Washington State Department of Agriculture
Specialty Crop Block Grant Program
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Final Performance Report

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PROJECT #1

Project Title: *Farm-to-School: Building New Markets for Specialty Crops in Schools*

Partner Organization: Washington State Department of Agriculture (WSDA) Farm-to-School Program

PROJECT SUMMARY

Farm-to-School: Building New Markets for Specialty Crops in Schools was designed to support connections and market opportunities between Washington specialty crop producers and Washington school and institutional meal providers. Market access is critical for fruit and vegetable producers, particularly for the majority of Washington farms that are small and medium scale producers seeking to sell their products– which has become challenging as many market outlets have become consolidated. Demand for fruits, vegetables and legumes have increased in schools and institutions as nutrition has been emphasized in school meal programs and local, seasonal foods and educational connections to the farms that grow them have been shown to increase student consumption of fruits and vegetables. This demand has increased even more over the duration of the grant period, as new federal nutrition standards for schools were released as a result of the 2011 Healthy Hunger-Free Kids Act, requiring increased servings of fruits and vegetables in school meals. While demand is high and interest to sell is great, there are key challenges for specialty crop producers to access this market and schools to access the local products they seek to purchase.

This grant project successfully sought to create more awareness about the market opportunity in Farm to School, address known challenges to succeeding in this market, and conduct surveys of producers, processors and buyers to better understand the farm to institutional marketplace going into the future. The project was based on the following key challenges and opportunities to better serve specialty crop producers in relation to school markets. These were identified through WSDA's work with growers and institutional buyers prior to the grant, and include:

- Informing specialty crop producers about market opportunity, requirements for selling to schools, and how to meet the requirements. Few farmers are aware of the purchasing procedures for schools and how they can develop these sales relationships. Topics for trainings include: networking with schools; local, state and federal policies affecting school food, food safety planning and Good Agricultural Practices, product liability insurance, distribution, food processing, and promotional materials.
- Informing school and institutional food buyers about opportunities and processes for purchasing Washington grown specialty crops. Purchases by these buyers are most commonly done through large food service distributors and government commodity programs. Trainings for food buyers include purchasing from farms or small distributors, seasonal produce availability, menu development, and fresh food handling.
- Basic food processing – School buyers often require fresh product to arrive in minimally processed forms due to labor, equipment or facility constraints. Many farmers have limited knowledge of or access to food processing facilities to provide schools products in the final form that they need, limiting farmer opportunity to sell product. Schools and farms will be surveyed to better understand their processing needs, and food processing companies will be surveyed for WSDA to gain a greater awareness of processing capacity, accessibility and resources needed to increase market connections.

PROJECT APPROACH

WSDA addressed the challenges and opportunities through these activities and tasks.

WSDA Farm-to-School Toolkit

In April, 2011, WSDA launched the Washington Grown Food Kit as the centerpiece to the WSDA Farm to School Toolkit website www.wafarmtoschool.org. This web-based farm to school toolkit for food service workers, farmers, school staff and community members is designed to provide resources to help people meet their farm to school goals. It has a section for each of the audiences with step-by-step guides to getting started with Farm to School, models for supply-chain logistics, information on food safety and liability, and information on education connections and funding opportunities. The toolkit has received 11,397 visits; 8,368 visitors; and 36,755 page views since the site launched in 2011.

The featured item of the toolkit is a Washington Grown Food Kit highlighting school meal recipes and nutrition facts specific to Washington grown specialty crops. Information in this section can be viewed and filtered in multiple ways, enabling searching by crops in season, recipes specific to each crop, and what a full menu would like with each crop being featured. The Washington Grown Food Kit component was modeled after the University of Minnesota Farm to School website. A back-end system administrative tool was included in the development of the website to make edits and additions to the toolkit quick and easy. The toolkit serves as a platform to share resources and deliverables for other Farm to School projects, including a recently-added Farm to School Start-up Kit and "A School's Guide to Purchasing Washington-Grown Food," a procurement primer on geographic preference.

Farmer and Food Service Trainings

WSDA created a mobile tour structure to provide an opportunity for farms and schools to see each other in action and learn about the realities of operations on farms and in school kitchens. Bus travel time allows for interaction among participants and encourages potential cooperation to develop supply chain solutions specific to their region. Participants start by visiting two farms that use diverse production methods to grow a variety of crops, and sharing an on-farm meal made with farm-fresh produce, and then travel to a local School District's central kitchen.

At the school district site, farmers and nutrition staff divide into two break-out groups: one for farmers, focused on market access and development; and the other for nutrition staff to attend a hands-on, peer-led cooking training and prepare 4-6 recipes that comply with USDA standards for school lunch menu planning and feature farm-fresh Washington-grown produce.

WSDA conducted four mobile tours throughout the state:

- Central WA – May 18, 2011
- Spokane – June 13, 2011
- Snohomish County – October 14, 2011
- Olympic Peninsula – October 19, 2011

This project proposed to conduct 3 farmer and 3 foodservice workshops to provide information on institutional markets and how to purchase and prepare Washington specialty crops. In addition to the 4 mobile tours that reached both of these groups, WSDA provided the workshops and presentations listed below.

Additional School Specific Trainings:

- *How to use the WSDA Farm-to-School Toolkit to incorporate WA specialty crops into school meal programs* – Washington School Nutrition Association (WSNA) Conference, Vancouver, WA. July 25th, 2011
- *Washington Grown foods for Taste Washington Day* – WSNA Conference, Vancouver, WA. July , 25, 2011
- *How to utilize WA grown specialty crops in the Fresh Fruit and Vegetable Program* – Fresh Fruit and Vegetable Training, Office of the Superintendent of Public Instruction, Wenatchee, WA. August 17th, 2011
- *How to utilize WA grown specialty crops in school meals and meet the nutrition guidelines for Healthier US Schools Challenge* (*HUSSC)* – HUSSC Training, Office of the Superintendent of Public Instruction, Everett, WA. September 21st, 2011

Additional Farm Specific Trainings:

- *Increasing Access Points for Local Products* – South Sound Farm-to-Table Trade Meeting, Olympia, WA. *April 11th, 2*011
- *Farm-to-Cafeteria: Overcoming Roadblocks, Expanding Opportunities* – Tilth Producers of Washington Annual Conference, Yakima, WA. Sept 13th, 2011
- *Your Farm Feeding Washington's Kids: How to Sell Your Products to Schools* – Washington Sustainable Food & Farming Network Fresh Food in Schools Summit, Olympia, WA. March 8th, 2012
- Outreach to Agricultural Education and WSU Extension Agents on Farm to School, WSU & WSDA Small Farms Team Annual Meetings, April 5th, 2010; March 29th, 2011; and Feb 28th, 2012.

Tradeshows:

- *Regional Bounty Row* – WSNA Conference, Vancouver, WA. August 25th, 2011 – 13 vendors participated
- *Farm to School Showcase* – WSNA Conference, Spokane, WA. July 31st, 2012 – 18 vendors participated

The Annual WSNA Conference includes a tradeshow of over 600 food vendors. WSDA, in partnership with EcoTrust and FoodHub of Oregon, worked to create a Farm to School focused area of the tradeshow to highlight Washington and regional specialty crops and products that are a good fit for school meals. Survey responses from showcase participants are included in the 'Goals and Outcomes Achieved' section below.

Food Safety and Good Agricultural Practices Trainings and Video

Good Agricultural Practices (GAPs) are a voluntary set of food-safety guidelines designed to help farmers handle food safety from the farm to the market. These practices include: developing a food safety plan for the farm; training farm employees about this plan and farm food safety practices; and documenting farm practices to reduce the risk of microbial food safety hazards on farm products.

Schools and other institutional buyers are increasingly asking questions about regulations, food safety and liability as they consider local sourcing of food products. Farmers, especially those operating smaller and diverse farms, have expressed anxiety about the complexity and expense of food safety certification. With this grant, WSDA provided outreach and education of food safety planning and GAPs to farms and agricultural educators.

WSDA conducted two on-farm trainings in partnership with the WSU Small Farms Team and Tilth Producers of Washington. Participants walked through the farms as host farmers discussed their food safety planning and GAP auditors shared assessment practices. Based on the walk through with the GAPs check list in hand, the groups discussed possible first steps to take and things to consider. Participants were able to view practices that are already in place, and start thinking of what practices make sense to integrate based on individual farms' practices. Events took place on July 26th, 2010 at the WSU Field Station in Puyallup, and on Oct 10, 2011 at Cedarville Farm in Bellingham.

WSDA created a video on Good Agricultural Practices to broaden the reach of GAPs training and information. The video features, farmers, auditors and food buyers addressing food safety and Good Agricultural Practice. The video has received 761 views, and is used by agricultural educations in workshops and classes on food safety. The video is featured on the WSDA Bridging the Gaps page, the WSDA Farm to School Toolkit, and the WSDA Youtube page, and has been used in trainings for WSDA GAP/GHP auditors as part of a current Specialty Crop Block Grant, *Bridging the GAPs*.

Surveys – Farms, schools, food processors

WSDA conducted statewide surveys of farms, schools and food processing companies to gather data on current Farm to School participation, capacity for future participation, and to identify WSDA resources and services that will be most useful to these groups for meeting their Farm to School goals. Specifically, surveys covered production and use of specialty crops, equipment and facilities, vendor requirements, and perceived challenges and benefits of Farm to School. Data from the farm and school surveys was used to evaluate this project

WSU/WSDA Small Farms Team Annual Meetings

Over the course of this grant, WSDA and the WSU Small Farms Team coordinated annual Small Farms Team Meetings of agricultrual educators throughout the state. At these meetings, the team worked together to plan, develop and implement training and outreach to small farms and minority and socially disadvantaged farmers on food safety, Good Agricultural Practices and Farm to School. This effort

created broader outreach on these topics, and resulted in partnership with WSU Small Farms Team on the GAPs farm walks and video projects.

GOALS AND OUTCOMES ACHIEVED

Growth in Farm to School during the duration of this grant period was significant. Grant activities included a great deal of outreach and education – informing constituents about Farm to School, seeking feedback from school and farm communities about resources needed, and responded to those needs through in-person trainings and web-accessible resources. This chart shows responses from WSDA 2012 school survey regarding when Farm to School activities in the school district began. The rate of schools beginning farm to school activities rose steadily from 2008 through 2011. In 2008, the Washington legislature passed the Local Farms – Healthy Kids Act, creating the Farm to School Program at WSDA and this SCBG was secured within the first year to complement the program goals. In 2011, funding was eliminated for the Farm to School Program. WSDA support of farm to school and other farm to institution markets continues on a limited basis with grant funds.

Expected Measurable Outcome: Increase the awareness and capacity of farmers and school food service mangers of the opportunities to sell/purchase local fruit and vegetables.

Target: 100 farmers will have increased awareness of the opportunity to sell to schools and knowledge of requirements and procedures to do so.

> 115 farmers attended Farm to School mobile tours and workshops with this grant (40 at mobile tours, 30 at Farm-to-Table Trade meeting, 30 at Tilth Conference, 15 at Fresh Food in Schools Summit). Note, some participants attended multiple trainings. Additionally, combined total of over 60 farmers attended the on-farm GAPs workshops.

Target: 100 school food service managers will have increased awareness and skills to buy local fruits and vegetables.

> 170 school food service managers and staff attended Farm to School mobile tours and workshops with this grant (60 at mobile tours, 50 at FFVP, 30 at HUSSC, 30 at WSNA). Note: some participants attended multiple trainings. The tradeshow events at the WSNA conferences had a reach of an average of 500 school food service managers and staff.

Increased awareness and capacity were measured through surveys of participants from events, which yielded positive response. The surveys were tailored for each mobile tour and some additional events. The statements below are some examples of survey results:

- One hundred percent of participants from the Spokane tour said their understanding of Farm to School programming improved or significantly improved.
- Eighty percent reported they 'feel confident they can implement what they learned' about how to prepare new recipes featuring WA grow food.
- From the Olympic Peninsula tour, 83% responded that the training improved understanding of how to sell to schools and institutions/buy from local farms, and 79% responded that they gained knowledge about food safety practices and 3rd party certifications.
- For the Farm to School Showcase at the WSNA Conference, 63% of participants report making between 6 – 10 significant new connections with school nutrition staff as a result of the Farm to School Showcase.
- When asked 'Would you like to see the Farm to School Showcase return to WSNA next year?' 100% of respondents responded: "Yes, absolutely." Below are quotes from participants:
    - "I loved learning what the school nutrition staff's needs were. The time spent at the Showcase was highly beneficial to gain insight on how we can meet those needs!" – Bella Terra Gardens
    - "It was fantastic to meet so many wonderful people interested in our locally-grown legumes. It was also great to learn about their [school nutrition staff's] concerns

regarding the new nutrition guidelines, so we can serve as a resource for them." – Davidson Commodities

Expected Measureable Outcome: Increase the number of specialty crop growers obtaining GAP certification, and therefore eligible to sell to more markets, including schools.

Target: Fifty new farms will be GAP/GHP certified by 2012.

A combined total of 60 farmers attended the on-farm GAPs workshops. The GAPs video project has received over 760 views, and is used by agricultural educators in workshops and trainings, broadening the reach of the content to wider specialty crop producer and food buyer audiences.

The WSDA 2012 Farmer survey conducted as part of this grant revealed the following information about food safety and Good Agricultural Practices on farms in Washington: The majority of farms who responded to the survey are implementing good agricultural practices, though only 13% have GAP certification. Forty-five percent receive questions about food safety, and many farms are communicating their practices to customers.

Good Agricultural Practices	# of farms	% of farms
I communicate my food safety practices to my customers	114	77%
I implement GAPs in my farm operation	88	61%
I receive questions about food safety safety from my customers	62	45%
I have attended a GAPs workshop/training	58	40%
I document the implementation of GAPs in my farm	39	29%
My farm is GAPs certified	16	13%

All of the above numbers shown from the 2012 survey are up from the 2011 WSDA farmer survey. In 2011, 7 respondents attended a training event, 24 implemented GAPs in their farm operation, and 6 were GAP certified.

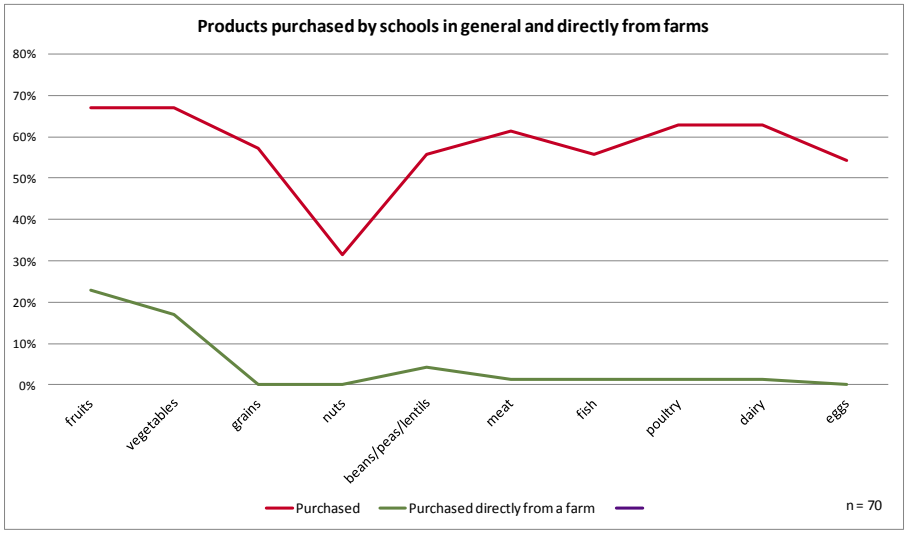
Expected Measurable Outcome: Increase the number of schools buying direct from specialty crop growers.

Target: Ten percent of school districts (30 districts) will be purchasing Washington grown fruits and vegetables by 2012

The 2011 WSDA school survey conducted showed that 49 districts were serving Washington grown foods and 35 districts purchased directly from farms. In the 2012 survey, 47 districts report buying Washington grown and 29 school districts purchasing Washington grown products directly from farms. While the numbers in 2012 are lower than 2011, the total number of responses to the survey was lower, though the percentage of respondents buying directly from farms was same 56%.

Additional related data from the 2012 survey:

- 93% of schools that have purchased directly from farms report that they would do it again.
- Of schools that report purchasing Washington grown foods, 62% responded that they purchase some or all directly from farms and 100% of them purchased some or all of that food through a distributor.
- 81% of schools that have not purchased directly from a farm report being 'somewhat' or 'very' interested in doing so.



This chart shows products schools purchase in general, and the products they purchase directly from farms. Specialty crops – fruits, vegetables and beans/peas/lentils – are the products schools most commonly purchase directly from farms.

BENEFICIARIES

Beneficiaries of this project include Washington specialty crop producers and school nutrition staff through increasing their knowledge about farm to school, making connections and ultimately increasing sales. Students in Washington schools are getting access to more fresh, Washington grown foods and learning about where their food comes from.

In the 2012 surveys, farms and schools identified the following benefits of farm to school:

Farms most commonly identified the benefits of selling to schools to be:

- Positively impacting children's health and nutrition
- Raising public awareness about food and farming
- Strengthening community relationships.

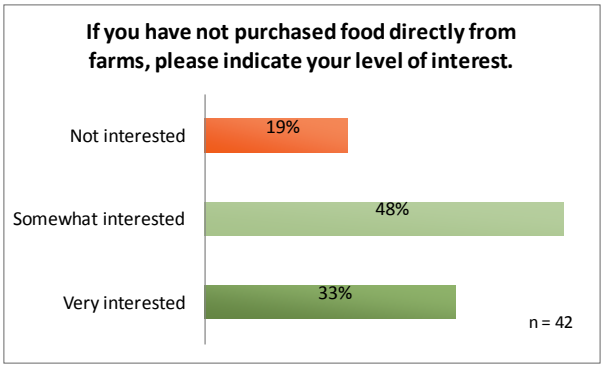
Schools most commonly identified the benefits of engaging in Farm to School to be:

- School meal programs supporting the local economy
- Schools buying locally results in good community relations
- High quality fresh product.

Producers and school food buyers gained significant knowledge about farm to school opportunities and logistics from grant programming. Farmers and schools received direct introductions with one another and began establishing the foundation for sales relationships. Going forward, farms and schools want to continue to grow their connections and sales opportunities. In the 2012 WSDA farm survey, 70% of farms 'would consider' or 'are interested' in growing crops specifically to meet school needs. Of the 22 farms that have sold to schools in the past year, 91% are interested in working with schools to grow specific crops to meet school needs.

Ninety percent of farms who have sold to schools report selling less than $5,000 worth of products. Sales per farm farm ranged from under $500 to over $1,500,000. Interest to sell to schools is high.

Sales to schools	# of farms	% of farms
$1 - $499	8	42%
$500 - $1,499	6	32%
$1,500 - $4,999	3	16%
$5,000 - $24,999	1	5%
$25,000 - $99,999	0	0
$100,000 - $1,499,999	0	0
$1,500,000 or more	1	5%



The majority of schools rate the experience of purchasing directly from farms to be positive or 'very positive'. Of schools that have not purchased directly from farms 81% of them are interested in doing so.

LESSONS LEARNED

This project benefitted from having numerous training, tradeshow and outreach events in which WSDA had repeated face time with school districts and farms. This enabled more constant educational and course correction opportunities for WSDA project staff and for farms and schools working through farm to school logistics. Farm to School is an emerging and growing market; it will be critical to continue these communication and educational opportunities.

An additional key lesson learned from completing this project is to be mindful of audience schedules for timing training events and surveys. For scheduling training events, and for the surveys in particular, participation rates would have been higher had the surveys occurred at a different time of year. Conducting farmer surveys in the early winter and school surveys in the early spring would likely gain higher response rates than other times of year.

Food Safety

The expected measurable outcome of 50 new farms being GAP certified was not achieved. Of the over 70 farms that attended on-farm trainings and additional 100 farms that participated in either mobile tours or workshops between 2010 and 2012, only 3 farms were certified by 2012. Farmers shared with WSDA that the certification process – including the planning time, integrating practices onto the farm, documentation, and audit - took between 6 months and two years to prepare for. Additionally, many farms expressed concern about food safety and a desire to integrate the best practices, but many were not interested in certification.

Interest in GAPs and food safety education is high. 64% of survey respondents indicated interest in attending an on-farm GAPs training event. 36% considers hosting a training event at their farm and want more information. Additionally, when asked what information or events farms see as critical to supporting their farm to school goals and selling to other markets, 42% of respondents said GAPs and 35% said general food safety.

Feedback from farmers throughout the grant period informed a follow-up WSDA Specialty Crop Block Grant focusing specifically on Good Agricultural Practices for small and medium size farms with diversified crops. This grant project, *Bridging the GAPs*, is featured in the GAPs video piece developed for this grant.

Food processing

The survey of food processing companies was the first of its kind to be conducted throughout the state, and within the national farm to school effort. For this survey, the 1300 WSDA-licensed food processing companies that utilize specialty crops in their processing were encouraged to participate. The survey was disseminated via email to all WSDA licensed food processors that utilize specialty crops, and partners

distributed the survey through their networks. (Partner organizations included: Northwest Food Processors Association, WSU Small Farms Team, and Tilth Producers of Washington). Responses from 373 companies were received, representing a range of scale, processing type, and geographic location. The data points below indicate that there is opportunity to focus future efforts toward assisting processors in working directly with producers and selling products to schools.

- Three of the top five specialty crops used by food processors are also the top minimally processed fruits and vegetable used by schools in 2011.
- 35% of processor operations reported fit within the USDA definition of 'minimal processing'. This is relevant because when schools purchase foods for school meal and snack programs, they may apply a geographic preference only to whole and minimally processed foods.
- Eighty-four percent of processors have interest to increase sourcing Washington products directly from producers. Trainings and resources on sourcing directly from Washington growers is one of the most commonly desired resources among food processors.
- 17% of processors indicated interest in resources on selling to schools.

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ADDITIONAL INFORMATION

In-kind matching donations for this project totaled $72,623. In-kind funds from WSDA came from time contributed to the grant by WSDA employees, valuing $43,623. Time included project supervision, advisement in retreat and project planning (farmer and school surveys, food processing research and surveys, GAPs video project), and participation in related events. Additional in-kind matching donations were provided by the University of Minnesota Farm to School program for the web structure and code for the on-line toolkit, valued at $25,000 and from Washington State University Extension support and review of the GAPs video project, valued at $4,000.

PROJECT #2

Project Title: *Apple Integrated Pest Management (IPM) Transition Project*

Partner Organization: Washington State University

PROJECT SUMMARY

The importance of this project lies in the value of apple production to Washington's economy. Apple accounts for approximately 70% of the Washington tree fruit industry, which contributes annually over $6 billion to the state's economy. For Washington's tree fruit growers to remain competitive in the global marketplace, they must produce high quality, pest-free fruit. To meet requirements imposed by domestic and international regulatory actions, apple growers must successfully implement new integrated pest management (IPM) technologies.

The timely nature of this project is due to regulatory actions on insecticides used in apple resulting in the elimination of several products. Since 1996 the U.S. Environmental Protection Agency (EPA) has significantly restricted use of organophosphate (OP) insecticides, the primary pest control technology used in tree fruit production. In 2007, the EPA acted to implement a complete phase-out of azinphosmethyl (AZM, Guthion) by 2012. This insecticide has been the OP most used to control codling moth, which is the most important pest of apple in Washington. In addition, many overseas markets are imposing similar, or even more stringent, regulatory restrictions on commonly used pesticides, including AZM.

WSU research had shown that employing a range of reduced-risk OP-alternative insecticides in an IPM program could protect crops as effectively as older, OP-based, programs. The need for this project lies in the fact that there were a number of significant barriers to the adoption of OP-alternative technologies. The OP-alternatives have lower efficacy, require more precise timing and better spray coverage, have different modes of activity requiring different use patterns, and are more expensive than products they are intended to replace. For Washington apple growers to adopt and manage new OP-alternative technologies, a systematic, extensive, and ongoing education and outreach effort was required.

The Apple IPM Transition Project (AIPMTP) addresses the critical challenges imposed by increased regulatory action restricting or eliminating old pest control technologies by enhancing adoption of new technologies via an industry-wide implementation of biologically intensive IPM. While the AIPMTP was not previously funded by the SCBGP, an earlier project, the Pest Management Transition Project (PMTP), had received funding from the Washington legislature based on the full support of the Washington tree fruit industry. A final report of the PMTP project can be found at http://pmtp.wsu.edu/. The AIPMTP project built upon the foundation of educational materials and framework for delivering new IPM knowledge to growers and consultants developed in the PMTP. AIPMTP used baseline information generated by the PMTP to demonstrate changes in IPM practices over time. The AIPMTP built on the established working relationships with the farm worker community to enhance their understanding and support of IPM transitions occurring in the Washington tree fruit industry.

The goals of the AIPMTP were to:

- accelerate the adoption of new IPM technologies through educational programs and communication of research-based knowledge,
- improve real-time pest management decision-making through increased use of the web-based WSU Decision Aid System, and
- document changes in practices, attitudes, and perceptions of growers, IPM consultants, and farm workers.

PROJECT APPROACH

Accelerate the adoption of new IPM technologies through educational programs and communication of research-based knowledge

The AIPMTP delivered new knowledge to the apple industry through Implementation Units, a web site, newsletters, traditional meetings, publications, and the WSU Decision Aid System.

Implementation Units. Implementation Units are groups of growers and consultants who desired to meet together to improve their understanding of how to use new OP-alternative technologies in their apple IPM programs. These groups were small in size, 6 to 25 members, distributed throughout the state, and were comprised of industry leaders and early adopters.

Implementation Unit meeting in Quincy, WA.

In 2010 WSU met with two new IUs and held several meetings with other IUs during the growing season. It was obvious that the existing IUs had a good understanding of the transition from AZM to new reduced risk technologies associated with control of the codling moth. However, there remained questions on how to deal with secondary pests, especially the woolly apple aphid and in 2010 the rosy apple aphid.

Website. The AIPMTP website is a primary means of delivering information on current issues to clientele as well as preserving archives of historical information. The website developed under the previous project was redesigned and reorganized to improve visitor satisfaction and accessibility. The navigation structure was streamlined to make it easier to find desired content. On the Home page 'Special Interest' links were reduced and reclassified by type: News & Events, Industry Links and IPM Resources for quicker access. New features added to all pages were 'Share' links, which allowed visitors the ability to print, email or to share page content on social media websites such as Facebook and Twitter. An easier 'subscribe' method was included allowing people to be added directly to an automated mailing list to receive newsletters and meeting/event notices. Other additions to the site include publication of all progress reports and all surveys as soon as they are completed. These reports are also made available for downloading as PDFs from the related web page.

Analysis of the site visitor log showed that the most popular pages were the newsletter pages (current and archived issues) to view or download issues (32%), the fruit school page to watch videos (14%), the handbook page to download it by section or in its entirety (10%) and the tours and events page to watch slideshows or download event packets or flyers (8%). Most visitors viewing the site did so by way of: referring links on other sites including industry link pages, DAS, Twitter and Facebook (33%); bookmarks (30%), indicating a desire for repeat viewing; a keyword search (24%); or by using the link contained in the subscriber email notice (12%). Overall, site visits peaked when new newsletters or events were announced via emails, Twitter and Facebook, but a steady stream of visitors found the site via search engines and referring industry links.

AIPMTP Handbook. The handbook developed during the previous project was updated and reprinted for use in the AIPMTP educational activities in 2010. References to the old codling moth degree-day model were updated to reflect the model used in the WSU Decision Aid System (DAS). In addition, a thorough explanation of how degree-day models are used in orchard IPM and how they are used in conjunction with DAS was added. Other changes to the handbook include an expanded pest monitoring section, an expanded secondary pest discussion, an updated web references section, and the addition of a natural enemies pictorial guide to the appendices. The updates include some changes in insecticide use recommendations and new information on the impacts of insecticides on natural enemies. A completely updated version of the AIPMTP Handbook is available as a pdf on the projects web site - http://pmtp.wsu.edu/handbook.html.

Translation of the AIPMTP Handbook from English to Spanish was completed, published, and disseminated. This tool serves as a great aid to the Spanish-speaking growers in Washington who are very interested in transitioning their IPM programs to new and safer technologies. An example of a page of the Spanish Language Handbook is shown to the right. As with the English version of the handbook, the Spanish version is available as a pdf download from the project website.

Proyecto sobre la Transición del Manejo de Plagas en Manzano

Ovicidas – matan huevecillos

Ovicidas ~ ¿Cómo funcionan?

Huevecillo

Hoja

Los huevecillos de la palomilla son depositados en la superficie superior de las hojas cerca del los racimos de fruta y en la fruta.

Hay dos maneras de afectar los huevecillos antes de que nazcan:

1. Aplicar el producto antes que los huevecillos sean depositados (residualmente) Ó
2. Aplicar el producto sobre los huevecillos (tópicamente)

Huevecillo

Hoja

Tópico

El aceite funciona como un ovicida cuando se aplica sobre los huevecillos.*

Residuo

Esteem, Intrepid, Rimon, y *Altacor* funcionan como ovicida cuando los huevecillos son depositados sobre el residuo.

Example of a page from the AIPMTP Handbook translated into Spanish.

Educational Newsletters. Five issues of the project newsletter were produced and disseminated. All newsletters can be viewed online on the project website, where they can also be downloaded for printing (http://pmtp.wsu.edu/newsletters.html). Back issues of the newsletter are available to view or download from an archive index page. There are nearly 400 subscribers receiving the newsletter either electronically or by post. A new automated newsletter subscription link was added to the website allowing people to join the electronic mailing list. With the automated electronic subscription WSU can tell not only who receives the newsletter, but also who actually views it online or downloads the pdf version and who forwards the newsletter announcement to others.

Specialized Farm Worker training. IPM presentations were made at two WSU-sponsored pesticide re-certification classes (Pasco and Wenatchee) as well as at the Washington Tilth Organic Producers Association conference, the Washington State Horticultural Association conference, and the GS Long annual meetings to a total of 788 Spanish-speaking pesticide applicators and supervisors (with some growers, managers, and consultants in the mix). During these sessions, questions were asked using the Turning Point audience response system to survey participants on their knowledge of the pesticide transition and pesticide health and safety. Summary results from these surveys are presented under the section on documentation.

Final results of the specialized farm worker training surveying participants on their knowledge of the pesticide transition and pesticide health and safety during winter 2009-2010 are posted on our website (http://pmtp.wsu.edu/TPsurvey2010_Sum.html) alongside comparative results from 2008-2009. Results showed that the pest management transition is underway in apple orchards, as IPM tactics and alternative insecticides are becoming more widely available, understood, and used by pest applicators and supervisors as well as growers and consultants.

A pesticide safety poster was designed to help farm workers better understand the differences in human toxicity between organophosphate insecticides and newer alternative insecticides was created, presented, and distributed to 60 farm worker health outreach workers at the Washington Association of Community and Migrant Health Center spring outreach training in April. Participants caught on very quickly as to how to read the poster and how they could use it in their outreach to farm workers. Fifteen of these outreach personnel also agreed to be contacted later in the summer to provide feedback on how useful the poster was (or was not) for communicating health and safety information to migrant and seasonal farm workers during the 2010 season. The poster was also distributed to growers and managers for display at orchard workplaces, and is posted online for easy downloading (http://pmtp.wsu.edu/Ref_tools.html). Finally, the poster was presented and distributed to farm workers at health fairs at worker housing camps in Monitor and Malaga through the playing of a pesticide safety roulette game designed to teach participants how to read and interpret the poster. These health fairs were sponsored by the Washington Association of Community and Migrant Health Centers, Columbia Valley Community Health, and AIPMTP, and attended by about 425 people total (275 in Monitor, 150 in Malaga).

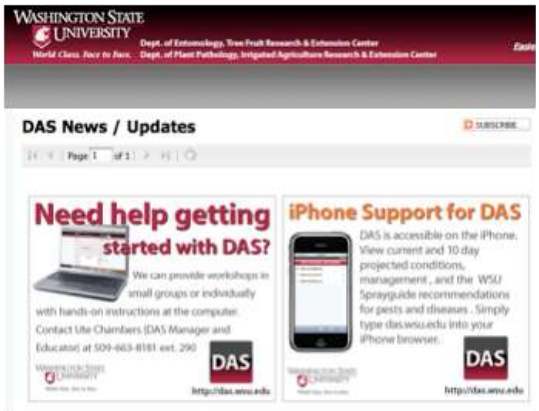
Pesticide safety poster showing relative risk of different insecticides commonly used in apple orchards.

AIPMTP also participated this quarter in a research review of the University of Washington's Pacific Northwest Agricultural Safety and Health Center to identify research priorities in worker health and safety for the coming years.

Presentations on AIPMTP were given at the Department of Pesticide Safety Registration tour in Prosser in July and the Washington State Association of Public Health professionals conference in Yakima in October. In addition, the pesticide safety poster was presented and distributed to farm workers and community

Organizers of Health Fairs in Monitor and Malaga, WA, 2010.

members at the Quincy Community Health Clinic back-to-school health fair in August.



Improved real-time pest management decision-making through increased use of the web-based WSU Decision Aid System

WSU Decision Aid System. Dr. Ute Chambers served as Manager of the WSU-DAS in 2010. She worked with the AIPMTP team to integrate educational and outreach activities of WSU-DAS where her background in IPM research and implementation was very valuable. She participated in the Implementation Unit meetings to review the new features of WSU-DAS and interacted with consultants and growers on their needs for IPM education.

The online video tutorials and online DAS Manual were completed and implemented in the WSU-DAS Help Center. Both help features assist old and new users in accessing and using the system to its capacity. The WUS DAS monitoring system shows that the video tutorials have been viewed frequently (393 times in total). The most viewed tutorials are "Set Up a New Weather Station" (121 times) and "View Model Options" (82 times).

The re-designed front page of DAS now highlights seasonal-specific issues growers need to be concerned with. These stories are regularly updated and cover a wide range of information from insect control tactics to spray drift to bee pollination. Many of these posts are based on work done in the AIPMTP and include links to the AIPMTP homepage and newsletters, as well as other IPM related websites of WSU. To date, 36 stories have been posted on the DAS front page. The number of views per story ranges from 21 to 295 (total 3319). The most read stories are "DAS is now on the iPhone" (295 views), "DAS workshops" (246 views), "New codling moth degree-day/development table" (218 views), and "Leafroller and codling moth movement during the season" (210 views). The first two stories have been published the longest.

DAS front page showing examples of seasonal-specific issues of interest to growers.

An online survey of 2010 registered users was conducted. The results of this survey have been compiled and are presented in the documentation section.

An **iPhone compatible web format of WSU-DAS** was launched in February 2010, which allows users to access DAS from anywhere in cell phone reception range. Users can view current and projected pest conditions and management recommendations as well as the Mini WSU Spray Guide.

All pest conditions and management recommendations on WSU-DAS have been translated into Spanish. Various options are being considered how to translate everything else on the website, including links, buttons, table headings, etc. Google Translate is being tested as one of the options. The Spanish WSU-DAS was opened up in May 2010 for our beta-testing group, which includes several native speakers, to evaluate the Spanish language part of the system.

DAS has been reformatted to optimize it for search engines, i.e. to make certain pages and the RSS feed more search engine friendly. As a result, Google has been indexing far more information in the last two weeks than in the past (number of pages crawled per day). Over time, this improves search engine placement and will make the WSU-DAS website more easily available to the average web user. Additionally, all video tutorials for DAS have been published on YouTube.com to increase DAS' Internet visibility.

WSU are in the process of planning and designing new filters for the DAS pesticide database (WSU Spray Guide). These filters will allow users to search for pesticides that specifically have a low or no negative impact on certain natural enemies with the goal to enhance biological control. Also, the new filters will assist users with resistance management by enabling the user to search for pesticides with a resistance class (mode of action) that is different from previously applied products.

Outreach. During the winter 2009/2010, talks on the WSU-Decision Aid System were presented at six industry sponsored grower meetings (North Central Washington Apple Day, Wenatchee; North Central Washington Stone Fruit Day, Wenatchee; Okanogan County Horticulture Society Meeting, Okanogan; Northwest Wholesale, Brewster; Chelan Fruit Growers Day, Okanogan; and Wilbur Ellis, Tonasket), as well as at the GRAS2P Orchard Sustainability Workshop, the Western Orchard Pest and Disease Management Conference (Portland, OR), the WSU Pesticide Education Program (Wenatchee), and the International Cherry Growers Tour (Wenatchee). In addition, updates on the Decision Aid System were presented at three Spanish language pesticide recertification classes (Wilbur Ellis, GS Long, and WSU Chelan County Extension), as well as through poster presentations at the Washington State Horticultural Association conference in Wenatchee and the annual meeting of the Pacific Branch Entomological Society of America in Boise, ID. Also, updates on DAS were featured in the March 2010 issue of the magazine Good Fruit Grower.

A mailing campaign (emails as well as postcards) was launched in January 2010 to AIPMTP IU members to advertise DAS training workshops this season. Additionally, DAS training workshops are continuously advertised on the DAS home page. Between February and June 2010, 12 workshops (20 hours in total) were held on request in small groups (3-9 people) or individually. A total of 51 participants were walked step-by-step through all features available on DAS. All participants could experience DAS hands-on for themselves at their own laptops or with notebooks provided from the DAS-AIPMTP mobile computer lab. Two workshops were held for Hispanic growers, who had not used the system before, demonstrating the features of DAS, including the Spanish web sites. Further mailing campaigns are planned in January 2011.

Workshop participants were asked to fill out an evaluation questionnaire at the end of each workshop to assess if the participants increased their knowledge on how to use DAS and where the training sessions can be improved. The overall assessment of the workshops was very positive, and all participants learned new ways to use DAS for their operation. Several suggestions were offered on how to improve future training. The workshops also gave valuable insight in how people use DAS, what features they use and do not use. For example, the filter options in the WSU spray guide and the historic weather data center have not been widely used. Such observations allow us to tailor our educational efforts more effectively and to improve the DAS interface to be more intuitive and self-explanatory.

Document changes in practices, attitudes, and perceptions of growers, IPM consultants, and farm workers

Implementation Unit Survey. At the beginning of this project, in the fall of 2009, WSU used the Turning Point audience response system to assess learning and knowledge of alternative insecticides and IPM practices, and to gather feedback to improve Implementation Units for 2010. Evaluation results showed that most participants in Implementation Units were grower/managers (62%) or warehouse fieldmen (23%), 85% of whom made or contributed to apple pest management decisions. Fifty-two percent used or recommended AZM, a much lower percentage than the industry-wide 93% of consultants

and 80% of growers who used or recommended AZM in 2007 and 2008, respectively. Among Implementation Unit members, 81% used or recommended alternatives to AZM, especially Delegate (81%), Assail (71%), Altacor (67%), and Intrepid (65%), and 85% used or recommended codling moth mating disruption, again both values higher than industry-wide percentages.

Most Implementation Unit members (79%) reported that codling moth did not cause unacceptable damage in their apple orchards in 2009. Some expressed concern about leafroller (37%) and woolly apple aphid (27%). Most (65%) had used the WSU Decision Aid System (DAS) in 2009 to help time IPM activities, and 89% indicated an interest in learning more about DAS. Of those interested in learning, 48% preferred instruction in small group hands-on workshops, 21% preferred using video tutorials and the DAS manual online, and 17% preferred individual lessons with WSU Extension educators. These results showed us that Implementation Unit members had experienced success in transitioning their IPM programs to use of OP-alternatives and provided guidance on educational needs for Implementation Unit meetings for 2010, especially DAS education opportunities. For more results see the AIPMTP web site (http://pmtp.wsu.edu/survey_IUres1.html).

Apple Consultant Survey. The AIPMTP conducted a consultant survey in January of 2010. With the completion of this survey it is now possible to compare consultants' insecticide recommendations, knowledge of IPM tactics, and thoughts about the AZM phase-out with results from a similar survey conducted in 2007 to see how these recommendations, tactics, and thoughts have changed during the course of the AZM phase-out. While some of results remained the same between 2007 and 2009, other aspects changed. Highlights of these changes are as follows:

In 2009, consultants perceived less damage from insect pests in apple orchards overall. Eighty-one percent (81%) felt that codling moth had caused unacceptable crop damage, down from 98% in 2007. Similarly, 47% felt that wooly apple aphid had caused damage compared to 70% in 2007, and 26% felt that spider mites had caused damage compared to 55% in 2007.

In 2009, 18% of consultants felt that codling moth caused unacceptable damage every year, down from 67% of consultants in 2007. In 2009, fewer consultants (15%) felt codling moth injury had increased over the previous three years compared to 2007 (40%), and more consultants (68%) felt that injury had remained steady compared to 2007 (48%). Thus, the concern of strong and rising codling moth damage seemed to have decreased over this two year period.

Organophosphate (OP) recommendations for codling moth decreased between 2007 and 2009. In 2009, 83% of consultants recommended AZM to control codling moth, down from 93% in 2007. And 74% stated in 2009 that their recommendations of OP insecticides for codling moth had decreased over the past three years, up from 35% in 2007.

In 2009, consultants also perceived less leafroller damage, with 16% saying they found acceptable damage 2 out of every 5 years or more, down from 69% in 2007. Accordingly, fewer consultants recommended Lorsban in 2009 (61%) than in 2007 (80%), and a higher percentage did not recommend any OP insecticides for leafroller in 2009 (25%) as compared to 2007 (13%).

In 2009, more consultants (69%) knew that 2012 would be the last year AZM could be used, up from 55% in 2007, and more answered correctly that the phase-out schedule would limit the total amount of AZM that could be used by a grower each year (52%, up from 32% in 2007). Thus, knowledge of the AZM phase-out had increased over time.

In 2009, more consultants felt that there were effective alternatives to AZM (mean score rose by 0.25 on a 1-5 scale), and that the phase-out would protect the health of agricultural workers (mean score rose 0.35) and the environment (mean score rose by 0.3). More consultants also felt that growers would bear the

burden of the AZM phase-out (mean score rose by 0.76), and that the cost and control of leafrollers would be more difficult after the phase-out (mean scores rose by 0.38 and 0.43). Fewer consultants felt in 2009 that control of codling moth would be more difficult (mean score dropped by 0.27) or that tree fruit production would be riskier for growers (mean score dropped by 0.41) after the AZM phase-out.

In 2009, slightly fewer consultants (62%) were interested in additional training on how to use AZM alternatives to manage pests than in 2007 (75%). This might be in part because more had already received training through AIPMTP and other venues.

Overall, it seems as though consultants in 2009 were more knowledgeable about and felt more in control of pest management in a world without (or soon to be without) AZM, and fears of codling moth damage increasing because of the phase-out had declined. Some of these differences between 2007 and 2009 data could be due to a larger sample size used in 2009 (120 of 200 surveys completed in 2009, compared to 40 of 73 in 2007), or perhaps to a greater representation of consultants working in the southern tree fruit regions (15% increase in representation from Yakima and the Tri-Cities in 2009) than in the north (16% decrease in representation from Wenatchee in 2009), but mostly they are likely to be due to consultants' increased experience working with AZM alternatives and with the success of AIPMTP efforts to provide resources for transitioning away from AZM (45% of consultants in 2009 had participated in an AIPMTP Implementation Unit, and 87% knew about the AIPMTP). These results demonstrate significant benefit from AIPMTP outreach to consultants over the past several years.

Farm Worker Survey. Results from the farm worker surveys indicate that most respondents (71%) have worked with AZM and know that it was being phased out (82%). Most have worked with pheromones (77%), know well or somewhat well how to manage crop production without AZM (69%), and know well or somewhat well what IPM is (68%). These results are similar to data gathered in 2008-09. In 2009-10, however, knowledge of the timing of the AZM phase-out was 33% higher than it had been in 2008-09, and the number of respondents who had worked with the OP-alternative insecticides Altacor, Calypso, and Delegate increased by 68%, 38%, and 23%, respectively. Pesticide safety data were fairly consistent between 2008-09 and 2009-10, and indicated that most respondents were aware of important safety measures for working with pesticides, such as personal protective equipment, re-entry intervals, and pesticide label information. In general, results showed that the pest management transition is underway in apple orchards, as IPM tactics and OP-alternative insecticides are becoming more widely available, understood, and used. There is, as always, room for participants to learn more about how to use IPM strategies to manage crops without AZM, and an ever-present need for reinforcement of safety knowledge and standards as the kinds of insecticides used change over time. Results of the 2008-09 and 2009-10 surveys are posted on our website (http://pmtp.wsu.edu/TPsurvey_res1.html).

DAS User Survey 2010. A survey of WSU DAS users was conducted in 2010. A summary of some results are presented below. More details are available in the section *Additional Information*.

- Participants: 154 participants answered the voluntary user survey, 34.4% of active users. 40.3% of the survey participants started using DAS within the last 2 years.
- User occupation: The majority of the survey participants are growers/orchardists (60.8%), 37.9% are orchard managers, 20.2% work as Ag Chem distributor consultants, 16.3% are Packinghouse/ Company fieldmen, 13.7% work in research and/or extension, 9.8% work as private crop consultants, and 9.1% have other occupations.
- How easy is DAS to use: Most users rated the use of various features of DAS as easy or very easy. The average rating on a scale from 1 (= very easy) to 5 (= impossible without help) for first time registration, setting up a user profile, editing the user profile, viewing model results, viewing model charts was 1.8, 1.9, 1.9, 1.6, 1.7, respectively.

- Impact of DAS: The majority of survey participants (56.0%) indicated an increase in the level of pest control due to the use of DAS; 29.0% saw no change and 7.0% reported a decrease in pest control level (8.0% answered "not applicable").
- WSU also asked how the user's operation would be affected if DAS was discontinued next year. The majority of survey participants indicated that the discontinuation of DAS would have major or modest impacts on the user's number of sprays (21.4% "major", 49.0% "modest", 29.6% "no impact").
- DAS support: Almost half of the survey participants (45.6%) have requested any kind of support from the DAS team and rated the responsiveness, helpfulness, and friendliness good or excellent (100%, 95.2%, and 100%, respectively).
- Models used in DAS: The most used models on DAS are codling moth (93.0%), fireblight (79.7%), western cherry fruit fly (65.0%), oblique-banded leafroller (63.6%), cherry powdery mildew (58.7%), and Pandemis leafroller (54.5%). For 62.2% of the survey participants, the codling moth model was the most important model, while for 21.5% fireblight and for 5.2% western cherry fruit fly is the most important model.

GOALS AND OUTCOMES ACHIEVED

The primary goal of the AIPMTP was to accelerate the adoption of OP-alternative insecticides by 20% while reducing the recommendation of OP insecticides by 20%. Based on the various survey results, these targets were met. The Experiences shared by IU participants and others in the apple industry indicate that the transition has been achieved without major disruptions of pest control programs. IU participants indicated that after two years of participation in the PMTP, a predecessor project to AIPMTP, that the use or recommendation of AZM (59%) was lower than that reflected in the consultant survey (67%). Eighty-four percent (84%) of IU participants either used or recommended the use of OP-alternatives for codling moth control and 65% used pheromone mating disruption. Funding of the AIPMTP allowed WSU to continue working with the IU participants after the funding for the PMTP had ended, therefore results shared above are attributable to this project and reported on the AIPMTP web site (http://pmtp.wsu.edu/survey_Cres1.html).

Surveys for consultants showed changes from 2007 to 2009, which represents a growing season prior to and one two years after the PMTP had been functioning (see Apple Consultant Survey). Highlights of changes between 2007 and 2009 include: a 31% drop in the concerns over unacceptable crop damage by codling moth, a 23% drop in concerns about woolly apple aphid, a 29% drop in concern about spider mites, a 10% reduction in recommendations to use AZM, a 39% decrease in the recommendations of OP insecticides, a 29% reduction in the recommendation to use Lorsban for leafroller control and a 14% increase in the number of consultants that knew the last year AZM could be used (Table 1). Without the AIPMTP the 2009 consultant survey could not have been conducted so results of this activity are attributable to it.

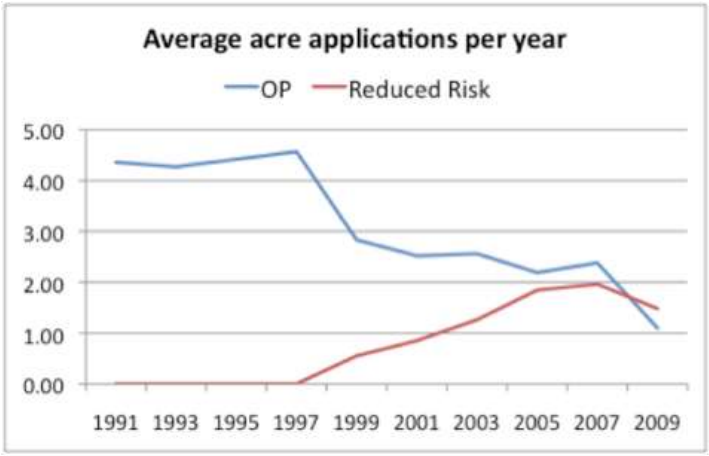
Table 1. Percent consultants responding to statements about pest control recommendations, 2007 vs 2009.

Statement	2007 survey results	2009 survey results
Codling moth caused unacceptable crop damage	98%	67%
Woolly apple aphid caused unacceptable crop damage	70%	47%
Spider mites caused unacceptable crop damage	55%	26%
Recommended use of AZM	93%	83%
Recommendations of OP insecticides had decreased	35%	74%
Recommended use of Lorsban for leafroller control	80%	61%
Knew that the last year of AZM use was 2012	55%	69%

The 2008 apple grower survey served as a baseline for the grower survey that will take place under the continuation of the AIPMTP through approval of an addition year of SCBGP funding, (FY11). By comparing the 2008 to the 2010 grower survey, WSU will be able to document the contribution of the SCBGP funded programs in changing practices and attitudes.

The National Agricultural Statistics Service (NASS) Pesticide Use Survey has been conducted on odd numbered years from 1991 through 2009 and provides a clear picture of changes in pesticide use over time. The figure to the right shows changes in acre applications (percent acres treated time the average number of applications) of OP insecticides and reduced risk (OP-alternative) insecticides from 1991 through 2009. The decline in the acre applications for OPs in 1999 was due to regulatory action against these products and to the adoption of pheromone mating disruption for codling moth by the apple growers of Washington. The decline in acre applications of OP insecticides in 2009 compared to 2007, 55% representing a decline of over 270,000 pounds of OP insecticide, must in large part be attributed to the apple industry adopting reduced risk (OP-alternative) insecticides as mediated by efforts of the AIPMTP. The concurrent reduction in the acre applications of reduced risk (OP-alternative) insecticides in 2009 compared to 2007 suggests that apple growers were becoming more confident and were getting good results with these products.

When comparing the apple grower survey with NASS survey data there are some interesting observations. The 2007 NASS survey indicated 66% of acres used AZM while our 2008 apple grower survey indicated that 80% (of growers) used AZM at least one time. The average number of applications of AZM in our 2008 apple grower survey was 2.4, which is the same as the 2007 NASS survey (2.4), but higher than the 2009 NASS survey of 1.7 applications. Our apple grower survey identifies many more facets of pesticide use than the NASS surveys. For instance, 50% of apple growers in our 2008 survey indicated that they had decreased use of OP insecticides for codling moth in the previous three years while only six percent (6%) said that they had increased OP insecticides use during the same period. Interestingly nine percent (9%) said that they used no OP insecticides for codling moth control during the previous three years. Sixty-five percent (65%) of Washington apple growers indicated that they used pheromone mating disruption for codling moth control. However, the NASS survey does not pick the use of pheromones because they do not ask a question that growers recognize as being products used for mating disruption.



Acre applications of OP and reduced risk (OP-alternatives) based on NASS Pesticide Use Survey data from 1991-2009.

The second outcome of the project was to increase the use of the WSU Decision Aid System (DAS) by 20%. In reality, the number of users has almost doubled (451 active uses compared to 247 in 2008) as a result of the outreach activities and value of the decision support system. The contribution of the AIPMTP to enhancing and upgrading aspects of the WSU DAS in 2010 provided an easier platform for growers and consultants to use in setting up their personal accounts, learning about the features of DAS, and in accessing information.

The third outcome of the project was to affect a 20% increase in farm-worker knowledge of IPM and reduced-risk insecticides. Results are mixed with certain knowledge remaining similar to the baseline data, while other knowledge grew beyond the 20% target.

Most respondents (71%) have worked with AZM and knew that it was being phased out (82%). Most have worked with pheromones (77%), know well or somewhat well how to manage crop production without AZM (69%), and know well or somewhat well what IPM is (68%). These results are similar to data gathered in 2008-09.

However, knowledge of the timing of the AZM phase-out was 33% higher than it had been in 2008-09, and the number of respondents who had worked with the OP-alternative insecticides Altacor, Calypso, and Delegate increased by 68%, 38%, and 23%, respectively. Pesticide safety data were fairly consistent between 2008-09 and 2009-10, and indicated that most respondents were aware of important safety measures for working with pesticides, such as personal protective equipment, re-entry intervals, and pesticide label information. In general, results showed that the pest management transition is underway in apple orchards, as IPM tactics and OP-alternative insecticides are becoming more widely available, understood, and used. There is, as always, room for participants to learn more about how to use IPM strategies to manage crops without AZM, and an ever-present need for reinforcement of safety knowledge and standards as the kinds of insecticides used change over time. Results of the 2008-09 and 2009-10 surveys are posted on our website (http://pmtp.wsu.edu/TPsurvey_res1.html).

BENEFICIARIES

While this project is not considered truly complete, since one more year of funding has been awarded by the Specialty Crop Block Grant Program, WSU can identify groups and organizations that have benefited as a result of the AIPMTP activity to date.

The primary beneficiaries of the AIPMTP project have been the apple growers and orchard managers of Washington and the consultants that provide IPM advice to them. These groups were the ones most directly impacted by EPA regulations on OP insecticides, especially on the phase-out of AZM. Because WSU had been conducting research for several years on the reduced risk, OP-alternatives that would replace OP insecticides, answers were readily available on the characteristics of these new pest control technologies and how to incorporate them into IPM programs. External funding provided the capacity to deal with barriers to adoption facing the Washington apple industry. The primary activity of the AIPMTP was to educate growers, orchard managers and consultants on the relative efficacy, timing and rates of OP-alternative products targeting codling moth and leafrollers and to inform them about unintended consequences of some OP-alternatives on beneficial insects (predators and parasites). These groups were informed using a variety of methods, which together produced changes in opinions, attitudes and, most importantly, practices. The evidence of changes in attitudes and practices has been documented in various survey results discussed in the documentation section of the chapter on Project Approaches and the chapter on Goals and Outcomes Achieved.

The benefit to growers and orchard managers comes by achieving desired crop protection with minimal pesticide inputs, thus potentially reducing costs, and through efficiencies gained in farm labor management due to short re-entry periods (hours instead of days) of OP-alternatives compared to OP insecticides. The consultants were able to recommend crop protection programs based on sound science and to share their experiences with each other therefore expanding their knowledge base and gaining insights into practical programs that worked in different orchard settings and with growers that had differing risk aversions. Both groups benefited from improvements made in the WSU DAS, which allowed them to precisely time insecticide applications and helped them choose the from a list of products that best fit their crop protection goals.

The farm worker community was another beneficiary of the AIPMTP. Specialized farm workers, those who were employed to manage or apply pesticides to orchards, received training on the new insecticides being used in orchards as well as the phase-out of AZM. Knowledge gained about the relative safety of OP-alternative insecticides helped specialized farm workers understand the short re-entry intervals associated with these products and to gain appreciation that their work environment had become much safer. Temporary farm laborers, those who provided seasonal labor for pruning, fruit thinning, and harvest, also benefited by learning some basic information about the safety of OP-alternative insecticides used in orchards. They also gained directly from a safer workplace environment. While they may not have fully understood the impact that changes apple growers had made in pest control programs, they none the less benefited from reduced risks to their health and the health of their families.
Citizens of Washington benefit indirectly because OP-alternative insecticides being implemented into apple IPM programs represent a reduced risk of negative impacts on the environment. Almost all OP-alternatives have low or very low toxicity to wildlife (mammals and birds) and to fish. While some OP-alternatives can have a negative impact on aquatic organisms that fish use for food, and these concerns need to be addressed by appropriate practices, the overall benefit to the environment from transitioning to OP-alternatives in apple IPM programs is substantial.

Regulatory agencies benefit because they have access to real data documenting changes of attitudes and practices of groups affected by their activities.

LESSONS LEARNED

Capacity is required to change attitudes and practices is substantial both in personnel needed and time commitments. Changing attitudes and practices is always a challenge, especially when those changes are dictated by an external authority, e.g. government imposed regulations. The capacity within WSU that made the AIPMTP possible was the research knowledge on OP-alternatives that had been developed over time through external funding. The capacity of people to implement a program that would result in a desired outcome of changed attitudes and practices was not present within WSU and therefore external resources were needed to hire the right people that could implement the educational program that was needed. This capacity included a social scientist, a communications and web specialist, and a project manager.

Dr. Nadine Lehrer was a key member of this project by providing expertise in the area of social science plus her bilingual skills - English and Spanish. She was a key resource for designing and implementing surveys that formed the basis for documenting changes in attitudes and practices. Without her expertise the project would not have achieved its goals in this area.

Partnering with industry leaders, both growers and crop consultants, was key to the success of the project. These individuals represented the early adopters and influencers who spread the information and knowledge they gained to others.

By partnering with key people in the farm worker health networks WSU was able to reach and impact a key beneficiary group that WSU could not otherwise have gained access to. The partnership with these people provided access and credibility to the message WSU delivered to the farm worker community.

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ADDITIONAL INFORMATION

Survey Comparisons – Pest Management Consultant Results - 2007 and 2009

With the completion of the 2009 survey of apple pest management consultants, it is now possible to compare consultants' insecticide recommendations, knowledge of IPM tactics, and thoughts about the AZM phase-out with results from a similar survey conducted in 2007, in order to see how these recommendations, tactics, and thoughts have changed during the course of the AZM phase-out. While some of results remained the same between 2007 and 2009, other aspects changed. Highlights of these changes are as follows:

In 2009, consultants perceived somewhat less damage from insect pests in apple orchards overall. Eighty-one percent (81%) felt that codling moth caused unacceptable crop damage, down from 98% in 2007. Similarly, 47% felt that wooly apple aphid caused damage compared to 70% in 2007, and 26% felt that spider mites caused damage compared to 55% in 2007.

In 2009, 18% of consultants felt that codling moth caused unacceptable damage every single year, down from 67% of consultants in 2007 (instead, most consultants (52%) in 2009 reported unacceptable damage one year or less out of every five). In 2009, fewer consultants (15%) felt codling moth injury had increased over the previous three years compared to 2007 (40%), and more consultants (68%) felt that injury had remained steady compared to 2007 (48%). Thus, the perception of strong and rising codling moth damage seemed to have decreased over this two year period.

Organophosphate (OP) recommendations for codling moth decreased accordingly between 2007 and 2009. In 2009, 83% of consultants recommended AZM to control codling moth, down from 93% in 2007. And 74% stated in 2009 that their recommendations of OP insecticides for codling moth had decreased over the past three years, up from 35% in 2007.

In 2009, consultants also perceived less leafroller damage, with 16% saying they found unacceptable damage 2 out of every 5 years or more, down from 69% in 2007. Accordingly, fewer consultants recommended Lorsban in 2009 (61%) than in 2007 (80%), and a higher percentage did not recommend any OP insecticides for leafroller in 2009 (25%) as compared to 2007 (13%).

In 2009, more consultants (69%) knew that 2012 would be the last year AZM could be used, up from 55% in 2007, and more answered correctly that the phase-out schedule would limit the total amount of AZM that could be used by a grower each year (52%, up from 32% in 2007). Thus, knowledge of the phase out had increased over time.

In 2009, more consultants felt that there were effective alternatives to AZM (mean score rose by 0.25 on a 1-5 scale, with 5 meaning "strongly agree"), and that the phase out would protect the health of agricultural workers (mean score rose 0.35) and the environment (mean score rose by 0.3). More consultants also felt that growers would bear the burden of the AZM phase out (mean score rose by 0.76), and that the cost and control of leafrollers would be more difficult after the phase out (mean scores rose by 0.38 and 0.43). Fewer consultants felt in 2009 that control of codling moth would be more difficult (mean score dropped by 0.27) or that tree fruit production would be riskier for growers (mean score dropped by 0.41) after the AZM phase out.

In 2009, slightly fewer consultants (62%) were interested in additional training on how to use AZM alternatives to manage pests than in 2007 (75%). This might be in part because more had already received training through AIPMTP and other venues.

Overall, it seems as though consultants in 2009 were more knowledgeable about and felt more in control of pest management in a world without (or soon to be without) AZM, and fears of codling moth damage increasing alongside the phase out had dampened. Some of these differences between 2007 and 2009 data could be due to a larger sample size used in 2009 (120 of 200 surveys completed in 2009, compared to 40 of 73 in 2007), or perhaps to a greater representation of consultants working in the southern tree fruit regions (15% increase in representation from Yakima and the Tri-Cities in 2009) than in the north (16% decrease in representation from Wenatchee in 2009), but mostly they are likely to be due to

consultants' increased experience working with AZM alternatives and with the success of AIPMTP efforts to provide resources for transitioning away from AZM (45% of consultants in 2009 had participated in an AIPMTP Implementation Unit, and 87% knew about the AIPMTP). This demonstrates significant benefit from AIPMTP outreach to consultants over the past several years.

Survey Comparisons – Apple Growers (2008) and Consultants (2009)

It is also possible now to compare the 2009 pest management consultant survey data with similar data gathered from apple growers in 2008, in order to see how consultants and growers differed (and at times how they answered similarly) with regard to their pest management practices, decisions, and thoughts. Highlight of this comparison are as follows:

Insect and insecticide questions

Growers in general seemed to perceive somewhat fewer pest problems in their orchards than did consultants. In 2008, 57% of growers found that codling moth caused unacceptable crop damage in their orchards, lower than the 81% of consultants who felt that way in 2009. Similarly, 21% felt that wooly apple aphid had caused damage, compared to 47% of consultants (in 2009).

Statement	2008 grower survey	2009 consultant survey
Codling moth caused unacceptable crop damage	57%	81%
Woolly apple aphid caused unacceptable crop damage	21%	47%
Codling moth never caused unacceptable crop damage	25%	4%
Growers used – consultants recommended AZM	83%	80%
Growers used – consultants recommended Imidan (phosmet)	31%	25%
Growers used – consultants recommended diazinon	8%	7%
Use of – recommendation of OP insecticides decreased	50%	74%
Use of – recommendation of pheromone mating disruption	65%	98%
Use of – recommendation of OP alternatives increased	47%	76%
Codling moth control cost more	76%	87%
Leafrollers never caused unacceptable crop damage	36%	18%
Knew that the last year of AZM use was 2012	35%	69%

While a similar percentage of consultants and growers (18% and 17%, respectively) felt that codling moth caused unacceptable damage every year, many more growers than consultants (25% compared to 4%) felt that codling moth never caused unacceptable damage in their orchards. Perhaps consultants get to see more evidence of damage when doing detailed monitoring or trap-checking in orchards, or perhaps they simply have lower thresholds on how much damage they consider acceptable.

Despite the finding that growers perceived fewer pest management problems from codling moth than consultants, growers and consultants reported similar spraying habits in 2008 and 2009 respectively. Specifically, 83% of consultants and 80% of growers reported using AZM, 31% of consultants and 25%

of growers used Imidan, and 8% of consultants and 7% of growers used Diazinon, suggesting that growers do in fact generally follow their consultants' spray recommendations.

However, of the growers who sprayed AZM in 2008, 37% used two applications and 36% used three, compared to the two applications 61% of consultants used in 2009. Similarly, 50% of growers said their use of OP insecticides for codling moth had decreased over the previous three years, as compared to 74% of consultants in 2009. This higher number of spray applications and lower likelihood of reducing OP use among growers might be in part because the AZM phase-out was better known and further progressed in 2009, even though the EPA-allowed limit of AZM did not change between 2008 and 2009. It might also indicate a tendency among growers to spray more than consultants given an equal level of (perceived) damage. Here, growers used more OPs despite their lower perceptions of damage.

Somewhat fewer growers used OP alternatives for codling moth as compared to consultants. For example, 65% of growers used pheromone mating disruption as compared to 98% of consultants, 54% of growers used Assail as compared to 74% of consultants, and 45% of growers used Delegate as compared to 83% of consultants. (Note, however, that Delegate was a new product in 2008 when growers were surveyed, and became more trusted by 2009 when consultants were surveyed.) Overall, 76% of consultants indicated that their recommendations of OP alternatives for codling moth had increased over the previous three years, compared to 47% of growers. These results again may indicate increasing adoption of OP alternatives with the passage of time from 2008 to 2009, or perhaps an increased rate of adoption among consultants as compared to growers.

With regard to codling moth injury levels, 68% of consultants and 57% of growers found that they had remained the same over the previous three years. And just slightly more consultants than growers (87% versus 76%) felt that the cost of codling moth control had increased accordingly over the previous three years.

Greater percentages of growers than consultants (24% of growers versus 7% of consultants) used the WSU-recommended 1 pheromone trap per 2.5 acres or less for monitoring codling moth density. Instead, consultants used 1 trap per 2.6-5 acres (39%) or 1 trap per 5.1-10 acres (45%). More growers than consultants (18% of growers versus 1% of consultants) did not use pheromone traps at all. Thus, while consultants are more likely to use pheromone traps, growers are more likely to use them at higher (recommended) densities. If consultants are placing these fewer traps in areas of higher codling moth pressure (either unintentionally or to better monitor these hotspots) this might contribute to consultants' higher perceptions of codling moth injury, damage, or presence.

Fewer growers than consultants used the battery of IPM practices surveyed than consultants. For example, 93% of consultants monitored their fields for damage often, compared to 81% of growers. Similarly, 90% of consultants used degree day models often, as compared to 65% of growers, and 83% of consultants used resistance management strategies often, as compared to 43% of growers. Fewer growers than consultants indicated that their use of these IPM practices had increased over the previous three years (62% of consultants versus 32% of growers for resistance management strategies, 41% of consultants versus 26% of growers for field monitoring, and 38% of consultants versus 27% of growers for degree day models).

Growers were also less concerned about leafrollers than consultants, with 36% of growers and 18% of consultants asserting that leafrollers never caused unacceptable damage. Among growers, 20% expected less than 1% damage if no controls were applied, as compared to 9% of consultants. However, more consultants than growers (49% compared to 26%) felt that leafroller injury had decreased over the previous three years.

Consultant use of OP insecticides for leafroller was lower than grower use, with 25% of consultants and 12% of growers stating they did not use or recommend any OPs for leafroller control. More growers than consultants also reported spraying AZM (30%, compared to 5% of consultants) and Imidan (14%, compared to 4% of consultants) for leafroller, whereas levels of Lorsban (59% and 61% respectively) and Diazinon (5% and 3% respectively) were similar.

Like with codling moth, fewer growers than consultants used various IPM practices and/or OP alternatives for leafroller. For example, 75% of consultants used or recommended Delegate compared with 41% of growers and 62% used Intrepid compared to 32% of growers; note, however, that more growers than consultants (48% versus 36%) used horticultural mineral oil. Fewer growers reported increasing their use of OP alternatives for leafroller over the previous three years (25% compared to 37% of consultants). This again may indicate a slight hesitance among growers to adopt newer products, even perhaps when recommended by their consultants.

Phase-out and information source questions

- Similar percentages of growers and consultants (99%) knew about the AZM phase-out. However, more consultants (69%, compared to 35% of growers) knew that 2012 was the last year AZM could be used and 52%, compared to 42% of growers, knew that the phase-out would limit only the total amount of AZM used per year (rather than number of applications or timing).
- Accordingly, most consultants (72%) and growers (65%) were in the process of reducing their use of AZM at the time they were surveyed. However, more growers than consultants (14%, compared to 6%) reported not having yet begun to reduce AZM use.
- Consultants expressed higher confidence ratings in their knowledge of how to use OP alternatives (on a scale of 1-5 with 5 being very confident, consultants averaged 4.7 for pheromone mating disruption compared to 3.8 for growers, 4.3 for Assail compared to 3.5 for growers, and 4.3 for Altacor compared to 3.0 for growers). As discussed above, these results may reflect consultants having had more practice with OP alternatives and the AZM phase-out in 2009 than growers did in 2008, or they may reflect greater facility and familiarity with new pest management practices among consultants than among growers.
- Nevertheless, more consultants reported barriers to using OP alternatives than growers. While 83% of consultants thought alternatives were too expensive, only 68% of growers felt that way; while 73% of consultants worried that alternatives caused other pest problems, only 42% of growers felt that way; and while 64% of consultants were concerned that export markets might not accept fruit with alternative insecticide residues, only 30% of growers expressed that concern. However, similar percentages of growers and consultants felt that alternatives' level of effectiveness and timing of application were barriers to their adoption (but both were seen as lesser barriers than those above). More growers than consultants (14% compared to 5%) stated that they did not face barriers to using OP alternatives. Thus, while fewer growers use OP alternatives than consultants, fewer perceive the barriers to adoption of these products that consultants do.
- While growers and consultants agreed upon many of the opinion statements presented to them in their respective surveys, growers felt more strongly that phasing out AZM would make tree fruit production riskier for growers (mean score 0.33 higher for growers than for consultants on a 1-5 scale where 5 means "strongly agree"), that the cost and control of leafrollers would be more difficult after the AZM phase out (mean scores 1.04 and 0.76 points higher for growers than consultants), and that the phase out would require significant retraining of agricultural workers (mean score 0.21 points higher than for consultants). Growers were also less convinced that they had effective alternatives to AZM available (mean score 0.52 points lower than for consultants) and that WSU had developed good information on AZM alternatives (mean score 0.3 points lower than for consultants). Thus growers were more worried than consultants about production challenges, especially for leafrollers, and were less sure that there were adequate remedies for these challenges.
- With regards to secondary pests, growers reported fewer problems than consultants, with 44% of growers saying wooly apple aphid problems had increased over the previous three years (compared to 87% of consultants), and 17% (compared to 68% of consultants) saying that spider mite problems had increased.

- More growers placed responsibility for insect monitoring on their own heads than did consultants. Whereas 84% of consultants felt that they (consultants) were responsible for monitoring and only 38% felt that growers or managers were responsible for monitoring, 72% of growers named themselves responsible for monitoring. And fewer growers than consultants reported barriers to monitoring (40% versus 53% for lack of time and 21% versus 33% for lack of trained staff).
- The top three sources of information growers used for making pest control decisions were agricultural chemical distributor fieldmen (mean score of 4.20 on a scale of 1-5 with 5 being "very important"), WSU Crop Protection Guide (3.67), and insecticide label information (3.53), followed by conferences, workshops, or seminars, and WSU researchers. For consultants, the top three sources were the WSU Decision Aid System (4.32), WSU Crop Protection Guide (4.17), and other professional consultants (4.08), followed by insecticide label information and WSU researchers. Thus WSU resources were important to both consultants and growers, with growers also relying most heavily on advice from their field consultants.
- Of growers, 37% used the WSU Decision Aid System (DAS) compared to 90% of consultants, and 53% knew about the WSU Pest Management Transition Project (PMTP) compared to 87% of consultants (17% of growers, compared to 45% of consultants, had participated in a PMTP Implementation Unit). In addition, 37% of growers knew about using USDA Environmental Quality Incentives Program (EQIP) funds for integrated pest management compared to 67% of consultants. Both growers and consultants were equally interested in additional training on how to use AZM alternatives (62%).
- In terms of orchard demographics, growers owned, operated, or managed an average of 193 acres compared to a mean 1875 acres visited by consultants. Similar percentages managed orchards organically or in transition to organic (11-12%), conventional with use of OPs (62-67%), and conventional without use of OPs (23-30%). Demographically, similar percentages of consultants and growers were between 45 and 64 years of age (62-64%), although the remainder of growers were generally older (22% aged 65 and up) and the remainder of consultants were younger (36% under 45). While similar percentages of growers and consultants came from farming backgrounds (68-74%), consultants were more likely to have a four-year college degree than growers (68%, compared to 35%).

Overall, despite some similarities, apple growers in 2008 seemed slightly less comfortable with the AZM phase-out and introduction of OP alternatives than consultants. As mentioned previously, this may be due to the progress of the phase out from 2008 to 2009 and/or to differences between consultant and grower experiences and perspectives. Nevertheless, growers were more likely to see certain of the aspects of the transition, from pest problems to barriers to adoption of new technologies, in a somewhat more positive light than consultants. Results also lend credence to the role that WSU programs like AIPMTP and DAS have played in helping especially consultants adapt to the pest management transition. Many of these resources have also helped growers, either directly or likely through the medium of their relationship with their consulting fieldmen. Results argue for continued assistance to both groups, in accordance with their levels of knowledge and interest.

Preparations are underway now for a 2010 apple grower survey for January 2011, whose results will be compared with results from the 2008 grower survey and 2007 and 2009 consultant surveys, in order to see how grower attitudes have shifted over the period of the AZM phase out.

DAS User Survey 2010 - Results Summary

- Participants: 154 participants answered our voluntary user survey (= 34.4% of 447 users that logged in at least 3 times in 2010; 134 participants completed all questions; 26.8% of the responders also participated in the 2008 survey (50.3% did not participate in 2008; 22.9% do not remember if they participated in 2008).

- Year of registration: 40.3% of the survey participants started using DAS within the last 2 years (14.8% in 2010, 25.5% in 2009, 31.5% in 2008, and 28.2% in 2007). (Note: 149 responses total)
- User age: Similar to the survey results from 2008, the majority of DAS users in the 2010 survey is above 50 years of age – 63.6% (3.2% are 29 years or younger; 10.4% are between 30 and 39; 22.7% are between 40 and 49; 43.5% between 50 and 59; and 20.1% are 60 years or older.)
- User gender: 92.2% of the survey participants were male, 6.5% female, 1.3% declined an answer. (This distribution is similar to 2008 when 87.9% DAS users were male and 10.1% female. 2.0% declined.)
- Educational background: The educational background of DAS users in the 2010 survey is the same as in 2008, with the majority (66.2%) of users having a 4-year degree or higher, followed by some college (15.6%), a 2-year degree (11.0%), high school/GED (4.5%), and trade school (2.6%).
- Language: Spanish is the first language of 5 (3.3%) survey responders (English 96.1%; 0.6% declined). 14 participants (10.1%) said they were interested in using DAS in Spanish.
- User occupation: The majority of the survey participants are growers/orchardists (60.8%), 37.9% are orchard managers, 20.2% work as Ag Chem distributor consultants, 16.3% are Packinghouse/ Company fieldmen, 13.7% work in research and/or extension, 9.8% work as private crop consultants, and 9.1% have other occupations. (Note: Users could check multiple answers for full- and part-time occupations.)
- How easy is DAS to use: Most users rated the use of various features of DAS as easy or very easy. The average rating on a scale from 1 (= very easy) to 5 (= impossible without help) for first time registration, setting up a user profile, editing the user profile, viewing model results, viewing model charts was 1.8, 1.9, 1.9, 1.6, 1.7, respectively. On average, survey participants rated viewing the full WSU Spray Guide, changing the output in the full WSU Spray Guide, using the filter in the full WSU Spray Guide, using the DAS Help Center, and using the Historic Weather Data Center as 1.8, 2.0, 2.0, 2.0, and 2.2, respectively. Between 6.2% and 27.4% of users indicated that they were not aware of the latter 5 features. The survey participants rated the various insect, disease and disorder models between easy and very easy to use.
- How useful are features on DAS: Various features on DAS were rated on average between 1.3 and 1.9 on a scale from 1 (= very useful) to 3 (= not useful; 2 = somewhat useful). Best average ratings were given to projected model forecast with management recommendations, model charts, and the overall full WSU Spray Guide. Compared to 2008, survey participants rated the usefulness of DAS features the same (management recommendations, projected model forecast with management recommendations, and natural enemy effects in Spray Guide) or slightly better (model charts, full WSU Spray Guide, and pesticide efficacy/secondary pest effects in Spray Guide). New features, such as video tutorials, online manual, front page stories, and iPhone version were rated on average as 1.8 or 1.9 (somewhat useful).
- Impact of DAS: The majority of survey participants (56.0%) indicated an increase in the level of pest control due to the use of DAS; 29.0% saw no change and 7.0% reported a decrease in pest control level (8.0% answered "not applicable"). The impact of DAS on the number of sprays and management costs increased from 2008 to 2010. In 2010, the use of DAS decreased the number of sprays for 36.0% of survey participants compared to 23.6% in 2008. The number of sprays increased for 11.0% and did not change for 45.0% of the survey participants in 2010 (8.0% answered "not applicable"). In 2010, the costs for pest management decreased for 31.0%, compared to 13.4% in 2008, increased for 17.0%, and remained the same for 39.0% of DAS users (13.0% answered "not applicable"). Furthermore, in 2010 a higher percentage of DAS users indicated that DAS helped with pest management decisions compared to the 2008 survey. In 2010, DAS helped 97.0% of the survey participants to some or a very great extent with clarifying treatment timings (2008: 79.5%), 68.0% with choosing chemicals for best efficacy (2008: 26.0%), 65.0% with clarifying management for multiple pests (2008: 38.6%). In addition, 86.0% of the survey participants feel that DAS helped with improving the their overall management strategy, with providing general information on IPM (86.0%), and with choosing chemicals to reduce natural enemy mortality (60.0%). (Note: 100 total responses for this question)

- We also asked how the user's operation would be affected if DAS was discontinued next year. The majority of survey participants indicated that the discontinuation of DAS would have major or modest impacts on the user's number of sprays (21.4% "major", 49.0% "modest", 29.6% "no impact"), costs for pest management (17.3% "major", 54.1% "modest", 28.6% "no impact"), level of pest control (31.6% "major", 43.9% "modest", 24.5% "no impact"), on the clarity of treatment timings (58.2% "major", 36.7% "modest", 5.1% "no impact"), the user's choice of chemicals for best efficacy (11.2% "major", 53.1% "modest", 35.7% "no impact"), choice of chemicals to reduce natural enemy mortality (12.3% "major", 45.9% "modest", 41.8% "no impact"), management for multiple pests (20.4% "major", 51.0% "modest", 28.6% "no impact"), and improvement of the user's overall management strategy (34.7% "major", 53.1% "modest", 12.2% "no impact").
  (Note: 98 total responses for this question)
- Sharing information: 48.3% of the survey participants said they were asked for information from DAS, and 81.4% of all survey participants share the information with others.
- How did users learn about DAS? The majority of users learned about DAS through grower meetings (58.4% in 2010), followed by PMTP meetings (31.8%), Good Fruit Grower articles (26.6%), friends/colleagues (25.3%), employer/supervisor (16.9%), internet links/search engine (11.7%), and/or other sources (13.6%). In 2008, grower meetings were also identified as main source for DAS promotion (55.1%).
- How would users like to learn more about DAS? 66.2% of the participating DAS users would like to learn more about DAS. The preferred ways of learning were newsletters and updates on the DAS front page (63.0%), followed by online video tutorials and manual (53.3%), grower meetings (42.4%), and workshops (39.1%). Other suggestions included online workshops and interactive online training.
- DAS support: Almost half of the survey participants (45.6%) have requested any kind of support from the DAS team and rated the responsiveness, helpfulness, and friendliness good or excellent (100%, 95.2%, and 100%, respectively).
- Computer experience/proficiency: Twice as many DAS users said they use smart phones or PDA's in 2010 (50.6%) compared to 2008 (27.5%). In the 2010 survey, a slightly higher percentage of DAS users has experience with Email (96.8% vs. 90.7% in 2008) and spreadsheets and/or word processing (83.1% vs. 81.4% in 2008). 90.9% of the survey participants reported to have experience with web browsing (not asked in 2008). In 2010, more users consider themselves as computer experts (16.9% vs. 10.9% in 2008). 73.4% describe themselves as average user (78.5% in 2008), and 9.7% as novice (10.5% in 2008).
- Computers used: The percentage of users using desktop computers (82.5%), laptops (77.3%) has increased compared to 2008 (79.3% and 60.7%, respectively). The use of smart phones/PDA's has more than doubled (44.8% vs. 20.2% in 2008).
- Acreage: The survey participants from WA State provide pest control management or recommendations for a total of approximately 182,044 acres in 2,909 orchards. In 2008, survey participants provided management or recommendations for a total of 250,094 acres in 2,888 orchards, where the industry size estimates are 3000 orchards and 218,000 bearing acres (Noncitrus fruits and nuts 2009 summary, July 2010. NASS). (Note: 151 total responses for this question, 100 responses from WA State)
- Management practice: The majority of survey participants describes their management practice as conventional (81.5%), followed by organic (38.9%), non-OP (35.2%), and other (6.5%) including "sustainable", "BMP", "IPM based", "reduced risk pesticides", "prefer organic, but not certified", "international organic", and "Nutri-Clean." (Note: 108 responses total, multiple answers possible)
- Crops: Of the survey participants from WA State that provide management or recommendations, 92% do so for apples, 63% for pears, 69% for cherries, 32% for other stone fruit, and 11% for other crops including grapes or other small fruit. (Note: 100 responses total from WA State, multiple answers possible)

- Crops used in DAS: All crops are used in DAS by the survey participants, most importantly apple (92.1%), followed by cherry (70.6%), pear (61.5%), and other stone fruit (34.3%). Percentages of crops used in 2010 are very similar to 2008, whereas the percentage of people using cherry on DAS slightly decreased (98.4% apple, 80.3% cherry, 58.3% pear, 34.6% other stone fruit). (Note: 143 responses total, multiple answers possible)
- Models used in DAS: The most used models on DAS are codling moth (93.0%), fireblight (79.7%), western cherry fruit fly (65.0%), oblique-banded leafroller (63.6%), cherry powdery mildew (58.7%), and Pandemis leafroller (54.5%). Compared to 2008, the leafroller models switched places (OBLR 29.1%, PLR 60.6%), and new models have been added, such as the models for cherry powdery mildew, oriental fruit moth, and sunburn browning.
- For 62.2% of the survey participants, the codling moth model was the most important model, while for 21.5% fireblight and for 5.2% western cherry fruit fly is the most important model. The second most important model is fireblight for 31.1%, codling moth for 23.0%, and western cherry fruit fly for 11.1% of the users. The third most important model was western cherry fruit fly for 19.3%, cherry powdery mildew for 12.6%, and oblique-banded leafroller for 11.1% of the users. In comparison to 2008, the ranking for the first and second most important models has not changed. Added after 2008, the cherry powdery mildew model is one of the three most important models now.
- Number of stations used in DAS: The majority of users (77.3%) looks at 1 to 5 weather stations, the remaining survey participants use between 6 and 134 stations. In 2008, 65.3% users looked at 1 to 5 stations, while the maximum number of stations used was 25.

PROJECT #3

Project Title: *Global Retail Training in Produce Layout Design & Handling*

Partner Organization: Washington Apple Commission (WAC)

PROJECT SUMMARY

By the time Washington Apples, Northwest Pears, Northwest Cherries and Washington State Potatoes (cooperators) reach the retail shelves in foreign markets, they are high value items that, if mishandled, can cause significant losses to the store's produce department. This makes retailers hesitant to handle the product and in turn can mean limited opportunities through these important market sales channels.

Modern retailers (hypermarkets and supermarkets) in developing markets have limited exposure to the design layout and merchandising ideas of US fresh produce in their stores. Most of the fresh produce sections in these outlets are not designed to maximize sales. In addition, produce handling and training need to be intensified at the store level since most retail produce staff lack proper handling and merchandising skills. Modern retailers are increasing their share of fresh produce sales at the expense of traditional wet markets. Improved produce handling and display will accelerate this process. High quality Washington Apples, Northwest Pears, Northwest Cherries and Washington Potatoes were major beneficiaries of market share growth by the modern retail sector with our longer shelf life, better appearance, and timely delivery versus cheaper source origin produce that lacks the high quality image and characteristics of US produce.

WAC requested SCBGP funds to be used to provide training to key retailers in at least 6 emerging markets (Russia, the Middle East, India, Mexico, China and Thailand) in produce department layout design and produce handling, including follow-up display contests and evaluations. WAC contracted with John Baker of Produce Marketing Australia, a representative of the US Produce Marketing Association, who is an accredited trainer with extensive background in care, handling and merchandising of produce items. Training was preceded by a store visit so the consultant could understand strengths/weaknesses of the chain's current approach. To strengthen the training, co-operator in-country representatives worked with the PMA consultant and the retail chains to conduct produce department display contests to allow the participating retailers to incorporate the training into practical applications.

Recognizing that one of the main keys to maintaining the quality of Washington apples is correct care and handling practices, WAC has attempted to educate both importers and retailers throughout the marketing regions, particularly in less-developed countries. They have found that as the retail infrastructure develops, so do the opportunities for Washington apples and other high value specialty crop items like Northwest pears and cherries. The follow-up retail display contests were implemented with at least one retail chain per market (except in Russia where this type of promotion is not generally allowed by retailers). This provided incentive to utilize the training provided in a practical way to maximize the benefits to Washington apples, pears, cherries and potatoes.

During the 2008-09 season, FY08 SCBGP funds were used to conduct training seminars in China and India, two countries that offer tremendous growth opportunities for Washington apples and other tree fruits. Both projects involved training seminars with key retailers in major cities such as Shanghai, Guangzhou, New Delhi and Mumbai and were able to reach over 240 retail produce managers from 10 retail chains in China and 150 participants from 11 retail chains in India. Feedback from participants was very positive, with 85% of evaluation forms turned in and averaging 4.3 out of 5 for workshop quality and relevance. Although it is too early to tell whether WAC will achieve the goals of 3 chains in India renovating their produce sections this year, at least one chain in India did follow up on their own with a retail promotion based on the information provided in the seminar.

In the follow-up display contest in China with the Park n Shop chain using FY08 SCBGP funds, the participating stores, on average, were able to increase Washington apple display space from 2.5 square meters before the promotion to 6 square meters during the promotion at each of the 30 participating stores (a 140% increase). The total sales volume was 8,812 cartons during the display contest promotion, up from the sales volume of 2,516 cartons during the 4-week period before the display contest, surpassing our goal of a 50% increase. As a result of the tremendous growth of the sales volume of the Washington apples during the event, the importers increased the supply to the retail chain and made a handsome profit even though they had to slightly reduce the price as a contribution to the promotion. The promotion successfully helped to increase the confidence of importers and retailers in selling more Washington apples. However, because of the rapid expansion and development of the retail infrastructure in these countries, as well as the other targeted markets for this project, continued training is needed. In India and China this would mean targeting the major distribution centers as well as second tier cities that play a strategic importance to future sales opportunities.

PROJECT APROACH

The Washington Apple Commission (WAC) commissioned John Baker of Produce Marketing Australia to deliver a series of retail training programs in China, Russia, Mexico, Thailand, India and the Middle East. The program outline included:

1. Conduct store visits (at least one per retailer) and visit retail outlets for each of the participating retailers to assess:
    a. Current performance with the participating products, especially apples
    b. General store layout and performance in fresh produce (front and back) - receival, storage, handling, cold chain, food safety, product range, display, promotions etc
    c. Meet with store staff to determine:
        i. Profile of customer base – how often and when (time of day) do they shop for regular items (top up), discretionary products (and what are they) and impulse items. This has implications for where imported products fit (e.g. "Fresh @ 5" merchandising if shopping is later in the day, etc.)
        ii. Existing levels of knowledge and information in the areas to be covered
2. Conduct workshops (half day) customized for each participating retailer (or collectively for smaller retail groups) that included:
    a. Product and merchandising information that may include the following products: Washington apples (the main emphasis), USA pears, Northwest cherries, table grapes, berries, summer fruit, Washington potatoes, carrots and onions
    b. Information on cold chain and food safety requirements; trends in fresh produce; developments in organics
    c. Retail concepts and ideas from other markets (USA, Australia, New Zealand, etc.) that could be applied in the targeted markets.
3. Follow up with store visits (half-day) to participating retailers to provide further guidance on practical applications of information from workshops, clarify any issues raised in implementation of the training and provide feedback.
4. Prepare all resource materials and make available to participants: product specific and generic information; store concepts and any other relevant training materials in English. All translations, printing and distribution were handled by WAC.
5. Provide a written report at the end of the project with an evaluation of pre and post- project merchandising and handling activities of the participating retailers, with recommendations for follow-up activities for both WAC and/or any participating Agricultural Trade Office staff. Participant evaluations were used to assist in this evaluation, including:
    a. "open book" assessment by attendees at conclusion of each workshop, to reinforce key messages and assess level of knowledge achieved
    b. Participant survey of value and effectiveness of workshops and materials.

6. In markets where appropriate, the WAC representative orchestrated a display contest competition which will enable the participants to use the skills they learned in the seminars to build effective displays.

Project partners for the workshops included the Washington Apple Commission, Pear Bureau Northwest, the Washington State Fruit Commission/Northwest Cherries and the Washington State Potato Commission. Each partner provided information and input into the workshop training materials and were active participants in applicable markets.

GOALS AND OUTCOMES ACHIEVED

The workshops conducted included:

- China - six workshops, including two workshops each in Shenzhen, Shanghai, and Beijing in November and December 2009 with 231 participants attending
- Russia - five workshops, including three workshops in Moscow and two workshops in St Petersburg in January 2010 with 139 participants attending
- Mexico - three workshops for the retailer Soriana held in February 2010 with 128 participants attending
- Thailand - five workshops in Bangkok in March 2010 with 255 participants attending
- India - five workshops in Kolkata, Bangalore, Pune, Ahmedabad, Amristrar in March 2010 with 148 participants attending
- Middle East - five workshops in Dubai, Sharjah and Abu Dhabi in April 2010 with 105 participants attending
- Sri Lanka/India – eight additional workshops in Sri Lanka and India in January and February 2011 with 352 participants attending

The workshops were personalized for the participating retailers to be able provide instruction on how to improve their produce departments layout and the handling of the produce.

The immediate goal of the produce handling training was to increase the sales of Washington State Apples (and other fruits) to the participating retailers by 10% during the 3 month timeframe following the training by increasing their profitability and/or "value-added" benefits provided. In general, there was an average increase of 129% over the 6 markets, with the highest increase seen at the O'key supermarket chain in St. Petersburg, Russia (346% sales increase). The lowest increase was seen in the Carrefour chain in Thailand with only a 6% increase.

Incremental success was also measured by the number of tactics adopted by the training participants, including:

- Reduction of shrinkage/wastage of participating commodities by 2% among participating chains through proper storage, handling and rotation practices. This was more difficult to determine, as some stores were not willing to share direct numbers, however based on the data received, WAC was able to almost double their original goal of 2% to 3.9%. In general China showed the best increases with one participating store registering an 8% reduction of shrinkage/wastage after the training.
- Increase in display shelf space for participating commodities by 5-10% (varies by time of year) through the use of good merchandising practices. Based on the data gathered, WAC was able to achieve an average of 8.65% increase in display space following the training.

Although all of the measurable outcomes were able to be quantified in the 3 months following the training, WAC expects the training impacts to carry through to future seasons. In the case of Russia, due to the long transit time (up to 2 months) and timing of the seminars, several of the participating retailers decided to purchase Washington apples as a regular stocked item in the following seasons, rather than only filling in if other origin supplies were not available.

WAC is pleased that they have been able to surpass their targeted goals for the project.

In addition to the stated measurable goals, WAC has also been able to improve their relationship with the participating retailers, which is difficult to quantify but critical in terms of the ability to implement promotional programs and increase sales. As reported by their Middle East representative "The pre- and post-training workshops were very popular and were an excellent way to develop commercial relationships with potential and current customers. Once sales force personnel are well-trained and convinced of the quality of these products, they become more effective promoters of our products each working day at the point of purchase. The multiplier impact of this training program is very significant. The "value-added" benefits provided by the training generated goodwill among participants from all retail formats."

In order to gauge the effectiveness of the training and determine progress towards WAC's goals, in-country representatives obtained shrink/wastage and display space data from participating retailers both before the training and three months post-training. Sales of the participating products were also measured to determine the increase in sales after the training.

BENEFICIARIES

This project directly benefited Washington apples, Northwest pears, Northwest cherries, and Washington potatoes. Based on the average export values and total volume, WAC estimates the impact of the training to be in excess of $17 million FOB value on the respective industry shipments to the participating retailers. This assumes that the participating retailers continued to use the good handling practices learned in the training for the duration of the season.

A large number of retailers also benefited from this project. Retail participants in each country included: Jusco-China; CRC Vanguard/Ole-China; Lotus-China; E-Mart-China; BHG-China; Carrefour-China; Metro Cash & Carry-Russia; Union of Independent Retailers-Russia; Azbuka (Alphabet of Taste)-Russia; Carousel-Russia; Lenta-Russia; O'Key-Russia; Land-Russia; Soriana-Mexico; Big C-Thailand; Tops-Thailand; Carrefour-Thailand; Siam Makro-Thailand; Tesco-Lotus-Thailand; Spencers-India; Metro Cash & Carry-India; Big Bazaar-India; Garden Fresh-India; Aditya Birla Retail (More)-India; Namdharis-India; Foodworld Supermarkets-India; Heritage Foods-India; Reliance-India; Spar Hypermarkets-India; Fresh & Fresh-India; Nature's Basket-India; AB Retail Chain-India; Star Bazaar-India; Agri Fresh-India; Best Price (Bharti Wal Mart)-India; Hyper City Retail-India; T Choithram & Sons-Middle East; Union Co-ops-Middle East; Sunrise City Supermarkets-Middle East; Al Maya Group Supermarkets-Middle East; Spinneys-Middle East; New West Zone-Middle East; Waitrose-Middle East; Geant-Middle East; Emirates Co-op-Middle East; Lulu Hypermarket-Middle East; Giant/Safestway-Middle East; Lifco-Middle East; Abu Dhabi Coop-Middle East; and Union Co-ops-Middle East.

LESSONS LEARNED

This was the second round of training that WAC conducted using SCBGP funds and they were able to incorporate some of their lessons learned from the previous project to improve this training.

Modifications to the presentation included highlighting the superior quality and growing conditions of Washington Apples, Northwest Pears, Northwest Cherries and Washington Potatoes in order to maximize the training opportunities to educate the retailers regarding these products.

Timing continues to be critical, as the trainings ideally should be conducted while products are available in the market. In Russia, due to the transit time of almost two months, three of the four participating retailers said that although they were unable to increase their volumes in the current 09-10 season, they were planning to do so during the 2010-11 season.

There continues to be a high demand for this type of training, particularly in markets with quickly growing retail sectors such as China and India. Mexico was more challenging – the modern retail sector is more developed, and it was difficult to get management to allow their store personnel to take almost a full day off for training. In the end we were only able to get one retailer, Soriana, who was willing to participate. With the high demand in other markets, we would not repeat the training in Mexico.

As noted above, there were several positive results, most dramatically the commitment of all four participating Russian retailers to increase the volume of Washington apples that they carry as a result of the training. As an example, the Lenta chain from St. Petersburg has committed to purchasing Washington products separately as a special category, whereas before this seminar and communication/ facilitation with WAC, the chain was making purchases of any red apples on the tender bases, so Washington apples were sourced only if no other product was available. The seminars also allowed correcting problems with the mislabeling of Washington apples in this chain. Before the training, Washington apples were often labeled as apples of Argentinean, Chilean, European and other origin.

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ADDITIONAL INFORMATION

Matching Funds for this project totaled $35,414.78. This amount consisted of travel expenses for local representatives, prizes for display contests, apples for sampling, and meals provided during the seminars.

See **Report 12-25-B-0957 Attachment A** for the following:

1. Final Training Report: India
2. Final Training Report: The Middle East
3. Final Training Report: Mexico
4. Final Training Report: Russia
5. Final Training Report: Thailand
6. Final Training Report: Sri Lanka & India

PROJECT #4

Project Title: *Increasing Efficiency and Market Access with FoodHub*

Partner Organization: Ecotrust

PROJECT SUMMARY

In October, 2009 Ecotrust received $250,000 to support their project titled: *Increasing Efficiency and Market Access with FoodHub*. This has been a multi-state project serving specialty crop producers in Oregon and Washington.

FoodHub is an online directory and marketplace that makes it easy and efficient for buyers and sellers of regional food to find one another, connect, and conduct business. For chefs, restaurateurs and food service directors, FoodHub translates to fast foraging— they can find regionally-produced products quickly and easily, get background on producers and make direct contact with the click of a button. For farmers, FoodHub means marketing made easy— they can develop sales leads and promote their specialty products to professional food buyers interested in sourcing from within the region.

The purpose of this project was to enhance the competitiveness of specialty crop markets in Washington and Oregon by resolving distribution and business bottlenecks that limit commerce among specialty crop producers and buyers. The project's specific objectives were to:

1. Provide specialty crop producers a simple way to provide general information about their business and market themselves, their stories, and their products.
2. Provide food buyers a simple way to provide general information about what they typically buy (allowing specialty crop producers to do market research), access information about specialty crop producers, and order specialty crops based on specific requirements (e.g. certification, proximity, distribution model, and price).
3. Diversify and create new market opportunities for specialty crop producers by increasing the number and types of food buyers purchasing their products.
4. Increase specialty crop producers' total volume or dollar value of sales.

Funding for this project was provided by the Specialty Crop Block Grant Programs (SCBGP) administered by the Washington State Department of Agriculture (WSDA) and the Oregon Department of Agriculture (ODA).

While the market for locally-grown food was once largely the domain of high-end restaurants, food buyers of all types are increasingly interested in purchasing locally or regionally grown products. These larger-volume and institutional buyers —such as public schools, hospitals, food service providers on college and corporate campuses, and retail stores— now have 'authenticity requirements' in addition to long-standing cost, quality, quantity, and delivery requirements.

Washington (WA) and Oregon (OR) specialty crop producers, with their reputation for high quality and significant production capacity, are in a unique position to capitalize on this burgeoning market. However, Ecotrust's in-depth exploratory research found that key structural barriers exist that limited specialty crop producers' ability to access this market, including the following:

- Most larger-volume purchasers source product through wholesale distributors such as Food Services of America, Sysco, and other broadline distributors.
- Specialty crop producers typically cannot individually meet the minimum order (volume) and uniformity requirements of these wholesale distributors.
- It is often infeasible for larger-volume purchasers to do business outside of their current,

streamlined, supply chain model. For instance, many buyers can't receive multiple deliveries of products from individual suppliers throughout the week, or manage receipt and payment of multiple invoices from various individual producers.

- Highlighting production methods and authentic farm stories is often a key marketing strategy for specialty crop producers who seek to differentiate their products. Yet, sales to traditional wholesale distributors often result in a discontinuity of information flow, negating opportunities for many producers to receive compensation for the attributes and stories that differentiate their products.

Indeed, a product description and an SKU code are often the only information buyers have to inform their purchasing decisions. Yet in the age of product recalls, the ability to trace food back to its original point of origin is a business imperative. Moreover, being able to share the rich stories behind our food —the names of the farmers' kids, what led the farm family to switch to organic practices, how they knew when to harvest the cherries for maximum sweetness, which sweet onion producer always takes the blue ribbon at the county fair—provides a crucial competitive advantage to all those who merchandise locally/regionally grown specialty crops.

FoodHub was designed to serve a wide range of specialty crop producers in both OR and WA, and over the course of the funding period has been refined and improved based on close collaboration with these members. Ensuring efficient market access and regional competitiveness for these crops is vital to the states' agricultural economies. From the small farmers' market vendor to the many larger members of a well coordinated tree fruit association or packing house, FoodHub accommodates a wide range of specialty crop producers as well as buyers. At every scale of operation, FoodHub provides business efficiencies and marketing opportunities that were not previously available.

This project was not previously funded by WSDA. However, as noted above, this is a multi-state project serving specialty crop producers in Washington and Oregon, and it had been supported by ODA SCBGP funding through two consecutive one-year grants, in FY08 and FY09. The project has also leveraged U.S. Department of Agriculture (USDA) Rural Development funding for FoodHub research and technical development activities, through both the Rural Business Enterprise Grant (RBEG) and Rural Business Opportunity Grant (RBOG) programs. One reason that FoodHub has been so enthusiastically embraced throughout the region is that it complements, rather than duplicates, existing efforts and is well integrated with other economic development activities throughout the state.

Each grant that has supported FoodHub has a specific scope of work that is defined based on collaborative planning amongst FoodHub staff and project partners, and that responds to the particular needs of the tool's stage of development. From the beginning, FoodHub has been developed in close consultation and collaboration with colleagues and partners throughout Washington and Oregon, including government agriculture agencies, farmers and producer groups, non-profit organizations, and private businesses. Each of these partners have been actively involved in all stages of development, from early design concepts to the project's work plan and business requirement, to project evaluation and future planning. This has ensured that the project unfolds in a stepwise, strategic fashion that incrementally builds on previous work in a comprehensive overall project plan. At the same time, a critical element of FoodHub's success as a tool for specialty crop producers and buyers, as well as other users, is its ability to nimbly respond to the feedback of our members. The close involvement of partners throughout the process has provided vital feedback that informs the considered evolution of FoodHub's ongoing work plan.

PROJECT APROACH

Project activities summary

This project, *Increasing Efficiency and Market Access with FoodHub*, builds on several years of work by Ecotrust as well as numerous initial investments by individual, corporate, government, and foundation sources. As a result of this groundwork, Ecotrust had several fundamental pieces of the project in place at the time of their original proposal to WSDA: complete technical development of directory and search features, a business plan, and strong partnerships throughout the region with many other groups who were vested in FoodHub's success. Throughout the project, they built on this strong foundation through a range of activities:

- Engagement of Ecotrust's network of partners, including government and nonprofit organizations, business, professional and trade associations, and individuals.
- Close personalized work with "early adopters", such as participants in Ecotrust's longstanding *Guide to Local and Seasonal Products for Oregon and Washington*, to establish FoodHub's initial membership base representing a wide variety of users.
- Involvement of key partners and allies throughout the region in FoodHub Ambassador program, which helped to provide information about FoodHub within specific groups and geographic areas, and assistance with recruitment and registration of FoodHub users.
- Targeted outreach and marketing efforts to recruit, train, and support FoodHub members, including on-site training sessions specific to specialty crop producers and buyers, promotion of the tool at farm conferences and meetings of trade associations and professional food buyers.
- Mid-point evaluation of FoodHub's business model and strategies, incorporating an analysis of feedback and data from FoodHub's current membership and stakeholders as well as research regarding other internet business models and best practices relevant to FoodHub.
- Development of new technical features, including iterative usability testing and modification.
- Development of customer incentive and referral programs to promote user-to-user recruitment.
- Implementation of a monitoring and evaluation system, including focus groups, surveys and website mechanisms to solicit ongoing FoodHub user feedback.

During the project period, Ecotrust launched three versions of FoodHub (detailed below), each one adding improvements to existing functionalities and introducing new features. They also conducted outreach campaigns to create broad awareness of FoodHub, featuring on- and offline marketing, advertising, public relations, event sponsorship, and public speaking. A specific focus of strategic public relations outreach was an emphasis on both consumer and trade publications, to raise the profile of FoodHub's utility for specialty crop producers and buyers.

Project accomplishments and results summary

Technical development: After significant development of technical functionality, FoodHub launched in a limited release beta form on November 1, 2009. This provided invaluable user feedback on the system, much of it captured through the "feedback" button that appears pinned to the left border throughout the site in order to encourage on-the-spot user input, and Ecotrust was able to resolve system bugs, expand FoodHub's specialty crop taxonomy, and develop new functionalities as needed. At this time, they also modified the marketplace section, changed the way newcomers interact with the site, and added a blog to communicate more effectively with users and interested parties alike. The first quarter of project work set the stage for the remainder of the project, with an ongoing iterative development and evaluation process that closely involved FoodHub members every step of the way.

The full public launch of FoodHub was held in February, 2010, with a ceremonial ribbon-cutting by USDA Deputy Undersecretary Ann Wright at an event attended by over 120 Northwest food and agricultural colleagues. We debuted FoodHub Version 2.0 in September, 2010, at the Oregon Restaurant and Lodging Association annual meeting in Bend, Oregon. Version 2.0 incorporated improvements and

new developments reflecting user analysis and feedback gathered over the first eight months of the site's public use. In July, 2011, after additional user feedback and technical development, Ecotrust launched FoodHub Version 3.0 which included a wide range of improved and new features, along with a new "Associate" member category to complement existing buyer and seller memberships. (Technical development for each version of FoodHub is detailed more fully below under "Goals and Outcomes Achieved".)

WSDA's early investment has been critical in making FoodHub the effective, vibrant, thriving online marketplace it is today. **To date, there are 735 Oregon and Washington specialty crop producers registered as FoodHub members, as well as 1144 Oregon and Washington food buyers registered.** While these figures are lower than Ecotrust's original goals for the two-year project period, specialty crop user members show strong growth. The 2010 member survey found 260 Specialty crop producers in Oregon and Washington were registered FoodHub members, a number which has nearly tripled. Registered members who are specialty crop buyers have more than tripled, from 338 as of the 2010 annual survey.

These figures likely under-represent the participation of specialty crop producers and buyers in the FoodHub system. For the purposes of this grant, Ecotrust has consistently only counted specialty crop producers as those members who register as "farmers", and would thus not include a diversified dairy or a ranch producing and marketing specialty crops in addition to dairy and livestock. Today FoodHub boasts nearly 3,000 members, the vast majority of which are buying or selling specialty crops in some form.

Ecotrust is fortunate in that there are many other deeply vested partners who share a sense of responsibility for and ownership over FoodHub's success. FoodHub was created in consultation and collaboration with colleagues throughout the region, including producer groups, non-profit organizations, government agencies, and private businesses, each of whom commented on early design concepts or today work in partnership with them to disseminate the resource to their constituencies. These colleagues and allies across Washington, Oregon, and the greater region continue to help them promote FoodHub as a key tool for strengthening connections between regional food buyers and sellers.

Adding a membership category for Associate members also served to engage a whole host of project partners, including universities (e.g. Washington State University Rural Community Vitality Team), trade associations (e.g. Northwest Food Processors Association), commodity commissions (e.g. Pear Bureau Northwest), advocacy organizations (e.g. Washington Sustainable Food & Farming Network's Fresh Food in Schools project), and many others. Partners participate at various levels, with some simply joining FoodHub to take advantage of its many features, while others are deeply engaged in ensuring FoodHub's success. As but a few examples of the later, SYSCO Food Services supported the growth of FoodHub by initially underwriting memberships in the tool for Oregon and Washington producers, while Rotary First Harvest has supported FoodHub's growth by encouraging food banks and emergency food assistance organizations to use FoodHub as a tool to procure fresh fruits and vegetables.

GOALS AND OUTCOMES ACHIEVED

The project activities fell into three main categories: **technical development** (including the creation, testing, and release of new features); **outreach and promotion** (including training, member support, and marketing); and **monitoring and evaluation** (including ongoing assessment of user feedback and site functionality, research and implementation of best practices, and related adjustment of the project plan). Each of these three areas is addressed in detail below.

Technical development

The grant period encompassed significant and far-reaching developments to FoodHub, from the beta-launch through three official Version launches. Each launch incorporated additional changes, upgrades, and refinements to FoodHub based on member feedback and user testing.

Beta-launch— November 1, 2009

- **Basic member profiles:** specialty crop buyers and sellers have a direct line of sight to one another through member profiles that include business details and contact information; certifications held; products available for purchase; and pick-up, delivery and distribution information.
- **Marketplace:** with over 1,000 items in its taxonomy, FoodHub can accommodate food producers and food buyers of every scale and production type.
- **User feedback:** embedded site mechanisms encourage users to provide on-the-spot suggestions for added features or site improvements.
- **Ongoing usability testing:** although preliminary testing with initial users is complete, FoodHub plans on-going usability testing to ensure that the tool provides the features our users most need to meet their business objectives.

Version 1.0— officially launched February 1, 2010

- **Improved site functionality:** as expected, numerous system bugs became evident once FoodHub was made available publicly, and these were resolved on a case-by-case basis.
- **Expanded taxonomy:** based on the input of producers and buyers, FoodHub's taxonomy included even more Washington and Oregon specialty crops.
- **Marketplace:** new functionalities include listing Idaho markets and distributors to accommodate producers in Eastern Washington, and also allow producers to list which farmers markets they attend.
- **Multi-functional profiles:** new profile features allow users to act as both buyers and sellers so that members can maximize their use of FoodHub (e.g. bakery members who buy raw ingredients and sell finished products).
- **FoodHub blog:** through regular blogposts, the FoodHub team is able to communicate more effectively with users and interested parties alike.

Version 2.0— launched September 20, 2010

- **Marketplace:** the site's taxonomy more than doubled to over 2,000 products, meaning more regionally grown and produced food products, including specialty crops, were available at the click of a button.
- **Heightened matchmaking**: we expanded the range of customized searches, from general product descriptions to highly specific requests, and suggested potential matches to members upon login.
- **Site orientation:** an improved, more approachable homepage interface and navigation tools were introduced to do a better job of orienting new members to the site.
- **Online training:** a welcome video was added to provide new members or returning users with an overview of the system's features and quick coaching on how to get started and make the most of FoodHub's matchmaking functions.

Version 2.0 upgrade— released at FoodHub's one-year anniversary

- **New member category:** creation of Associate membership to engage commodity commissions, trade associations, logistics providers and many other associates who support specialty crop producers.
- **Free membership option:** the $100 annual fee was removed for basic membership for buyers, sellers and associates.

- **Fresh Sheets:** creation of a weekly bulletin, differentiated for buyers and sellers, emailed directly to members and also posted on the FoodHub blog. Fresh Sheets promote select specialty crop items that are either for sale or are wanted by buyers, and also feature product alerts, marketplace updates, and a weekly tip to help members use FoodHub most effectively.
- **Knowledge Base:** creation of a robust resource section where FoodHub members can access information designed to support sales of specialty crop products.

Version 3.0— launched July 12, 2011

- **Marketplace:** improved filter functionality to allow FoodHub members to sort byproduct type, distance or custom criteria with a single click.
- **Advanced Search Functionality:** search tools that allow users to search multiple variables at once and make it a snap to find local producers.
- **Training and member support:** new Step-by-Step Tutorial Videos are now available online 24-7, and a Help Desk staffed with live agents 8am-6pm weekdays, to help members take full advantage of FoodHub's cutting-edge technology to build their businesses.
- **Improved Knowledge Base:** FoodHub's online library of tools, resources and thought leadership on local food sourcing and supply chain challenges and solutions became available to the public.
- **Membership options:** to accommodate the needs of a wide range of users, three levels of membership are offered. "FastStart" membership provides a basic user profile and access to the Member Directory and Marketplace free of charge. For greater visibility and more features, members can upgrade to a monthly "Advantage" or annual "All-Access" account that allows them to enhance their member profiles and marketing strategies.
- **Marketing options:** creation of additional promotion opportunities for FoodHub members such as paid advertising, sponsored content, paid search placements, and weekly featured listings.

Outreach and promotion

Throughout the project period, the FoodHub team has worked to develop and continually improve their outreach and promotion efforts. These efforts include on-site presentations and training, online tools, video tutorials, phone support, participation in conferences and tradeshows, networking events such as Farm to Fork, individualized training in collaboration with Ecotrust's Farm to School program, direct mail, and strategic advertising and promotional placement. Outreach and promotion activities included:

- **Face-to-face outreach:** During the project period, the FoodHub team has conducted onsite presentations and trainings in settings urban and rural, small and large, for buyers and sellers, throughout Washington and Oregon.
- **Partner engagement:** Ecotrust has consistently worked with partner organizations serving specialty crop producers and buyers to mobilize their members and stakeholders to participate in FoodHub. These diverse entities from the region's food and farming community include trade associations, distributors such as Food Services of America (FSA), farmers' markets, and government agencies.
- **Conferences and events:** The FoodHub team has attended a wide range of conferences, tradeshows, and related events to raise awareness of FoodHub as a tool for regional food system stakeholders from farmers and agricultural agencies to supermarkets, food banks and schools.
- **Online tools:** Ecotrust has developed a strong set of online outreach tools that include e-newsletters, emailed Fresh Sheets, the FoodHub blog, and direct email contact with FoodHub users.
- **Social Media:** FoodHub maintains an active Facebook page (with 2046 followers), as well as a Twitter account (with 1379 followers).
- **Individual support:** The FoodHub Help Desk is staffed by core members of the FoodHub team Monday-Friday, 8 a.m.-6 p.m., accessible by phone at (503) 467-0816 or email at meet@food-hub.org.

- **Video tutorials:** Ecotrust created a series of accessible, engaging videos to assist members in getting oriented and using FoodHub. Current videos include: "An Orientation to FoodHub", "Getting Started on FoodHub", and "Filling Out Your FoodHub Profile".
- **Incentive programs:** Ecotrust has developed a number of incentive programs to encourage member referrals, membership upgrades, and paid promotional opportunities.
- **Direct Mail:** In order to address specifically identified issues in the public perception of FoodHub, Ecotrust designed direct mail campaigns targeted to food buyers and specialty crop producers in the region.
- **Earned media:** Media interest in FoodHub has been strong from its incipient stages, and continues to be robust since the launch of Version 3.0 in July. Samples of media coverage have been submitted with Ecotrust's quarterly reports, and are also available at http://food-hub.org/pages/press.
- **Success stories:** FoodHub's most effective tool in outreach and promotion is the personal success stories of current users. Ecotrust continually gathers and documents stories from FoodHub users about the connections made through the site, with a particular focus on capturing both sides of the story in the words of specialty crop producers and regional buyers. These stories and photographs are featured prominently on the site on both buyer and seller pages.

During the project period, two exciting opportunities arose which Ecotrust did not anticipate, and which helped to raise the profile of FoodHub while underlining the importance of rural development, regional food systems, and specialty crops. In 2010, Food & Farms Vice President Deborah Kane presented FoodHub at the invite-only National Nutrition Summit in Washington DC hosted by the Department of Health and Human Services and USDA, "Changing the Food Environment: Making it Happen." This summit gathered a wide range of food system leaders and stakeholders to share information about ways to improve access to healthy foods, and highlighted a number of federally-supported initiatives that support and promote a healthy food environment. Deborah presented on FoodHub as part of the "Know Your Farmer, Know Your Food" initiative. The USDA briefing was well received and included representatives from the "Food Hubs" team at USDA. Deborah also hosted FoodHub information sessions on Capitol Hill. Deborah's presentations at the Nutrition Summit and on Capitol Hill during this visit were purely for informational purposes, and were not part of any lobbying activities. Ecotrust is very much aware that lobbying would be a restricted use of federal grant funding, and no SCBGP funds were used towards lobbying activities at any point. In July, 2011, Deborah was again invited to Washington to share her work on FoodHub in a roundtable discussion hosted by the recently-established White House Rural Council.

To increase their capacity in conducting effective marketing outreach, Ecotrust invested in the customer relationship management tool, Salesforce, to be used for recruiting and managing FoodHub users. Key staff received intensive training in Salesforce, following which they worked to establish a basic system and field two successful Salesforce "test" campaigns. Salesforce will allow the FoodHub team to fine tune acquisition and engagement campaigns to maximize effective communication and marketing.

Monitoring and Evaluation

As noted above in Section 4, user feedback has been an integral part of the FoodHub development plan from the very first stages. Because FoodHub's success will be based upon its utility and responsiveness to user needs, Ecotrust places particular emphasis on continuously improving the tool in direct response to user feedback gathered. Primary user evaluation channels include periodic formal user testing of features, focus group sessions with a range of users and stakeholders, site-based feedback mechanisms, and an annual member survey. In addition, the FoodHub team conducts weekly monitoring of site usage patterns and ongoing monitoring of site functionality.

User-testing groups and focus groups with specialty crop producers and buyers in general yielded helpful feedback regarding ways in which FoodHub could deepen relationships with specialty crop producers and buyers. The "feedback" button that prominently appears throughout the site, automatically creating an email to FoodHub administrators for on-the-spot user feedback, has been an invaluable source of user input. Apart from issues related to the features, FoodHub members consistently provide feedback related to the site's fruit and vegetable taxonomy, helping us update and improve the way in which information regarding specialty crops is presented on the site. The annual member survey provides an important means to evaluate FoodHub's effectiveness overall, and to gather feedback about its usefulness in growing the specialty crop market.

Weekly site monitoring allows Ecotrust to identify usage patterns and trends and address engagement issues specifically through a variety of channels, provide key data used to develop outreach efforts and educational content. Where they observe that features are being underutilized, they create online "How To" tutorials, provide tips in e-newsletters, create phone support scripts, and develop training protocols for use during in-person member trainings.

Achieving self sufficiency for FoodHub is a long term goal. During the course of this granting period Ecotrust took steps to ensure FoodHub's long term financial viability by modifying the business model and adopted a "freemium" model, removing the original $100 membership fee that created a barrier to entry for some specialty crop buyers and sellers, and added new fee-based features described above. This change represents the first step toward fine tuning FoodHub's business model so that over time the resource is self sufficient. In the future, they intend to build upon the successful model created in the Northwest and open FoodHub membership up to a national audience. This next step allows Ecotrust to meet financial goals (drawing from a much larger potential customer base) as well as programmatic goals related to promoting specialty crops to the widest array of food buyers possible.

The overall goal of FoodHub is to provide an online directory and marketplace that makes it easy and efficient for buyers and sellers of regional food to find one another, share their stories and conduct business. In particular, FoodHub was designed to support the needs of specialty crop producers in Washington and Oregon, and enhance the market opportunities for these producers. During the project period, FoodHub has proven itself to be a powerful tool in supporting specialty crop markets within a thriving regional food system. FoodHub gathers food producers, professional food buyers, and the associations and suppliers that serve them both, in one dynamic marketplace and interactive directory.

As of this report, FoodHub boasts nearly 2,900 members, across four different membership categories. Buyer and seller members are balanced at 39% of overall membership, while associate members make up 19% of members and distributors make up 2%. But FoodHub's success can be measured in more than simply membership stats. This is readily apparent in the stories we hear from FoodHub users. Thanks to FoodHub, Sound Food in Bainbridge Island, Washington helped a retailer on the island source USDA-certified local pork from *Flying Dog Farm* in nearby Grapeview. Because of FoodHub, *Our Family Farm* in Eugene, Oregon now supplies pastured chicken to the 350 families who do their food shopping through buying club *Know Thy Food* in Portland, Oregon. And the Wahluke School District in Mattawa, Washington connected to *Bella Terra Gardens* in Zillah to provide regular deliveries of tomatoes and cucumbers for the school's salad bar this year.

Connections such as these happen on a regular basis. And in addition to delivering immediate value to Oregon and Washington specialty crop producers, FoodHub received national acclaim throughout this grant period, with Fast Company magazine naming FoodHub one of the "Ten Most Innovative Food Companies" while Treehugger.com selected FoodHub as "Best Food Business Innovation". We Are Not Ants, a book and website (wearenotants.org) devoted to highlighting promising social innovations, included FoodHub in its online directory of projects "that suggest more intelligent ways of doing things".

Most recently, Mother'sNewsNetwork included FoodHub in its Top 10 List of great tools for getting better food into schools.

Ecotrust has made measurable and significant progress towards the four outcomes defined in their project proposal. Each of these four original outcomes are included below, along with an update detailing the present status of progress towards each.

- ***Outcome 1****: Provide specialty crop producers a simple way to provide general information about their business and market themselves, their stories, and their products (GOAL). No such tool currently exists (BENCHMARK). At least 700 OR and WA specialty crop producers will have FoodHub user records in Year 1 and at least 1,400 OR and WA specialty crop producers will have FoodHub user records in Year 2 (TARGET and PERFORMANCE MEASURE). In addition, 85% of specialty crop producers surveyed will report satisfaction with the tool (TARGET) as measured by an annual FoodHub user survey (PERFORMANCE MEASURE).*

Update: FoodHub has been recognized by specialty crop producers throughout Washington and Oregon as an effective, user-friendly way to provide general information about their business and to market their products within the region. Feedback on FoodHub has been overwhelmingly positive, with specialty crop producers and buyers confirming that FoodHub provides a vital service. In year one, 64% of those surveyed reported satisfaction with FoodHub as a tool (measured by members' willingness to recommend FoodHub to a friend). As of the November 2011 annual member satisfaction survey, 70% of those surveyed reported a willingness to recommend FoodHub to a friend.

While this is lower than the goal of 85%, it should be noted that "willingness to recommend" is not the same thing as satisfaction with the tool. Ultimately, Ecotrust selected willingness to recommend as a key metric to measure over time because it represents both baseline satisfaction with the tool *plus* a level of enthusiasm necessary to recommend the tool to another person. Thus, they are quite satisfied with knowing that 70% of those surveyed indicated a willingness to recommend FoodHub to a friend. They will continue to monitor user satisfaction through ongoing feedback, annual surveys, and other means, and expect that user satisfaction will steadily increase given their dedication to improving the tool in response to member feedback. Both the first and second annual member surveys found that the feature set in FoodHub was relevant to specialty crop producers' needs, with more than 50% of members in both years indicating high levels of interest in the directory listings, search, message center, and marketplace features.

As mentioned above, Ecotrust currently has 735 Oregon and Washington specialty crop producers registered. While these figures are lower than the original goals for the two-year project period, specialty crop user members show strong growth. The 2010 member survey found 260 Specialty crop producers in Oregon and Washington were registered FoodHub members, a number which has nearly tripled. Registered members who are specialty crop buyers have more than tripled, from 338 as of the 2010 annual survey. In addition, these figures likely under-represent the participation of specialty crop producers and buyers in the FoodHub system. For the purposes of this grant, Ecotrust has consistently only counted specialty crop producers as those members who register as "farmers", and would thus not include a diversified dairy or a ranch producing and marketing specialty crops in addition to dairy and livestock. Today FoodHub boasts nearly 3,000 members, the vast majority of which are buying or selling specialty crops in some form.

- ***Outcome 2****: Provide specialty crop buyers a simple way to provide general information about their business, access information about specialty crop producers, and order specialty crops based on specific requirements (e.g. certification, proximity, distribution model, and price) (GOAL). No such tool currently exists (BENCHMARK). At least 750 OR and WA food buyers will use FoodHub to buy*

from specialty crop producers in Year 1 and at least 1,500 OR and WA food buyers will use FoodHub to buy from specialty crop producers in Year 2 (TARGET) as measured by data tracked in FoodHub user records (PEFORMANCE MEASURE).

Update: Like producers, specialty crop buyers in Washington and Oregon confirm that FoodHub is a simple, effective and convenient way to provide general information about their businesses, access information about specialty crop producers, and identify sources for specialty crops based on their specific requirements. As of this report, 1144 specialty crop buyers are conducting these activities via FoodHub. While this is lower than the target of 1,500 specialty crop buyers, Ecotrust believes that FoodHub is poised to meet and exceed this target. Just in the 6 weeks since Ecotrust submitted their final quarterly report on October 28th, the number of specialty crop buyers registered on FoodHub has increased by 45 members.

- ***Outcome 3****: Create new market opportunities for specialty crop producers by increasing the number and types of food buyers purchasing their products (GOAL). At the end of Year 1, we estimate that a minimum of 35% of participating producers surveyed will indicate increased numbers and/or types of buyers with whom they are doing business (TARGET) as compared to levels prior to FoodHub participation (BENCHMARK). At the end of Year 2, we estimate that a minimum of 60% of participating producers surveyed will indicate increased numbers and/or types of buyers with whom they are doing business (TARGET) as compared to levels prior to FoodHub participation (BENCHMARK). Performance will be measured through producer self-reported data in FoodHub user record data fields and/or on annual surveys (PERFORMANCE MEASURE).*

Update: Both formal evaluation data and anecdotal information confirm that FoodHub is indeed an effective and highly usable tool for increasing the number and types of food buyers purchasing specialty crop producers' products. Throughout their quarterly reports, Ecotrust has included quotes from FoodHub members on both sides of the marketplace that demonstrate individual success stories. These featured cases are backed up by two years of quantitative data from the FoodHub annual member survey. As of this report:

- 60% of FoodHub producers report making 2-4 new connections via FoodHub, while 20% report making 5-9 new connections and 3% report making 10+ new connections.
- 20% of FoodHub specialty crop producers report making at least one sale to a FoodHub connection, with the dollar value of such sales ranging from $250 - $20,000.

Types of specialty crop buyers who are registered FoodHub members represent a wide range, including grocers, chefs, caterers, schools and school districts, universities and hospitals.

- ***Outcome 4****: Increase specialty crop producers' total volume of sales or dollar value of sales (GOAL). At the end of Year 2, we estimate that a minimum of 40% of participating producers surveyed will indicate increased volume of sales or dollar value of sales (TARGET) as compared to levels prior to FoodHub participation (BENCHMARK). Performance will be measured through producer self-reported data in FoodHub data fields and/or on annual surveys (PERFORMANCE MEASURE).*

Update: While FoodHub sellers, as noted above, reported making as many as 2-10+ new connections on FoodHub, Ecotrust has less reliable data on the total dollar value of sales attributable to these connections because FoodHub does not track nor facilitate the actual transaction. Thus, to ascertain the degree to which FoodHub contributed to increased purchases of local product from the regional food economy, Ecotrust ended up relying on self reported data from *buyers*.

- 47% of FoodHub buyers report increases in the variety of local foods purchased.
- 41% of FoodHub buyers surveyed report increases in the overall percentage of their food costs dedicated to local food.

- 50% of FoodHub buyers report making 2-4 new connections via FoodHub, while 12% report making 5-9 new connections and 2% report making 10+ new connections.

In survey results, individual buyers offer testimony to the wide variety of successful connections and business relationship established through FoodHub. One buyer found the tool so effective that it became part of the standard sourcing plan: "I am going to assign a member of my staff to by my 'Foodhubber' and give her a monthly budget that she can (and must) spend." Another buyer spoke to the tool's facilitation of working directly with producers to farm specific crops, to the benefit of both: "I joined Food Hub in February 2011 to meet local farmers that wanted to grow peppers. I have indeed met many, and have done business with 3, including my main supplier: Barbee Orchards/Bella Terra Gardens of Zillah Washington. We selected seed together back in February and were in communication all spring, summer, and fall as the plants grew and produced over 5000 lbs of peppers; of which I bought over 3000 lbs!" A third noted FoodHub's utility in finding regional sources for crops not available locally: "I just discovered FoodHub this spring and it was very useful for us finding cabbage from Washington before it was ready in Thurston County."

BENEFICIARIES

Reviewing the project period, it is plain that specialty crop producers of all kinds in Washington and Oregon have benefited from the existence of FoodHub, as well as an immense range of specialty crop buyers. Ecotrust has found FoodHub to be particularly relevant to school food services directors who are new entrants to farm to school programming, a movement which is gathering momentum throughout the region. Additionally FoodHub serves area distributors seeking to expand their local offerings. And finally, with the addition of the Associate membership, FoodHub has proven itself to be a valuable resource for farmers markets, commodity commissions, trade association, non-governmental organizations, universities, and others who support regional food trade in various ways. From their annual members survey, Ecotrust heard from Associate members, "This site is a great networking resource for my services" and "I suggest to all my clients to become FoodHub members."

LESSONS LEARNED

A key lesson from this project is that face to face interactions remain a critical component when launching a new resource or tool.

Members received weekly email communications and encouragements from FoodHub and there was notable traction throughout the region with the site routinely in the popular and trade press. In addition, FoodHub's site architecture is generally perceived to be user friendly and intuitive. Yet time and again Ecotrust discovered that face-to-face trainings, or personal phone calls, were the most effective strategy for engaging members. There are so many distinct features within FoodHub that in-person trainings and demos, or one-on-one conversations, were the most effective means for educating members about how to maximize their use of and success with the tool. This presented challenges as FoodHub was attempting to cover two entire states with a very small staff. Thus, in addition to in person trainings they also created online video tutorials that could be more widely disseminated.

Similarly, face to face networking for members was equally effective in creating business connections. In the fall of 2011 Ecotrust hosted a wholesale-only open air market for FoodHub members and found that the face to face interactions reinforced online connections that had been made on the site in a very positive way. Technology can support real human relationships, but it will never replace them. This was a theme revisited over and over throughout the project period.

When FoodHub first launched Ecotrust imagined it would be used specifically by food buyers and sellers to connect and conduct business related to food products. Over time, it became clear that the platform could support connections of many kinds and for many different types of members. In recognition of this,

Ecotrust reoriented the membership to include not just buyers and sellers, but also associate members such as farmers' market managers, university personnel, government agencies, advocate organizations, service providers, commodity commissions and the like. Similarly, they encouraged information sharing and points of connection that went well beyond food. For example, the site is now increasingly being used to coordinate logistics and transport opportunities with members posting information about routes they run, or space availability on refrigerated trucks. Ecotrust is also very pleased to see the emergency food assistance community increasingly using FoodHub to solicit donations of fresh fruits and vegetables, an outcome they didn't foresee in the beginning.

FoodHub was not able to recruit the number of specialty crop buyers and sellers originally projected. In hindsight, the original $100 membership fee was a barrier to entry that slowed widespread adoption. W Ecotrust has since addressed the issue by changing the business model to accommodate free memberships, but the perception that FoodHub costs money to join lingers. This early misstep is demonstrative of the healthy tension between delivering immediate results and taking steps toward self-sufficiency. It also represents an original lack of familiarity and expertise with successful internet business models. FoodHub is a classic example of a social venture enterprise; we were both mission driven and business oriented. For others attempting online efforts in the future, early inclusion of advisers familiar with successful tech-oriented business models and marketing approaches would likely be useful.

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ADDITIONAL INFORMATION

In their proposal, Ecotrust outlined plans to leverage WSDA Specialty Crop funds with a total of $375,000 in funding from a range of sources including Foundations, Oregon Department of Agriculture, and program income. Matching fund totals for the project equal $392,113. Program income equals $100,000. In year one, income was generated through membership assessments and member fees. In the second year, income was derived from paid advertising, membership upgrades and sponsored search terms—all revenue streams which will contribute to FoodHub's long term self-sustainability.

FoodHub receives continued investment from a wide range of partners, including federal and state funders, foundations, and individual donors. In 2011 they received a third SCBGP grant from ODA and a grant from USDA's RBEG program to build on FoodHub's early success by expanding the FoodHub community of practice to include "Associate" members. Originally, FoodHub membership had only been open to individual buyers and sellers. Farmers' market managers, commodity commissions, trade associations, advocacy organizations, logistics providers, academic institutions, government agencies and many other service providers were left out of the conversation. The current priorities in developing FoodHub are to continue improving features used by specialty crop producers and buyers, while also engaging a tremendous range of Associate members so that they can better support and promote the development of specialty crop markets.

See **Report 12-25-B-0957 Attachment B** for the following:

1. "In their Own Words" — What members are saying about FoodHub
2. FoodHub Connections Stories
3. FoodHub photo gallery

PROJECT #5

Project Title: *GRAS^{2}P: Growers Response to Agriculture, Safe, and Sustainable Practices*

Partner Organization: Washington State Horticultural Association (WSHA)

PROJECT SUMMARY

Food safety audits are already a way of business life for tree fruit warehouses and marketing groups; it is not uncommon for a single entity to be having 3-8 audits per year. The expense is huge and the cost is paid through the sale price of fruit produced by growers. Retail pressure is building to extend these food safety audits to the growing site as well as to implement sustainability audits.

GRAS^{2}P was intended to be a proactive, shared-cost approach to prepare growers for third party audits as well as to support documentation of and continuous improvement in safe and sustainable practices used by growers to produce apples, cherries, pears, and stone fruits. GRAS^{2}P was designed to address food safety, education, and environmental concerns connected to the Washington State tree fruit industry.

Specific project objectives were to 1) assist a minimum of 350 Washington tree fruit farms become prepared for third-party food safety audits; 2) provide tree fruit growers with educational opportunities to increase their knowledge of and improve their sustainable practices in the areas of soil and water management; 3) identify/modify a grower-friendly database system facilitating organization and storage of on-farm documentation regarding safe and sustainable practices used in the orchard; 4) develop bilingual, multimedia educational materials to support both hands-on grower education and to communicate to consumers the responsible and sustainable practices applied within the tree fruit industry; and 5) extend the hard copy version of the GRAS^{2}P workbook and materials to a web-based version usable via computer and/or PDA.

All objectives were met, with the exception of objective 3. During the project, it was determined that conducting 100 additional pre-audits would be a better use of the funds budgeted for software modification/development.

PROJECT APPROACH

The following activities were conducted over the course of the project:

- Conducted GRAS2P workshops and educational trainings on food safety annually at the WSHA annual convention.
- Trained 10 GRAS2P pre-auditors per the Global Gap Internal Inspector requirements.
- Created and made available "GRAS2P Worker Orientation and Food Safety" video.
- Developed educational materials, including GRAS2P posters and a live feed (GoToMeeting) of a GRAS2P training that is also on the GRAS2P website.
- Created and made available over 500 GRAS2P guidance manuals for Washington State growers.
- Pre-audited 585 growers.
- Provided coaches and growers with technical support and training throughout this year with classes, manuals and on-site preparations for their audits.
- Conducted 5 GRAS2P training opportunities.
- Made available a web-based training guide (on the GRAS2P website) for growers to access and utilize when necessary.
- Annually published Washington State Hort Proceedings book (available online) on topics that include educational guidance such as crops/soil/water management, auditing and food safety.
- Developed curricula to teach a mass "Training for Growers" to address Global Gap, food safety, health and hygiene, water and soil management and many other relevant topics to food safety.

- Prepared templates for orchard signage needed in order to comply with food safety audits.
- Provided access to GRAS^{2}P materials and templates to growers and coaches in an electronic format that is compatible with the web and/or PDA (personal digital assistance) devices. This format was also extremely useful for GRAS2P specialists as they conducted pre-audits and worked with the growers to identify any necessary next steps.

Project partners included WSU Cooperative Extension, the Washington Tree Fruit Research Commission, WSU Tree Fruit Research and Extension Center, each of who played a large role by contributing to WSHA's food safety sessions and annual GRAS2P training seminars. NCSI Americas conducted pre-audits, and AJL and M&M Productions was contracted to create the highly successful GRAS2P video to help growers train their workers.

GOALS AND OUTCOMES ACHIEVED

WSHA contracted with the international certifying body NCSI Americas to perform pre-audits. Although 350 pre-audits were targeted as the original Expected Measurable Outcome, a total of 585 pre-audits were conducted. This increase was made possible as a result of the following two circumstances:

1) In early 2011, WSHA requested and received approval to shift funds away from planned software modification/development and instead utilize those funds to conduct 100 additional pre-audits, bringing the new target to 450 pre-audits.
2) In the summer of 2012, WSDA approved WSHA to utilize funding that remained unspent by other WSDA SCBGP FY09 projects. These remaining funds allowed WSHA to conduct an additional 135 pre-audits, bringing the total to 585.

Although not one of the original Expected Measurable Outcomes, WSHA also measured the number of warehouses/growers that participated in GRAS2P who went on to become certified. The numbers by warehouse include: McDougall (130 pre-audits), Blue Star (128), Blue Bird (200), Chelan Fruit (93) and Apple House (34). 100% of growers who received pre-audits through this project have become GlobalGAP certified.

BENEFICIARIES

Direct beneficiaries include the 585 farms that participated in this program and who have successfully passed a third party food safety audit. Many others in the tree fruit industry have also benefited as a result of the multiple trainings, outreach events, and educational materials provided through GRAS2P. Spanish speakers in the industry also benefited, as many of the materials were translated into Spanish.

In addition, the 585 participating growers received the direct economic value of the pre-audit's costs, all of which was covered through the grant. However, the economic impact as a result is much greater. All have since been deemed in compliance with required 'good agricultural practices.' Compliance means fruit from these orchards can be shipped to all retailers requiring GAP certification. In the broadest sense this means that this project has protected a significant portion of the $2.4 Billion farm-gate value of crops that are shipped annually from Washington State. That translates to over $6 Billion in economic activity statewide as 30% of Washington's production is exported, generating over $800 Million in sales revenue. Domestically, Washington is the leading fresh apple producing state and 98% of what is grown in Washington is consumed outside of the state. This also means that 98% of the revenue comes from outside of Washington; however this revenue then stays in Washington where the growers/packers/marketers are locally owned and operated. Microsoft and Boeing cannot make such a claim. Hence, the overall economic impact to the state is enormous. This grant – while relatively small in overall dollar volume – is huge in its economic impact to the state and to the growers/warehouses who are directly impacted.

LESSONS LEARNED

This project was originally planned to last for one year, however, there was not a lot of interest the first year and less than 60 pre-audits were conducted. It wasn't until the large retailer WalMart came out with their letter to growers stating that they needed to comply "with on-farm" food safety audits by July 30, 2012. A month after this letter, President Obama signed the Food Safety Modernization Act which initiated a huge rush of Washington State growers wanting help with their food safety programs and needing training. Because the GRAS2P project was in place, WSHA was ready to start training growers to become GAP certified. The shelf-ready manual was a quick and easy way for growers to understand the compliance criteria of Global GAP. Finally, the funds that were available from the grant made it very appealing for growers/warehouses to seek the guidance and training from GRAS2P.

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ADDITIONAL INFORMATION

Total match received during the course of the project totaled $143,940.
GRAS2P materials and resources can be found at: www.gras2p.com.

PROJECT #6

Project Title: *Cut Flowers: Developing Sustainable Insect Management Techniques and Marketing Strategies, Including the Underserved Minority Hmong Farmers.*

Partner Organization: Washington State University (WSU)

PROJECT SUMMARY

The National Agricultural Statistics Survey consistently ranks Washington State in the top five cut flower producing states. However these statistics primarily represent a relatively small number of large, commercial bulb producers, while a higher number of small-scale cut flower producers, including the Hmongs, underrepresented statistically, serve many of the 160 farmers markets throughout the state, as well as locally run, progressive grocery stores and florists, tourist venues such as Pike Place Market in Seattle, and other direct marketing channels like roadside stands, U-pick farms, and Community Supported Agriculture (CSA). The objective of this grant was to increase the profitability of Washington State's underserved small-scale cut flower farms, by providing sustainable pest management techniques and by developing marketing strategies to improve their profit margins.

At the beginning of this project, there was a lack of profitable market channels and understanding about the many marketing challenges facing small-scale cut flower growers in Washington State. Over the term of the grant, a wholesale growers market has been developed in Seattle by a group of small-scale cut flower growers. This grant influenced development of the wholesale market and provided encouragement for Washington State's specialty cut flower growers to write and receive their own specialty crop block grant, awarded in 2012. For Washington cut flower growers who cannot participate in the wholesale market due to geography, alternative business goals, or differences in product attributes, many other market opportunities and strategies were identified. This project aimed to address marketing challenges common to both Hmong and traditional growers, as well as challenges specific to each group, resulting in a strengthened industry.

The Hmong grow a more traditional range of cut flowers and primarily target farmers markets, which offer potential for volume sales with relatively low overhead cost of selling. Through this project, Hmong flower growers have benefited from opportunities to learn new sustainable pest management techniques and gain awareness of new selections and improved vector management through the Grower's School, on-farm visitations, and experimental demonstrations and consultation. Harvest data collected from Hmong farms and a bouquet pricing study conducted by this grant documented the price level for cut flowers at farmers markets where Hmong sell, establishing a basis for Hmong crop valuation and comparison with more profitable alternative sales channels in the future.

Prior to the wholesale growers market, Washington State's cut flower industry was associated with the Hmongs and large commercial bulb growers. Following development of the wholesale market, the industry has developed a more complete identity that includes traditional small-scale specialty cut flower growers, Hmong flower growers, and large commercial bulb growers. The wholesale growers market continues to strengthen the cut flower industry in Washington State through statewide grower education, networking, and promotion, while rapidly capitalizing on increasing wholesale buyer interest in high quality locally grown cut flowers. The growers market also plays a prominent role nationally in promotional and educational efforts on behalf of specialty cut flower growers in the United States. In the course of this grant, Washington's small-scale growers have gone from obscure and playing a minor role in Washington's cut flower industry, to national leaders!

Interest in small-scale production of cut flowers is growing but market status at the start of the project was limited to the state's 160 farmers markets, limited direct sales to florists, unprofitable sales to wholesalers,

other small volume, direct-marketing options. The Hmong and other small-scale cut flower growers, comprising a stratified specialty cut flower industry, were competing for the same limited markets in some regions of the state. Differences in culturally based production methods, pest management philosophy, and price-setting strategies further promoted schism and hindered industry growth. There was a need to identify additional market channel opportunities, compatible with the ideologies and resources of these two groups in order to support further industry growth and success. Given the current consumer interest in locally-produced products, there is tremendous potential for small-scale cut flowers to capitalize on this trend by marketing their "locally grown" flowers to both businesses and individual customers.

PROJECT APPROACH

Entomology

Become familiar with the small-scale cut flower grower industry and determine their most critical pest/damage issues. Conduct interviews to understand the current cut flower grower knowledge of damage/causative insect.

The entomology team conducted multiple interviews on-farm (15 with both Hmong and traditional flower growers) and a written pest survey at the 2011 cut flower grower's school. Results (Table 1) indicated that Washington state specialty cut flower growers believed in sustainable/organic production methods for pest management of cut flowers. Only two growers indicated they used pesticides and only one of those considered themselves a conventional grower, while the other practiced IPM. The majority of Hmong and traditional growers prefer sustainable methods of control. The Hmongs are sustainable because either they believe in the philosophy of sustainability or they lack the ability to access proper pesticide training in their language and are reticent to ask for assistance outside the Hmong community. Traditional growers not restricted by language barriers are sustainable by choice and actively search out sustainable methods and supplemental training to incorporate into their farm management. Some of the strategies mentioned by the traditional growers include:

- Select cultivars that have few insect pests and avoid those that are prone to pest problems.
- Adopt a holistic approach to cut flower growing beginning with fertile soil and grow a diverse range of plants rather than large monocultures. Many of the traditional flower growers actively practice "farmscaping" techniques.

Only one grower interviewed was certified organic and recently had given up her certification. Others opt for a sustainable approach and indicate that the economic return for certified organic production is currently not enough incentive to endure the process of certification. Despite their preference for sustainable approaches, when asked, growers readily admitted they would use insecticides when appropriate. Of the seven survey respondents that provided information on cost of annual pest methods, only one indicated pest control inputs reached 10% of their annual budget, while all others indicated less than 5%. Four major cut flower pests were listed: aphids, slugs, thrips and spider mites. Eight minor pests were reported: earwigs and cutworms were mentioned multiple times (4 and 2 respectively) while others were mentioned once. Two of the minor pests listed were not cut flower pests, carrot rust fly and pear slug suggesting their farms were diversified and their income not totally dependent on cut flower production.

While the grower school survey respondents were relatively few in number, nevertheless they revealed prospective cut flower growers were not adequately trained in pest identification. The cut flower grower's school included training in basic pest management of cut flowers. Survey results of these cut flower growers did not include lygus bug or western spotted cucumber beetle. In contrast with traditional non-Hmong cut flower growers, on-farm surveys including Hmong farms revealed western spotted cucumber beetle and Lygus to be serious pests. Large populations were observed on two Hmong farms compared with traditional cut flower growers farms. Conversations with them indicated they were aware

that Western spotted cucumber beetle (WSCB) were more attracted to light colored flowers but had no knowledge of how to control them. Higher populations of WSCB on Hmong farms may be due to their tendency to intercrop flowers with vegetables, including cucurbits, which are highly attractive to cucumber beetles. Hmong and traditional cut flower growers indicated they were concerned about the following pests: aphids, thrips, *Lygus* and western spotted cucumber beetles with additional occasional pests: grasshoppers, leafhoppers, weevils and spider mites. Aphids, thrips leafhoppers are plant virus vectors making control a priority particularly when plants such as dahlia are kept for longer than 1 season.

Table 1. Pest Survey, 2011 Grower's School

County	Acreage	Major pest	Host plant	Other pests	Pest management philosophy	Annual pest $
Pierce	9		dahlia	earwigs	organic	2-3%
Skagit	100	aphids	cherries	voles	organic (certified?)	
Skagit	2	aphids slugs	dahlia	earwigs	sustainable	
Benton	6				conventional	
Island	10	slugs		earwig, pear slug		<$150
King	7.5	aphids slugs	hellebores roses		cultural practices	
King	2	aphids, slugs	nasturtium bee balm lupine			not much
		aphids, slugs	Lupine thillictrum hosta		nothing	
King	18				Cultural practices	0
Thurston	3	Thrips aphids, spider mites		cutworms, cabbage looper, carrot rust fly	Organic (certified?)	
King	5	thrips aphids, slugs			cultural practices	<5%
King	5			deer	cultural practices	5-10%
Island	16	thrips	dahlia gladiola		Cultural practices (trap crops)	<1%
Whatcom	Park	thrips, aphids spider mites, slugs		Leafminer earwigs cutworms	IPM	
Clark		aphids, spider mites, slugs			organic	

Results of the insect pest surveys and interviews indicated that experienced commercial traditional growers had either adequate knowledge of pests and their control or how to access information. New growers lacked some of the basic information required for successful pest management in cut flower production but like the more experienced traditional growers, were more likely to seek help. The Hmongs could often identify the causative insect but had little knowledge of how to control them and were severely challenged when it came to knowledge of insecticides and their proper use. Language limitations particularly of the elder growers prevented them from the testing process required for obtaining a commercial applicators' license. Bee Cha explained the Hmongs lack a written language and

require an interpreter for translating and training. It is not clear if they read English adequately to interpret insecticide labels but empty pesticide containers seen at their farms indicated they used "over-the-counter" insecticides. Comparison between active ingredients and insect pests observed at some of their farms also indicated they lacked expertise in selecting effective insecticides and were unclear on distinction between conventional and organic approaches.

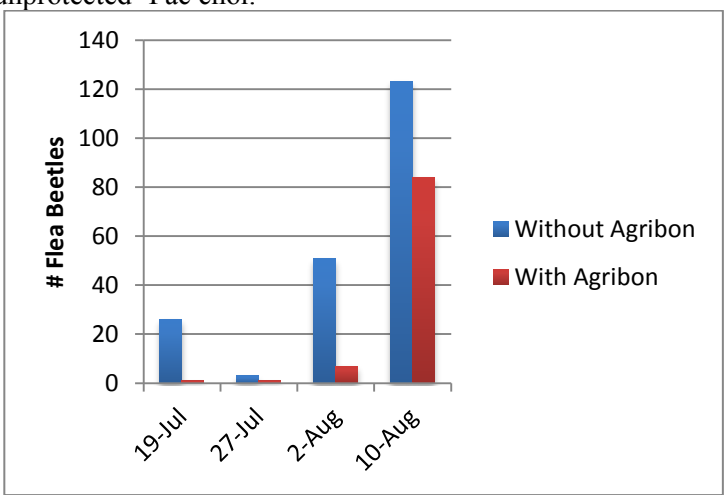
Hmong bouquets show more insect damage than those of traditional cut flowers; however the market venues for Hmong flowers are more tolerant of insect damage. While use of proper pesticides could improve quality of their cut flowers, it may not be economically advisable. Their improper selection of insecticides is a more serious issue. It may also indicate they lack the knowledge to properly handle, apply and store insecticides. Even "over-the-counter" insecticides are dangerous if improperly used. Observance of empty containers around their farm bodegas suggests they do not know now to properly dispose of insecticide containers. The Hmong community should be provided with safety training in proper selection and use of "over-the-counter" insecticides if they choose to use them, to prevent injury and insect resistance development. This training is beyond the scope of this grant but should be investigated.

Test the efficacy of vegetative architecture, row covers, reflective mulch and trap crops for control of virus vectors and flea beetles. Field test select row covers, reflective mulch, trap crops, vegetative architecture.

Row Covers

Small-scale cut flower growers, particularly the Hmongs, often interplant with vegetables. This can result in a greater diversity of arthropods, both pests and beneficials. To address this we tested sustainable methods to prevent insect damage to vulnerable vegetables, particularly Asian style vegetables. Crucifer flea beetles, *Phyllotreta cruciferae*, are a pest of crucifers such as Asian leafy vegetables and some cut flowers, including Nasturtium and Stock. We tested the commercial row cover, Agribon®. This was found to be highly effective for protecting Asian vegetables such as 'Pac choi', if it is securely in place prior (preventing beetles from crawling under row covers) to crucifer flea beetle activity. Results of the second test (Fig. 1) show Agribon was effective until 3 August. Efficacy ended 3 August when flea beetles gained entry under the Agribon. Treated rows protected with Agribon resulted in 1/3 less flea beetles than rows without Agribon.

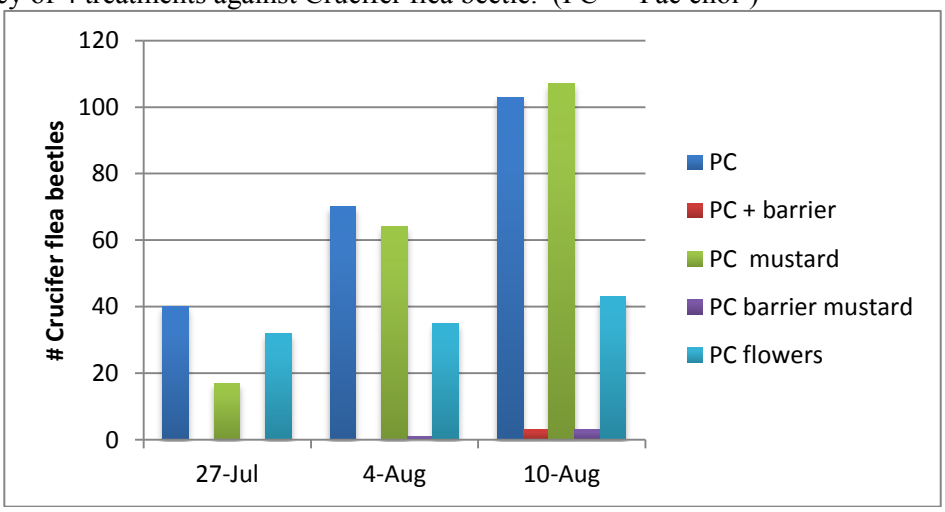
Fig. 1. Comparison between number of crucifer flea beetles on 'Pac choi' protected with Agribon to unprotected 'Pac choi.'



Trap crops, visual barriers and plant architecture
Four treatments were tested for efficacy against the crucifer flea beetle (Fig. 2). The Asian vegetable, 'Pac choi' was selected for testing the following 4 treatments: 1. Surrounded by freeway barrier. 2. With freeway barrier and the trap crop, 'Golden mustard' planted on either side of the barrier. 3. Only the mustard trap crop on either side of the 'Pac choi'. 4. Using the architectures of short and tall cut flowers (snapdragons and dianthus) on either side of 'Pac choi' as a visual barrier. Figure 2 compares the different treatments for the second 2010 field trial.

Results of the 4 treatments in the second field trial arranged in order of most effective to least effective: 1. 'Pac choi' with freeway barrier. 2. 'Pac choi' with freeway barrier and the trap crop, 'golden mustard'. 3. 'Pac choi' with 'golden mustard'. 4. 'Pac choi' with annuals. These field trials differed from actual 'Pac choi' commercial plantings in that the trials were allowed to run beyond the harvestable date of 'Pac choi.' The results of the second trial are in agreement with the first field trial. The Hmongs indicated that use of freeway barrier for protection of Asian vegetables was feasible at the current cost of $20/100.'
Results of the metallic mulch as a deterrent to thrips did not show convincing results to offset the price of the mulch.

Fig 2. Efficacy of 4 treatments against Crucifer flea beetle. (PC = 'Pac choi')



Western spotted cucumber beetle and Lygus bug field trials
Western spotted cucumber beetle (WSCB), *Diabrotica undecimpunctata* and lygus bugs were identified as the most damaging pests of specialty cut flowers in western Washington. Both pests cause economic damage to flowers. Western spotted cucumber beetle chews holes in the petals and frass left behind in the flowers is difficult and time consuming to remove, making them unmarketable. This is particularly noticeable in light-colored flowers, especially white dahlias (Fig. 3). Lygus bugs inject saliva resulting in misshapen unmarketable flowers (Fig. 4).

Fig. 3. WSCB in white dahlia with feeding damage.

Fig. 4. Dahlia with Lygus damage.

Greatest damage occurs during the bud stage. Field tests were performed in 2011 and 2012 (Figs. 5 &6). The 2011 field trials tested commercial chemicals available to growers possessing a pesticide applicator's license (Table 2).

Although three species of Lygus are found in Washington State, 2 species were collected and identified, *L. lineolaris* and *L. hesperus*.

Three chemical products (Table 2) were selected for testing because they were inexpensive and easily attainable if the grower has a commercial applicator's license. Of the three, only Conserve® is a biorational. Results indicated Talstar was most effective at controlling lygus (Fig. 5) followed by Conserve and malathion the least effective (Table 2).

Treatment	Average Lygus/plot	SE
Malathion 8EC	10.0	5.58*a*
Conserve SC	6.8	3.20*a*
Talstar 1	2.8	0.63*b*
UTC	12.8	3.99*a*

Table 2. Efficacy of select chemicals in controlling lygus bug.

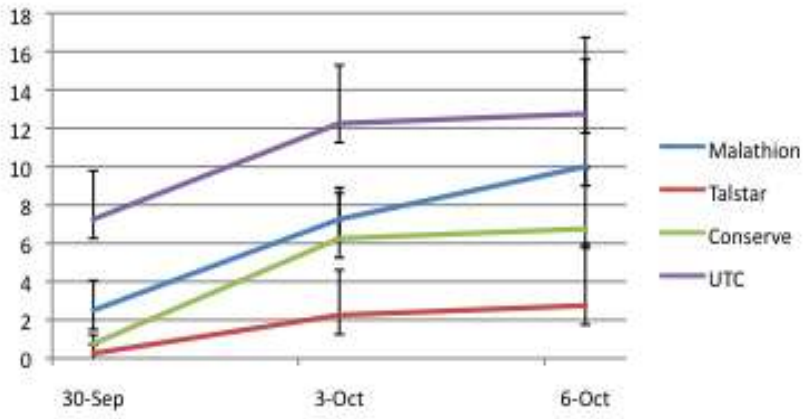
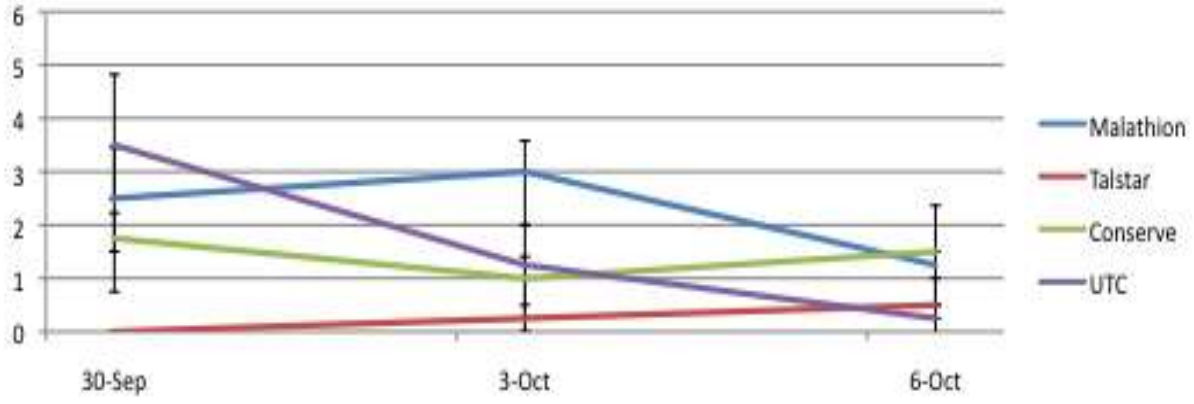


Fig. 5. Field efficacy of select chemicals for controlling lygus bug.

Only Talstar effectively controlled WSCB in the field (Fig. 6). Malathion and Conserve performed no better than the control (Table 3).

Fig. 6. Field efficacy of select chemicals for controlling WSCB.



Treatment	Average SCB/plot	SE
Malathion	2.3	0.52*a*
Conserve SC	1.4	0.22*a*
Talstar 1	0.3	0.14*b*
UTC	1.7	0.96*a*

Table 3. Field efficacy of select chemicals in controlling western spotted cucumber beetle.

Means ± SE followed by the same lowercase letters in columns are not significantly different according to ANOVA and Tukey's HSD. ($P < 0.05$).

Because the Hmongs rely on "over-the-counter" insecticides for pest management, in 2012 we selected a range of products, representing 4 IRAC (Insect Resistance Action Committee) mode of action classes, suitable for controlling WSCB on an organic farm and a conventional Hmong farm or any flower farm where the grower is restricted to or prefers to use "over-the-counter" chemicals. Results at 1 DAT indicate that the "over-the-counter" insecticides have at least short-term efficacy on the target insect, western spotted cucumber beetle (WSCB) (Tables 4 & 5, Figs. 7 & 8). Both farms showed an increase in WSCB in the untreated plots from the pre-count to the 1DAT reading, with the greatest population increase in the organic plot. This is consistent with an overall smaller population in the conventional farm based on pre-counts at both farms (66 -conventional farm and 42 organic-farm). 1 DAT results from the conventional farm show suppression of WSCB in all treatments with the highest reduction (100%) in the Pyganic and malathion plots, followed by spinosad, which decreased the resident population by 50%. At the organic farm all three OMRI approved products also suppressed the resident populations but none of the products resulted in 100% decrease. On this farm the spinosad treatment performed the best with a 65% reduction in beetles present. The conventional farm showed an overall decrease in resident population of WSCB by 40% and the organic operated farm showed an overall decrease by 15%.

At 3 DAT overall beetle populations are decreasing. This could indicate the beetles are nearing the end of their second generation. Western spotted cucumber beetle passes through 2 generations in the summer months in western Washington, with a small peak in May and a larger peak in August. During this time, dahlia buds should be protected since injury can result in unmarketable flowers. Damage occurring as the flower opens is less severe and damaged petals may be removed. Efficacy for the "over-the-counter" insecticides began to drop off after 3DAT and before 5 DAT for all products. Likewise all treatments were similarly effective but with a fairly short 5-day residual. Relying alone on insecticides will require frequent retreatment and diligent rotation between mode-of-action, "over-the-counter" insecticides, for the duration of the blooming season. For the Hmongs, lacking long-term residual insecticide efficacy, use of insecticides alone will be costly for the 4-month vulnerable period. Some of the recommended cultural and biorational methods for controlling WSCB such as delayed planting, floating row covers and use of commercial beneficials are not feasible since planting cannot be delayed, row covers may damage the flowers and purchasing insectary beneficials are not an economic alternative. Since planting vegetable crops along with flowers is a Hmong tradition, use of squash as a trap crop could be investigated as a more sustainable way to decrease cut flower production costs. Increasing picking frequency will reduce the number of buds damaged. Additionally many of the above insecticides will also help reduce lygus bug damage.

Hmong conventional farm white dahlias	5 minute/plot Beetle Pre-count 6 Aug	1 DAT 7 Aug	3 DAT 11 Aug	5 DAT 13 Aug
UTC	12	18	3	12
Bifenthrin	8	5	0	2
Malathion	9	0	2	1
Pyganic*	10	0	0	3
Spinosad*	12	6	1	4
Neem*	6	5	0	1
Esfenvalerate	9	6	2	1
Total	66	40	8	24

Table 4. Cucumber beetle field trials on a Hmong farm using conventional, "over-the-counter" insecticides. * organic products.

Hmong organic farm white dahlias	Pre-count 6 Aug	1DAT 8 Aug	3 DAT 11 Aug	5 DAT 13 Aug
UTC	7	33	10	8
Pyganic	4	1	4	8
Spinosad	17	6	3	7
Neem	8	2	7	8
Total	36	42	24	31

Table 5. Cucumber beetle field trials on an organic Hmong farm using "over-the-counter" insecticides.

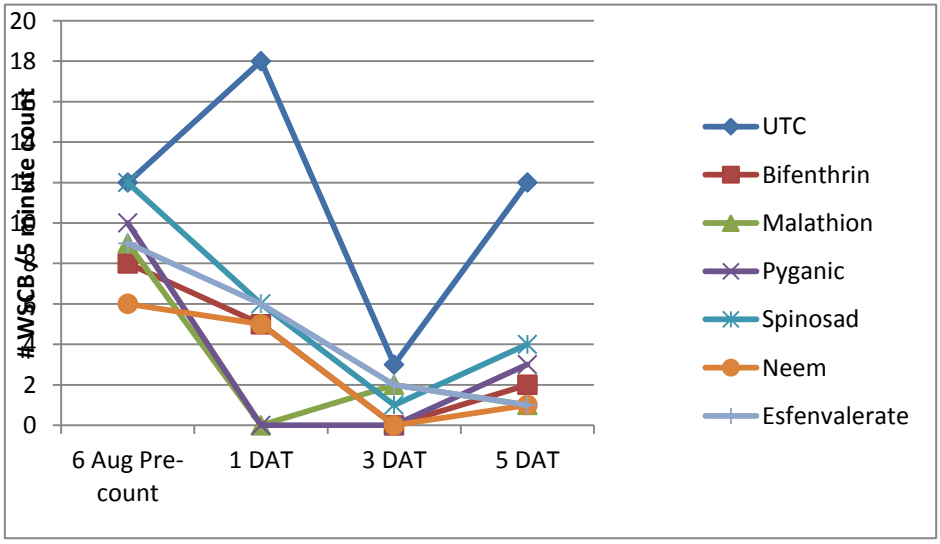


Fig. 7. Residual activity of WSCB insecticides up to 5 DAT on a Hmong conventionally operated farm.

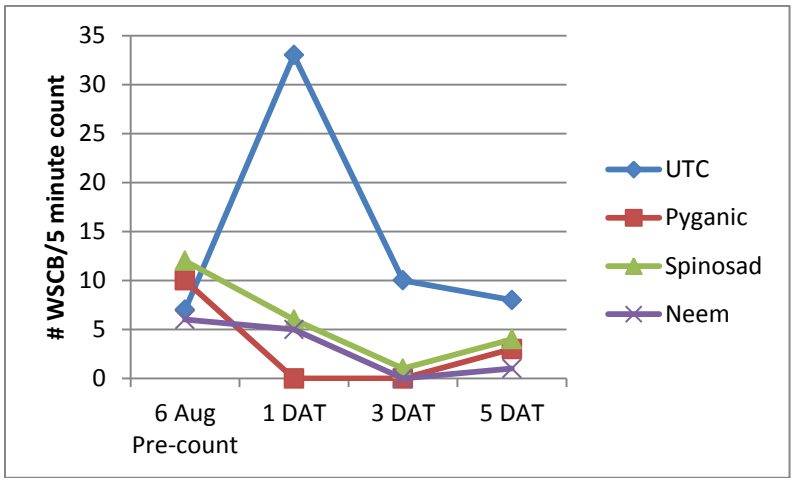


Fig. 8. Residual activity of WSCB insecticides up to 5 DAT on a Hmong organic farm.

Since the field residual tests on these two pests at the Hmongs in Autumn 2011, several traditional growers have reported similar problems with these insect pests. Information regarding control of these cut flower economic pests based on this WSDA Specialty Crop Block research was provided at both jointly sponsored specialty cut flower grower's schools and at the ASCFG (Association of Specialty Cut Flower Growers) National Conference and Trade Show, Tacoma, Washington, 12-14 November, 2012.

A Specialty Cut Flower Growers School
WSU in collaboration with The Seattle Wholesale Growers Market presented two cut flower grower schools, 2011 and 2012 at WSU NWREC. The two-day classes targeted beginning and intermediate flower farmers in the Pacific Northwest but attracted out of state participants. Local flower farmers Diane Szukovathy of *Jello Mold Farm* and Vivian Larson of *Everyday Flowers* were joined by third generation specialty cut flower grower, Joe Schmitt of Fair Field Flowers, Madison Wisconsin. Focus was on sustainable growing techniques, a mandate of The Seattle Wholesale Growers Market and included both classroom and on-farm instruction to help students begin growing and selling high quality cut flowers. An industry panel discussion addressed a wide variety of questions from the participants. The grower school topics included:

- Business planning basics
- Plant selection
- Growing techniques
- Pest management strategies
- Specialized equipment
- Quality postharvest care
- Season extension
- Marketing opportunities

The 2011, specialty cut flower grower's school was held on 18 and 19 February. The school drew 50+ participants from 11 Washington counties and states as far as Pennsylvania. The workshop was advertised in newspapers and online. Attendee questionnaires indicated 100% positive responses with requests for an annual workshop.

Other responses suggest that small farmers in Washington are looking for ways to generate income and are specifically interested in specialty cut flowers, primarily because they are a non-food crop and under less strict regulation.

Although the Hmong cut flower growers were offered scholarships and free transportation, no Hmongs attended the 2011 growers school. Three Hmongs were participants in the 2012 growers school. Bee Cha's translation and encouragement marked the first formal co-attended training by Hmongs and traditional cut flower growers (Fig. 9).

Forty-seven participants representing 10 counties (3 eastern Washington), 3 states and 2 countries attended the 2nd Cut Flower Growers School 24 -25 February 2012 at WSU NWREC. Beverly Gerdeman presented the section on cut flower pest management and Vicki McCracken and Jennifer Ringwood conducted an interactive economic marketing survey.

Fig. 9. WSU Hmong Program Coordinator and collaborator, Bee Cha (center), assisting 2 Hmong flower growers attending the 2012 specialty cut flower school.

All 47 Growers School participants took part in a 15 question marketing survey designed to better understand participants' current or planned cut flower marketing activity and information needs. Half of participants (24 growers) had no prior experience selling cut flowers and little experience growing cut flowers. Participants indicated they planned to sell cut flowers as primary or supplemental income, or to diversify their farm business. Farmers markets, on-farm sales, and florists were the top markets where growers planned to sell in the short term, but many hoped to eventually sell mostly through the Seattle Wholesale Growers Market cooperative or on-farm sales. Time and labor to grow, followed by market access and financial resources were the top challenges facing participants. Forty percent of participants were interested in learning to develop a marketing plan. The survey results were used to design a more extensive growers survey and to guide content for the marketing strategy options memorandum to growers.

Economics

The Cut Flower Industry: Overview (See Appendix A for additional detail.)
Activity: Background research on Washington State and the greater US cut flower industry using USDA data, global trade data, industry reports, trade articles and academic journal articles.
Results: The most dominant trends affecting domestic cut flower growers in recent decades are 1) increased volume and price competition from imported cut flowers, 2) increased sales of cut flowers through general retailers (e.g. grocery stores), and 3) increased sales of cut flowers through internet services. Although different sources disagree about the exact import share, it is generally estimated to be between 70-80 percent with Columbia, Ecuador, and Canada being the top three supplying countries. Increasingly the most popular imported flowers (roses, carnations, chrysanthemums, alstroemeria, tulips, lilies, and mini-carnations) are being sold through mass merchandisers, supermarkets, wholesale clubs, etc. Domestic growers are instead focusing on growing specialty cut flowers where they have a competitive advantage.
Recommendations: Domestic growers should (and are) focusing on specialty cut flower production. Creative marketing strategies and product quality differentiation is needed to reach customers in alternative outlets other than mass merchandisers, etc. that rely on cheap, imported flowers.

The Cut Flower Industry: How Cut Flowers are Bought and Sold in Washington State
(See Appendix B for additional detail.)
Activity: More than 15 interviews cut flower industry members including representatives from 3 floral wholesalers, 1 growers cooperative wholesale market, 3 local grocery chains, 3 national grocery chains, 2 studio florists, 1 distributer, and 1 floral design educational institution.

Results: Floral wholesalers buy locally grown flowers, but at lower prices and higher volume. Some are specifically interested in working with local growers, others have little/no interest. National, mass merchandising grocery stores primarily source flowers through their own national distribution systems or through large, local wholesalers and do not have the flexibility to work with local growers. Values-driven retailers (oriented toward organic, "natural", local, or other specialty products) were already sourcing some locally grown flowers or seemed interested in doing if growers were able to meet certain requirements. Studio florists are interested in local sources for high quality, unique flowers, but still need to purchase flowers from traditional floral wholesalers because of price, volume, and product consistency. Themes about local flowers emerged from all industry interviews, including:

- Definitions of cut flower quality differed greatly by flower type, but freshness, correct stage of harvest (bloom stage), long stem length, and lack of blemishes were most commonly mentioned
- Locally grown flowers are perceived to be fresher and generally of good quality, but challenges to sourcing more locally grown flowers included seasonality, unpredictable harvest schedule, correct varieties for cut flower use, and lack of growers' compatibility with retailers' purchasing systems.
- In general, the end consumer is not requesting locally or sustainably grown flowers at the businesses interviewed (grocery stores, florists, and wholesalers/distributors).

Recommendations: Some Washington businesses are sourcing (or are interested in sourcing) locally grown flowers and are models of innovative relationships between growers and businesses that purchase flowers. Growers with high quality flowers, as defined above, may be successful in securing profitable business relationships by seeking values-oriented grocers, wholesalers, and florists, or working collectively with other growers in a formal way (such as the Seattle Wholesale Growers Market Cooperative) or informal way to form cooperative marketing groups to buffer the challenges of working with individual local growers (e.g. seasonality, volume, distribution, etc.).

Cut Flower Growers in Washington State (See Appendix C for more detail.)
Activity: One growers survey during the 2012 Specialty Cut Flower Growers School (47 respondents) and one online survey of cut flower growers across Washington State (73 respondents).
Results: Growers School survey: Over half of respondents were new to growing and marketing cut flowers (57%). Most growers (52%) intended to market flowers for primary or secondary income; 26% planned to use flowers to diversify a current farm business. As a group, growers most commonly sold or planned to sell flowers through farmers markets, on-farm or U-Pick sales, direct to florists, or through subscription services. In the long-run, many growers hoped to sell primarily through the Seattle Wholesale Growers Market (27%) or through on-farm or U-Pick sales (27%). Participants felt competition from imported flowers and customers' low price expectations were the greatest challenges facing all Northwest-grown cut flower growers. WA Cut Flower Growers Survey: Seventy-three Washington growers partially or completely responded to the survey; 74% are current cut flower growers, 22% are future cut flower growers, and 4% are former cut flower growers. Fifty-five percent of growers used less than 1 acre for commercial cut flower production, while 19% used between 1 and 3 acres, 20% used 3 to 6 acres, and 6% reported using 6 or more acres. Current growers sell through a wide variety of channels. Only five growers (10%) sold all of their products through wholesale channels while 26 current growers (52%) only sold through direct marketing channels. The most commonly used direct marketing channels were farmers markets (46%) and do-it-yourself wedding/event sales (44%). The most commonly used wholesale channel was sales to florists (33%). Most growers identified consistent sales (83%), fair price (73%), and "relationship with buyer" (67%) as the most "important" factors in deciding where to sell flowers. As a group, growers "usually" or "always" used pricing strategies based on comparison with other growers' prices (79%), setting high prices initially and adjusting by sales (43%), and cost of production (42%). Only six responding growers (13%) depend heavily on cut flowers sales for their total household income. Nearly half of growers (46% or 21 growers) derive 25% or less of their household income from farm income, of which cut flowers may only be a small part. Growers were asked why they

sold (or planned to sell) cut flowers and were allowed to identify multiple motivations; 52% said "supplemental income", 26% said "primary income", and 47% said "to diversity my farm business."
Recommendations: A major finding of the growers' surveys was growers' objectives for their cut flowers businesses and their current or planned marketing channels. There appears to be a natural stratification of growers in terms of goals for their cut flower sales. A minority of growers in our surveys rely on cut flower sales as primary income, while the majority sells flowers as a side business or within the context of a food-growing farm business. Profit motivations, production practices, and preferred marketing channels may differ significantly depending on how important cut flower sales are to the grower. Growers will need to differentiate themselves from other local growers to appeal to their desired markets, especially in outlets with higher quality standards and profit potential. Many growers plan to or are pursuing on-farm sales and direct marketing as their primary sales channels; these channels are less formal and have more flexible quality requirements than sales to florist or specialty grocery stores. Analysis is on-going to determine characteristics of different grower groups in terms of farm business goals, product and production practices, and marketing strategies.

Hmong Flower Farmers, Farmers Markets, and a Bouquet Pricing Study (See Appendix D for more detail.)
Activities: Farmers market bouquet pricing study and Hmong flower farm harvest data, designed to document the price level for fresh cut flowers (sold as mixed bouquets) at farmers markets in the Seattle area and estimate per stem retail prices to help Hmong farmers estimate crop values for insurance purposes and baseline comparison for considering alternative market opportunities.
Results: The relative price level of cut flowers at farmers markets was evaluated using pricing information from the Seattle Wholesale Growers Market Cooperative (SWGMC). It is very important to note that we are not assuming the flowers at the farmers markets in this study and the flowers at SWGMC are equivalent products. The bouquet pricing study did not include any quality assessments or other subjective comparisons between cut flower products. The average price of a mixed bouquet at a farmers market was 53% of the price of a bouquet with the same number of stems and flower types at SWGMC. Farmers markets with a higher concentration of cut flower vendors (all Hmong vendors, in this study) had a lower average cut flower price level. The data documents the potentially low profitability situation at farmers markets that is frustrating to both the Hmong and other growers.
Recommendations: The pricing study establishes very important baseline data for the price level of cut flowers at farmers markets and per stem prices that Hmong farmers can use to evaluate profitability, estimate crop values for insurance purposes, and consider alternative market options in the future. Price and value are determined by many factors, including what customers are willing to pay for product attributes that they value in a product (e.g. longevity, convenience, volume, quality, etc.). Hmong bouquets are very popular at farmers markets, but the current low prices are a challenge for Hmong farms. Product quality assessment was not a part of this pricing study; in order expand sales beyond farmers markets Hmong farmers, researchers, and industry experts must objectively assess current flower quality characteristics. Many Hmong farms grow good quality flowers and have clear potential to move into other markets, but Hmong growers would need to overcome perceptions about the quality of their flowers by demonstrating adoption or improvements in flower quality (e.g. longevity, stage of harvest, stem length, pest and disease management, etc.) and postharvest management (e.g. sanitation for tools, buckets, and water, temperature control, etc.) in order to establish buyer confidence and receive potentially higher prices outside of farmers markets. Using our baseline data, future research could facilitate consultations with alternative market buyers and floral experts to objectively and specifically identify reasonable changes to production and postharvest management that would prepare Hmong farmers to sell cut flowers in other markets, if that is a goal for their farm business.

Cut Flower Consumers in Washington State
Activity: Online survey of 500 consumers in Washington State (general population, over age 18). The survey was written by the economists and was managed by the online research company, Qualtrics and its partners.
Results: The survey topics include cut flower purchasing habits (preferred location, important flower characteristics, reason for purchase, spending levels, frequency, etc.), food purchasing habits (similar questions in order to relate food and floral purchasing behavior, since locally grown food is a highly related market trend), opinions about cut flowers, and knowledge of plants, cut flower care, and imported cut flowers. Data collection is on-going, but 400 complete responses were recorded as of 12/13/12. Select preliminary results based on these 400 respondents are included here. Sixty-one percent of Washington consumers purchased cut flowers in the last 12 months for either personal or gift use. Grocery stores, supermarkets, supercenters, and wholesale clubs were the most common places people typically bought flowers (69-84%), but approximately 53% of people have purchased flowers from one or more direct marketing outlets, with farmers markets and roadside stands being the most common. Fifty percent of respondents said they knew where to buy locally grown flowers in their area; 70% said they would buy locally grown flowers if they were readily available. When purchasing cut flowers, the most important characteristics identified from a list (in no particular order) were "available where I usually shop", "color", "fragrance", "longevity (vase life)", "price", and "quality of blooms and foliage."
Recommendations: Once the survey is completed, more extensive analysis will be done on different consumer segments within the 500 respondents to determine what marketing messages, sales channels, and product attributes consumers will respond to most favorably when marketing locally grown flowers. Preliminary results suggest that consumer awareness about locally grown cut flowers is modest, but many people are interested in buying locally or domestically grown flowers, or flowers that "help keep farmers in business."

The role and contributions of project partners were as follows:

***Entomology*:** The entomology team facilitated entomology field research planning, implementation and analyses of data. The team identified the major insect pests of specialty cut flowers in Washington state, western spotted cucumber beetle and Lygus bug. Results provided information on efficacy of biorational/sustainable approaches, such as usefulness of plant architecture and road barriers to minimize pest infestation and field-testing of both commercial and "over-the-counter" insecticides to control major flower pests in western Washington. Information was presented to two cut flower grower's schools. The entomology team planned, co-hosted and participated in the 2011 and 2012 grower's schools.

Marcia Ostrom and Bee Cha of the WSU Small Farms Program have been instrumental in facilitating contact between Hmong farmer collaborators and researchers, allowing on-site farm visits and interviews. Bee provided transportation and instantaneous English/Hmong translation for Hmongs attending the cut flower grower's school.

***Economics*:** Diane Szukovathy and Dennis Westphall (Jello Mold Farm and founding member of the Seattle Wholesale Growers Market Cooperative) provided critical insights and feedback during numerous stages of the economics research activities. The Seattle Wholesale Growers Market Cooperative also provided valuable technical information and assistance. Bee Cha, the Hmong Outreach Coordinator in Carnation, WA was instrumental in arranging harvest data collection, explaining challenges facing Hmong farmers, arranging farm visits, and providing input for the bouquet pricing study. Business people in the Washington cut flower industry were generous with their time in granting interviews and sharing information about the workings of their business. Numerous growers and other researchers reviewed surveys for technical accuracy and content, and have offered assistance in distribution results through professional networks.

An abbreviated description of the economics/marketing activities and most significant findings and conclusions are included here. Appendices corresponding to each activity are included at the end of the report and contain more detailed summaries and visual representation of results.

GOALS AND OUTCOMES ACHIEVED

Entomology

The following Expected Measurable Outcome was related to Entomology: **A 50% increase in cut flower growers adopting one or more of the new pest management strategies.**

Although the efficacy of several sustainable approaches to pest management was tested in cut flowers, the team failed to detect an increase in growers adopting any of these strategies at this time. The proposal was written based on limited knowledge of the pest issues and grower challenges of both the traditional and Hmong growers. Following this research it is clear that the projected measurable outputs were off-target. The research instead revealed a complex group of factors contributing to each group's pest management approaches and why the above measurable inputs were not achieved.

Initial surveys to understand the major pest issues indicated the traditional growers, non-Hmongs, considered lack of market as their primary concern over that of pest issues, commenting "We can grow the flowers, it's the market we need." (conversation with Gretchen Hoyt, Alm Hill Gardens, 2010). Additional interviews with other traditional cut flower growers further substantiated Hoyt's statement. These cut flower growers ranged in size from 2 – 100 acres (n = 12), 75% of them represented 10 or less acres, similar to statistics provided by our economics team. Smaller sized acreages are more manageable because of logistics and time requirements therefore amenable to non-chemical approaches, allowing more flexibility in pest management options. In addition, Washington's traditional growers are interested in promoting sustainable management, enhancing quality of their cuts and providing a competitive edge over cheaper imports, as evidenced by the Seattle Wholesale Growers Market mission statement. Nevertheless, we performed research on a variety of sustainable and conventional methods (Project Approach section 4) and presented results of this at the cut flower growers' school and the national ASCFG convention. This information will be available for growers on the project website.

Hmong flower farms are primarily operated by older farmers, constrained by language and less apt to seek assistance. In contrast with the traditional growers, Hmong on-farm visits revealed larger populations of pest insects, in part because the Hmong farms visited were larger acreages than the average traditional growers farms, typically leased, with larger monoculture plots attracting more pests. Use of sustainable approaches, such as metallic mulch and road barriers are costly and less effective on large acreages unless plots are subdivided. Subdivision creates logistic problems for mechanical use, required by larger acreages such as plot management where rows are hilled by tractors and rototillers are commonly used for weed control. Efficient use of this machinery requires long unbroken plots or at least plot sizes and configurations that allow a tractor to pass around/through without damaging plants.

Other approaches such as use of trap crops may be unrealistic, requiring spraying trap crops with insecticides to prevent insects immigrating to flowers, additional work for laborers already challenged to meet harvest dates. Many traditional growers can pick early and often (cultivar dependent) but without a walk-in-cooler, Hmongs' picking schedule is not as flexible. Hmongs were observed to overplant to compensate for anticipated insect damaged flowers resulting in a large volume of wasted flowers particularly of high-demand varieties such as white dahlias, which growers recognized as more attractive to insects such as the Western spotted cucumber beetle.

Pest management for traditional growers is driven by their target market, with a high-level, knowledge support system. The support includes university extension, researchers and yearly growers' schools offered by The Seattle Wholesale Growers Market Cooperative whose mandate encourages sustainable

approaches. Challenges for the Hmongs are greater, due to their cultural/language constraints. Their knowledge support system is limited. While university support exists, the Hmong growers often do not regularly seek assistance Based on on-farm observations, outreach focusing on safe, effective use of chemicals may be a more immediate benefit than adoption of additional sustainable pest management techniques, but is beyond the scope of this grant. An effective approach to improving Hmong insecticide handling and use might be to focus on safety, through on-farm, site-specific, individual farmer trainings.

Access to Hmong farms was difficult and limited to a few cooperating Hmong farms. Despite limited Hmong farm access, the team is confident in its identification of the primary pest problems for the Skagit, Snohomish and Whatcom Counties since pests identified on the few Hmong farms were the same for the traditional growers. For the final year the team had planned for on-field insecticide trials with 2 additional Hmong farms, but the farms ultimately opted not to participate. As the project proceeded, the understanding of the complex nature of the cut flower industry in Washington state naturally evolved, directing the team's efforts toward areas of most concern and potential outcome. The results of this work will be useful to further the industry, already much changed from the inception of the project.

The following activities were also performed:

- Test the potential of plant architecture and visual barriers in managing insect pests of cut flowers. On-station (WSU NWREC) field trials were conducted to test the above methods. Sampling and evaluation was performed on a weekly basis.
- Field test select biorationals and novel chemicals for key pests. On-farm trials were performed on four Hmong farms. Plots were established and 5-minute timed pre-counts/plot were taken prior to the treatment applications. Five –minute timed counts/plot were taken at 1 DAT (days after treatment), 3 DAT and 5 DAT. Bee Cha assisted to translate safety information to the participating Hmong growers.
- Pictorial diagnostic guide for pests of specialty cut flowers. Photos of insect pests and damage were taken on both the traditional and Hmong farms. The challenge of conveying this information effectively to a non-language grower remains challenging and further investigations will require continued collaboration with the Hmong coordinator.

All planned activities were completed, except the pictorial guide to insect pests of western Washington specialty cut flowers. Accomplishing this activity for an ethnic group with no written language is challenging. Although photos of the insects and resultant damage are complete, additional text on life cycle and control measures need to be drawn in a pictograph style that will still retain some detail and will require additional assistance and advice from Bee Cha, the Hmong Program coordinator.

Economics

The following Expected Measurable Outcome was related to Economics: **A 5-10% increase in sales in small-scale cut flower growers in Washington State (including the Hmongs) by the project end.**

Domestic cut flower growers as a group, including those in Washington, have experienced sales decreases due to pressure from increased, cheaper imported flowers in recent decades and additional decreases in recent years due to the slow economy. Given these confounding factors, it would be very difficult to detect net increases in sales directly attributable to this grant as the original Expected Measurable Outcome states. However, the project team expects the intermediate and long term effects of this grant will contribute to increased small-scale cut flower growers' sales, and may have already positively impacted cooperating growers' sales in the short term. Additionally, significant steps were taken to support increases in sales through the following project activities:

- **Growers school marketing panels.** Marketing panels included experienced sellers and retail floral buyers at two growers schools. Over 70 current and future growers benefited from these

panels. Only 10 growers school attendees responded to the survey conducted in the final year of the grant, so it is difficult to assess the growers school's impact on sales; eight growers reported sales between $1-$4,999 and two reported sales between $5,000-$9,999. Four were beginning sellers reporting first year sales.

- **Improvements in pest and disease management possibly increased the volume of saleable cut flowers (i.e. reduced waste)**. Several members of the Seattle Wholesale Growers Market Cooperative shifted sales away from less profitable channels in order to sell more through the quality-driven wholesale market. Improvements in sustainable pest management helped some of these growers reduce waste, thereby increasing the volume of high quality products available for sale through the wholesale market. Growers school attendees also benefited from pest management information, but the impact on reduced waste and sales is not known.
- **Baseline data on farmers market retail prices.** Estimates of per stem retail values for Hmong flowers sold at Seattle area farmers markets provides a baseline for measuring future profitability in current or alternative market channels. This data was gathered in the final year of the grant.
- **Sales and marketing data was collected from 45 small-scale, Washington cut flower growers, a group underrepresented in USDA floriculture surveys.** The USDA reported the wholesale value of Washington cut flowers was $22.3 million in 2011, 68% of which was tulip sales. Only 59 producers were counted in 2011, most of whom were bedding plant producers. Our 2012 growers survey supplemented the USDA data by gathering cut flower sales data from 45 small-scale growers: 67% reported sales below $10,000 in a typical year, hence they would not be included in the USDA floriculture survey. Our data may serve as a baseline reference for future assessments of small-scale growers' sales.

One of the primary objectives of this project was to identify marketing opportunities to improve cut flower farm profitability for both traditional and Hmong flower growers, who currently face many cultural and market barriers in selling cut flowers. In the first year of the grant, there were several changes in the economics portion of the research team. Under the original project proposal, the proposed grant objectives included developing enterprise budgets for cut flower farms to evaluate profitability under alternative production and marketing scenarios, with special attention to developing alternative market opportunities for Hmong farmers. When the current economists joined the project, it was decided that more information was needed about current marketing challenges and market needs before specific, well-informed recommendations could be made to growers about production or marketing. The revised goals were chosen to document:

- The structure, players, and nature of competition within the Washington cut flower industry, considering the increasingly global context of cut flower trade and associated pressure on domestic, small-scale growers;
- Product and marketing requirements for specific marketing channels, especially channels mostly willing or able to buy locally grown flowers;
- The current capacity (or potential ability) of Washington cut flower farmers to capitalize on the identified market opportunities.

Therefore, some of the original project objectives were revised or delayed and instead completed the following:

1. More than 15 interviews with cut flower industry members including representatives from 3 floral wholesalers, 1 growers cooperative wholesale market, 3 local grocery chains, 3 national grocery chains, 2 studio florists, 1 distributer, and 1 floral design educational institution.
2. Two surveys of current and future cut flower growers involving 47 and 73 growers each.
3. One bouquet pricing study involving 7 farmers markets and 36 bouquets to document farmers markets' price level, competition within farmers markets, and comparison with other locally marketed flowers.

4. Harvest data from two Hmong flower farms over a 5 month growing season to document harvest levels, waste, and crop valuation.
5. One consumer survey of 500 Washington consumers about cut flower purchasing habits and interest in locally grown cut flowers.

The findings and recommendations based on these completed activities will be formally written and published as WSU Extension publications, articles in trade/industry press, and distributed through the networks of growers and industry advocates, many of who have specifically requested to receive documentation of project findings. Academic publications will also be pursued to contribute to the research community's dialogue about locally or sustainably produced products and small-scale agriculture.

All planned activities were completed, except for the consumer survey. As of 12/13/2012, 400 of the contracted 500 responses had been completed by the contracted online research company, Qualtrics. The survey is expected to close by 12/17/2012, at which time analysis of results will begin immediately. Analysis and dissemination of additional results are in-progress.

BENEFICIARIES

All Washington cut flower growers will benefit from higher quality blooms through increased information on major insect pests of cut flowers and sustainable methods for control. This is in keeping with their mandate for sustainable, fresh, local flowers.

Growers survey results will draw attention to the importance of cut flowers to small-scale agriculture. The consumer survey results will provide very specific information about what customers want in cut flower products, greatly improving the marketing information available to Washington growers. The consumer survey will also be a critical contribution to the state and national level discussion about and promotion of the domestic cut flower industry; Washington will have some of the best data in the country about cut flower consumers, generating additional awareness.

Hmong growers will benefit from having the only known data estimating per stem retail prices for flowers they sell at farmers markets. This data may incentivize Hmong growers to keep harvest records in order to assess current profitability, consider revenue potential in other markets, and estimate crop values for insurance purposes.

Documentation about the definition of "quality" in cut flowers will help all Washington cut flower growers identify ways to improve cut flower quality and expand into more lucrative markets, if that is a relevant business goal.

All findings will help inform and leverage the work of the Seattle Wholesale Growers Market Cooperative as they execute their own SCBGP project in the next few years, further developing as a national model for marketing locally grown flowers to high-end florist and retail customers.

The current economic impact of the project is currently unknown, but data and results generated from the growers surveys, the consumer surveys, and the bouquet pricing study will be made available to the hundreds of small-scale cut flower growers in Washington. The data will provide information on consumers and market channels that previously did not exist, and will help inform growers' marketing strategies going forward. The bouquet pricing data will help Hmong farms estimate crop values for insurance purposes and may motivate some Hmong farms to evaluate current profitability and potential for expansion into alternative, more profitable markets.

LESSONS LEARNED

Entomology

Insect pest management is market driven. Washington's cut flower industry is stratified between the Hmongs focused on large volume at farmer's markets and tourist venues such as Seattle's Pike Place Market, while the traditional growers have developed an additional niche through their grower owned wholesale growers market. The farmer's market clientele is more tolerant of insect damage and primarily focused on bouquet appeal through color and volume/dollar value. The traditional growers however are concerned with developing the state's industry through promoting fresh, local quality flowers and demand a higher standard for insect/damage free flowers. These two systems uniquely mirror the ability of each group to successfully manage insect pests since economic damage threshold is also two-tiered. The two grower groups can exist in harmony while meeting the needs of the state's cut flower consumers.

The project team was surprised at the overall lack of insect pest issues on cut flowers. The traditional growers have developed efficient methods in planning, crop selection and continually select new varieties with pest issues in mind. They are eager to share their knowledge to promote the industry, which was evident by the development of the wholesale growers school. Many are members of the ASCFG (Association of Specialty Cut Flower Growers), a valuable national organization providing information including pest management and expertise to their members. The Hmongs are limited by their language barrier, to easily access new information, such as information on pest management and pesticide use. They intentionally overplant, anticipating loss from insect damaged flowers. Assistance to help the Hmongs will remain primarily within their own community and through outreach by WSU experts such as the Small Farms Program.

The pictorial guide to insect pests was not completed due to the challenges of writing a guide for an ethnic group lacking a formal written language. The team will explore the possibility of creating a pictograph style that would be instructive for the Hmong cut flower growers and will continue to look into different formats for non-language communication.

Economics

This project confirmed and formally documented some of the local and global marketing challenges facing Washington cut flower growers. An important insight from the project was the natural stratification of growers along both cultural lines (Hmong and non-Hmong) and cut flower business types (full-time cut flower farm vs. diversified food-focused farms vs. supplemental income "side" business). While Washington growers statewide would benefit from greater promotion of locally grown flowers, individual growers have different business objectives (primary vs. supplemental income) and resources (time, capital, knowledge, local demand) that influence how they grow and sell flowers. Growers' objectives and resources will also influence whether they adopt research recommendations that promote goals not aligned with their specific interests. In the present case, some Hmong farms may be content to meet the current expectations of farmers market customers at current prices, while other Hmong farms may adopt or demonstrate quality and business practices that allow them to sell flowers in more profitable markets. Channels for local flowers differ in price and product requirements, as evidenced by the industry interviews, so both Hmong and traditional small-scale cut flower growers must carefully consider how their business goals align with the product requirements (e.g. quality, expected longevity, volume, etc.) and profit potential in different market channels.

The original proposal included the Expected Measurable Outcome of a 5-10% increase in sales in small-scale cut flower growers in Washington State (including the Hmongs) by the project end. When the current economists joined the project in the second year, this outcome was delayed until more was understood about growers and marketing strategies that may lead to improved profitability. Prior to this grant, little was known about the decentralized, small-scale cut flower growers across Washington State; few belong to the national Association of Specialty Cut Flower Growers and fewer are likely to be

included in USDA data on floriculture crops. In building the contact list for the growers survey, it was apparent that comprehensive baseline and annual surveys of cut flower growers' sales would require multiple modes (email, mail, phone, and in-person interviews) and intensive resources, and would still likely miss many growers who make casual sales for supplemental income. The team instead focused resources on growers actively seeking improvements in production and profitability through the growers schools and related networks, and on Hmong farmers struggling with low price situations in their current markets. In the final year of the grant, the team gathered baseline data on Washington growers' production and sales, Seattle area farmers market retail prices, and Washington consumers' current cut flower purchasing habits. Future studies may use this data to measure increases in sales or price levels, and changes in consumers' local purchasing habits (i.e. frequency of purchasing local flowers).

With the improved understanding of Washington growers' diverse situations, future outreach should be tailored to different grower groups' specific farm business goals, geographic production and marketing opportunities, and cultural preferences for learning new production and marketing strategies, within and beyond the growers schools. Grower groups identified include full-time cut flower growers (including both traditional and Hmong growers), part-time cut flower growers, and diversified farms with a cut flower component. The team will tailor its results and recommendations to each group, but were unable to document a 5-10% increase in sales across this diverse grower group due to the short-term impact of this grant, at this time.

Research activities and outreach during the course of the grant was met very enthusiastically by cut flower growers, business persons, industry advocates, and researchers at other institutions. Many people have requested results from this project and hope to utilize our data and results in their own efforts to improve small-scale cut flower farm profitability and promotion of Washington and domestically grown cut flowers. This project stimulated interest and discussion beyond original expectations.

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ADDITIONAL INFORMATION

"Business is Blooming," Washington State Magazine, Summer 2011.

See **Report 12-25-B-0957 Attachment C** for the following:

1. Appendix A: The Cut Flower Industry: Overview
2. Appendix B: The Cut Flower Industry: How Cut Flowers are Bought and Sold in WA State
3. Appendix C: Cut Flower Growers in Washington State
4. Appendix D: Hmong Flower Farmers, Farmers Markets, and a Bouquet Pricing Study

PROJECT #7

Project Title: *Washington Wine Promotion in Emerging Markets*

Partner Organization: Washington State Wine Commission (WSWC)

PROJECT SUMMARY

Washington State wines have gained exposure in new and emerging markets in recent years. They have also gained recognition among leading wine journalists, which has created demand for Washington State wines among importers around the world. However, many of these importers are unfamiliar with Washington State wines. They may have read about the region but few have had the opportunity to visit Washington wine country or sample a range of wines from the state. At the same time, few Washington wineries understand opportunities available to them in emerging markets. They focus attention on traditional wine importing countries such as those in Europe or in Canada and Japan. The purpose of this project was to increase market awareness, distribution and demand for Washington wines in two key wine markets: India and Mexico.

The Washington State Wine Commission continually seeks to develop and expand export markets for Washington State wines. Though the vast majority of Washington State wines are sold domestically, foreign markets play an important role in stabilizing outlets for the State's growing grape and wine production. Moreover, the U.S. remains a leading wine import market and annually, competition for sales in the United States among global producers intensifies.

The WSWC pursued this SCBGP project in 2009 because the organization had just recently brought a number of trade contacts from India and Mexico to the state to tour its wine regions. The guests were part of the Washington State Wine Experience, a bi-annual event that seeks to introduce foreign trade and media to Washington State wine through a week-long tour and educational activities. The tour piqued the interest of buyers from both markets and the SCBGP presented an opportunity to secure additional funds that would permit follow-up promotional/educational activities to take place in-country. It is one thing for contacts from these countries to visit Washington State and to meet with suppliers while here. But it is equally important for Washington State suppliers to demonstrate a willingness to export to these markets, and to support distribution there through promotional events. The SCBGP project was done for this purpose and with the long-term goal in mind of developing India and Mexico as growing markets for Washington State wines.

With the increasingly competitive landscape in the worldwide wine market thanks to the growing popularity of new wine regions in Australia, New Zealand, South Africa, and South America, it is imperative for Washington wines to establish an international presence in burgeoning markets now to build market share as a world class wine-producing region.

PROJECT APPROACH

Below is a summary of tasks per target market.

Mexico

The Washington State Wine Commission (WSWC) held its Taste Washington – Cancun event on October 6, 2010. It included a seminar and trade/media tasting at the Hilton Cancun. WSWC then followed that up with a seminar and tasting in Mexico City in January 2011. That tasting was coordinated through the U.S. Embassy in Mexico City. It was held at Restaurant Syrah, a venue arranged by the U.S. Agricultural Trade Office.

Key accomplishments for the Mexico work plan were as follows:

- An RFP was issued and a contractor was selected to assist with in-country planning and logistics. Specifically, WWC worked with Imalinx, a contractor based in Cuernavaca, Mexico.
- The Hilton Cancun was selected as the venue for the tasting.
- A seminar was led by Shayn Bjornholm, Director of Education of the WWC for **46 trade members**, covering Washington Geography, wine industry in the state and main varietals, and a comparative tasting with other U.S., Australian and Mexican Wines.
- A Tasting event for the HRI sector followed, with attendance of **165** sommeliers, Food and Beverage managers from hotels and restaurant owners.
- Ten representatives from Washington wineries attended the Cancun event. In total, **59 different wines** were presented, with 24 different varietals and blends.
- In Mexico City, a seminar was conducted by Juan Munoz Oca, winemaker for Columbia Crest winery. The seminar was conducted in Spanish to 36 trade and media guests. It was followed by a tasting of 14 Washington wine brands from five different wineries with distribution in Mexico City.

The tastings and seminars surpassed expectations. Attending winery representatives commented on the quality of Mexican trade that attended the tasting. The level of interest in Washington wines was very high.

India

Washington wine tasting events took place in New Delhi and Mumbai the week of September 4, 2011. These included trade and media tastings and more private importer wine dinners in each city. The events began in Mumbai with an importer dinner at Ziya in the Oberoi Hotel. Twenty-seven guests participated, which was slightly lower than the 35 targeted. This was despite RSVPs that exceeded 35 and that were confirmed numerous times prior to the event, including on that same day. The following night, the trade tasting took place at The Leela Hotel. Fifty-five contacts attended. The following day was for travel to Delhi. In that city, the Oberoi hotel hosted the trade tasting on the 8th (for over 80 guests) and a wine dinner on the 9th, for 29.

Representatives from the Washington wine industry attended all of the events. From the Washington State Wine Commission, Ryan Pennington (Communications Manager) and Madeline Dow (Marketing Manager) attended. They helped pour at the events and were on hand to discuss the Washington State Wine Commission as a generic promotional body. Al Portney (Ste Michele Wine Estates) also attended to represent the many brands that Ste. Michele offers, many of which have distribution in India. Other industry members were heavily recruited to represent their products as well, but unfortunately this was not possible. Owners of Hedges Cellars (another large exporting winery in the state) intended to participate but had to change their plans due to a family issue. Some brands were represented by their importers. In total, eighteen different Washington State wine brands were featured at the events.

Each year of the SCBGP project, information on exports and distribution to the two markets was collected through industry surveys. Those surveys were completed each year in August/September. The surveys helped determine whether the projects achieved certain goals that were laid out in the original proposal. Specifically, the WSWC established two criteria as expected outcomes for this project. First, the WSWC would measure success by examining increased distribution in Mexico and India resulting from the project. The goal was to achieve new distribution for 6-10 wines. Second, the WSWC anticipated that the project would result in an increase of 100% in overall wine sales to the two markets.

It does not appear that the WSWC met its quantitative goals on either measure. On the first criterion, the WSWC is aware of new distribution for Washington wines in Mexico, where at least three Washington wineries had secured additional distribution as of early 2011. But with the latest export survey

completed, it does not appear that any additional new distribution occurred. In India, one importer issued a trade lead to begin importing wine from one specific Washington winery that has not previously been available in India. This was potentially for substantial volume. However, that Washington winery was sold this past year and the company was not in a position to enter new trade agreements while the sale was pending. It appears that this lead had since grown cold. That said, other issues prevented the Washington wine industry from meeting it goal for new distribution in India. The country's tax structure for imported alcoholic beverages makes all but the cheapest Washington wines nearly unaffordable. Importers are generally only looking at wines at the lowest price point and there are not too many Washington wineries capable of delivering wine at their asking prices. Success in India was (and still is) possible and the tax regime there is changing, so there were a number of reasons why activity there made sense. The timing seemed right to do events that built upon the interest of Indian wine importers and that might help gain additional exposure for Washington wines in the hotel sector in a market that is expected to be sizeable when it ultimately opens. And in the end, there was definite interest among certain importers to bring in specific Washington brands. The ultimate problem seemed to be that there was a disconnect between the premium products the wineries wanted to provide to the market and the lower-end products that the importers were interested in. Importers wanted to start with low-end products while the industry is looking to establish its brand at the premium end. In any case, it is clear that WSWC did not reach its goal of at least 6 new brands in distribution.

On the second criterion, total exports to both markets grew at the outset of this project, but have since tapered off. As a result, it does not appear that the industry will have met its goal of 100% growth in exports to the two markets. In India, Washington wine exports grew by over 360% by value from 2009-10 to 2010-11 but in 2011-12, Washington wine exports to India contracted. Exports last year were less than $100,000. One of the two major exporters to the market saw sales decline considerably. Thus sales to India following the project were actually below where they were at the beginning.

In Mexico, exports for 2010-11 did not grow substantially over the prior year despite some small wineries securing new distribution in that market. Their volumes are small but opening a new market for a small winery is an important gain. For 2011-12, exports to Mexico were again up, albeit slightly. Exports totaled over $226,000. Over the course of this project, Washington wine exports to Mexico have grown by 11.3%, still far from the expected outcome of the project.

In terms of conclusions and recommendations, there were lessons learned in both markets. These included:

- It was good approach to select a location within a new target country that is already an established market for U.S. wines. This was the case with Cancun and Delhi and Mumbai, though volumes sold in those cities are small.
- Follow up is critical to ensure that new distribution is achieved. In India, one Washington winery missed out on a significant sales opportunity because an export contact at the winery was not identified. The original winery contact that was in place at the outset of these activities left her position shortly after completion of the India events. Indian importers interested in wine from that company attempted to reach the winery to discuss sales possibilities but a suitable replacement for these negotiations was never identified.
- For future events, sample shipment should include a larger buffer time, preferably three weeks to ensure sample delivery.
- For future activities, a communications calendar between WSWC, wineries, their distributors, and in-country contractors working on the projects should be put in place to make sure that details and information is appropriately shared between all parties.

- There is interest in Washington wine among Indian trade and recognition that Washington wineries make premium products. However, the market's tax structure is extremely difficult to work with and prices most Washington wines out of reach for importers and retailers.
- India's regulatory requirements for wine import are also cumbersome to deal with and discourage wineries from pursuing the market.
- Advance press outreach is critical to trade and media attendance.
- The WSWC cannot count on industry representatives attending international events despite expressions of interest and/or intent at the outset of a project.
- Further activity in India is not recommended until such time that India's regulatory environment improves. However, India importers should continue to be encouraged and invited to visit Washington State. Further activity in Mexico should be considered if Washington State wineries already doing business there show substantial sales growth over the next few years.

The WSWC did not have many project partners for these events. United States Department of Agriculture personnel provided significant assistance and attended the events. In Mexico, USDA officials secured the venue and assisted with outreach to the trade and media for the WSWC's tasting and seminar in Mexico City. In India, the US Ambassador attended and spoke at the tasting in Delhi. The WSWC also could not have completed the projects without the support of in-country representatives in both places. Imalinx (Mexico) and Wine Forays (India) were instrumental to the events, handling all of the local logistics including invitations and outreach. Ste. Michele Wine Estates was also a significant contributor to the project. Ste Michele made available its Spanish-speaking winemaker to lead the seminar in Mexico City (at no charge to the WSWC) and provide important insight and contacts in both markets.

GOALS AND OUTCOMES ACHIEVED

The activities that were completed as part of this project were all described in the previous section. They included tastings, seminars and wine dinners in New Delhi and Mumbai, and tastings and seminars in Cancun and Mexico City. These events all attracted influential importers, distributors, and media in each market and positioned Washington wine brands for exposure and new business. Ultimately, the goals for the project were to support new distribution for Washington wines in both countries. Achievements against those goals are described below.

As mentioned, the WWC established two expected outcomes for this project:

1. Gain distribution for 6-10 new Washington wines in each market by matching interested wineries without representation with interested importers in both markets.

2. Increase the overall sales of Washington wine in each market by 100% over the course of a three-year period.

The WSWC did not meet either of these goals by the completion of the project. While gains were made in each market, those gains were ultimately reversed or diminished in subsequent years. Trade barriers are a primary constraint in India but in both markets, it simply appears that interest among Washington State wineries is minimal. There are other, larger markets for Washington State wines, and for small wineries in the State, these larger markets often take precedence.

The following table contains a full list of tasks associated with the project and information on whether the task was completed, eliminated or changed.

MEXICO	
Task/Activity	**When Completed**
Begin research on event dates, event format and target invitees with in-market trade contacts and wineries active in the market (importers, current customers and supporters of WA wine)	Winter, 2009/2010
Perform baseline survey on current level of Washington wine distribution and annual sales volume and value	January – March 2010
Develop a detailed activity plan and budget	April 2010
Negotiate and confirm agreement with hotel venues	April/May 2010
Develop a participation package, itinerary of events, and matching contribution requirements for wineries	May 2010
Recruit and register participating wineries	May/June 2010
Deliverable 1: Conduct trade tasting & education seminar event in Cancun	October 2010
Deliverable 2: Trade tasting & education seminar event in Cabo San Lucas	Canceled, replaced by Mexico City seminar
Post event wrap-up, follow-up and survey of results	October 2010
Deliverable 3: Seminar at Restaurant Syrah	January 2011
Deliverable 4: Conduct "Washington Wine Month By-the-Glass" Promotion	Canceled – budget required for India activities.
Survey results in 6 month intervals for 3 years	Surveys conducted annually each summer

INDIA	
Task/Activity	**When Completed**
Begin research on event dates, event format and target invitees with in-market trade contacts and wineries active in the market (importers, current customers and supporters of WA wine)	March, 2011
Perform baseline survey on current level of Washington wine distribution and annual sales volume and value	Fall 2010
Identify and select contractor to assist with in-market activities	January 2011
Deliverable 5: Visit to Washington State by in-market contractor	April 2011
Develop a detailed activity plan and budget	May 2011
Negotiate and confirm agreement with hotel venues	June 2011
Develop a participation package, itinerary of events, and matching contribution requirements for wineries	June 2011

Recruit and register participating wineries	July 2011
Execute pre-event logistics	August 2011
Deliverable 6: Trade tasting & education seminar event in Mumbai	September 2011
Deliverable 7: Trade tasting & education seminar event in New Delhi	September 2011
"Washington Wine Month By-the-Glass" Promotion Program – Mumbai and Delhi	September 2011
Post event wrap-up, follow-up and survey of results	October/Nov. 2011
Submit final assessment of project effectiveness and results	November 15, 2012

In 2009, there were 6 Washington wineries exporting to Mexico and 4 wineries exporting to India. By the close of this project, the numbers have not changed dramatically. In Mexico, the WSWC is aware of 8 wineries exporting to Mexico. The number of wineries exporting to India may actually have decreased with only two now reporting sales there based on the most recent export survey.

In terms of sales increases, Washington State wine exports to Mexico and India have gone in different directions. Exports to Mexico are up slightly over the three year period with growth exceeding 11% by value. To India, however, exports are down from 2009 despite a significant increase after year 1. Exports in 2011-12 were approximately half of exports in 2009-10.

The conclusion from these results is that these two markets may represent niche opportunities for certain Washington State suppliers, but they are unlikely to present substantial volume opportunities for the State. Moreover, moderate (at best) interest from the wineries makes a long-term commitment to the two markets unlikely. This will complicate efforts by the WSWC to build a strong base of exports to both countries.

BENEFICIARIES

A total of 10 wineries sent representatives to Mexico, with 14 wineries participating and nearly 60 wines featured. In India, 18 wineries participated. At this point, only a handful of wineries have directly benefited from the completion of this project. Those are the wineries that had or have distribution in the two target countries. That said, the promotional activities in both countries secured media coverage and raised awareness of Washington State wines among certain influential trade targets, media, and to a lesser extent consumers. The following quotations were received from participants in India, as an example….

> *"The events were organized beautifully and the best part is that the execution was very wine friendly. Especially doing the events over 2 days with the trade tasting on the first day and the proper pairing the wine with food at the dinner on the second day was really good. It completely enhanced the whole experience. To be frank, I wouldn't have come on the second day if I hadn't become such a fan of Washington wines. We go to several tastings like Chilean or Australian wine events, but this was very well planned. After the tasting I have already initiated the order for all my 3 restaurants to have Columbia Crest and Chateau Ste Michelle -which are available in India. Will introduce others as well once they get to one of the wine importers. Though having attended these events, one idea my partners and I are considering is to import some of these*

wines ourselves as they really are good quality and match up to Napa or Bordeaux region's wines." – Saurabh Khanijo, Director –Kylin, Sartoriaand KylinPremier Restaurants

"*I think it was an absolutely brilliant idea to have an event like this which promoted the Washington State wines, particularly because the US portfolio in India has traditionally been dominated by Californian wines. The first step was to bring awareness of the wines to the Indian market, but more importantly the wine tasting dinners confirmed that this is a quality product. Following this introduction to the Washington State wines, I will certainly consider listing some of them at The Table in the near future." – Gauri Devidayal, Proprietor –The Table (one of the top wine restaurants in Mumbai)*

An argument can therefore be made that the whole of the Washington wine industry ultimately benefitted from the project, even if exports have not immediately grown as a result. Export market development takes time. It hinges on relationship-building and increasing awareness and interest in these new products. Certain importers and trade contacts certainly now have a better understanding of Washington State wines following the project than they had prior to it. That may not have paid off in immediate sales opportunities for wineries not yet in the market, but it should facilitate market entry for new brands in the years ahead.

The WSWC's expected measurable outcomes were quantitative measures related to exports to Mexico and India and to the number of wineries with brands in distribution in the two countries.

LESSONS LEARNED

Lessons learned were outlined earlier in this report in the activity summary. These included:

- It was good approach to select a location within a new target country that is already an established market for U.S. wines. This was the case with Cancun and Delhi and Mumbai, though volumes sold in those cities are small.
- Follow up is critical to ensure that new distribution is achieved. In India, one Washington winery missed out on a significant sales opportunity because an export contact at the winery was not identified. The original winery contact that was in place at the outset of these activities left her position shortly after completion of the India events. Indian importers interested in wine from that company attempted to reach the winery to discuss sales possibilities but a suitable replacement for these negotiations was never identified.
- For future events, sample shipment should include a larger buffer time, preferably three weeks to ensure sample delivery.
- For future activities, a communications calendar between WSWC, wineries, their distributors, and in-country contractors working on the projects should be put in place to make sure that details and information is appropriately shared between all parties.
- There is interest in Washington wine among Indian trade and recognition that Washington wineries make premium products. However, the market's tax structure is extremely difficult to work with and prices most Washington wines out of reach for importers and retailers.
- India's regulatory requirements for wine import are also cumbersome to deal with and discourage wineries from pursuing the market.
- Advance press outreach is critical to trade and media attendance.
- The WSWC cannot count on industry representatives attending international events despite expressions of interest and/or intent at the outset of a project.
- Further activity in India is not recommended until such time that India's regulatory environment improves. However, India importers should continue to be encouraged and invited to visit Washington State. Further activity in Mexico should be considered if

Washington State wineries already doing business there show substantial sales growth over the next few years.

The WSWC successfully implemented tastings and seminars in both markets and there was solid interest among the trade and media. Participation among the Washington wine industry was reasonable, though a bit lower than anticipated in India where original projections suggested a few more wineries would join the program. What was perhaps more surprising was the lack of direct winery representative attendance. Despite initial feedback that winery representatives would travel to the events on behalf of their brands, this was not always the case. In India specifically, only one representative attended the tastings. Other brands were represented generically by WSWC staff. This likely diminished the effectiveness of the presentation to importers and undermined the message of commitment to the market.

The WSWC's expected measurable outcomes were not achieved for this project. A few key lessons learned include:

- Ensure broad support in advance for the project – in the WSWC's case firm support existed among a small number of wineries in the activities in both countries. Initial surveying suggested that more wineries would participate but their participation did not materialize. Their interest in these markets was lukewarm and the travel distance (and cost) at least for India was prohibitive.
- Identify realistic measures – the WSWC set lofty goals for this project, but in hindsight an expectation of 6-10 new wineries in each market was unrealistic, at least in the sense of new distribution agreements during the course of this project. Wineries that participated in the tastings may still secure new agreements over time, but it was unlikely that so many wineries would reach agreements after only one tasting event in each market. More of a sustained presence is likely needed.
- Economic factors matter – this project occurred during a downturn in the US economy that likely caused many wineries to re-focus attention domestically. Wineries that would otherwise have participated in the project elected not to because the timing was not right to pursue these less-traditional wine markets.

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ADDITIONAL INFORMATION

Cash and in-kind match totaled approximately $49,000.

See **Report 12-25-B-0957 Attachment D** for the following

1. Washington State Wine Seminar - Mexico City
2. Washington Wine Experience - Cancun
3. Washington State Wine Events in India

PROJECT #8 – FINAL REPORT

Project Title: *Healthy Fruits Lead to a Healthy Family*

Partner Organization: Pear Bureau Northwest

PROJECT SUMMARY

Health and wellness are becoming bigger priorities for Mexicans. Mexican consumers are becoming more aware of growing health problems like obesity, diabetes, and more. Obesity is an oncoming epidemic in Mexico, which has the first highest percentage of obesity in the world – adults and children. As of the year 2010, 70% of adults in Mexico are considered obese compare to just 20 years earlier, when only 10% of Mexicans were obese. Like in America, the increase in the junk food, fast food and increased sedentary lifestyles has created the conditions for this epidemic. This problem affects young children with over 4.5 million children ages 5 to 11 considered to be overweight or obese. Therefore, nutrition, healthy diets and a healthier lifestyle are increasingly important to Mexican consumers. And with the recent outbreak of the Swine Flu in Mexico, having a healthy lifestyle, eating lots of fruits and vegetables, and having a good immune system has been made an even more important priority. As such, health and nutrition are hot topics in Mexico and this program provided a very timely promotional activity.

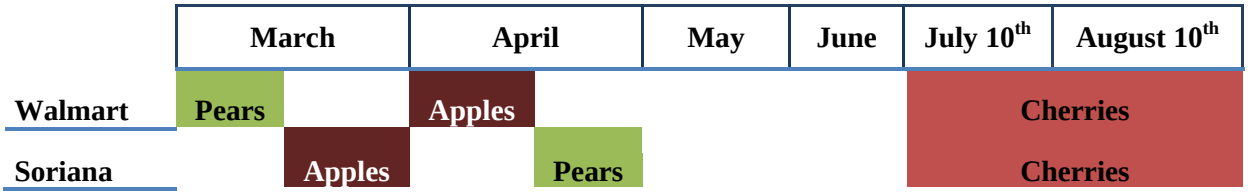
Mexico is one of the most important markets for Washington growers of apples, pears and cherries. Its proximity to the US makes it naturally one of our largest trading partners. This project positively impacted the state's approximately 1,217 pear growers, 3,500 apple growers and 2,500 cherry growers immediately through increased sales during the promotional period; and in the long-term with an improved positive association with pears, apples and cherries as a healthy and nutritious product that is a great value for the consumers' money. With consumers purchasing behavior changing due to the economic recession, consumers need to be reminded of all the positive reasons to buy Washington apples, pears, and cherries. Health-related reasons are becoming more important drivers for consumer purchases.

In terms of the economic impact to the state, all 3 industries represent over $2.25 billion in revenue for pear, cherry and apple growers and constitute 5.25 percent of all of Washington's food and agriculture revenue. Mexico is the largest export market for pears and represents nearly 20 percent of the total crop and over 40 percent of all exports. In terms of values, pear exports to Mexico reached nearly $60 million in 2008-09. For Washington Apples, Mexico is also its largest export market and accounts for nearly 30 percent of total exports. In 2008-09, Washington Apple exports to Mexico reached $169 million. Mexico is a new market with a huge growth potential for Washington state cherries. In 2008, NW Cherry growers shipped 74,000 boxes worth $3.56 million dollars to Mexico. Being able to conduct large-scale promotions such as this helps to build a strong promotional presence in Mexico. This in turn helps increase the overall demand for the products, resulting in better overall prices and returns to the grower.

The Healthy Fruits Lead to a Healthy Family was a two part promotion focusing on an in-store video promotion with all Wal-Mart stores in Mexico and nutritionist workshops in front of or inside of Soriana stores for a period of 1 month per retail chain per commodity group for a total of 6 months of promotional activity in Mexico. The Healthy Fruits Lead to a Healthy Family promotion targeted women age 24-48 with children and highlighted the nutritional benefits of pears, apples and cherries and how regular consumption (along with daily exercise) leads to a healthier lifestyle. The promotion helped increase sales of pears, apples and cherries with the two largest retail chains in Mexico, as well as help position pears, apples and cherries as a healthy fruit choice in the mind of the consumer.

When the promotion took place, pears and cherries were facing a retaliatory tariff in Mexico, so this promotion acted as an incentive for the two top retailers to carry larger volumes and additional varieties during the promotional period. At this time, all three products are facing retaliatory tariffs in Mexico.

The timeline of the project was divided as follows:



PROJECT APPROACH

A well-respected Doctor in Mexico – Dr. Diane Pérez – was hired as the spokesperson for the project. Dr. Pérez is a famous and well-known opinion leader due to her renowned 20-year journalistic career in television and radio, such as the health segments of Televisa, Latin America's largest communications company. In addition, several food and drug companies have hired her to do various advertising campaigns. Finally, Dr. Pérez has her own website and presents a radio show that airs on a major radio station in Mexico City – Radio Trece 1290AM.

Dr. Pérez appeared on the informational video regarding the nutritional benefits of eating pears, apples and cherries that was run at Wal-Mart stores; her image also appeared on the POS and consumer materials used in the Nutritionist Workshops with Soriana. Utilizing Dr. Pérez as the medical spokesperson gave more credibility to the health-related messages.

The video provided a presence at Walmart stores nationwide. The video appeared on screens located throughout the stores, as well as in the cashier lines. Originally planned to be shown at 56 stores in three cities (Mexico City, Guadalajara and Monterrey), through negotiations (see Lessons Learned), Walmart agreed to show the video in 106 stores nationwide.

A nutritionist team carried out the Nutrition Workshops outside (and sometimes inside) of Soriana stores promoting nutritional values, seasonality and characteristics of each fruit, teaching consumers how to obtain a healthier life style by including apples, pears and cherries in their daily diet. A total of 361 Soriana stores were covered, reaching 722 sampling days in Mexico City, Guadalajara and Monterrey. During these promotions 106,508 consumers were reached. The average sales increase was 252% compared with a normal period – 277% for apples, 263% for pears and 216% for cherries. Market research was carried out in order to evaluate these two campaigns, obtaining the following results:

- The most important aspects for consumer awareness of each fruit:
  - ✓ Pears – Fiber content, vitamins, nutritious, healthy and digestion helpers
  - ✓ Apples – Fiber content, prevent cancer, vitamins, healthy and prevent high cholesterol
  - ✓ Cherries – Prevent cancer, vitamins, contain antioxidants, nutritious & healthy

- The information provided was consistently considered "Good-Excellent" and "very useful"

- In general, people knew more about apples than they did about the other two fruits
- After receiving the information, people who did not typically buy the fruit were more willing to buy it; and for current buyers, they will increase the amounts they purchase

- In general, focusing on fiber content and disease prevention were the health aspects with the highest impact

Soriana Support

- Most of the people knew that those providing information were nutritionists and they rated higher all the aspects regarding the information itself. They rated lower the facilities and promotional materials.

Walmart Support

- The video spot by Dr. Diane Pérez was positively evaluated, since most of the people knew her (72%), and they consider her an expert on health and well-being issues.

- They rated highest the clarity of information and lowest the way in which the information was delivered.

Both activities were very successful. In Walmart, success rested on the use of a very well-known spokesperson and in Soriana with the personalized nutritionist consultancy.

Each participating cooperator also conducted their own in-store sampling promotions, PR activities and advertising in addition to this promotion, in order to optimize each group's promotional program.

GOALS AND OUTCOMES ACHIEVED

Both activities – the Walmart video and Soriana Nutritionist Workshops – achieved the performance goals by promoting and increasing sales of Northwest Pears, Washington Apples and Northwest Cherries.

During Soriana Nutritionist Workshops, sales increase on average 252% compared with a normal period without promotion – 277% for apples, 263% for pears and 216% for cherries. During Walmart TV promotion, 75% of interviewed consumers mentioned that after seeing the video they were somewhat willing to buy the fruit being promoted and the remaining 25% mentioned that they were totally willing to buy the fruit, meeting goal 2.

Performance	Baselines 2008	Targets 2009	Results 2010
Consumers who reported that information will influence their purchase behavior positively to buy more Northwest fruits	52%	60%	75%
Consumers who eat at least 3 servings of fresh fruit and vegetables a day	42%	49%	53%
Consumers that participated in the nutritionist workshops or saw the promotional video became more educated about Northwest Fresh Fruits	33%	40%	60%
Consumers who consider health and nutrition important purchase decision motivators	29%	37%	78%

BENEFICIARIES

This project positively impacted the state's approximately 1,217 pear growers, 3,500 apple growers and 2,500 cherry growers immediately through increased sales during the promotional period; and in the long-term with an improved positive association with pears, apples and cherries as a healthy and nutritious product that is a great value for the consumers' money. During these promotions average sales increases were 277% for apples compared with a normal period, 263% for pears and 216% for cherries.

Pear imports during the 2009-10 season (when this promotion was carried out) increased 23.6% compared with 2008-09 according to the Pear Fresh Committee. Apples decreased their imports volume 5%, but increased imports in terms of value by 13% according to the Global Agricultural Trade System (September-May). Cherries imports increased by 20% compared with 2009 according to the World Trade Atlas (June-August).

Consumers also benefited from this project. Obesity is an oncoming epidemic in Mexico, which has the highest percentage of obesity in the world. Therefore, nutrition, healthy diets and a healthier lifestyle are increasingly important to Mexican consumers. The Soriana workshops provided direct nutrition consulting to consumers regarding pears, cherries and apples, and reached 106,508 consumers.

Ociel López, a Soriana Buyer, said, "*Consumers liked it a lot and nowadays it is very important to teach them how to reach a healthier life by including fruits." "Great support for the chain and for the produce department."*

Victor Manuel Padilla, a Walmart Buyer said, "*We like to have these ads in our stores because consumers have in mind buying different fruits, therefore increasing sales in the department.*"

LESSONS LEARNED

This was the first time that Walmart TV was used as a promotional activity tool and at the beginning there was some uncertainty about the results; however, it turned out to be a very good media to promote these products. Consumers paid close attention to the information on the screens during their visit to the store and while in the cashier line. The content of the video, plus the well-know spoken person, were critical for this success. It was also determined that using a well-known spoken person gave additional value to the promotion because consumers trusted her, which provided even more credibility to the campaign.

At the beginning of the Walmart project, it was discovered that several televisions in stores were not working. After discussing the problem and negotiating, Walmart agreed to project the video at 106 stores, instead of only at 54 stores, as originally planned. Walmart also agreed to keep each video live for 8 weeks instead 4 weeks, increasing the frequency 152%. The total cost to include the additional stores and time would have been $79,916 - 121% more than what was actually paid.

Overall, it was confirmed that consumers are very receptive to information that could help their family to have a better life style.

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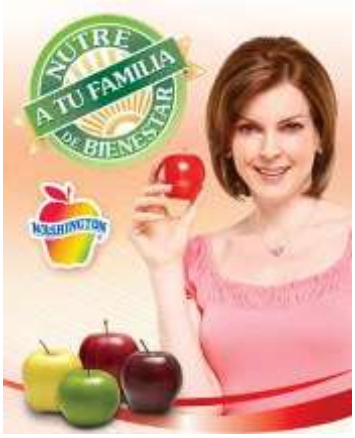
Banners



Displays

Consumer Brochure

Soriana Nutritionist Workshops

Walmart TV Ad

PROJECT #9

Project Title: *Increasing Profitability with Organic Orchard Floor Management Alternatives*

Partner Organization: Washington State University (WSU)

PROJECT SUMMARY

Washington is the leading national producer of organic apples, pears, and cherries, with these crops having an estimated annual value exceeding $150 million. Organic fruit from Washington are prized by consumers for their exceptional eating and nutritional qualities. Two-thirds of the organic orchardists in the state rely on tillage for weed control (based on unpublished December 2008 survey data). Tillage is generally effective for weed control. But over time, tillage is implicated in deteriorating soil conditions and declining tree performance, including smaller fruit. In 2008/09, many organic apple growers received lower revenue for organic fruit relative to conventional fruit due to small fruit size. A loss of one or two fruit sizes can make an orchard unprofitable. Some organic growers have gone bankrupt in part due to declining fruit size. In addition, many irrigated orchards in Washington have soils with low native organic matter and soil texture is commonly coarse. Soil tillage works against attempts to increase organic matter, and therefore jeopardizes meeting the National Organic Program (NOP) standard regarding "maintaining or improving soil quality" (Sec. 205.203).

This project was designed to examine whether two alternative orchard floor management systems would perform better than a tillage-based system in terms of tree performance, soil condition, and economics. The project focus and design was based on feedback from surveys of commercial growers, conversations with growers, and contradictory results from research trials. Orchard floor management impacts tree nutrition, weed control, soil quality, tree performance, rodent damage, yields, fruit quality, production costs, and value of fruit sales. Relative to conventional orchard production, where low cost and effective options are available, organic growers find weed control, tree nutrition, and rodent control to be more challenging and typically more expensive. Poor weed control can cause nutrient deficiencies in the tree, obstruct sprinklers, and increase rodent habitat, all of which can have negative economic impacts. While more weeds might detract from tree growth and yield, increased vole populations due to poor weed control can lead to death of trees from girdling by rodents, which is a much greater economic loss. Thus, this project sought to address an important challenge for organic orchardists in the state and provide a better understanding of the net economic effect of different orchard floor management systems such that growers could make more informed decisions and improve their financial stability.

PROJECT APPROACH

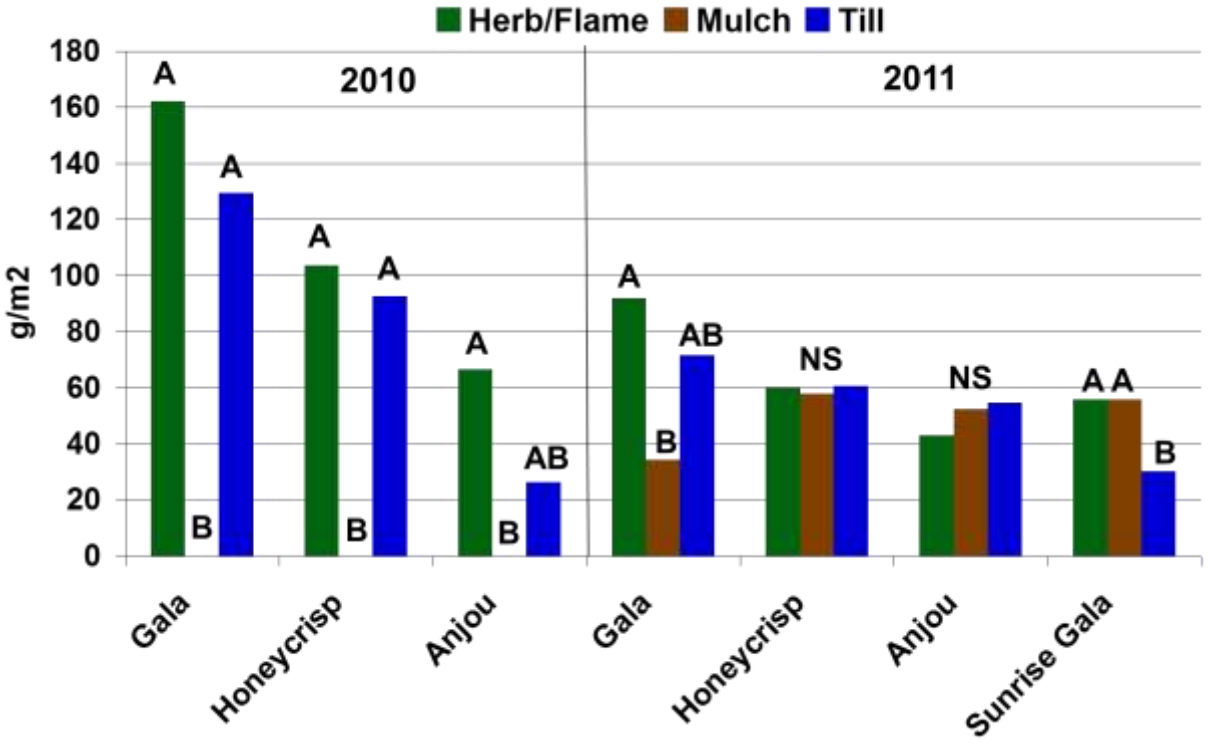
The project approach was built around the use of large-scale on-farm research on commercial organic orchards. Three field trials were set up on three different orchards owned by the Foreman Land and Fruit Co., who was the main project collaborator with Washington State University. The orchards used were: 1) Vantage Orchard, Royal Slope, WA, 6-yr old 'Gala'/M.26 apples, sandy sloping soil, certified organic since 2006; 2) Sundown Orchard, Omak, WA, 4-yr old 'Honeycrisp'/EMLA.26 apples interplanted in an established 'Red Delicious' orchard, flat silt loam soil, certified organic since 2008; and 3) Pine Creek Pears, Tonasket, WA, mature 'd'Anjou'/ OHxF97 pears, generally flat silt loam soil, certified organic since 2008. The same three treatments were used at each site: 1) tillage (with Wonder Weeder), considered the standard; 2) organic herbicide [combination of WeedPharm (Pharm Solutions, Inc., Port Townsend, WA) 20% acetic acid at 12 gal/applied acre; citric acid at 16 lb/applied acre; horticultural oil at 2 gal/applied acre; with 16 gal water] and/or flame weeding; and 3) wood chip mulch over a weed barrier fabric (non-woven landscape fabric, Geotech South, Macon, GA). Each treatment was replicated 4 times at each site in large-scale plots (plot size varied with the site; for example, plots were ~0.7 ac each at Vantage). Treatments were first applied to Vantage and Pine Creek during August 2009, and to Sundown in late fall 2009 and early the next spring. In addition, a separate trial was established in April

2010 at the WSU Sunrise research orchard near Rock Island, WA, as a parallel trial. In addition to tillage and herbicide/flame weeding treatments, the Sunrise trial had separate wood chip and weed fabric mulch treatments, and used small plots of 10 trees each, with 5 replications. Data from Sunrise were collected from 2010-2012.

Key activities and results for different aspects of the project are described below, with reference to previously submitted reports that contain more extensive data.

Weeds. Weeds were measured at several times during each growing season (Figure 1). Both Vantage and Sundown sites were infested with quackgrass (*Agropyron repens*), a difficult to control perennial grass weed. The mulch system was more successful in controlling this weed than the other two systems. However, the weed fabric put underneath the wood chips, while not typically combined for commercial use, was installed at all sites (except Sunrise) to specifically address the quackgrass problem. While the addition of fabric helped with weed control in the first year or two, over time the quackgrass roots expanded beyond the soil into the wood chips where they thrived. In addition, at Vantage, voles became very active under the fabric (in contrast to very little vole activity normally found in wood chips alone) and damaged many of the tree trunks, which impaired tree performance by damaging the cambium layer. Neither the tillage nor herbicide/flaming was very successful in reducing the quackgrass infestation. The herbicide and flaming provided similar control, but the cost of the herbicide was over $1000/acre in 2010 compared to less than $100/acre for flaming. Thus, during 2011 (and 2012 at Sunrise) only flaming was used in the herbicide/flame treatment at all sites.

Figure 1. Total weed biomass in tree row in mid-June to mid-July 2010 and 2011 for 3 commercial organic orchards (Vantage=Gala, Sundown=Honeycrisp, and Pine Creek=d'Anjou) and in 2011 for WSU Sunrise.



Voles. As mentioned above, voles were present under the wood chip mulch over weed fabric treatment at Vantage; and they damaged many trees during winter 2009/10. The majority of trees at Sundown were damaged by voles during winter 2010/11 regardless of treatment, and extensive in-arch grafting was done to attempt to save the trees. This damage greatly impacted tree performance at Sundown, rendering the yield and growth data of little use. Voles were not a problem at Pine Creek on the large, older pear trees. Some vole activity was evident at Sunrise, which was higher under the weed fabric but absent in the wood chip mulch treatment. However, little tree damage was sustained at Sunrise, even in the weed fabric treatment.

Tree growth. The best indicator of tree growth is percent increase in trunk cross-sectional area (TCSA), since it removes the variability due to different sizes of trees at the beginning of the trial. Initial measurements were made in late June and early July 2009 at the three Foreman orchards and in March 2010 at WSU Sunrise. The two-year growth (2010-2011) is reported below (Table 1) since some of Sundown did not get treatments applied in 2009. When the three Foreman orchards are analyzed together, there is no separation of treatments for % increase in TCSA (Table 1). Mulch plots tended to have greater growth at Vantage and Sunrise, but not the other two orchards. At WSU Sunrise, there were no significant differences among treatments for tree growth in 2010 and 2011, although trees in the mulch and herbicide/flame plots tended to grow more than trees in the tillage and weed fabric plots. Only in 2012 were these differences significant (p=0.01) at Sunrise, with mulch 25.8a, herbicide/flame 23.6ab, tillage 21.4bc, and fabric 18.7c (values are % increase in TCSA). This is interesting in light of the yield results in 2012 where the fabric treatment had significantly greater fruit yield and fruit number than the other treatments, despite their lower vigor. These growth results provide mixed support for the initial hypothesis that tilled trees would grow less than mulched trees due to root pruning, with herbicide/burn plots falling between these two treatments. The cause of the growth reduction with fabric is unknown, but could be due in part to soil temperatures under the black fabric during summer which exceeded a reported optimal level for M.9 rootstocks (Skroch and Schribbs, 1986).

Table 1. Cumulative* tree growth (% increase in TCSA).

Treatment	All Foreman orchards	Vantage	Pine Creek	Sundown	WSU Sunrise
Mulch	26.7	26.9 a	10.1	44.9	124.9 a
Herb/flame	31.6	22.6 ab	11.3	60.9	109.2 ab
Tillage	24.8	21.8 b	7.8	43.2	99.8 b
Weed fabric	--	--	--	--	97.3 b
P=	0.16	0.05	0.23	0.24	0.05

*2 yr for Foreman orchards, 3 yr for WSU orchard project personnel also monitored tree leaf nitrogen from samples taken in late July as an indicator of tree nitrogen supply (Table 2). There were some significant treatment effects but the pattern was not consistent from site to site or among years. Most levels were at or above the range for sufficiency regardless of treatment. In 2011 at Vantage, N levels were at the lower concentration for sufficiency, which may have contributed to their lower yields. At Sunrise, mulch plots tended to have lower tree leaf N than other treatments (likely due to some N immobilization by the mulch), which has the potential to influence fruit quality. However, no significant differences in fruit quality were detected at Sunrise.

Table 2. Tree leaf total N.

	Vantage		Pine Creek		Sundown		Sunrise		
	2010	2011	2010	2011	2010	2011	2010	2011	2012
Treatment	- - - - - - - - - - - - - *Total N (%)* - - - - - - - - - - - -								

Herbicide	2.32 b	1.91	1.99	1.91 b	2.66	2.60 a	2.40 a	2.46 ab	2.34 b
Tillage	2.34 b	2.00	2.08	1.97 a	2.71	2.21 b	2.43 a	2.57 a	2.56 a
Wood chip	2.39 a	2.04	2.00	1.82 c	2.51	2.62 a	2.27 b	2.32 b	2.26 b
Weed fabric	--	--	--	--	--	--	2.37 a	2.49 a	2.50 a
p=	0.012	0.24	0.281	0.002	0.562	0.01	0.017	0.02	<0.001

Fruit Yield and Size. At harvest, all the fruit from 5 trees in each plot at Vantage and Pine Creek and 10 trees per plot at Sundown and Sunrise were picked, counted and weighed to get individual tree yield, fruit number, and average fruit weight. At Vantage and Pine Creek, commercial bin harvest was done for each plot, with each group of bins per plot labeled and packed individually and run over a commercial grading line (Table 3). Thus, real world pack-out data on full row samples were generated for Vantage and Pine Creek orchards. This was not possible at Sundown due to the very limited fruit yield (often less than 1 bin per plot). Instead, bins were counted in the field to estimate fruit yields at Sundown. Based on pack-out data, yields per acre were similar in both 2010 and 2011 at Pine Creek. Although there were no treatment effects in 2010 at Pine Creek, in 2011 mulch plots had significantly greater yields than tillage plots. At Vantage, mulch plots tended to yield higher than tillage for 2009 and 2010, and were significantly greater (p=0.01) than both of the other treatments in 2011. There were no differences in yields at Sundown.

Table 3. Fruit yield (bins/acre).

	2009	2010	2011
Vantage			
Mulch	16.7	41.4	44.2 a
Herb/flame	14.8	34.0	28.0 b
Tillage	11.8	30.5	26.4 b
p=	0.08	0.07	0.02
Pine Creek			
Mulch		36.2	40.8 a
Herb/flame		31.1	36.3 ab
Tillage		39.3	34.8 b
p=		0.20	0.04
Sundown			
Mulch		3.4	2.2
Herb/flame		4.4	1.8
Tillage		3.8	2.7
p=		0.52	0.42

No clear trend emerged for treatment effects on fruit size. At Vantage there was no effect in 2009 or 2011, but significantly larger fruit size from the mulch treatment (p=0.04) in 2010, with nearly double the percentage of fruit in the target sizes of 80 and 88. There were no clear treatment effects on fruit size at Pine Creek or Sundown. Tillage plots did have slightly more fruit in the larger box sizes at Pine Creek in 2011.

At WSU Sunrise, the treatments had no significant effect on fruit yield or size in 2010, although the weed fabric plots trended higher for yield. In 2011, there were no yield differences but fabric and woodchip mulch plots had significantly larger fruit than tillage plots. In 2012, fabric plots yielded more than any of

the other treatments, while woodchip mulch plots had the largest fruit size. Fabric plots had the highest number of fruit per tree while woodchip mulch plots had the lowest.

Table 4. Fruit yield and size at WSU Sunrise.

	Fruit yield (kg/tree)			Cum. yield (kg/tree)	Ave Fruit Wt. (g)		
	2010	2011	2012	2010-2012	2010	2011	2012
Mulch	11.8	8.8	10.5 b	31.0 b	157.4	199.6 a	187.7 a
Herb/flame	13.2	8.8	10.1 b	32.1 b	156.8	189.4 ab	179.4 ab
Till	16.3	7.9	11.8 b	36.1 ab	159.6	184.2 b	169.4 b
Weed fabric	22.1	8.8	15.1 a	46.0 a	152.2	201.6 a	172.2 b
p=	0.24	0.63	0.008 3	0.054	0.82	0.042	0.042

Fruit Quality. Fruit were analyzed for standard quality parameters (firmness, soluble solids, and starch), as well as skin and flesh phenolics, for all orchards and years except Pine Creek pears in 2010 because the fruit deteriorated in storage. Also, the 2012 'Gala' apples from WSU Sunrise were not analyzed for phenolics because of the few phenolics' differences measured in the previous years' samples. There were very few treatment effects at any site or in any year. The 'Honeycrisp' at Sundown had more skin phenolics in 2011 than the 'Gala' at Vantage, but not in 2010. This is most likely just a cultivar difference between 'Honeycrisp' and 'Gala'. At WSU Sunrise, both skin and flesh phenolics were higher in 2010 than in 2011 when maturity was less advanced. The only significant treatment effects were:

- Skin phenolics in the pears in 2011, where tillage had more phenolics than herbicide.
- Soluble solids at WSU Sunrise in 2011, where tillage had more soluble solids than herbicide.
- Firmness at WSU Sunrise in 2012, where the herbicide and woodchip mulch treatments were firmer than the fabric mulch treatment.

We had speculated that the wood chip mulch might impact fruit quality since it did impact general tree performance. If it had positively impacted fruit quality, that would have been another benefit from this management system. Nevertheless, the fact that there were few differences in fruit quality among the treatments and where differences occurred they were inconsistent over time, suggests that none of these weed control management systems negatively impacted fruit quality.

Soil and Tree water Status. The different treatments were expected to have different impacts on soil and tree water status, which could influence tree performance and fruit yield and size. Soil moisture was monitored several times during each season with a portable TDR probe (0-20 cm depth), and on some dates also with a portable tensiometer. Tillage usually causes pruning of shallow tree roots, which could compromise water uptake if irrigation applications are not closely monitored, while mulching generally preserves soil moisture potentially lowering tree water stress. Project personnel attempted to take soil moisture measurements on the day before a scheduled irrigation so the soil would be in its driest state. Mulch plots tended to be wetter, and tilled plots drier, across the season, but differences were often not large enough to be statistically significant. To look directly at tree water stress, midday stem water potential was measured with a pressure bomb at all 4 sites in 2010, at Vantage and Sunrise in 2011, and only at Sunrise in 2012. There were no differences in stem water potential at Vantage and Sundown in 2010, while mulched trees at Pine Creek had significantly less water stress than the other treatments (surprising for large, older trees). At Sunrise, tilled plots had significantly greater water stress than the other treatments (i.e. woodchip mulch, fabric mulch, and herbicide/flame) in 2010, and the pattern was similar for soil moisture. In 2011, mulch plots at Sunrise had significantly lower water stress than the other treatments (which were not different). In 2012 at Sunrise, a mini-trial was conducted on some untilled trees by imposing 4 treatments in early August during hot weather: 1) no tillage; 2) tillage on one

side of the tree row (3 cm depth); 3) tillage on both sides of the tree row (3 cm depth); and 4) tillage on both sides of the tree row (1.5 cm depth). The goal was to see whether there was an immediate effect of tillage via root pruning that would induce tree water stress and perhaps explain the differences between 2010 and 2011 results. However, there were no differences in tree water stress measured over a 10-day period in this experiment, suggesting that deeper roots may be more critical to water uptake during the summer, at least for 4-6 year-old M.9 rootstocks growing in a lighter textured soil.

Soil organic matter. Soil samples for a complete analysis (0-30 cm depth) were taken from each plot of the three Foreman orchards prior to treatment application (July 2009) and then again in October 2011. In addition, shallow samples (0-5 cm and 5-10 cm depth) were taken initially and in October 2010 and October 2011 for analysis of particulate organic matter carbon (POM-C), a measure that may detect soil carbon changes sooner than some other tests. The Vantage site had the poorest soil, with a strong gradient of poorer soil going up slope. Sundown and Pine Creek had silt loam soils with higher organic matter than Vantage. Overall, there were no clear patterns of change in soil C. Project personnel had hypothesized that tillage would reduce soil C while mulch would increase it. This was not the pattern observed in the commercial orchards; in fact, soil C in mulch plots tended to decrease over the project period. This may be in part due to the sampling protocol that removed the mulch down to mineral soil, omitting the carbon-enriched top layer, and sampling down to 30 cm. In the final WSU Sunrise soil sampling in October 2012, 2.5 yr after treatment application began, there was significantly greater organic matter (0-15 cm depth) with wood chip mulch than for tillage or weed fabric (Table 4). Although not statistically significant, there was a similar pattern of the woodchip mulch having the highest total soil N and cation exchange capacity. These results indicate the positive effects that woodchip mulch has on soil quality.

The POM-C tests did not reveal any consistent trends for increasing or decreasing organic matter due to treatment. The only site with a treatment effect was at Vantage, where tillage POM-C (0-5 cm depth) was greater than mulch. The POM-C data suggest that tillage can increase active C in the top 5cm of soil with residue incorporation, but the active root systems in herbicide/burn led to greater POM-C at 5-10cm depth. These differences, plus the lack of response to mulching, point to the need for better sampling methodologies to track soil C changes under such contrasting management systems in order to understand whether levels are changing. It was surprising to see a significant change in soil organic matter (related to total soil C) and not in the POM-C fraction, which is generally considered an early indicator of total C change.

There were few other changes in soil constituents due to treatment. One was an increase in soil K (mg/kg soil) with the mulch compared to the other treatments (mulch, 213a; herb/flame, 192ab; tillage 166b; p=0.006), with a similar effect on soil B.

Table 4. Soil quality parameters at WSU Sunrise, October 2012 (0-15 cm depth).

Treatment	Soil Organic Matter (%)	Total N (mg/kg soil)	Cation Exchange Capacity (meq/100g)
Woodchip mulch	2.38 a	1245	5.56
Herbicide/burn	2.08 ab	1113	5.02
Tillage	2.02 b	1085	4.90
Weed fabric	1.88 b	960	4.38
P=	0.05	0.20	0.31

Financial analysis. At Vantage and Pine Creek, the fruit in each plot and each repetition was separately packed and sold so that the actual revenue could be assessed. The costs of each plot and repetition was likewise tracked and estimated for each year. Because the plots were otherwise treated identically the

costs differ only in the orchard floor management costs. The revenue difference can therefore be associated with the difference in cost and any difference in yield and packout. Both Vantage and Pine Creek achieved statistically significant differences for yields and total revenue that provides a basis to assess which orchard floor investment was the most profitable.

Tillage is used as the baseline orchard floor management technique as it is currently the most common in the industry. The cost of tillage is reasonable, about $128 per acre per year for six passes through the orchard (Table 5). One third of this cost is associated with incremental equipment required, specifically the WonderWeeder (Harris Mfg., Burbank, WA) and a front three-point lift required for the WonderWeeder. The other two thirds are from the direct operating costs, including fuel, labor and the cost of the tractor.

Table 5 - Cost of Tillage

(a)		**Tillage Capex**	$	11,700
(b)		**Useful Life (yrs)**		7
(c)		**Weighted cost of capital**		10%
(d)	=pmt[(c),(b),(a)]	**Equipment cost/yr**	$	2,403
(e)		**Typical Acreage**		50
(f)	=(d) / (e)	**Equip. Cost/ac**	$	48.06
(g)		**Tractor deisel/hr/hp (gal)**		0.07
(h)		**Tractor power used (hp)**		25
(i)		**Diesel cost ($/gal)**	$	4.12
(j)	=(g)*(h)*(i)	**Fuel cost per hour**	$	7.21
(k)		**Tractor rent/hour**	$	9.00
(l)		**Labor cost/hr**	$	13.00
(T)	=(j)+(k)+(l)	**Tractor Op. Cost/hr**	$	29.21
(n)		**Tillage Speed (mph)**		2.50
(o)		**Miles per acre**		1.14
(p)	=(n) / (o)	**acres per hour**		2.20
(q)	=(T) / (p)	**Cost per acre**	$	13.28
(r)		**Passes per year**		6
(s)	=(r)*(q) + (f)	**Tillage cost/acre**	$	128

Table 6 - Cost of Mulch (3ft wide, 4in thick in treerow)

(a)		**Treerow spacing (ft)**		14
(b)		**Square feet / acre**		43,560
(c)	=(b) / (a)	**Linear feet per acre**		3,111
(d)		**Mulch strip width (ft)**		3
(e)		**Mulch thickness (in)**		4
(f)	=(c/3)*(d/3)*(e/36)	**Cubic yards required**		115
(g)		**Cost per yard**	$	-
(h)		**Cost/yd for hauling**	$	8.00
(i)		**Yards per acre**		112
(j)	=[(g)+(h)]*(i)	**Material cost/acre**	$	896
(k)		**Spreader rent/hr**	$	20.00
(l)		**Yards per load**		6
(m)		**Loads applied/hr**		3
(n)	=[(k)+(T)]*(i)/(l)/(m)	**Application cost/ac**	$	306.20
(o)	=(j)+(n)	**Mulch cost per acre**	$	1,202.20

Mulch is a one-time exercise that cost $1,202.20 per acre, nearly ten times the annual cost of tillage. In previous trials, mulch has provided weed control from 2-4 years, and likely provides growth benefits beyond that. As illustrated in Table 6, application was 4 inches thick and 3 feet wide along the tree row. The mulch material itself represented three quarters of the cost. In this study, the material was obtained from a source at no charge but had to be hauled 60 miles. If material had been closer, this cost would have been less. One quarter of the cost was incurred from the application of such a large amount of bulk material using a rented Whatcom Spreader.

Table 7 - Cost of Organic Weed Spray

(a)		**Speed (mph)**		2.00
(b)		**Miles per acre**		1.14
(c)		**Acres per hour**		1.76
(d)		**Water (gal/ac)**		16
(e)		**Vinegar gal/ac**		12
(f)		**Vnegar cost ($/gal)**	$	6.00
(g)		**Hort.oil gal/ac**		2
(h)		**Hort.oil cost ($/gal)**	$	6.00
(i)		**Citric acid lbs/ac**		16
(j)		**Citric acid cost ($/lb)**	$	1.50
(k)	=(e)*(f)+(g)*(h)+(i)*(j)	**Material cost / pass**		$108.00
(l)	= (k) + (T)/(c)	**Total cost per pass**		$124.60
(m)		**Number of passes**		4
(n)		**Weedspray cost/yr**		$498.39

Organic Weed Spray costs were $498.39 per acre when the rate and concentration was raised to levels that were effective for weed control. Initially, lower rates of WeedPharm (20% acetic acid), citric acid and oil were used, but they were not effective and the treatment was changed to the maximum allowable rates. A low volume Enviromist weed sprayer was purchased to see if that could help the economics by running lower rates of material. High concentrations at low rates were more effective than low concentrations at high rates, however results were still insufficient to provide any meaningful control. Additionally, the acidic solution quickly destroyed the Enviromist sprayer. Consequently the only way to

achieve any sort of control was through the use of large quantities of spray material. Other organic compliant herbicide materials were tried as well, including GreenMatch and Burnout Organic Herbicide. GreenMatch at higher rates was effective (data not shown) but it was more costly than the vinegar/citric/oil solution. Weed control with organic herbicide was expensive.

Table 8 - Cost of Flaming

(a)		**Flaming Capex**	$	2,500
(b)		**Useful Life (yrs)**		7
(c)		**Weighted cost of capital**		10%
(d)	=pmt[(c),(b),(a)]	**Equipment cost/yr**	$	514
(e)		**Typical Acreage**		50
(f)	=(d) / (e)	**Equip. Cost/ac**	$	10.27
(g)		**Speed (mph)**		5.00
(h)		**Miles per acre**		1.14
(i)	=(g) / (h)	**Acres per hour**		4.40
(j)		**Propane cost/ac**	$	14.00
(k)	=(T) / (i) + (j)	**Cost /acre/pass**	$	20.64
(l)		**Passes per year**		5
(m)	=(k)*(l)+(f)	**Cost per year**	$	113.46

Flaming costs were comparable with tillage costs and control was achieved with fewer passes (Table 8). Results were generally better than what was achieved with the organic weed spray and so for the part of the second year and all of the third year flaming was used for the Herbicide/burn treatment. It was also employed on the mulch because weeds began to grow from the mulch in the second year. Most of the cost of flaming is from the cost of the propane used. Travel through the orchard is at higher speeds when flaming than it is for tillage or weed spray.

Table 9a - Vantage Orchard Production Value from 2009 - 2011

	Bins / acre			**Revenue/bin ($)**			**Revenue / acre ($)**		
	2009	**2010**	**2011**	**2009**	**2010**	**2011**	**2009**	**2010**	**2011**
	(a)	(b)	(c)	(d)	(e)	(f)	(g)=(a)*(d)	(h)=(b)*(e)	(i)=(c)*(f)
Mulch	17	41	44	233	229	377	3,891	9,481	16,643
Herb/flame	15	34	28	231	229	375	3,419	7,769	10,496
Tillage	12	31	26	227	227	371	2,679	6,924	9,798

Table 9b - Vantage Orchard Net Present Value of Orchard Floor Treatments

Treatment cost			**3-year Net Present Value**	**Weighted cost of capital (m): 10%**		
				Revenue less orchard floor costs		
2009	**2010**	**2011**				
(j)	(k)	(l)	(n)=NPV(m,o:q)	(o)=(g)+(j)	(p)=(h)+(k)	(q)=(i)+(l)
(1,202)	(113)	113	**$7,574**	2,689	9,367	16,757
(498)	(113)	(113)	**$1,581**	2,920	7,656	10,383
(128)	(128)	(128)	**$0**	2,551	6,796	9,671

Vantage Orchard Economics. At Vantage Orchard, the fruit production of the mulch plots rose each year while the production of the other plots rose and then fell (Table 3). The most marked difference was in the third year when the mulch treated rows had much higher production. The revenue per bin was not statistically different. The revenue was statistically higher for the mulch treated rows (Table 9a). Table 9b illustrates that the high cost of mulching the orchard incurred was greatly exceeded by the increased revenues in the subsequent three years. The future benefit was reduced to reflect the time value of money, risk and opportunity using a cost of capital of 10%. Column (n) in Table 9b shows the present value of these future benefits normalized to the present value of the Tillage plots. The mulch had a benefit of $7,574 relative to that of the tillage. This present value is large because the magnitude of the revenue benefit greatly exceeds the cost of the mulch. Few actions in the orchard result in economic benefit of this magnitude. The economic benefit of the mulch is likely underestimated because its benefits are likely to last beyond the third year into the fourth, fifth, sixth, and perhaps seventh year. The magnitude of this future benefit cannot be quantified however due to the study duration being three years. The benefit of herbicide/flaming while positive on average was not statistically different from tillage. Flaming and tillage produced similar outcomes.

Table 10a - Piencreek Orchard Production Value from 2010 - 2011

	Bins / acre		Revenue/bin ($)		Revenue / acre ($)	
	2010	2011	2010	2011	2010	2011
	(a)	(b)	(c)	(d)	(e)=(a)*(c)	(f)=(b)*(d)
Mulch	36.2	40.8	370	251	13,394	10,242
Herb/flame	31.1	36.3	363	246	11,289	8,933
Tillage	33.3	34.8	357	260	11,888	9,033

Table 10b - Pinecreek Orchard Net Present Value of Orchard Floor Treatments

Treatment cost		3-year Net	Weighted cost of capital (i): 10%	
2010	2011	Present Value	Revenue less orchard floor costs	
(g)	(h)	(j)=NPV(i,o:q)	(k)=(e)+(g)	(l)=(f)+(h)
(1,202)	(113)	**$1,403**	12,192	10,129
(498)	(113)	**($952)**	10,791	8,820
(128)	(128)	**$0**	11,760	8,905

Table 10b shows the moderate differences in revenue and net present value for the three treatments at Pine Creek. However, the differences in revenue are not statistically different. The effect is not large enough to overcome the inherent noise resulting from variability within the orchard. The magnitude of the revenue difference across treatments was much less than what was measured at Vantage. A trial that covers a much larger section of the Pine Creek orchard than the 10-acre trial used might tease out an effect, if there is one. It is possible also that if the study was continued for a longer duration, an effect may emerge, but what is certain is that the effect is much smaller than what was experienced at Vantage Orchard. The reasons for this are discussed later, but is likely to be primarily a result of soil differences and tree size differences.

David Granatstein provided overall project leadership and coordination. He and his staff did the field data collection and managed the plots at WSU Sunrise. They did the field data entry and statistical analysis on these data. Granatstein also shared project findings with grower stakeholders at industry meetings. Alan Groff organized the sites and field management on the three Foreman Orchards. He arranged for the appropriate management to be done on the different plots, monitored the performance of the different systems and made adjustments, set up the large scale commercial harvest logistics and separate fruit packing for each plot to generate replicated pack-out and economic data, documented

practical aspects (pro and con) of the different systems, and conducted the economic analysis. Preston Andrews assisted with field data collection and supervision of the graduate student (first season), conducted all fruit quality analysis in his lab, and statistically analyzed fruit quality data. He also worked with Granatstein and Groff on needed management adjustments and project decisions, and contributed to outreach via posters at several industry events. David Granatstein authored the quarterly and annual reports, with Andrews and Groff contributing to and editing them.

GOALS AND OUTCOMES ACHIEVED

The project had four outcomes that could be achieved during the project period and one long-term outcome that will not occur for some time after project completion.

Tree performance (statistically greater tree growth, fruit yield, fruit size, and less alternate bearing issues). Mulch trees tended to grow more than tilled trees at two sites, with statistically greater growth in some cases. The results were not as clear as we might have expected. Mulch trees tended to have higher fruit yields at some sites (statistically significant in some cases), while there was no consistent effect on fruit size. Fruit size at WSU Sunrise was consistently less than 200g, a threshold size to be above to receive the best prices. There was no evidence that the treatments influenced alternate bearing tendency at the three commercial orchards.

Soil sustainability (a statistical increase in soil organic matter [total C, Particulate Organic Matter C]). The most meaningful change in soil organic matter, a key indicator of soil quality, was seen at WSU Sunrise. Mulch plots had significantly greater soil organic matter than tilled plots, but neither tillage nor mulch plots were significantly different from herbicide/burn plots. This approximated the original hypothesis of mulch increasing organic matter and tillage decreasing it relative to a bare ground undisturbed soil (the goal for the herbicide/flame system). The detected difference at Sunrise may have been due to the smaller depth increment of sampling (0-15 cm soil at Sunrise vs 0-30 cm in the commercial orchards). For this outcome, there was neither an increase nor decrease in soil carbon tied to treatment during the two years of monitoring at the three commercial orchards even though the results at WSU Sunrise did support the original hypothesis of decreased soil quality from tillage. Thus, use of tillage for weed control did not pose a risk for loss of organic certification due to decreasing soil quality in the commercial orchards, but it did at WSU Sunrise.

Fruit quality (a statistical improvement in standard fruit quality measures and/or nutritional quality). There were only two cases of significant differences in fruit quality due to treatment. Thus, orchard floor management did not impact the economics of the orchard via an effect on fruit quality, either positive or negative. While unexpected, this outcome is encouraging in that any of these weed control systems appear to be similar with respect to fruit quality.

Profitability (equal or increased net three year return and net present value for the alternative systems compared to the tilled system; lower costs for external soil amendment inputs; no major barriers to adoption of alternatives [e.g., increased voles]). At Vantage, the economic benefit of the mulch exceeded that of tillage by $7,574 per acre. This must be weighed against the risk of vole damage, which occurred at Vantage, but was not enough to prevent the economic benefit. Nonetheless, the experience at Sundown, with young trees, stands as a warning of greater risk of vole damage. The economics of herbicide/flaming treatment was in no case statistically worse or better than that of tillage showing that it is a very viable orchard floor management strategy that avoids the downsides of soil degradation and root disruption. Organic herbicides were much more expensive than flaming and would not be economical. A hybrid of the two could be used, where tillage is employed at the end of the season to disrupt rodent habitat.

The one long-term outcome for the project was **Grower Adoption** (increased number of growers using either alternative system that proves superior to tillage, based on surveys at the winter industry horticulture meetings). Project results did not point to a clearly superior orchard floor management system. Mulch appears to have potential to improve tree performance, but this is probably most likely to occur on sandy or shallow soils. Organic herbicides were no better than flame weeding and tremendously more expensive. So, this study's results would discourage growers from relying on those materials. Flaming and tillage are both relatively low cost compared to mulching. Again, while the data were not compelling, tillage plots tended to perform less well than the undisturbed herbicide/flame plots. This might be due to a negative effect from a combination of root pruning and greater soil evaporation, for which there was evidence at WSU Sunrise in the first year of the trial (greater tree and soil water stress), but this was not repeated in subsequent years. It could be that any adverse effects from root pruning by tillage are compensated for in subsequent years. In addition, the stress from root pruning was not enough to induce any effects on fruit yield, size, or tree growth. Tilled plots at Sunrise did show the potential for a reduction in soil organic matter. Some growers commonly use several practices, such as spring and fall tillage with mid-summer flaming and mowing. This project did not test such combinations, although it is probably desirable to use a variety of weed control methods over the season. While there appears to be a benefit from mulching, a 4-6" layer of mulch was used in this study in order to effectively control weeds. This requires large quantities of mulch and the expense of transporting and applying it. If a thinner layer of mulch could deliver the desired growth benefits for the trees, but be combined with other practices (e.g. flaming) to control weeds, growers might be more able to afford the initial cost of mulching. And suitable mulching materials are not necessarily widely available, thus lower rates would stretch constrained supplies. The wood chips have generally not incited vole problems, while most other mulch materials, including fabric, have. A combination of wood chip mulch on top of fabric aggravates rodent damage, especially if their populations are high.

The primary hypothesis for the project was that tillage damages tree feeder roots responsible for water and nutrient uptake and destroys organic matter, which reduces water- and nutrient-holding capacity of the soil. The consequence of these effects would be impaired tree health and performance, lower revenues from reduced yields and smaller fruit size and higher costs because of the necessity for additional inputs of organic amendments to rebuild soil organic matter. The alternative systems used in the project were chosen to eliminate soil disturbance. Previous research suggested that these weed control alternatives can enhance soil quality and tree root health while lowering fertilizer cost. Research conducted in past decades demonstrated that the herbicide strip-grass alley system plus conventional fertilizer was the lowest cost and highest profit approach, despite the fact that in more than 10 published studies, mulching the tree row led to superior tree performance. However, the improved performance of using mulch in the tree row shown by these studies did not justify the added cost of mulch. The constraints of organic farming systems (i.e. expensive fertilizers and poorly effective herbicides) may change the profit equation and challenge conventional wisdom, and thus informed the project design. The goal was to test three contrasting orchard floor management systems at field scale in commercial organic orchards to determine whether the hypothesis was correct, and whether a superior system would become evident.

During the course of the project, project personnel performed all the field practices and data collection that were outlined as necessary to test the hypothesis and evaluate the systems. However, as in all science, the outcome of the research is not predictable or guaranteed to conform to the results that were expected. Rather than the outcomes of the study proving clearly that tillage is detrimental and mulch is superior, the project did generate evidence that mulch can improve tree performance and in some situations this can result in a net improvement in profitability. Tillage did not lead to obviously or consistently poorer tree performance or soil degradation, but these negative outcomes did occur in some instances and thus confirm the caution that repeated tillage for weed control should be avoided. The clearest result was that in the herbicide/flaming treatment, intended to eliminate soil disturbance while

still providing weed control, the available organic herbicides were no more effective than flaming, but cost much more. None of the treatments led to consistent changes in fruit quality, another factor that could influence profitability. The project results did largely disprove the hypothesis that tillage would necessarily lead to a series of negative outcomes (poorer tree growth, smaller fruit size, declining soil organic matter), but these outcomes do remain a risk if tillage is used indiscriminately.

Tree performance. Tree trunk cross-sectional area (TCSA) was measured at the beginning of the study, and each fall, to enable calculation of this accepted measure of tree growth. The commercial orchards were monitored for 2.5 growing seasons and WSU Sunrise for 3 seasons. Fruit yield and size were measured both with a small sample (5 trees per plot at Vantage and 10 trees per plot at the other sites) as well as commercial bin harvest by plot at Vantage and Pine Creek. The mulched trees tended to produce greater tree growth and higher yields, but there was no clear trend for fruit size. There was no evidence of treatment effect on alternate bearing.

Soil sustainability. There were no significant trends in soil C, either as total C or POM-C (an early indicator of change) other than the treatment differences at WSU Sunrise. Total C (0-30 cm depth) at both Vantage and Pine Creek declined slightly over the course of the project and increased slightly at Sundown, where there was a significant treatment effect. The herbicide/flame plots tended to have the highest total C, perhaps due to C contributions from the active root systems of the weeds and/or C from charred vegetation on the surface after flaming. However, this was not supported by the surface POM-C data at that site. There was a significant treatment effect on POM-C only for 2010 at Vantage, where tillage was higher than mulch. Only at Sunrise was there a treatment separation for soil C, a key component of soil quality mandated by the National Organic Program.

Fruit quality. Standard fruit quality as well as fruit phenolics (an indicator of antioxidant content) were measured but the results did not show any meaningful effect of orchard floor treatment. Results did differ by site and year. Therefore, treatments did not have a negative impact on economics based on differences in fruit quality that could affect fruit value.

Profitability. Mulch provided a large economic benefit at Vantage Orchard. Orchards similar to Vantage, namely with soils that have low organic matter (less than 1.5%) should consider mulch as an important tool to improving organic orchard profitability. On the other hand at orchards similar to Pine Creek, with large trees and rich soils (organic matter greater than 5%), mulch is likely not going to provide sufficient economic benefits to be justified. Our results show similar profitability for herbicide/flaming and for tillage. The two techniques offer different advantages. Tillage, while it has downsides, provides the benefit of disrupting rodent habitat. Flaming provides the benefit of not disrupting soil or the roots of the trees. This is likely to be important in young orchards where trees have small shallow root systems. A hybrid of the two techniques should be considered to maximize both of these benefits.

BENEFICIARIES

By partnering with Foreman Fruit Co. for the study (Alan Groff), this project provided a commercially relevant, data driven comparison of organic orchard floor management systems. The results have benefited Foreman Fruit Co., a significant organic producer in the state, and have been shared with other growers through field days and presentations at grower meetings. There are approximately 275 growers with organic tree fruit in the state, and they can benefit from the findings by avoiding reliance on organic herbicides, using cost-effective flaming and tillage, and using mulch in targeted situations on poorer soils.

No quantitative data on any adoption of the practices being investigated were collected, as the project length was insufficient to expect that outcome in 2-3 years. The project team is aware of 1200 organic acres that have adopted the lessons from this study. Across all of these orchards tillage is now used very sparingly after harvest for the purpose of managing rodents. Mulches have been applied to weak soils;

for example, the remainder of Vantage Orchard, which is 130 acres, all received mulch. All blocks are receiving higher levels of compost each year with the goal of getting organic matter to 5% on all blocks. It is likely that more growers will follow suit given that those orchards that have adopted these practices are getting better than industry standard results.

LESSONS LEARNED

Based on the results from this project, it was not possible to firmly conclude that tillage is a less desirable orchard floor management system, as previous studies have shown. Negative results from tillage did occur but were inconsistent. This project studied large plots in commercial organic orchards to represent a real-world situation, but with proper experimental design to generate valid data. The ability to gather yield and packout data by plot (for two sites) was a valuable methodological decision and illustrates the potential shortcomings of small plots in orchards where variability from tree to tree can be very high. While the large plots may have added some variability in terms of soil type and management errors, they did provide a large harvest sample to evaluate. Two of the orchards were infested with quackgrass, a perennial weed for which there is no effective organic control in an orchard setting. The combination of wood chip mulch over fabric was successful in suppressing this weed for one season, but incited vole damage in the process. While quackgrass is not uncommon in organic orchards, it might have been useful to include a younger orchard site without such extreme weed pressure. As it was, none of the treatments provided satisfactory multi-year weed control in the quackgrass infested orchards. But this did not appear to create undo competition for nutrients with the trees based on the leaf tissue nitrogen analysis. Thus, adequate fertility and water inputs can largely compensate for weed competition. But lack of weed control does increase the risk of vole damage, which was experienced at these orchards.

Based on project results, currently available organic herbicides are not a cost-effective weed control option. They were substantially more expensive than the flame weeding with no better performance. Flame weeding at WSU Sunrise quickly selected for dandelion, which was not killed over the 3-year project despite repeated flaming. It would take a much higher frequency of flaming to reduce this weed than what was used by Foreman Fruit.

One commercial orchard was on a sandy soil, and two orchards on silt loam soils. Improvements to tree performance were more obvious on the sandy site. Foreman Fruit tested mulch on another orchard with sandy soil and observed noticeable benefits to tree performance. Had the study not been impacted by voles at Vantage and Sundown, there may have been more of a tree response to mulching. At Vantage, mulching did lead to a significant increase in size 80 and 88 fruit in 2010, often the most valuable sizes. The revenues generated from the mulch, herbicide/burn, and tillage plots for that year were $10,497, $ 8,434, and $ 8,365 per acre, respectively, with per bin returns of $233, $231, and $227 for the respective treatments. Commercial pricing was relatively flat on the peak sizes and thus the fruit size impact was more related to volume (i.e. yield) than price. At Vantage, with current fruit prices of approximately $400 per bin, it would only take 3-4 bins to cover the added cost of mulching, and mulch increased yields more than this in both 2010 and 2011.

The large-scale on-farm trials were complemented by the smaller, more controlled parallel study at the WSU Sunrise research orchard. In part this was intended to provide a more stable data source for the graduate student on the project. These plots were useful for some of the additional intensive monitoring and several satellite studies. However, fruit yield variability was quite high, as was overall tree-to-tree variability, so the results were less striking than anticipated, even using 5 replications.

At the end of this study, project findings can be summarized into the following two key conclusions:

- In mature orchards on fertile soils, with higher organic matter and satisfactory irrigation systems, tillage does not necessarily impair profitability, because it is lower cost and provides better rodent

control, potentially offsetting any loss of tree performance. Although surface feeder roots may be damaged the first year tillage is used, the root system appears to adjust in subsequent years.

- In orchards on dwarfing rootstocks in lighter soils and with inadequate irrigation, mulch can be more profitable. Mulch will likely improve tree performance in more situations than can be economically justified.

The biggest unexpected problem with the study was vole damage at the Vantage and Sundown orchards. A fabric material was used under the wood chip mulch because of the quackgrass infestation, not anticipating that this would provide an attractive habitat for voles. They burrowed beneath the fabric and came to the surface by the trunk where they caused significant feeding damage to the bark. The project included funding for a graduate student as part of the staffing. A parallel trial was set up at WSU Sunrise to help ensure success for the student. However, the student left after one year and her position was filled with other hired labor. With this change, the project lost the potential for an individual to delve deeper into some of the soils issues that were of interest to project staff. The monitoring of soil C changes may have been more successful had the student remained on the project. Measurements of stem water potential were conducted, an indicator of tree water stress. The most intensive work was done at WSU Sunrise. It was surprising how difficult it was to induce a change in tree water stress at this site, where the sandy loam soils were expected to dry out quickly without irrigation and for the trees to respond to the added water stress. Tillage plots at Sunrise did separate out from the other treatments for both stem water potential and soil moisture (more stress) in the first season (2010), but not in subsequent seasons (2011 or 2012). A small side study was conducted to see whether we could induce more tree water stress following various tillage regimes in mid-summer, when the effect of root pruning would be expected to be greatest. This did not occur over a 10-day study period. Thus, it was not possible to confirm the likelihood that the more negative stem water potential seen with tillage in the first year was due to root pruning or not. Nevertheless, the roots may have adapted to tillage after the first year by refocusing their growth into untilled areas of the soil profile in subsequent years.

While the data from the study did not confirm all points of our starting hypothesis, the project clearly met its goals of conducting an orchard-scale comparison, showing a number of results where mulch was beneficial but fewer results with a negative impact of tillage than anticipated. The negative effects of tillage observed in some parts of the industry may reflect the use of tillage combined with a failure to apply compensating organic amendments to the tilled soil. Vantage Orchard at one time relied completely on tillage and had an alternate bearing problem so severe that every other year it had only 20% of a crop and even in the "on" years it was operating below its potential. Even in the tillage portion of the trial, there were improvements in performance, which may have reflected greater application of compost than had been used in the past (compost was applied equally to all plots). Over time tillage reduces organic matter and without the application of imported organic matter, the orchard may reach a tipping point where nutrient holding capacity and biological properties are impaired such that the profitability declines. Determining that point was not feasible within the time frame of this study.

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ADDITIONAL INFORMATION

David Granatstein committed 5% of his time to the project as in-kind match, but provided more in terms of the actual hours involved. He provided overall project management, was responsible for much of the field data collection and analysis, and worked on the outreach. Foreman Fruit Co. provided $81,960 in in-kind match that included additional orchard wages for the trial, salary (Alan Groff), mulch hauling and

application, and additional incremental orchard management cost to conduct the trial. They hosted the trials at three of their orchards, where they covered all normal operating costs plus much of the additional cost of having replicated plots with differing treatments. They also arranged for the commercial bin harvest at Vantage and Pine Creek and packout by plot at the fruit company, which provided much better data than small plot harvests. Alan Groff was responsible for all of the economic analysis and an assessment of grower practicality.

Andrews, P., Granatstein, D., Groff, A. 2011. Increasing profitability with organic orchard floor management alternatives. Poster presentation at Wash. St. Hort. Soc. Annual Meeting, Wenatchee, WA, Dec. 5-7, 2011.

Andrews, P., Granatstein, D., Groff, A. 2011. Increasing profitability with organic orchard floor management alternatives. Poster presentation at 2nd International Organic Fruit Symposium Leavenworth, WA, June 18-21, 2012.

PROJECT #10

Project Title: *Stem Number, Tuber Set and Size Distribution Relationships for Specialty Potato Cultivars*

Partner Organization: Washington State University (WSU)

PROJECT SUMMARY

This project focused on developing management techniques for modulating tuber size distribution to maximize value of selected fresh market potato cultivars. Tuber set and size distribution are closely correlated with the degree of apical dominance (stem numbers) produced by seed potatoes. As stem numbers increase, plants set more tubers, and average tuber size decreases. Since tubers are packed and marketed according to size, the size distribution profile can greatly affect crop value. Target stem number and tuber set relationships exist for every production region and market niche, where size distribution can be optimized for maximum profitability of a particular cultivar. Seed and commercial growers can potentially add value to their crops by treating seed to produce a particular tuber size distribution according to anticipated market requirements. Developing reliable methods for storage and treatment of seed potatoes to optimize tuber set and size distribution for added value was a major goal of the project.

Goals and Objectives

(1) Develop pre-plant treatments for seed of cultivars Chieftan, Red LaSoda, Yukon Gold, Cal White, and Satina that will enable growers to effectively alter tuber set and size distribution.

(2) Undertake a comprehensive economic analysis of different tuber size profiles to identify the target stem numbers for maximum returns using fresh and seed contract assumptions.

Potato growers are constantly looking for ways to increase the efficiency of production to enhance economic returns. Researchers in the Knowles lab at WSU have researched the physiology of tuber set along with production factors affecting tuber size distribution in potato production for many years. Controlling tuber set and size distribution can add substantial value to a crop. Fundamental and applied aspects of this research have been extended to stakeholders at various industry meetings (e.g., WA/OR Annual Potato Conference) but the focus has been primarily on long russet cultivars for the processing industry. Several years ago, Dr. Knowles was approached by commercial seed growers in WA to initiate a project to develop techniques for manipulating tuber set and size distribution in specialty cultivars produced for the fresh potato market. Hence, the initial motivation and partial support for this project came directly from industry stakeholders.

PROJECT APPROACH

This three-year project tested a number of treatments (strategies) to accomplish the objectives stated above. Treatments included accelerated aging by storing seed at temperatures greater than 4°C and use of auxin transport inhibitors, pinching agents, and gibberellins (GA) as seed treatments to decrease apical dominance. As described below, the most effective treatments were discovered and developed during years two and three of the project.

Consistent with results of preliminary studies conducted in 2008/09, cultivars Satina, Red LaSoda, Cal White, Chieftain, and Yukon Gold were highly resistant to increasing stem numbers in response to high temperature-induced age-priming treatments administered during storage in 2009/10. Hence, a different approach involving plant growth regulators was pursued in 2010/11 and 2011/12. In 2010, a number of plant growth regulators were screened for their effects on decreasing apical dominance when applied to seed directly prior to planting in April. The overriding objective was to break apical dominance so that seed-tubers produced plants with more stems, increased tuber set, and greater yields of smaller tubers without affecting market yield. Of three growth regulators tested (3-nonene-2-one, cyclanilide, GA), GA

(gibberellin) at 10 ppm greatly increased stem numbers (from 3 to 5-7 stems per seedpiece, depending on cultivar), resulting in desired shifts to smaller tubers; however, GA also decreased yield and altered tuber shape (elongated tubers). These effects were likely due to the relatively high concentration (10 ppm) of GA used in the initial studies. Accordingly, in 2011 a lower range of GA concentrations was tested to determine if apical dominance could be reduced and tuber size distribution altered without negatively affecting yield and tuber shape. It was reasoned that reduced rates of GA may result in intermediate levels of reduced apical dominance to the extremes produced with 10 ppm, thus producing a broad range of stem numbers, tuber set and size relationships for each cultivar. Seed of the five cultivars were treated with 0, 2, 4, and 8 ppm GA in 2011 to evaluate efficacy on apical dominance, tuber set, yield, tuber shape, and tuber size distribution. While 8 ppm GA was still too high, reducing tuber yield and adversely affecting tuber shape, 2-4 ppm GA greatly increased stem numbers and shifted tuber size distribution without negatively impacting yield and tuber shape. These results suggested that even lower concentrations of GA may have efficacy for manipulating tuber size distribution. Therefore, in 2012, GA was tested at 0.5, 1, 2 and 4 ppm. Stem numbers increased with GA rate, resulting in a broad range of apical dominance for each cultivar, with minimal impact on marketable yields.

As stem numbers increased with GA, tuber set per plant increased and size distributions shifted to favor higher yields of the potentially more lucrative "C" size (creamer, 10-66 g) and "B" size (67-91 g) potatoes at the expense of the larger "A" size (92-360 g) tubers (Tables 1-5). The optimum GA concentration for shifting tuber size distribution and adding value to Cal White, Chieftain, and Red LaSoda was 2-4 ppm in two years of study. Total returns from the GA-induced yield shift (and in some cases, increased yield) ranged from 4-30%, depending on cultivar, GA concentration and year. Crop value of Yukon Gold was increased by only 5% at 2 ppm GA in 2011 but increased 14% when seed was treated with 0.5 ppm GA in 2012. GA at 2-4 ppm increased total returns of Satina by 19 and 27%, respectively, in 2010 by shifting tuber size distribution and increasing marketable yield. However, a shorter growing season in 2012 resulted in variable effects on returns for Satina, which ranged from -13 to +7%, depending on GA concentration. Collectively, these results demonstrate that pre-plant treatment of seed potatoes with GA is an effective method to reduce apical dominance, increase tuber set, shift tuber size distribution to smaller grades, and increase value of the crop. Hence, the 3-year project was successful in developing a strategy to manipulate tuber size distribution for added value. Further work is needed to evaluate the interaction between GA concentration and length of growing season to fine-tune the recommendations for each cultivar.

This project did not involve researchers from other states. Cooperators included Dick Bedlington Farms and Pure Potato, LLC. The Bedlingtons (Marlys and Dick) have been instrumental in procuring high quality certified seed from specialty potato seed growers in the Lynden, WA area each fall for the project. The project also constitutes a portion of the thesis of Jacob Blauer, a PhD student under my direction in the Molecular Plant Sciences program at WSU.

GOALS AND OUTCOMES ACHIEVED

The activities undertaken to achieve the project goals are described in the Project Approach section. Expected measurable outcomes included the increased value inherent in producing a commercial crop from seed that has been treated to give a higher percentage yield in the more lucrative tuber size classes (eg. Sizes "B" and "C" grades). To date, our studies have shown that the five specialty cultivars in this study are highly resistant to accelerated aging treatments induced by brief storage periods at high temperatures. This finding is in contrast to that for most of the long russet cultivars. Management of storage temperature is thus not an option for influencing apical dominance and tuber size distribution of these fresh market specialty cultivars. Treatment of seed with GA, however, significantly increased the proportion of 'B' and 'C' size tubers without reducing marketable yields, and in several cases significantly increased marketable yields. The measurable outcome of increasing crop value with treatments designed to alter tuber size distribution was thus achieved.

The measurable outcome of developing an effective method to shift tuber size distribution to add value to the specialty potato cultivars used in this study was achieved; however, more work is needed to fine-tune the recommendations for GA concentration in relation to length of growing season and cultivar-specific differences in tuber growth rate. Extension of the results to stakeholders will facilitate adoption of this management technology as an option for growers. The long-term economic impact will thus depend on the extent to which the technology is adopted by stakeholders.

The goal of developing an effective method for manipulating tuber size distribution in selected potato cultivars was accomplished by evaluating the effects of seventeen treatments (seed age, plant growth regulators, GA rates) in fifteen independent replicated trials conducted at WSU's Othello Research Unit during the 2010, 2011 and 2012 growing seasons. All cultivars responded favorably to low concentrations of GA, and recommendations for use of this hormone to regulate tuber size have been (and will continue to be) communicated to stakeholders.

The measurable outcomes of increasing tuber set and shifting tuber size distributions to add value were achieved by effectively decreasing apical dominance with GA treatment of seed-tubers to increase stem numbers beyond that inherent in non-treated seed of each of five specialty cultivars. The baseline data was thus the degree of apical dominance, tuber set and size distributions characterized in non-treated seed of each cultivar. Stem numbers ranged from one to three stems per plant (baseline) depending on the cultivar. GA treatment (at the appropriate concentration) increased stems to four to seven per plant, with associated shifts in tuber size distribution, without negatively affecting yield and quality (depending on concentration), resulting in increased crop values.

BENEFICIARIES

Because the project was only just completed, potato growers have not yet had an opportunity to implement the findings. However, as explained above, it is expected that extension of the results will lead to further adoption. The beneficiaries of this project will be specialty potato growers, including seed and commercial growers of fresh pack. Processors of specialty potatoes for the baby potato market (e.g., baby bakers for the retail and quick service food industry) also stand to benefit from this technology. Extension of the results has already begun. Results were reported to stakeholders at the WA/OR annual Potato Conference and Trade Show and the Western WA Potato Growers meetings January 26 and February 17, 2011, respectively. An article from the project was published in the Proceedings of the WA Potato Conference and Trade Show (Knowles NR, Blauer JM, Knowles LO. 2012. Shifting potato tuber size distribution with plant growth regulators. Proceedings of the Washington-Oregon Potato Conference, Jan 24-26, Kennewick, WA, pp 20-28.)

The economic effects of using GA to increase stem numbers, tuber set, shift tuber size distribution and/or increase marketable yields are summarized by the data in Tables 1 and 5.

LESSONS LEARNED

Offer insights into the lessons learned by project staff as a result of completing this project. Include the positive and negative results and conclusions of the project.

- Age priming by storing tubers for various periods at elevated temperatures during storage is not effective in altering apical dominance and tuber size distribution with these cultivars.
- The chemical pinching agent, 3-nonen-2-one, and the auxin transport inhibitor, cyclanilide, were also non effective.
- Pre-plant treatment of seed-tubers with GA effectively shifted tuber size distribution; however, concentration is critically important to avoid negative effects on tuber yield and shape.
- Optimal GA treatments (i.e. concentrations) need to be matched to the cultivar in relation to length of growing season.

- Target size distributions should be identified before treating and planting seed to facilitate choosing the ideal concentration of GA and length of the growing season to optimize tuber size distribution.
- Growers need to work closer with packers to identify size distribution needs.
- Returns will depend on contract prices and specific size clauses and these prices will vary with market conditions through the season. Therefore, harvest windows for each cultivar need to be closely coordinated with marketing windows where price contracts are optimal (i.e. in phase with production of specific size classes).

The insensitivity of these cultivars to high temperature age-priming treatments was surprising and has implications for handling and storage of seed. Unlike many russet cultivars, seed of the five specialty cultivars in this trial can accumulate significant heat units without affecting yield potential. Hence, moderate heat unit accumulation during wound healing in the fall, warm up in the spring, and during the cutting operation will likely have little effect on performance in the field. The apparent interaction between length of growing season and optimum GA concentration demands that recommendations for GA use be cultivar specific.

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ADDITIONAL INFORMATION

The match provided for this project totaled $56,046.

See **Report 12-25-B-0957 Attachment E** for tables demonstrating research results.

PROJECT #11

Project Title: *Determining the benefits of cane burning to red raspberry in the Pacific Northwest*

Partner Organization: Washington State University (WSU)

PROJECT SUMMARY

Cane burning, chemically removing the first primocanes produced by red raspberry in the spring, is commonly practiced in the Pacific Northwest. The practice was first described by scientists in Washington and Oregon in the early 1970's, and was developed to aid in the machine harvest of the predominant raspberry cultivar at the time ('Willamette') using the herbicide dinoseb. This practice is now used on approximately 95% of raspberries in Washington. The goal of this research was to determine whether cane burning current Pacific Northwest red raspberry cultivars with currently available herbicides improves berry yield as dramatically as cane burning did when it was first developed. Our research hypothesis was that that cane burning is not as important as it was during its development and may be dropped from current raspberry production practices without resulting in lost yield or unacceptable losses in weed control.

This project measured the effects of cane burning herbicides in two older and three newer red raspberry cultivars ('Meeker' and 'Coho' and 'Cascade Bounty', 'Chemainus', and 'Saanich', respectively). Data generated included (1) effectiveness of five herbicides for managing primocanes; (2) injury to floricanes, including visual symptoms and berry yield; and (3) weed control. Treatments included a residual herbicide (terbacil, Sinbar) applied to dormant raspberries or cane burning products (carfentrazone (Aim), oxyfluorfen (Goal), pyraflufen (Vida), glufosinate (Rely), and saflufenacil (Treevix) applied to emerging primocanes. In off-station trials, weed control and primocane growth were monitored and those plots were machine harvested each season. In on-station trials, weed control, yield, and primocane growth were monitored as well as herbicide effects on floricane fruiting laterals (counts of flowers, fruiting sites). At the end of the season, final primocane measurements were collected and time required for pruning and training was recorded. The project was conducted from 2010 to 2012, with the same plots receiving the same treatment each year.

An estimated 95% of red raspberry producers in Washington cane burn at least once per season, depending on the health and vigor of their raspberry planting. Herbicide cost alone ranges from $30 to $50/acre to cane burn, translating to an estimated $475,000 on the 9,500 acres of red raspberries harvested each year. Over a ten-year lifespan for a raspberry planting, Washington growers may spend as much as $4.5 million on this practice. Since this project could confirm the hypothesis that cane burning certain PNW red raspberries does not significantly improve berry yield, growers of those cultivars might be able to reduce their use of these cane burning herbicides, potentially saving growers the cost of the products as well as their cost of application. Because this project also evaluated the effect of cane burning on weed control, we could also gauge the necessity of replacing the cane burning herbicide application with a different residual product, potentially off-setting some of those savings. Consequently, it was anticipated that this project would better identify the value of the cane burning practice for red raspberry producers and result in more profitable raspberry growing enterprises.

PROJECT APPROACH

A Master of Science student, Yushan Duan, began on assistantship on the project in January, 2010. She attended classes at WSU in Pullman during spring and fall semester, 2010, and was at the WSU Mount Vernon Northwestern Washington Research and Extension Center (NWREC) in the summers of 2010 and 2011. She completed her MS in fall, 2011, but continued on the project through 2012 and, with the exception of final pruning and training, has completed the field work for Field experiments #1 and #3 during the third and final year of the project.

Field Trial #1. This trial was designed for large-plot primocane management comparisons. Two red raspberry cultivars were tested in 2010 ('Meeker' and 'Coho'), both fields owned and managed by Sakuma Brothers Farms near Burlington, WA. Plots measured at least 300 feet long (one row per plot). A third site with similar plot sizes was added for 2011 and 2012, a 'Cascade Bounty' field near Lynden, WA (Truman Sterk, Cooperator). 'Meeker' plots were tested from 2010-2012; 'Coho' plots were inadvertently oversprayed by the cooperator in 2011, so that trial was dropped in 2011. Treatments in 'Meeker' and 'Coho' were Aim alone, Goal alone, Sinbar alone, Aim + Sinbar, Goal + Sinbar, and a nontreated check, replicated three times. In 'Cascade Bounty', treatments were Aim, Goal, and Sinbar each used alone, and a nontreated check, replicated three times. Herbicides were applied in April of each year when primocanes were about 6 inches tall. Primocane re-growth (diameter and height) and weed control were measured biweekly through each summer. Berries were machine-harvested approximately every three days by the cooperator during July and August of each year, and berry weight from each harvest was recorded.

Berry yield. In all Field Trial #1 treatments, only applications to 'Meeker' resulted in significantly increased yield (Table 1). No treatments improved 'Meeker' total berry yield in 2010, while all treatments except Sinbar alone increased yield in 2011 and 2012 compared to nontreated 'Meeker'. Berry yield in the three year average followed the same pattern, except even Sinbar alone improved yield compared the nontreated raspberry, although Sinbar alone resulted in similar berry yield as did Aim applied alone. Given that treatment with Aim + Sinbar and Goal + Sinbar yielded more berries than did Sinbar alone, the lower yield from Sinbar alone was probably due to poorer weed control (discussed below) or reduced primocane growth during fruiting rather than herbicide injury.

Neither 'Coho' in 2010 nor 'Cascade Bounty' in either 2011 or 2012 produced significantly more berries than did nontreated raspberries, nor did they produce more fruit than raspberries treated with Sinbar alone (Table 1). The trend in the data, however, was toward that same conclusion in both cultivars; that is, cane burning resulted in nonsignificant numerical increases in berry production.

Primocane growth rate. 'Meeker' primocane growth rate was reduced by all treatments until 68 days after treatment (DAT) in 2012 (Figure 1). Growth rate of primocanes treated with Sinbar alone was greater than when applied in sequence cane burning herbicides, or by cane burning herbicides alone. By 87 DAT, primocanes in all herbicide treated plots were growing as quickly as nontreated primocanes. 'Meeker' primocanes in 2012 responded to cane burning herbicides in a similar manner as in previous years (growth reduction until 78 DAT in 2010 and 80 DAT in 2011, data not shown). Differential growth from Aim or Goal in 2012 was not as pronounced as in previous years, however. 'Cascade Bounty' primocane growth rate was reduced by Goal for the entire season, although the difference was slight by about 77 DAT (Figure 2). Aim also reduced primocane growth rate from 54 DAT through the rest of the season. Primocanes treated with Sinbar grew similarly to nontreated primocanes until the last measurement at 109 DAT, at which time growth rate slowed slightly. In 2011, 'Cascade Bounty' primocane growth rate was reduced by Goal until 80 DAT, and by Aim and Sinbar until 48 DAT (data not shown).

Weed control. In 'Meeker' (2010-12) and 'Coho' (2010), Sinbar applied with or without caneburning herbicides gave the best August weed control, exceeding 84% (Table 2). There were subtle differences between Aim and Goal in 'Meeker' over time. Weed control with Goal initially was superior to Aim (2010), but by 2012, weed control with Goal alone was only 16% compared to 46% with Aim alone. This result was primarily due to poor control of common chickweed (*Stellaria media*) by Goal over the three years, although the combination treatment of Goal + Sinbar was poorer than Aim + Sinbar by 2012 (84 and 96%, respectively). In 'Cascade Bounty', initial weed populations were very low, resulting in no significant treatment effect in 2012 (85 to 93% among treatments). It appears, then, that under conditions

of low weed pressure, that cane burning herbicides can provide adequate weed control even when used alone. Under higher weed pressure, however, residual herbicides are necessary to maintain acceptable weed control, and that combination/sequential applications of cane burning herbicides with a residual product may be superior to residual products alone.

Table 1. Total berry yield (kg/ha) in the first trial (2010-2012).

Treatment	Application Rate	2010	2011	2012	Average
Meeker		kg/ha	kg/ha	kg/ha	kg/ha
Aim	0.09 kg ai/ha	7716	8579 a	7,057 ab	7784 ab
Goal	0.47 kg ai/ha	9373	9450 a	7,052 ab	8625 a
Sinbar	1.34 kg ai/ha	8007	7940 ab	6,205 bc	7384 b
Aim + Sinbar	0.09 kg ai/ha+ 1.34 kg ai/ha	9310	9135 a	8,132 a	8859 a
Goal + Sinbar	0.47 kg ai/ha+ 1.34 kg ai/ha	8744	9166 a	7,892 a	8601 a
Non-treated	-	6758	6250 b	5,121 c	6043 c
Coho					
Aim	0.09 kg ai/ha	4,099	---	---	4,099
Goal	0.47 kg ai/ha	4,921	---	---	4,921
Sinbar	1.34 kg ai/ha	4,638	---	---	4,638
Aim + Sinbar	0.09 kg ai/ha+ 1.34 kg ai/ha	4,449	---	---	4,449
Goal + Sinbar	0.47 kg ai/ha+ 1.34 kg ai/ha	4,887	---	---	4,887
Non-treated	-	3,646	---	---	3,646
Cascade Bounty					
Aim	0.09 kg ai/ha	---	10,163	8,261	9,212
Goal	0.47 kg ai/ha	---	11,135	8,396	9,766
Sinbar	1.34 kg ai/ha	---	10,755	7,618	9,187
Non-treated	-	---	9,794	7,154	8,474

Means in each column followed by the same letter, or not followed by a letter, are not significantly different based on Tukey's Honestly Significant Difference method (P< 0.05).

Table 2. Weed control (%) in August in Meeker and Cascade Bounty (2010-12).

Cultivar	Treatment	Weed control		
		2010	2011	2012
Meeker	Aim	60 c	55 b	46 c
	Goal	70 b	47 b	16 d
	Sinbar	92 a	91 a	82 b
	Aim + Sinbar	89 a	96 a	96 a
	Goal + Sinbar	95 a	96 a	84 b
Coho	Aim	51 b	---	---
	Goal	52 b	---	---
	Sinbar	95 a	---	---

	Aim + Sinbar	95 a	---	---
	Goal + Sinbar	97 a	---	---
Cascade Bounty	Aim	---	96 b	93
	Goal	---	98 ab	85
	Sinbar	---	100 a	91

Means in each column followed by the same letter, or not followed by a letter, are not significantly different based on Tukey's Honestly Significant Difference method (P< 0.05).

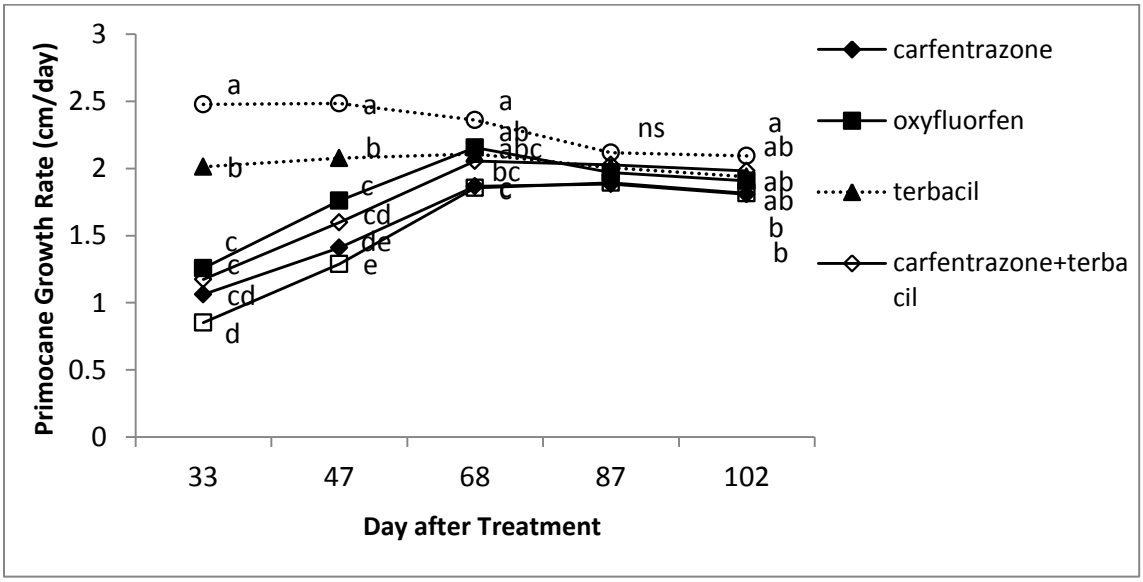

Figure 1. Meeker primocane growth rate (cm/day) in the off-station trial (2012). Products tested were Aim (carfentrazone), Goal (oxyfluorfen) and Sinbar (terbacil). Means at each date followed by the same letter are not significantly different based on Tukey's Honestly Significant Difference method (P< 0.05).

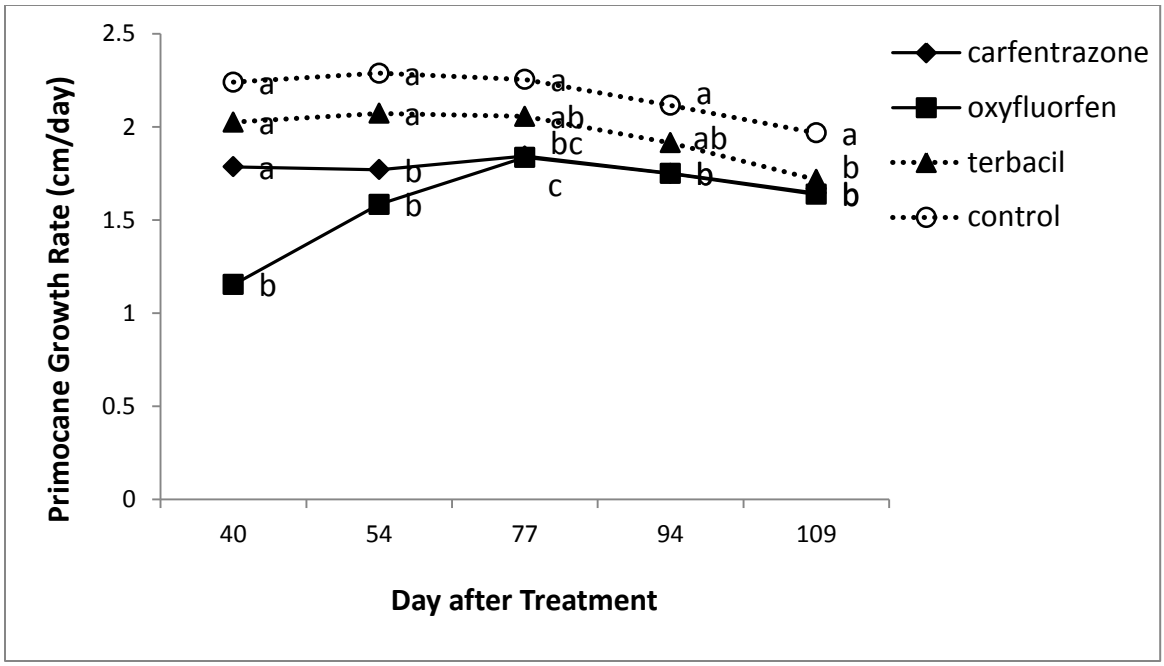

Figure 2. Cascade Bounty primocane growth rate (cm/day) in the off-station trial (2012). Products tested were Aim (carfentrazone), Goal (oxyfluorfen), and Sinbar (terbacil). Means at each date followed by the same letter are not significantly different based on Tukey's Honestly Significant Difference method (P< 0.05).

Field Trial #2. This trial was designed for small-plot primocane management comparisons between 'Meeker' and 'Cascade Bounty' raspberries established in 2006 at WSU NWREC. Plots measured 30 feet long (one row per plot), replicated five times. Treatments were Aim, Goal, or a nontreated check and the same plots were used in all years. Cane burning herbicides were applied in April of each year, when primocanes were about 6 inches tall. Primocane re-growth (diameter and height) was measured biweekly through each summer. Berries were machine-harvested during July and August of each year, and berry weight from each harvest was recorded. Following harvest, two floricanes were randomly selected per plot for vegetative and reproductive measurements (height, diameter, lateral length, fruiting site counts). Also, the time it took to prune and train these cultivars was recorded during the first two winters of the trial to determine cane burning affects to this aspect of raspberry production; pruning and training time will be recorded later in 2012 for the third and final year of this project. Primocane growth data from 2010 and 2011 were provided in earlier reports, so we will present only 2012 measurements in this report.

Berry yield. Yield was significantly affected by cane burning treatment and between cultivars in two of three years; the interaction between these effects was not significant in any year nor in the 3-year average. Treatment with Goal increased raspberry yield in 2010 and 2011, but not in 2012 nor in the 3-year average (Table 3); treatment with Aim increased berry yield only in 2011. Although not statistically significant, the trend in the data was for higher yield from cane burning in all three years, however. 'Meeker' produced more berries than 'Cascade Bounty' in 2010 and 2011, and the 3-year average production of 'Meeker' was 28% greater than 'Cascade Bounty'. Even in 2012, when fruit yield did not differ by cultivar, the trend was for more fruit from 'Meeker'. As in Field Trial #1, the lack of interaction between cane burning herbicide and cultivar indicates that although neither cultivar responded individually to cane burning, cane burning increased berry yield when the two cultivars were averaged together.

Primocane growth rate. Cane burning herbicides slowed primocane growth in 'Meeker' until 67 DAT (Figure 3). Suppression by Goal continued until 82 DAT, after which treated primocanes grew similarly to nontreated primocanes. 'Cascade Bounty' primocane growth was suppressed essentially season-long by cane burning, although growth following treatment with Goal was similar to nontreated primocane growth by 115 DAT. In previous years, cane burning reduced primocane growth rate of 'Meeker' until about 68 DAT, while cane burning reduced primocane growth rate of 'Cascade Bounty' until about 98 DAT. 'Meeker' primocane growth rate did not greatly differ whether treated by Aim and Goal in any year, but Goal suppressed 'Cascade Bounty' primocane growth about 14 days longer than Aim in 2010 and 2011.

Nontreated 'Cascade Bounty' primocanes initially grew faster than 'Meeker' primocanes in 2012, although growth was similar between the two cultivars from 52 to 97 DAT (Figure 3). By 115 DAT, nontreated 'Meeker' primocane growth was greater than for 'Cascade Bounty'. This pattern was similar to primocane growth observed in previous years, so it appears that 'Cascade Bounty' primocanes grow more quickly early in the season then gradually slow, while 'Meeker' primocanes grow more quickly from mid-season on. This may help to explain some of the differential weed control from the two sites in Field Trial #1, as early-season 'Cascade Bounty' primocane growth may result in quicker bed shading and therefore greater competition to weeds.

Dormant Season. In 2010-11, pruning and training 'Meeker' took 20% longer than 'Cascade Bounty', equivalent to about 36 additional hr/ha (Table 4). Total time spent on 'Meeker' was reduced by an average of 45 hr/ha (18%) by cane burning. Both Aim and Goal were equally effective for reducing training time of 'Meeker'. Training time for 'Cascade Bounty' was not improved by cane burning, although there was a trend toward reduced training time after treatment with Goal. In 2011-12, pruning and training time was not reduced by cane burning for either cultivar. Similar to the previous year, 'Meeker' took 22% longer to prune/train than did 'Cascade Bounty'.

In general, pruned primocane biomass was not significantly different between cultivars after cane burning in 2010-11, although 'Meeker' produced less biomass than 'Cascade Bounty' when not cane burned (Table 5). Furthermore, pruned primocane weight from plots treated with Goal was 49 and 58% less with both 'Meeker' and 'Cascade Bounty', respectively, than for nontreated plots. Pruned primocane weight of 'Meeker' following Aim treatment was similar to that of nontreated 'Meeker', but Aim reduced 'Cascade Bounty' primocane biomass by 43% compared to nontreated 'Cascade Bounty'. Primocane weight was generally greater in 2011-12 than in the previous year, but response to cane burning herbicides was similar. Goal reduced pruned 'Cascade Bounty' and 'Meeker' primocane biomass by 44 and 33%, respectively, compared to nontreated raspberries, while Aim reduced pruned primocane biomass by 26 and 21%, respectively. Pruned primocane biomass of 'Meeker' was 39% less than 'Cascade Bounty in 2010-11 and 29% less in 2011-12.

Table 3. Total berry yield (kg/ha) in the second trial (2010-2012).

Treatment	Rate	2010	2011	2012	Average
		kg/ha	kg/ha	kg/ha	kg/ha
Aim	0.09 kg ai/ha	7309 ab	5483 a	6792	6528
Goal	0.47 kg ai/ha	8015 a	6018 a	6729	6921
Nontreated	-	6155 b	4063 b	5815	5344
Cultivar					
Cascade Bounty	---	6203 b	4692 b	6027	5640 b
Meeker	---	8116 a	5685 a	6864	6888 a

Means in each column followed by the same letter, or not followed by a letter, are not significantly different based on Tukey's Honestly Significant Difference method (P< 0.05).

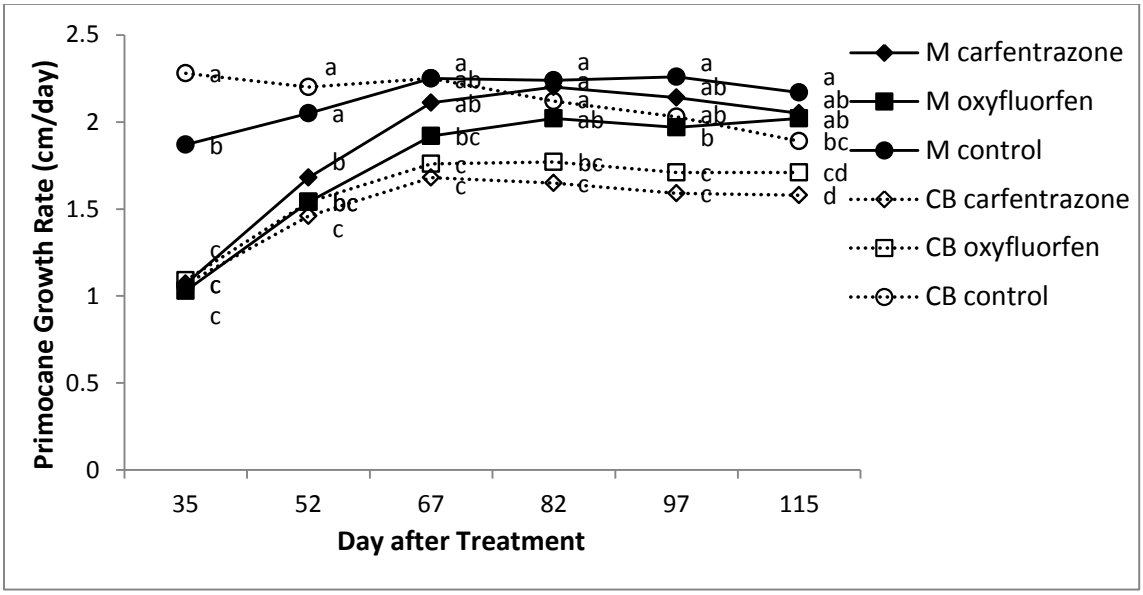

Figure 3. 'Meeker' and 'Cascade Bounty' primocane growth rate (cm/day) in on-station trials (2012). Products tested were Aim (carfentrazone), Goal (oxyfluorfen). Means in each date followed by the same letter are not significantly different based on Tukey's Honestly Significant Difference method (P< 0.05).

Table 4. Total dormant-season training time (hr/person/ha).

Treatment	Cultivar		Treatment mean
	Meeker	Cascade Bounty	
2010-11			
Aim	204 b	186 a	196 B
Goal	207 b	168 a	186 B
Non-treated	250 a	189 a	218 A
Cultivar mean	218 A	182 B	
2011-12			
Aim	100	82	91
Goal	97	85	91
Non-treated	106	81	94
Cultivar mean	101 A	83 B	

Means in each column followed by the same letter, or not followed by a letter, are not significantly different based on Tukey's Honestly Significant Difference method (P< 0.05).

Table 5. Weight (kg/ha) of primocanes pruned off the bed.

Treatment	Cultivar		Treatment mean
	Meeker	Cascade Bounty	
2010-11			
Aim	1396 bc	1946 b	1671 B
Goal	925 c	1411 bc	1168 B
Non-treated	1829 b	3389 a	2609 A
Cultivar mean	1383 B	2249 A	
2011-12			
Aim	2491 a	3857 ab	3174 AB
Goal	2234 a	3201 b	2628 B
Non-treated	3351 a	4853 a	4103 A
Cultivar mean	2759 A	3910 B	

Means in each column followed by the same letter, or not followed by a letter, are not significantly different based on Tukey's Honestly Significant Difference method (P< 0.05).

Field Trial #3: The red raspberry cultivars 'Meeker', 'Chemainus', 'Saanich', and 'Cascade Bounty' were transplanted into a new block at WSU NWREC in 2010. Cane burning was conducted on these raspberries using the nonregistered herbicides Vida (pyraflufen), Treevix (saflufenacil), and Rely (glufosinate) in April of 2011 and 2012. Berries were picked by hand three times in 2011 and by three machine harvests in 2012.

Berry yield. Total fruit yield differed by herbicide application in 2012 and also by cultivar, but there was no interaction between those two main effects. Berry yield was improved 25 to 30% by Treevix, compared to the other two cane burning herbicides or to nontreated raspberries (Table 6). Berry yield was higher in 'Saanich' than in either 'Cascade Bounty' or 'Meeker', while 'Chemainus' yielded similarly to both 'Cascade Bounty' and 'Meeker'. Lack of interaction between herbicide and cultivar indicates that cane burning was not a consistent factor in yield among these cultivars, at least in two- or three-year old raspberries.

Table 6. Total fruit yield after application of cane burning herbicides (2011-12).

Treatment	Rate	2011	2012
	product/a	lb/acre	lb/acre
By herbicide			
Vida	5.5 fl.oz	1486	1047 b
Treevix	1 oz	1714	1500 a
Rely	77 fl.oz	1667	1027 b
Non-treated	---	1454	1146 b

By cultivar			
Cascade Bounty	---	2947 a	1061 b
Chemainus	---	768 c	1232 ab
Meeker	---	328 d	924 b
Saanich	---	2278 b	1503 a

Means in each column followed by the same letter, or not followed by a letter, are not significantly different based on Tukey's Honestly Significant Difference method (P< 0.05).

Grower cooperators were excellent to work and invaluable for completion of this project. Obtaining yield data on grower fields and using their harvest equipment added credibility and insured that other growers could easily believe the results and likely see a similar response on their own fields. Both cooperators were excited about the research, and very interested in seeing the results on their own farm.

GOALS AND OUTCOMES ACHIEVED

Completed activities included off-station tests with 'Meeker' (three years), 'Cascade Bounty' (two years), and 'Coho' (one year) and two on-station tests: one with 'Meeker' and 'Cascade Bounty' (three years) and a second with 'Meeker', 'Cascade Bounty', 'Chemainus', and 'Saanich' (two years). A survey of Washington red raspberry producers provided baseline information about grower attitudes about cane burning prior to reporting on project findings. Portions of the project still remaining to be accomplished include the effects of cane burning on pruning and training (two years have been collected and the third year will be completed in November-December, 2012) and the final survey of grower attitudes (to be conducted after training (Lynden, December 2012) and completion of fact sheet reporting on these result). Only short- and mid-term outcomes were expected from this project.

The project experimentation was very successful, with most of the anticipated work occurring. A few tasks were, however, not successfully accomplished. First, not as much field data was obtained as was hoped in Field Trial #1. Only three cultivars were tested, primarily because the new raspberry cultivars we were interested in including in our trial were either not available for long-term testing on grower fields, or not as large as we needed for a minimum level of testing (treatments of Aim, Goal, Sinbar, and nontreated was considered to be the minimum level). This shortcoming was alleviated through testing of four cultivars in Field Trial #3, including the cultivars in which the primary interest lay ('Meeker', 'Cascade Bounty', 'Saanich', and 'Chemainus'). Goal setting may have also been too ambitious in the desire to have measureable results by the end of the project. While this portion of the project will be successfully completed, it will not occur for several months. Despite these shortcomings, good data were generated that indicate that cane burning may not always be necessary in PNW raspberries. Conclusions from this research are as follows:

Berry Yield. Cane burning increased berry yield of 'Meeker' in two years of three, averaging 29 to 47% greater yield in treated plots over three years. At least some of this increase resulted from weed control, as residual herbicide alone increased yield by 22%. Conversely, 'Cascade Bounty', 'Coho', 'Saanich', and 'Chemainus' berry yield was not significantly increased by cane burning. There was a trend in the data suggesting that yield was marginally better in treated plots, but the numerical increase was within the margin of error for each trial. Although yield of individual cultivars was not greater with cane burning, when 'Meeker' and 'Cascade Bounty' yields were averaged together, raspberry yield was increased by treatment with either Goal or Aim during two of three years. Treevix also increased berry yield when yields of two- or three-year-old 'Meeker', 'Cascade Bounty', 'Saanich', and 'Chemainus' was averaged together.

Primocane Growth. Primocane growth rate was slowed by use of cane burning products for about 70 to 80 days. Goal slowed growth rate slightly longer than did Aim in both 'Meeker' and 'Cascade Bounty'. Biomass of pruned primocanes that had to be removed during the dormant-season did not differ between Goal and Aim treatments, although pruned primocane biomass tended to be marginally greater with Aim than with Goal.

Product Choice. There did not appear to be much difference between Aim and Goal in the cultivars used in this trial when applied at the tested rates. Goal slowed primocane growth longer than did Aim, but yield was not statistically increased. These products were generally inadequate for weed control unless a residual product was also used. This was particularly true in fields where weed pressure was higher, in particular when common chickweed was present, where Goal performed more poorly than Aim. Of single applications of the three nonregistered products, Treevix was more effective than Vida or Rely, significantly increasing berry yield of three-year-old raspberries.

Cultivar Choice. In side-by-side comparisons, 'Meeker' produced 18% more fruit than did 'Cascade Bounty'. 'Cascade Bounty' also produced about 30% to 40% more primocane biomass that had to be removed during dormant-season pruning. Despite this, 'Meeker' required significantly more time to prune and train than 'Cascade Bounty', about 20% longer in both years. In their first two harvests, 'Saanich' and 'Cascade Bounty' produced more fruit than 'Chemainus' or 'Meeker'. This is an indication of the relative precociousness of these cultivars, although it may also be partly due to more winter injury suffered by 'Meeker' than other cultivars.

Some of the more pertinent results from the baseline survey include:

(1) 80% of survey responders (24 growers) grow 'Meeker' raspberry, and 92% of those growers practice cane burning on that cultivar. 'Chemainus', 'Saanich', and 'Cascade Bounty' account for a combined 27% of growers (8 growers), and 100% of those varieties are cane burned each year.

(2) At least 70% of growers cane burn to increase yield, to provide weed control, or to improve harvest efficiency.

(3) 89% of growers use Aim to cane burn, followed by 59% who use Gramoxone (paraquat), 30% who use Goal, and 19% who use a combination of herbicides.

(4) 67% of these growers would consider modifying their primocane management programs based on data from this project, while 30% said "maybe" and 4% said they wouldn't consider changing.

The goal was to increase the knowledge of red raspberry producers about the benefits and risks of cane burning as a primocane management strategy. The target was that by 2013, one third of surveyed red raspberry growers would test a primocane management program that does not include cane burning. As the field portion of this research was conducted, preliminary results were reported at grower meetings (such as the Western Washington Small Fruit Workshop in Lynden, WA and WSU Extension/Whatcom Farmers/Skagit Farmers/Wilbur-Ellis grower meetings) and growers were informed of year-to-year progress toward confirmation of the research hypothesis. At the end of these grower meetings (the last is scheduled for early December, 2012) and following production of the final cane burning fact sheet (March, 2013), growers will be asked about their beliefs and thoughts about cane burning and, if they currently practice cane burning, whether they may consider changing their program in response to this new information. This will provide data as to whether the target outcome was achieved.

Pruning and training time for Trial #2 has been collected, and pruning and training for Trial #3 is about half complete. Once these times are fully available, they will be analyzed as in previous years, with an eye toward multi-year trends.

In Year 1 of Trial #2, there was a significant reduction in pruning and training time due to cane burning for 'Meeker', but no significant effect in Year 2; pruning and training time for 'Cascade Bounty' did not

change due to cane burning in either year. This will be the first full set of data for the four cultivars and different herbicides included in Trial #3.

The plan is then to write up an extension-style fact sheet and mail these results to raspberry producers along with the follow-up survey, to be mailed by mid-February. In addition, a newsletter article including the final project data will be published in the WSU Whatcom County Extension February newsletter. Based on survey responses, the team will know if the Expected Measureable Outcome (that by 2013, one third of surveyed red raspberry growers will test a primocane management program that does not include cane burning) was successfully achieved.

BENEFICIARIES

Raspberry producers in the PNW will clearly benefit from the results of this research project. Showing that the raspberry cultivars 'Cascade Bounty', 'Chemainus', 'Coho', and 'Saanich' did not produce significantly more berries in response to cane burning will give producers of those cultivars additional data to consider when deciding whether to cane burn or not in future years. It will also bring home in a tangible way the benefit of cane burning to reduce pruning and training costs in 'Meeker' during the dormant season (one year of two) as contrasted with 'Cascade Bounty', where cane burning did not significantly affect pruning and training time in either of the first two years.

Based on these data, it appears that 'Meeker' raspberry generally responds favorably to cane burning, showing an increase in three-year average berry yield and reduced dormant-season training and pruning time. 'Cascade Bounty' benefits less from cane burning than does 'Meeker', with cane burned plants producing a similar berry yield and requiring a similar amount of time for pruning and training as did nontreated plants. Since 'Meeker' is by far the most widely planted raspberry cultivar in Washington, we do not generally recommend dropping the practice for most producers. Producers of other cultivars, in particular 'Cascade Bounty', 'Chemainus', and 'Saanich', should experiment with not cane burning every year to determine whether cane burning is a net benefit to their raspberry production systems.

LESSONS LEARNED

All project staff learned which raspberry measurements were of greater importance than others. For example, the number of primocanes measured for growth parameters in year one was substantially reduced in subsequent years, given that variability between canes and cane loss due to harvest damage were both lower than anticipated. This will be useful for project staff when designing future raspberry trials.

This was a project with a graduate student, so she was unquestionably the staff member who learned the most from this project. She learned how to apply treatments, manage field portions of the project, prune and train PNW red raspberries, and methodically collect data, as well gaining insight into the physiology of raspberry as it responds to cane burning treatments. She has presented findings in scholarly meetings as well during as her final defense seminar with WSU. She currently is enrolled in a PhD program, based in large part on her successful completion of the tasks in this project.

Although not completely unexpected, it is believed that the two grower cooperators learned much about how to establish and conduct statistically sound research. It is often surprising to first-time cooperators how replication of treatments is required for investigators to generate meaningful data. Perhaps the largest benefit they gain, apart from the results generated on their land, is this ability to test other management practices on their own fields after the experiment is done.

The incomplete level of outcome achievements in this trial has more to do with time than to results not matching expectations. The team expects that it can meet the goal of one third of raspberry growers re-evaluating their cane burning practices in light of these data, but the outcome will not be realized until the extension portion of this project is completed. In retrospect, this project was too ambitious in scope in

that data analysis and reporting on the findings really couldn't be done in the prescribed timeline. Therefore, future projects need to allow more time for this aspect of project completion.

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ADDITIONAL INFORMATION

In-kind donations by the grower-cooperators were documented in 2010 and 2011 as targeted ($10,000/ac/year of the trial was targeted; actual in-kind costs were 10,260/ac for 2011 and 2012). In-kind donations are at a similar level in 2012 (data will not be available until after pruning and training is completed during winter 2012-13). The expected donation will therefore total about $31,000. These in-kind donations included crop husbandry at the Field Trial #1 sites (pruning and training, fertility, irrigation, pest management (except herbicides), and particularly, the cost of harvesting the berries).

Scholarly publications:

1. Duan, Y. and T.W. Miller. 2011. Determining the effects of cane burning to red raspberry in the Pacific Northwest. Weed Science Society of America, Portland, OR, WSSA Abstracts, CD.
2. Duan, Y., T. Miller, and T. Walters. To burn or not to burn, that's the question. VI International Weed Science Congress, Hangzhou, *China (in press).*

Presentations:

1. An update on cane burning in red raspberry. December 7, 2010. WSU Western Washington Small Fruit Workshop, Lynden, WA.
2. Weed research update. January 13, 2011. North Willamette Horticulture Society, Canby, OR.
3. Weed management in raspberries. December 9, 2011. WSU Washington Small Fruit Conference, Lynden, WA.
4. Weed research update. January 12, 2012. North Willamette Horticulture Society, Canby, OR
5. Raspberry spawn control: what we know and what we need to find out. July 19, 2012. Fruit for the Future, Invergowrie, Scotland, UK.

PROJECT #12

Project Title: *Sustainable Disease Control to Reduce Cost and Risk in Potato Production*

Partner Organization: Washington State University (WSU)

PROJECT SUMMARY

Potatoes are the second most valuable crop in Washington, generating about $3.4 billion annually. The warm climate and long growing season of the Columbia Basin favor higher potato yields and quality than nearly any other region in the world. However, these same factors favor Verticillium wilt (caused by *Verticillium dahliae*). To control this disease farmers are highly dependent on soil fumigation with metam sodium. Each year 90% of potato acres in Washington are fumigated, costing an estimated $25 million. Washington potato growers need alternatives to fumigation to control Verticillium wilt.

In addition to being costly, farmers are now seeking to reduce dependence on fumigation because of increasing regulation, market demands, and their own interest in improving soil quality. The 2008 U.S. EPA re-registration decision for metam sodium will increase farmers' application costs and will eliminate some uses, particularly near populated areas. In March 2009, the McDonalds Corporation, the largest buyer of potatoes in the U.S., agreed to promote pesticide use reduction within its American potato supply chain. This will increase pressure on farmers to adopt alternatives to fumigants. Regions that best respond to these market forces will be more competitive. Finally, surveys of Washington farmers indicate that many would like to improve their soils, but it must make economic sense. A practice that could replace fumigants and improve soils would be eagerly adopted by Washington potato farmers.

If green manures could be used in place of metam sodium, Washington's ~250 potato producers could save $10+ million each year (about $109 savings per acre using 2008 costs). This does not include the value of the increased soil quality, carbon sequestration, reduced erosion, or other cropping system benefits of the green manures on the 165,000 acres of land producing potatoes each year. These benefits would enhance the competitiveness of Washington potato production and potentially benefit production of other vegetable crops such as onions, carrots and green peas, all of which are currently grown after green manures in Washington on small acreages

PROJECT APPROACH

Field plots of selected green manure treatments were planted at both the WSU Othello (silt loam) and OSU Hermiston (sandy loam) research centers. Field treatments were designed to test the ability of various green manure crops to suppress *V. dahliae*. The project team tested three types of green manures (high-glucosinolate Brassica (*B. juncea*), low-glucosinolate Brassica (*B. juncea*), and non-Brassicaceae barley (*Hordeum vulgare*), both as short-cycle green manure crops following a spring wheat crop and as a full-season treatments (three successive green manure crops). The following treatments were replicated 4 times in a completely randomized design in 1.5 x 4.5 m plots at both sites:

1. Spring wheat – fumigation (+ control)
2. Spring wheat – no fumigation (- control)
3. Spring wheat – barley GM
4. Spring wheat – high-GL Brassica (*B. juncea*) GM
5. Spring wheat –low-GL Brassica (*B. napus*) GM
6. Barley GM x 3 GM
7. High-GL Brassica (*B. juncea*) x 3 GM
8. Low-GL Brassica (*B. napus*) x 3 GM

GL=glucosinolate, potential source of biofumigation; GM = green manure.

The treatments were applied to 32 plots for one year and on another 32 plots for two consecutive years at both sites (see note about Othello site below). Then, in the 3rd year, all 64 plots were planted to potatoes. The factors being compared by these treatments are 1) green manure biomass; 2) inclusion of a Brassica green manure; 3) high and low glucosinolate levels in the green manures; 4) wheat in rotation, and 5) fumigation.

Soil levels of Verticillium, Black Dot, Fusarium and Pythium were monitored in all plots, both sites, through analysis of samples taken every spring and fall.

The potatoes were monitored and the stems rated for Verticillium incidence and severity four times during the season. At harvest, yield was measured for the following market classes: culls, <4oz, 4-8 oz., 8-12 oz., >12oz, and total yield. Tubers were collected for evaluation of Verticillium and Black dot. Soils were transported from all the treatments at the Hermiston site to microplots at Pullman. Potatoes were grown in the microplots and evaluated by measuring plant necrosis at six stages (and combining these into an area under the senescence progress curve, AUSPC), leaf chlorophyll levels, tuber black scurf incidence and severity, tuber yield and number, and aboveground biomass. The same was done with soils from Othello plots in 2012.

Although the team started field activities at both Othello and Hermiston in the spring 2010, the original plots at Othello were abandoned after the project team received the results of the soil analysis from spring soil samples. Although preliminary soil analysis from both sites in the fall of 2009 showed significant levels of Verticillium, the results from individual plot samples in the spring of 2010 showed lower Verticillium levels in Othello. The levels were so low that any treatment effect on Verticillium might not be evident, and so the decision to find a better site was made. However, since other fields had already been cropped, the start of the Othello trial had to be postponed until 2011. Therefore, activities at Othello plots will not be completed until 2013. The soils data from the Othello trial will be analyzed in relation to the 2013 potato results. Funding from sources other than SCBGP was necessary to finish the work at both sites, so this delay at Othello did not create any problems with the SCBGP end date. The project at Othello will be finished using other funding.

Team members completed a thorough literature review of the topic of using green manures in potato production.

Significant results:

Treatment application

Green manure biomass, means for each treatment, tons(dry)/acre:

Barley

1x=2.2, 2x=4.9, 3x=7.9, 6x=26.6

High glucosinolate mustard

1x=4.1, 2x=11.6, 3x=6.1, 6x=23.2

Low glucosinolate mustard

1x=4.0, 2x=8.5, 3x=6.3, 6x=25.2

Soil fungal assays

- There was no significant correlation between the spring 2012 soil fungal levels and any of the yield measurements.
- Although there were significant treatment differences for the changes in soil fungal levels over the three years of the project, the patterns were not consistent from one year to the next and so no conclusions can be made.
- The Pythium, Verticillium and especially the Fusarium levels were higher in the two year treatments (2010-2011) than in the one year treatment plots (2011). This could be the cause of the significantly different yields in the two sets of treatments, and for

this reason the project team decided to analyze the two sets separately. Other possible causes for this are the corn crop preceding the one year treatment (rotation effect) or nematodes, which were not monitored.

- There was no evidence that soil fungal levels were significantly affected by green manure incorporation in the long-term (> 1 year). There were no differences between treatments in the Verticillium levels measured just before potato planting. This confirms other research showing that green manures do not reduce Verticillium inoculum in the soil.
- While there was some evidence that Pythium levels increased after green manure incorporation, this was not always observed and the when it was, the levels always decreased by the next measurement. The results from Othello will be important in confirming or rejecting these observations from Hermiston.

From the 2011 Microplots:

- The percent plant necrosis (potato) was significantly different among treatments with the 3x green manure treatments doing the best. The same was true for the AUSPC measurements.
- Aboveground potato plant biomass results showed that the the high glucosinolate x3 mustard treatment was significantly lower than the other two x3 green manure treatments. Three of the green manure treatments had significantly higher potato biomass production than the wheat-fumigation treatment.
- Tuber yield were highest in the low-glucosinolate mustard x3, the barley x3 treatments, and the wheat-fumigation treatments. Wheat-no fumigation produced the lowest yields.
- These results, while somewhat variable, support the hypothesis that there is benefit to green manures, and that increasing green manure biomass results in more benefits.

From the 2012 Microplots

- Treatments with the low glucosinolate mustard had higher disease severity than other green manure treatments, yet produced higher yields. This contradicts some of the results from the 2011 microplots.
- Unlike the 2011 results, there was no treatment differences measured for AUSPC.
- Overall, there were very few differences between the treatments in the measurements taken, and the differences that were measured were not sufficiently large or consistent enough to allow us to make conclusions.

From the 2012 field plots at Hermiston

Two-year treatment plots – disease incidence and severity

- There were no significant treatment differences in any of these measurements. For some unknown reason, disease incidence was much higher in this set of treatments than in the one-year treatments.

Two-year treatment plots – yield

- There were no significant treatment differences (ANOVA) in any of the potato yield factors measured (culls, <4oz, 4-8 oz., 8-12 oz., >12oz, and total yield) in the plots receiving two years of treatments. There was high variability of yields and other measurements within these treatments.
- There were no yield differences between the fumigated and non-fumigated control in these plots.

One-year treatment plots - disease

- The wheat-barley and Low glucosinolate mustard x3 treatments had higher Verticillium incidence in the stem ratings and higher AUSPC than the other treatments.

One-year treatment plots – yield

- The higher disease ratings translated to lower 8-12 oz., >12 oz., and total tuber yields compared to the fumigated control and the Barley x3 treatments.
- There were some differences in yields between treatments for the 8-12 oz. and total yields, but they were minor and were not conclusive.
- The fumigated control had higher total yields than the green manure treatments which were greater than yields from the unfumigated treatment.
- There were no differences between the high and low glucosinolate treatments.
- There were minor differences in yield classes between Brassica and non-Brassica treatments, but no difference in total yields.
- Fumigation resulted in higher 4-8 oz. and total yields when compared to all unfumigated treatments.

There was no correlation between green manure biomass in the treatments and yield components.

The team believes that, while the Hermiston results can stand alone, the results from the Othello site will be important in confirming or rejecting them, or confirming different results from applying the treatments to different soils types.

The project team included faculty from both Washington State University and Oregon State University:

Institution and personnel	Role
Andrew McGuire, WSU Extension	Project director, Extension and Research
Lynne Carpenter-Boggs, WSU	Research (soil microbiology) and Extension
Dennis Johnson, WSU	Research (Verticillium)
Philip Hamm, OSU	Research (Verticillium) and Extension
Don Horneck, OSU	Research and Extension

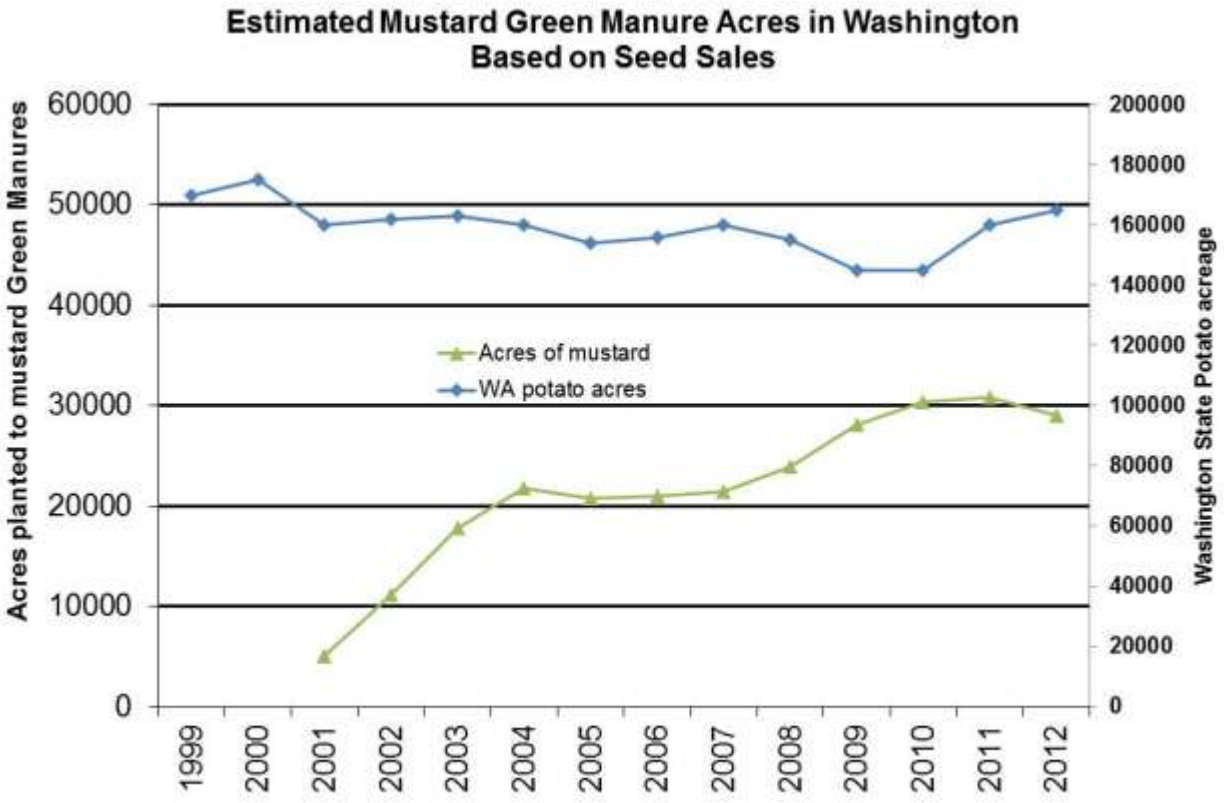
GOALS AND OUTCOMES ACHIEVED

- As part of ongoing evaluation, an annual survey was conducted to determine mustard seed sales in the Columbia Basin.
- The project team completed a 2010 survey of potato growers. This survey contacted potato growers in the Columbia Basin region of Washington State to find out about their use of metam-based (metam sodium and metam potassium) fumigation and green manures. A four-contact mailing sequence was used to obtain responses. Respondents also had the option of completing the survey online if that was a preference. Of the 235 respondents contacted, 70 respondents completed the questionnaire. This return yielded a response rate of 33.3%.This provided baseline data and will be repeated in 2015.

- The long-term outcomes will be measured in 2015, but initial results (see 2010 survey results in #9 below) indicate that some growers are using green manures to replace metam sodium, and that more will adopt the practice with better scientific data. This shows the potential of this project but also that results will be seen in the long- rather than short-term.

Planned activities	Completed
Obtain seed and supplies	X
Advertise and hire post-doc.	X
Prep field sites in Othello and Hermiston.	X
Take soil samples	X
Seed first set of crops.	X
1st soil analyses.	X
1st GM crop chopped and incorporated	X
2nd GM crop seeded	X
2nd GM crop chopped and incorporated, wheat harvested	X
3rd GM crop seeded	X
Plots fumigated, 3rd GM crop chopped and incorporated	X
Fall soil sampling	X
Fall soil analyses	X
Obtain and transport soil to Pullman from each 1st year plot	X
Repeat above steps for second year of GM crops.	X
Establish pot study	X
Pot study final assays	X
Begin mechanistic studies: biotic/abiotic, general/specific	
2nd pot study establishment	X
Mechanistic studies phase 2: systemic resistance	
2nd pot study final assays	X
Hold green manure field demonstrations	X
Hold green manure field days	To be done after Othello trial is finished
Revise and update green manure website	X
Produce revised and new publications	To be done after Othello trial is finished
Make presentations to potato producers	X
Meet with advisory committee	X
Present materials regionally and nationally	To be done after Othello trial is finished

The results of the yearly seed sales survey is shown below.



The project goal was to increase the acres planted to green manures to 55,000 by 2015. The 2012 estimate is about 29,000 acres, so the goal has not yet been achieved. The project team was aiming for a 15% annual increase but achieved only a 4% annual increase in the acres planted to mustard green manures.

The main results of the 2010 potato grower survey:

- Over half of the respondents had used green manures (mostly mustard or mustard blends) before potatoes, with larger farms more likely to try it than smaller farms.
- Almost half of those who had used the practice had tried it first within the past three years.
- The soil-building rather than pest control benefits were most important to farmers making the decision to try green manures.
- Better soil tilth, increased soil organic matter, reduced wind erosion, and improved water infiltration were the top rated benefits of using green manures before potatoes.
- Only 17% of respondents reported using green manures to replace metam-based fumigation, but of those, 64% reported results equal to those obtained with fumigation.
- Only 26% of respondents plan to use green manures to replace metam-based fumigation in the future. However, if additional scientific data were available showing that green manures could successfully replace metam-based fumigation, those who would consider trying this would increase to 71%.

This survey will be repeated in 2015 to measure changes.

BENEFICIARIES

Potato growers in the Columbia Basin of Washington and Oregon will benefit from this project, but because the project work took all three years to complete, and because work at one of the two project sites was delayed, this benefit has not yet been realized.

Because the research data was obtained at the very end of the 3 year project period, the results have not yet been disseminated to growers. However, the 12% increase in mustard green manure use during this project shows that farmers are benefitting now, even without this research data. Green manures are known to improve soil quality, and so even while this research was focused on the disease suppression, farmers are benefitting from the practice in other ways. Without the disease suppression and associated replacement of fumigation with green manures, however, it is difficult to estimate the economic benefit of this increase in use of green manures.

LESSONS LEARNED

The research results, so far, are inconclusive. Because of the high variability in the Hermiston plots, no conclusions can be made from the results there. High variability a risk inherent in agricultural field research, and although actions were taken to minimize this risk, they were not successful.
However, half of the field trial portion of the project has not been completed. The field trial at Othello is moving forward with other funding and will be completed in late 2013. This trial may still yet provide the benefits planned for this project.

Although the challenge of completing this research was recognized from the beginning, and measures were taken to increase the chance of success, the complexity of the biological systems involved is daunting. The interaction of green manures, soil biology, and specifically soilborne diseases is still largely a "black box." Researchers can measure what goes in and what comes out of the box, but still do not have an accurate view of what goes on inside the box. In addition, it is not clear that there is a readily available solution to this problem. Field research of this type is risky, but for now, it is the best option. Perhaps new soil DNA techniques (one of the project team members is pursuing this line of inquiry) will allow us to peer into the soil's black box, but until other tools are developed, the project team will have to continue this type of field research.

CONTACT PERSON

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ADDITIONAL INFORMATION

Total WSU Cost Share: $71,336.47. Other funding provided by the Washington State Potato Commission (2010: $8,770; 2012: $12,961) and Oregon Potato Commission (2012: $6,209).

Mustard green manure website, updated during this project:
http://csanr.wsu.edu/pages/Mustard_Green_Manures

Literature Review: Green Manures and Biofumigation to suppress Verticillium wilt: review, by Ahmed Al-Hammouri (available upon request).

PROJECT #13

Project Title: *Homeowner Pest Education*

Partner Organization: Washington State University (WSU)

PROJECT SUMMARY

Washington State is the leading state producer of apples, pears, and cherries with over 200,000 acres of these specialty crops. Annually, these crops contribute over $2 billion dollars to the state's agricultural economy. While these tree fruits are of extremely high value, consumers in domestic and foreign markets do not tolerate fruit damaged by codling moth, *Cydia pomonella*, and the western cherry fruit fly, *Rhagoletis indifferens*. These fruit pests are often found in backyard trees and can serve as a reservoir of pests that spread to commercial orchards. Improperly managed backyard fruit trees are often the source of these pests that are capable of dispersing to and producing economic damage to commercial crops. These pests directly impact both the quality and marketability of commercial fruit.

Commercial growers are making the transition away from the broad-spectrum organophosphate insecticides to more environmentally friendly management strategies to control these pests within their orchards. As growers continue the transition and key organophosphate insecticides are removed from the market, they experience addition challenges in controlling key pests that originate outside the orchard.

This project was intended to educate backyard fruit growers about these pests and how they affect commercial orchards. It also planned to demonstrate viable low risk methods for homeowners to control codling moth and cherry fruit fly, and to evaluate the impact that proper management of backyard fruit trees has on the spread of these pests to adjacent commercial orchards.

This project was not based on previous SCBGP work, however, it is based on work conducted by Tim Smith of WSU Extension Wenatchee, and work conducted by Ken Bessin and John Hartman of University of Kentucky Extension and their previous work on apple bagging.

PROJECT APPROACH

This project involved outreach to both growers and backyard apple and cherry growers and educating them about the apple pest codling moth, and the cherry pest western cherry fruit fly.

Apple:

Codling moth monitoring was begun in April of each year with weekly trap checks and data recording at each trap site. Apple trees were pruned and thinned, followed by the actual bagging of the apples in early June, when the appropriate size was achieved by the apple fruit. All damaged fruit was thinned and recorded at the time of bagging. During the first two seasons, ten percent of the fruit was left exposed on each tree, to serve as a control for the project. In the third and final growing season, fifty percent of the fruit was left exposed on each tree to serve as a control. The control fruit was monitored each week, and any damaged fruit was removed and recorded during each of the three seasons. The bagged apples were monitored for growth and development, and it was learned that here in Central Washington, the fruit must achieve at least 25mm (quarter size). If the fruit is not allowed to reach this size, it will spontaneously drop. In other areas of the world such as Japan and the Eastern United States, fruit can be bagged at smaller size avoiding early codling moth injury. Here in Central Washington, apples must be bagged at a later and larger stage of development, while tolerating some injury by codling moth - the injured fruit is removed and discarded and codling moth larvae on the project trees are not allowed to complete their life cycle. The supplier of the apple bags has adopted the recommendation to wait until proper size is achieved by the apple fruit and then bag from the results of the project. From a quantitative view, the project was presented to both the Master Gardeners of Yakima County and Benton County, and they are

proponents of the method in order to avoid: codling moth injury, hosting codling moth, creating problems for commercial growers. The method has been adopted by several Master Gardeners with apple trees, and they are introducing their neighbors with apple trees to the method. In other cases, the backyard apple growers have made the decision that the method was too labor intensive and voluntarily allowed the apple trees to be removed. At two project sites the codling moth moving into the neighboring commercial orchard were reduced to zero by bagging the backyard apples. Correspondingly, the injury was reduced to zero codling moth injury as verified by pack out reports from the orchardist warehouse. Previously the growers were forced to perform a more stringent spray regimen, and still bear some losses to codling moth as was also shown by previous years pack out reports. These growers have been able to reduce their numbers of sprays and also reduce acreages sprayed, a positive outcome from both an economic and ecological viewpoint.

Cherry:
Western Cherry Fruit fly monitoring and control was performed for three seasons at multiple sites, comprising both commercial and backyard trees, and how well control could be performed utilizing GF 120 Naturalyte Insecticide, an organic approved product produced by Dow AgroSciences. In the case of cherries, weekly monitoring of the sites began in mid May utilizing baited yellow sticky traps. At the first detection of an adult fly, the applications were began of GF120. Monitoring and applications were continued until late August when no more adult cherry fruit fly were caught. In the event of rain, another application was made the following day, as GF120 is not rain-fast. At harvest time samples were taken from both backyard cherries and commercial cherries as well. The fruit was inspected for damage both visually and by the same method as is used for export cherries: 7 pounds of brown sugar is dissolved in 5 gallons of water, and crushed fruit is submerged in this sugar water. Any cherry fruit fly larvae present in the fruit floats to the surface and were collected and verified to be cherry fruit fly larvae and were counted. At the control sites, utilizing an infested backyard cherry tree where no applications were made and a non production unsprayed juvenile cherry orchard, detections were made in the commercial orchards fruit, as well as in the backyard fruit. At another location where no applications were made to infested backyard trees, the commercial orchard was sprayed with GF120 on a weekly basis by the orchardist and no detections were made in the commercial cherry fruit which was monitored with traps and the fruit inspected in the same manner with sugar water. Two replicates utilizing adjoining backyard cherry trees were also monitored and weekly applications of GF120 were made to one tree at each site. In this case control was not as good as was hoped, with 100% infestation in the unsprayed cherry trees as was expected, but there was over 10% infestation in one case in the sprayed tree. We are unsure as to the cause, but the trees are located only 75 feet apart, and it is surmised that reproduction and oviposition were more important than feeding on the GF120 which is a bait, not a contact insecticide.

Project Partners including the following:
Yakima:
Dr. Mike Bush of WSU Extension Yakima designed and managed the project, as well as performed oversight. Jeff Upton performed outreach and applications of GF120 as well as monitored the apple bagging and pest monitoring Henry Vander Houwen performed weekly monitoring of the traps and data collection as well as performing the cherry evaluations

Benton:
Maryanne Ophardt of Benton County WSU Extension managed the Benton County personnel, and performed local management Frank Wolf performed outreach and applications of GF120 and monitoring of the projects involving apple bagging and cherry evaluations. Jo Boone performed trap monitoring in both the apple and cherry projects in Benton County. Pete Mellinger performed trap monitoring and consulting to both Yakima and Benton Counties from the standpoint of a commercial cherry orchardist (retired)

GOALS AND OUTCOMES ACHIEVED

The primary activities performed were the selection of proper sites for the apple and cherry aspects of the project, as this involved both commercial and backyard producers of fruit. This was critical to the project as there is great need for backyard fruit tree growers to understand that the pests that originate in their trees cause great harm to commercial producers. By educating backyard fruit producers, it has in a small scale at this time became apparent to them that if their apple and cherry trees are not maintained in a pest free manner, neighboring commercial growers have to spray more frequently and experience insect damaged fruit, which results in economic hardship to the commercial growers. In some of the cases, at the completion of the project, the backyard fruit trees have been removed as the homeowners now realize that the work involved is more than they are willing or able to devote to their fruit trees. In other cases, the backyard growers are now educated and willing to perform the work needed, and they are also assisting other backyard fruit growers with performing sprays and bagging of their apples.

As was noted above, backyard growers that have adopted apple bagging and GF120 sprays are now educating their neighbors and friends about these methods. Another long term goal was achieved by educating the WSU Master Gardeners about the methods and they now educate the public about the methods.

Project goals were to educate the public and reduce the pests originating in backyard apple and cherry trees in both Yakima and Benton County. In both of the Counties, commercial orchards are now impinged upon by neighborhoods and therefore backyard fruit trees. The commercial growers are in large part negatively impacted by these backyard apple and cherry trees. Through this project, a number of growers now are able to reduce the number and frequency of their insecticide applications and they now experience lower codling moth and cherry fruit fly damage.

It was initially hoped that GF120 would be made available in a smaller package that was more "homeowner friendly" after it was demonstrated that there was enough interest. Unfortunately this is not the case as the manufacturer has decided to not offer the material in smaller packaging. It was also hoped that 100% control of cherry fruit fly would be possible, but this was not the case, as in some instances there were detections made in backyard cherry fruit of larvae. There was however improvement as rather than 100% infestation with larvae it was greatly reduced to a high of 10% in one case.

In the case of apple bagging, all goals were met. Codling moth affecting the commercial growers was eliminated as bagging effectively stops the life cycle of this pest. Commercial growers with neighboring backyard trees were able to reduce insecticide sprays and experienced no codling moth damage.

One commercial apple grower experienced 12% codling moth cullage in his packed fruit due to 22 unmanaged apple trees prior to the project. After the first season, there was no codling moth damage detected at the warehouse where his fruit was stored and packed. In the case of cherries, a commercial grower had experienced very large trap catches of cherry fruit fly and was forced to make insecticide sprays on a frequent basis in order to avoid having infested fruit. After the project began the trap catches were greatly reduced to less than one-tenth of what they were prior to the project. The owner of the nearby unmanaged cherry tree has since agreed to removal of the tree, as he is unwilling to spray because it is “too much work.” This is a positive outcome as “no host” means “no pest.”

One of the Expected Measurable Outcomes was to reduce codling moth and western cherry fruit fly in targeted backyard trees by 98%. For backyard apple trees, the project reduced the incidence of damage to the fruit to levels below 2%, which is considered acceptable for commercial production standards and indicates that the target was met. The codling moth-damaged apples were due to apples being bagged that had codling moth eggs already laid on the surface of the fruit, and this is difficult to detect. This means that the bagged apples went from 100% infested prior to the project to 98% undamaged from codling

moth after the implementation of bagging. Initial damage prior to the actual bagging was quite high in some cases - as much as 15%. The damaged fruit was removed and destroyed prior to bagging. In the project apple trees, each tree was thinned of its fruit to at most 25% of its initial apples, so any codling moth infested fruit being destroyed resulted in further reduction of codling moth. In the case of these backyard trees, populations of codling moth rebound quickly, due to other unmanaged apple and pear trees in the vicinity. This was documented by monitoring trap counts performed in the backyard trees.

For backyard cherry trees, a reduction was achieved, from 100% infested backyard cherry fruit, to a high of 10% infestation in the same tree the following year. The other cherry sites were better, with only perhaps 2-4% infestation in the cherry fruit. Cherry fruit fly damaged fruit went from 100% infested fruit to 90% clean in the worst site to 98% clean fruit in the best sites. Therefore, the outcome was met in most cases. The neighboring commercial growers which previously had experienced elevated trap counts of cherry fruit fly saw a huge reduction in the number of adult flies caught. In commercial cherry production, any trap catch is considered a cause to spray, as cherry fruit fly is a "zero tolerance" pest." Although the results were promising, the hope of zero cherry fruit flies was not achieved.

The second Expected Measurable Outcome was that 50% of targeted backyard growers would adopt the demonstrated "Integrated Pest Management" techniques. This outcome was successful, with 5 out of 8, or 63%, of participants adopting IPM practices. The other three participants have chosen to remove their fruit trees, which is still a successful outcome for the nearby commercial growers.

BENEFICIARIES

Commercial growers and backyard growers have both benefitted from the project, with the benefits more heavily weighted towards commercial growers, as intended. The small number of project participants have now began to educate others of the benefit of proper pest management, including how it reduces costs and is more ecologically sound.

Although the economic benefits for each grower was not measured, one commercial apple and one commercial cherry grower shared that they were able to reduce their sprays dramatically. The apple grower reduced his codling moth sprays from six per season to two per season. The cherry grower was able to reduce his sprays by one-third, down to a total of four. (In the case of cherries, there is zero tolerance of cherry fruit fly and therefore growers must spray in order to avoid any detections.)

Backyard growers that have adopted the program now experience no codling moth damage and greatly reduced cherry fruit fly injury. They also do not contribute pests to nearby commercial growers as was demonstrated in trap data that showed no codling moth in traps directly abutting the backyard trees. They also are no longer utilizing conventional insecticides that are disruptive to natural enemies and beneficial insects.

LESSONS LEARNED

Lessons learned included the following:

- It is necessary to limit the number of participants in the project as the work can become labor intensive, particularly at apple bagging time. Codling moth injury in the last-to-be-bagged fruit was rather high due to time constraints.
- All parties must be consistent in data collection methods so that the data is meaningful to the project.
- The correct timing of bagging apples in Central Washington is very important, and some varieties just don't work for bagging due to the heat destroying the bagged apples.

- In the case of cherries, it was hoped that GF120 would achieve 100% control of cherry fruit fly, and that was not observed, even with diligent applications. Great reductions were achieved, but not 100%.
- The working group met several times throughout each season, but it would have been better to have met more frequently to communicate better and problem solve together, rather than by phone.

On a positive note, this outreach project has made WSU Extension and the Benton and the Yakima County Pest Boards more visible to the local constituents that they serve. Citizens have become interested in the project and are willing to adopt the program.

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ADDITIONAL INFORMATION

In-kind funds were primarily derived from time devoted to the project. In Yakima County, 640 hours were devoted per season by Jeff Upton totaling 1920 hours over the three years of the project. This equals approximately $42,000. Mike Bush devoted 800 hours of his appointment to the project equaling $28,000. In Benton County, Frank Wolf devoted the same 640 hours over the four month season each year, totaling 1920 hours. This equals approximately $40,000. Maryanne Ophardt dedicated 800 hours of her appointment to the project equaling $25,000.

A “how to” apple bagging video was produced by Benton County, with Jo Boone performing this aspect of the project. Jo served as the videographer and Frank Wolf performed the actual bagging. The video was placed on DVD and is available to the public for free distribution. It is currently being reviewed by WSU for inclusion on the WSU "YouTube" channel.

"Growing Backyard Apples Without Pests" was produced and is available for free distribution through the Yakima Horticultural Pest & Disease Board. A copy will be included on the updated Yakima County Horticultural Pest & Disease Board webpage by January 1, 2013.

PROJECT #14

Project Title: *Washington Specialty Crop Farmer-Buyer Trade Meetings*

Partner Organization: Cascade Harvest Coalition (CHC)

PROJECT SUMMARY

Washington State specialty crop farmers who want to connect with local buyers often do not have the time or skills necessary to develop successful business relationships. In addition, chefs, food service providers and institutional food buyers looking for locally sourced products lack networks to find producers and are faced with an ever increasing consumer demand.

This project worked to provide specialty crop producers with education and networking opportunities, inspiring creative sales strategies, building new relationships with food buyers and increasing the purchase of local products. Events also worked to educate chefs and buyers about what products were available, how to use them and how to work with (perceived and real) barriers of volume, pricing, processing, distribution and seasonality.

Over the course of three years the funding from the WSDA Specialty Crop Block Grant Program (SCBGP) allowed Cascade Harvest Coalition (CHC) to build off of a well-known Farm-to-Table Workshop Series, funding 14 regional workshops, including a Northwest WA event coordinated in partnership with Sustainable Connections (SC). The SCBGP also supported the Seattle Chefs Collaborative (SCC) in the expansion of popular Farmer-Chef Connection (F2C2) and Meet & Greet (MG) events. Coordinating farmer-buyer events between all grant partners in this one project created a "clearing house" for these events in the State, aiding in effective collaboration and an efficient use of resources.

National and local shifts have occurred towards promoting local food sources for economic, health and environmental reasons. Large and small buyers alike have made commitments to purchase more locally sourced products from small- and mid- scale farmers. For instance, in 2011, Wal-Mart, the nation's largest retailer, developed sustainability commitments which resulted in an increase of locally sourced produce by 97%, accounting for 10% of all the produce sold. Increases in local purchasing can also be seen in institutions. In 2010, 72 school districts worked with 47 farms throughout Washington State took part in Taste Washington Day, incorporating local products in school cafeteria menus and generating approximately $17,000 in sales on the actual day and an estimated $90,000 in the following 6 months. Consumer demand can be demonstrated in a rise in the number of farmers markets from 1,755 in 1994 to 7,864 in 2012, with a 9.6% increase in the number of markets from 2011 to 2012 (USDA AMS). This project was and will continue to be extremely timely with such emphasis and energy being put into sourcing local products.

Just as the work of food producers is a 24-7 job, the work of supporting local producers and helping to form connections with buyers is never complete. Changes in the economy and environment annually create new challenges that must be addressed and food trends can shift at any time. Responding to these factors can be staggering for small-scale food producers who often are not only farmers, but also the processors, marketers, sales representatives and distributors of the food they produce. Buyers and producers were given an opportunity to network and to learn more about what each other need in order to make a good sales relationship.

PROJECT APPROACH

Total attendance at all Farm-to-Table events was 3,370, of which 400 were unique specialty crop producers and 672 were unique buyers (as noted below, some producers and buyers brought more than

one person to each event). The remaining attendees included other producers, ag service providers, educators, lenders, non-profits and community members.

Farm to Table Trade Meetings
14 day long or afternoon workshops highlighted successful farmer-buyer relationships, focused on communication and business skills and provided networking opportunities. Networking happened throughout the event, but was also targeted during focused 10 minute mini-meetings or "speed dating" sessions between farmers and buyers. Partner, support and community organizations were invited to attend to provide resource booths and some events included farmers to provide a trade show component.

Farmer-Chef Connection
This project supported 3 F2C2 events, a day-long direct-marketing event for Washington Food Producers and Buyers. In addition to the facilitated and unstructured Networking Sessions that are always the heart of the F2C2 conference, the program included a keynote address, panel discussions and several breakout sessions on topics relevant to the audience. Event food service (a continental breakfast, lunch buffet and afternoon tasting) served as a showcase for Washington state products; each of the meals featured local ingredients donated by Washington producers and prepared by volunteer chefs working with catering staff. F2C2 also featured an Exhibitors Area for food producers, nonprofits and other organizations whose work supports the food system. SCC event staff worked to produce an event that would bring small-scale food producers together with buyers who are interested in supporting our local food economy. Networking is at the core of building farmer-buyer relationships. Each year F2C2 continued to draw new producers and buyers along with returning attendees and supporters. This can be seen in the unique businesses that attended F2C2 over the 3 year grant spread sheet. There was a steady flow of first time attendees that is balanced by a core of returning business representatives. The mix keeps the networking sessions active with a steady supply of new producers and their products each year. In 2012, 189 Buyers and 154 Producers registered for F2C2 and participated in the speed networking sessions. As a survey comment states, "Still met new folks even after all these years." It has been observed that even though there was formal networking that was timed and moderated; much work was accomplished around the periphery of the space. Some attendees preferred the more casual approach to making connections.

Meet & Greets
The MG program did an excellent job of continuously reminding local culinary professionals to keep thinking of new ways throughout the year to use locally grown specialty crops through 12 events. Anecdotally, organizers found these events resulted in a dramatic up-tick in the presence of these crops on local menus and significant increases in sales for local producers. Events put the spotlight on what chefs could create with pumpkins and winter squash, mushrooms, shelling beans, grapes, and other fresh vegetables and how chefs could use different preparations to utilize specialty crops like grilling, pickling and distilling.

Event Attendees	**2010**	**2011**	**2012**	**Total**	**Average/yr**
Total Attendees	1,092	1,132	1,146	**3,370**	1,123
Specialty Crop Producers	106	170	124	**400**	133
Buyers (no specific data for M&G events)	225	190	257	**672**	224

A registration process was used to ensure that only specialty crop producers benefited from SCBGP funding. Grant partners found successful ways to support the non-specialty crop producer attendance through in-kind match, food donations, sponsorships, and in some cases charging a fee to cover the costs of their attendance.

Coordinating trade meetings from all grant partners in this one project created a "clearing house" for farmer-buyer trade meetings in the State, which aided in effective collaboration and more efficient use of resources. The local food system is built upon a community of dedicated organizations, buyers and producers, working to encourage business growth.

Community partners, businesses and farmers took part in making these events address the unique needs of each community. Additional event partners and sponsors include, but are not limited to these below:

• OlyCap • Jefferson LandWorks Collaborative • Local Investment Opportunities Network (LION) • Slow Money NW • Whole Foods • Fort Worden State Park • Bon Appétit Restaurant Management Company • Northwest Agriculture Business Center • Grow Northwest Magazine • Haggen, Inc. • Community Food Co-op • WSU Extension (Jefferson, Benton, Whatcom, and Kitsap) • WSDA Farm-to-School • WSDA Small Farms & Direct Marketing • Occasions Events and Catering • Olympia Coffee Roasting • Lattin's Cider Mill and Farm • King County Public Health • NW Regional Food Hub • Kitsap Conservation District • Cedarbrook Lodge • Cedar Grove Packaging	• Tacoma Farmers Markets • MultiCare Center for Healthy Living • Tacoma-Pierce County Health Department • Tacoma Regional Convention and Visitors Bureau • Healthy Communities of Pierce County • Northwest Leadership Foundation • Clark County Food System Council • Clark County Health Department • New Seasons Markets • FoodHub • Herban Feast • Grand Central Bakery • Oxbow Farm • Blue Danube Productions • Apres Vin • Klipsun Vineyards • Thundering Hooves • Gleason Ranch • Olsen Farms • 3 Sisters Cattle Company • TASTE • Kitsap Food & Farm Policy Council • Jefferson Farmers Markets

GOALS AND OUTCOMES ACHIEVED

October 1, 2009 – September 30, 2012: Deliverables and Completed Activities
Deliverable 1: Farm to Table Workshop #1 • Whatcom Bounty Expo, December 3, 2009, Bellingham
Deliverable 2: Farm-to-Table Workshop #2 • NW Washington Farm-to-Table Trade Meeting, February 22, 2010, Mt. Vernon
Deliverable 3: Farm to Table Workshop #3 • South Sound Farm-to-Table Trade Meeting, March 22, 2010, Olympia
Deliverable 4: Farmer-Chef Connection Conference #1 • Farmer-Fisher-Chef Connection (2010 F2C2), March 1, 2010, Seattle
Deliverable 5:Farm to Table Workshop #4

• Olympic Peninsula Food and Finance Summit, December 3, 2010, Port Townsend
Deliverable 6: Meet & Greet #1 • Meet & Greet 1 - The Heirloom Shelling Beans, March 22, 2010, emmer&rye, Seattle
Deliverable 7: Meet & Greet #2 • Meet & Greet 2, Restaurant Gardens & Farms, April 26, 2010, The Herbfarm Restaurant, Woodinville
Deliverable 8: Meet & Greet #3 • Meet & Greet 3, Washington Spices, June 21, 2010, Elliott Bay Café—Seattle
Deliverable 9: Annual Report • Completed—Nov. 2010
Deliverable 10: Farm to Table Workshop #5 • Northwest Farm-to-Table Trade Meeting, February 22, 2011, Bellingham
Deliverable 11: Meet & Greet #4 • Seasonal Cocktails, July 18, 2011, Mistral Kitchen, Seattle
Deliverable 12: Farm to Table Workshop #6 • South Sound Farm to Table Trade Meeting, April 11, 2011, Olympia
Deliverable 13: Farm to Table Workshop #7 • Pierce County Farm-to-Table Forum, October 13, 2011, Tacoma
Deliverable 14: Farm to Table Workshop #8 • Clark County Farm-to-Table Trade Meeting, October 25, 2011, Vancouver
Deliverable 15: Farmer-Chef Connection (F2C2) • Farmer-Fisher-Chef Connection, February 28, 2011, Seattle
Deliverable 16: Farm to Table Trade Meeting #9 • Olympic Peninsula Farm-to-Table Trade Meeting, December 8, 2011, Pt. Townsend
Deliverable 17: Meet & Greet #5 • Kimchi & Restaurant Pickling, August 15, 2011, Revel, Fremont
Deliverable 18: Meet & Greet #6 • "Meat & Grape", October 18, 2010, Herban Feast, Seattle
Deliverable 19: Meet & Greet #7 • Octoberfest, October 10, 2011, Cedarbrook Lodge, Seatac
Deliverable 20: Annual Report • Completed—11/15/2011
Deliverable 21: Farm to Table Workshop #10 • Northwest WA Farm-to-Table Trade Meeting, March 15, 2012, Bellingham
Deliverable 22: Meet & Greet #8 • Pumpkins & Winter Squash, November 14, 2011, 6-8 p.m., Bastille, Ballard
Deliverable 23: Farm to Table Workshop #11 • Central WA Farm-to-Table Trade Meeting, March 21, 2012, Yakima
Deliverable 24: Farm to Table Workshop #12 • South Sound Farm-to-Table Trade Meeting, April 11, 2012 Lacey
Deliverable 25: Farm to Table Workshop #13 • Kitsap Farm-to-Table Workshop, April 23, 2012, Bremerton
Deliverable 26: Farm to Table Workshop #14 • Mid-Columbia Farm-to-Table Symposium, September 14, Richland
Deliverable 27: Farmer-Chef Connection Conference #3; send follow-up exit surveys, March 2012 • Farmer-Fisher-Chef Connection, February, 27, 2012, Seattle
Deliverable 28: Farm to Table Workshop #15

• Cancelled. Funds used for overall data collection and follow up with all Farm-to-Table attendees
Deliverable 29: Meet & Greet #9 • Mushrooms & Oysters, April 23, 2012, Melrose Market Studios, Seattle
Deliverable 30: Meet & Greet #10 • Cheese & Cider, May 14, 2012, Portage Bay Café and Catering, Seattle
Deliverable 31: Meet & Greet #11 • Grilling, August 13, 2012, Agua Verde Cafe & Paddle Club, Seattle
Deliverable 32: Meet & Greet #12 • Fresh Shelling Beans, September 17, 2012, Art of the Table, Wallingford
Deliverable 33: Follow-up, documentation and prepare final report • Completed—11/15/12

The performance goals were as follows and were all met:

- *To support WA farmers by providing them access to a network of buyers representing a diverse range of markets and buyers including chefs & restaurateurs, corporate and institutional food service and retailers.*

  Over the course of three annual F2C2 events 189 unique Seattle area buyers attended the events, many of them returning annually.

- *To showcase locally produced foods to potential buyers.*

  Events worked to showcase local products whenever possible. For Farm to Table events worked to incorporate local specialty crops into lunch or appetizers and in some cases even the tea. At F2C2 events, the ingredients and labor for these highly anticipated meals were almost entirely donated. The goal in seeking donations was not only to save money, but to create individual connections between the producers who grow or harvest the food and the chef who turns the raw products in to delicious meals. As demonstrated in MG events, working with a food item is the best way for a chef to consider its potential as a menu item. Chefs often stick with tried and true food producers whose product quality they know. The willingness of the producers and chefs to donate their product and time to produce these meals speaks volumes to the level of the community support these events have gained over the years. The value of the donated ingredients and labor for F2C2 2010 was $17,150.00. In 2011 the value was $14,000.00 and in 2012 the value came in at $ 15,015.

- *To provide focused, efficient opportunities for buyers and sellers to meet through a "speed networking session and other structured networking activities.*

  While the one-on-one connections were made between producers and chefs when putting together F2C2 or MG meals or during a break at the Farm to Table workshop, "speed networking" was an effective way for attendees to make new business connections and rejuvenate ones made at past events.

- *To facilitate discussion and problem solving relevant to local food markets at breakout sessions and panel presentations centered on topics such as local distribution networks, value-added products, marketing techniques, business skills for small scale producers, etc.*

  Event agendas were planned with small producers in mind. As mentioned earlier in this report, small-scale food producers are often not only farmers, but also the processors, marketers, sales representatives and distributors of the food they produce. Taking one day off from work to attend a meeting is a large commitment of valuable time for these individuals. They take this time to attend events as they know they will expand their knowledge of the food industry, be informed on

current issues and expand their business skills. A mix of keynote speakers, panels of buyers and farmers, group discussions and breakouts were used to allow for problem solving. Each event derived content by looking at the needs of producers in the community, developed with input from local agricultural support organizations and farmers.

- *To foster a sense of community and shared vision between local food producers and buyers*
  The presentations at events focused on the state of the local food network and economy as well as offered forums for discussion of common business challenges like processing and distribution. The speed networking sessions encourage producers and buyers to expand their range of business and make new sales relationships. Social time at meals and afternoon tasting sessions allowed time for the guests to discuss and consider all they had seen and heard during the event.

Long term goals were to:

- Increase local farm product sales to local retail and institutional buyers;
- Increase market share of locally grown and produced food;
- Facilitate specialty crop farmer-buyer sales connections in Washington;
- Provide a forum to discuss new and emerging sales and marketing strategies and issues for local agriculture; and
- Develop regional asset maps of producers and buyers.

While it was not possible to determine overall trends in market growth from only event attendees, survey responses reported suggest that both sales and purchases of locally produced food were likely on growth paths. On the purchasing side, surveys indicated there were noted increases in the number of buyers, both large and small, and an increase in the amounts of food being bought from Washington producers as a percentage of overall purchases. On the sales side, the number of producers was shown to be continually growing and that some of the largest producers are getting even larger. It also may be the case that Washington State producers who previously had focused on export markets are also becoming players in local markets.

It takes time to build business relationships. Some of the communities where events were held were just beginning to open communication between farmers and buyers about how to shorten the supply chain and increase the sale of products locally. In these cases, farmers and buyers were introduced to farm to table examples and successful strategies for the first time. It can also take time for small- to mid-scale producers to be able to accommodate communication, product volume and food safety needs of buyers. Organizers anticipate continual growth and movement toward more local sourcing and stronger relationships.

Grant deliverables were completed in entirety, with the exception of one Farm to Table workshop which was instead fulfilled through an overall final survey of Farm to Table Workshop participants. Project goals were accomplished (see above).

Established goals for this grant were to, “conduct a series of networking and educational opportunities to directly connect local producers with local food buyers, create new market relationships, and expand sales opportunities for farmers.” Events worked to provide education and build networking opportunities to aid in sales and connections.

The two measurable outcomes for this project were to:

1) Increase each producer’s sales by an average of $800 per year; and

2) Increase the number of business relationships between local specialty crop producers, local food buyers, and supporting agricultural organizations by 750 per year (2 each for 375 participants).

Day of evaluations asked attendees about suggestions for future workshops, what was valuable to their business, what marketing and sales tips they learned and what barriers still remained. Post-event surveys asked attendees to share sales information and how many connections led to a sale for a one year period after the event they attended. Post-event surveys were sent out via email and online 6 weeks to 3 months after each event. Event participants in F2C2, F2T and MGs were surveyed and analyzed separately.

Farm to Table Workshops
Attendee response rate was low for the 6 week follow-up surveys. The best representation of data showing Measurable Outcomes comes from surveys collected post-event in 2011 where estimated sales were $50,520, making the average sale for specialty crop producers around $5,052. This average sale per specialty crop producer exceeds the measurable outcome of $800 per specialty crop producer. Specialty crop producers that did not return survey data may have made additional connections and sales. Actual connections made by specialty crop producers alone were not well represented in survey data. In an attempt to capture more information about sales, organizers administered a final survey of F2T attendees at the end of this project. Out of 62 respondents, 25 said they were specialty crop producers. 16 reported sales of $800 and above – 67% of specialty crop respondents. Overall survey data including responses from all attendees indicated there were 68 sales or agreements were made between farmers and buyers and 66 connections were made as possible follow-up buys. Attendees averaged one or more connection that led to a future sale. Lastly, respondents indicated that they had experienced a better community presence and stronger business connections (see chart above).

Farmer-Chef Connection
Measurable Outcomes for all three F2C2 events were based on the results of the annual F2C2 exit surveys, spring surveys and fall surveys. Viki Sonntag of EcoPraxis annually analyzed the surveys and reported the results. In the third year of survey analysis Sonntag's report offered the results of the F2C2 2012 surveys as well as comparisons of three years' survey results over the entire grant cycle. In addition, Sonntag expanded the analysis to include the survey results on file from two years pervious to the grant cycle.

The goal of increasing participating producers' sales by an average of $800 per year was harder to track even with the survey results as a reference point. The fall survey is conducted in October at the end of the growing season. This time was selected as it is after the busy summer-fall growing and harvest seasons, but before the holidays. For the purpose of grant reporting specialty crop producers sales were considered separately from other sales.

The fall survey asks for 'to date' through October. The average of specially crop producers' sales to date in 2010 was $970. In 2011 the average was $624 and in 2012 the average was $443. Over the three year grant cycle, sales to date for specialty crop producers averaged $679. But sales for the year do not end in October and there should be additional sales made in the months of November and December. The three year average of sale per month over the annual survey's ten month period is $67.90. It is conservative to estimate that sales would at least continue at this rate for November and December, increasing the year end average of sales for specialty crop producers to $815 and meeting the grant's goal. Connections far exceeded initial expected outcomes of 2 per producer.

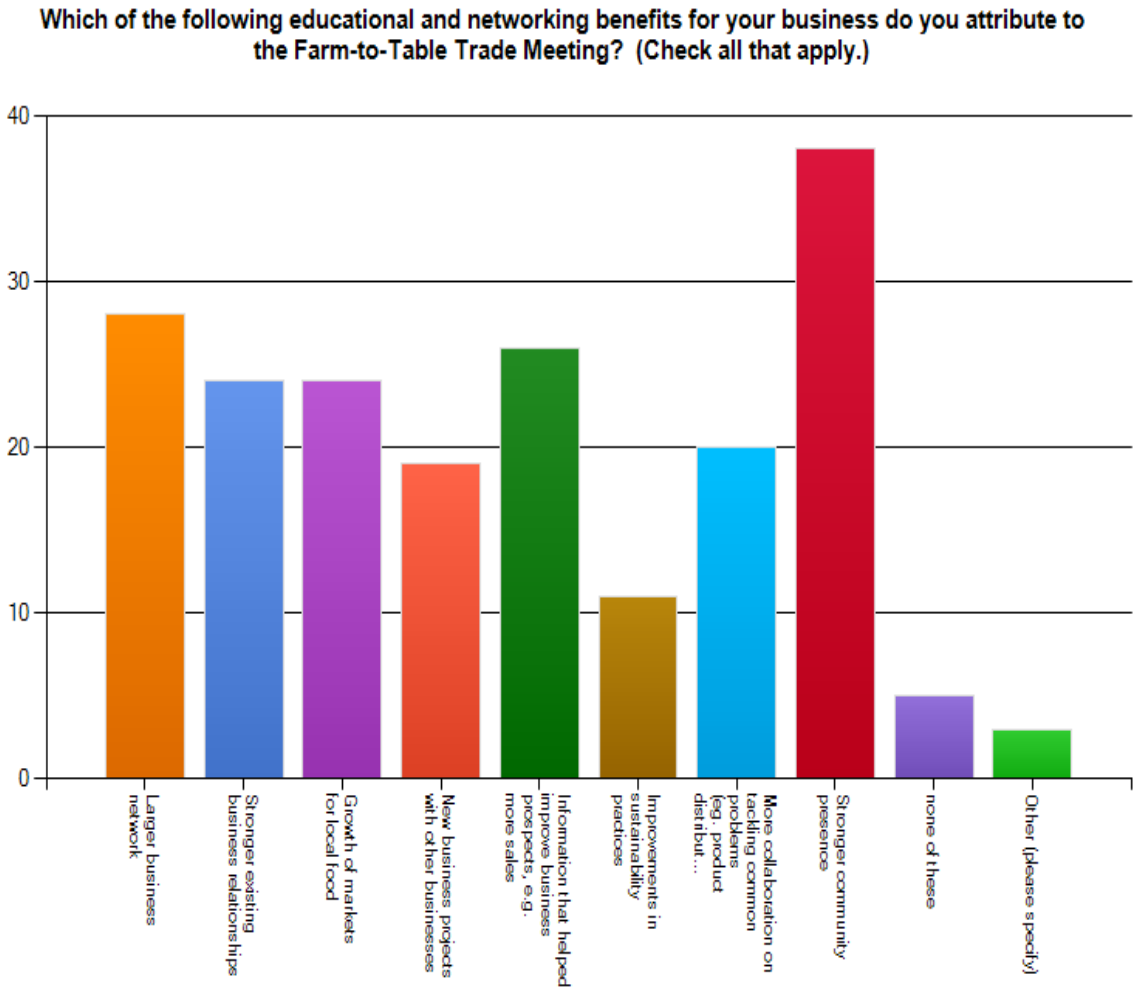


Table 3: Average Number of Connections Made at Event

	Average Number of Connections That:			
	Led to a sale or purchase	Resulted in an agreement (either formal or informal) for making a sale or purchase later this year	Are likely prospects for follow-up	Total number of connections
All	1.3	1.3	3.1	5.7
Buyers	1.2	1.3	2.6	5.1
Producers	1.3	1.4	3.6	6.3
Specialty Crops Producers	1.9	1.8	3.2	--

BENEFICIARIES

Current and future specialty crop producers are benefiting from increased information, relationships, exposure to buyers and increased buyer understanding of local products.

Hosting these events each year benefits small-scale local and regional food producers by offering them a space that is specifically for coming together to network and share ideas. These events are not trade shows with slick promoters and salespeople, but a gathering of small scale food producers who want to do better. They are proud of their work and the food they produce. They have stories to tell and lessons to share. Sales numbers are not huge and the volume of product moved may seem inconsequential, but to this target audience, a few new business connections can mean the difference between paying the bills and going out of business.

Event Attendees	**2010**	**2011**	**2012**	**Total**	**Average/yr**
Total Attendees	1,092	1,132	1,146	**3,370**	1,123
Specialty Crop Producers	106	170	124	**400**	133
Buyers (no specific data for M&G events)	225	190	257	**672**	224

Total attendance at all Farm-to-Table events was 3,370, of which 400 were unique specialty crop producers and 672 were unique buyers (as noted below, some producers and buyers brought more than one person to each event). The remaining attendees included other producers, ag service providers, educators, lenders, non-profits and community members.

The grant proposal anticipated event participation would be approximately 1,125 specialty crop producers and that these new sales connections would result in an estimated $1 million dollars per year in additional specialty crop farm income. These estimates were based on documented sales resulting from previous Farmer-Chef Connection conferences, Farm-to-Table workshops and specialty crop-focused Meet & Greets.

The number of participants that identified themselves as first time attendees decreased from 51% to 26% over the grant period (among all participants). Repeat attendance is critical to initiating, building and maintaining business relationships between specialty crop producers and buyers. However, the number of new connections and new sales opportunities for longer-term attendees may be lower than for first time attendees, as sales figures only capture the value of new relationships not previous or on-going relationships. Therefore, it is likely that total sales for specialty crop producers attending multiple events will be understated. Find ways to increase overall attendance by new specialty crop producers and continue to expand the diversity of food buyers.

Sales data collected during the three-year project period indicate that annual food-related sales for all producers in attendance totaled nearly $3.5 million or an average of nearly $1.2 million per year. For buyers, purchases over the same period totaled nearly $5.4 million or an average of nearly $1.8 million per year. Because there is overlap between sales and purchases, the numbers cannot be combined. However, with the total between $3.5 and $5.4 million, it is clear that Farm-to-Table events represent a significant opportunity to increase producer income. It should also be noted that no additional multiplier effects have been calculated from new sales, understating the total economic impact to the region.

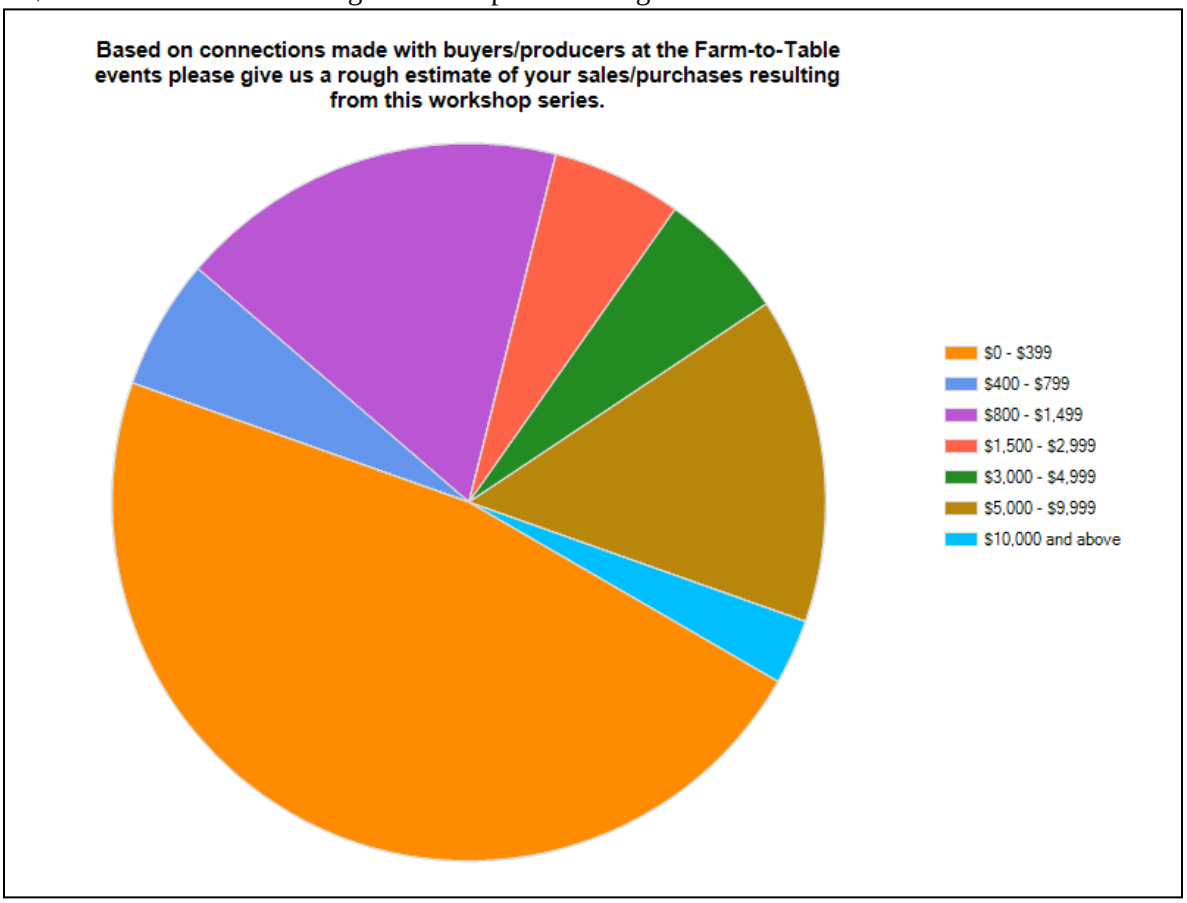
Average Annual Food Related Sales/Purchases*	**2010**	**2011**	**2012**	**Total**	**Average**
Buyers	$2,944,200	$1,568,227	$866,086	$5,378,513	$1,792,838
Producers	$802,243	$861,463	$1,788,377	$3,452,083	$1,150,694
Average Value of To-Date Sales for Specialty Crop Producers	**2010**	**2011**	**2012**		**Average**
All Specialty Crop Producers	$970	$624	$459		$684
Specialty Crop Producers Detailing Connections	$1,576	$1,373	$510		$1,153
Average:	$1,273	$999	$485		$919
Average Value of To-Date Purchases for All Buyers	**2010**	**2011**	**2012**		**Average**
All Buyers	$2,054	$2,036	$2,642		$2,244
All Buyers Detailing Connections	$3,240	$2,601	$3,170		$3,004
Average:	$2,647	$2,319	$2,906		$2,624
Estimated Annual Value of Connections Made	**2010**	**2011**	**2012**	**Total**	**Average**
Buyers	$2,583,830	$146,592	$146,592	$2,877,014	$959,005
Producers	$1,227,486	$95,108	$95,108	$1,417,702	$472,567
Average Number of Connections	**2010**	**2011**	**2012**		**Average**
Buyers	6.4	4.8	5.1		5.4
Producers	6.3	5.3	6.3		6.0
Specialty Crop Producers	9.6	4.5	6.9		7.0
* Calculations do not include any value to likely prospects for follow-up or the value of ongoing sales relationships between producers and buyers past the event year. This likely underestimates the total value of sales.					

For the initial grant application, it was assumed that each specialty crop producer would realize average sales of $800 (based on attendance and sales assumptions). For the grant period, specialty crop producers realized average sales of $919, more than what was initially estimated. It should be noted that this average figure does not include any value to likely prospects for follow-up or the value of ongoing sales relationships between specialty crop producers and buyers past the event year. This likely underestimates the total value of sales. Exploring ways of better capturing year-of-event and on-going business relationships (in terms of sales) would help solidify the numbers. Other suggestions presented here for increasing attendance and more complete counting of specialty crop producers should also help.

Beyond business connections and sales made, a very critical element of Farm-to-Table is networking. Not only among buyers and sellers, but with the broad diversity of agriculture, marketing support, lenders, institutions and other organizations that attend. The events meet a critical need in helping farmers just starting out with ideas about production, marketing, technical assistance and other support services - all critical in helping them establish sustainable business enterprises – but also critical in helping current farmers adapt to changing market demands. Also important is providing information on

issues that may affect the sustainability of their business as well, such as emerging food safety requirements, etc.

Farm to Table Workshop attendees were asked to complete a final survey to determine their sales based on one or more workshops they attended. 47% of all respondents (25 producers) indicated they had sold more than $800 as a result of attending a workshop and making sales connections.



Farmer-Chef Connection

The report written by Viki Sonntag best captures the economic impacts of F2C2. But as Sonntag offers in her report much of the value of F2C2 is not quantifiable, "…it should be noted that this calculation does not reflect the net value of connections made at the event. It is assumed that some portion of the connections made at the event would occur without the event. However, the added value of the event to participants is that it facilitates and lowers the cost of making and maintaining these connections."

Estimated Annual Value of Connections Made at 2012 F2C2 Event

Annual Value = (Average value of connections) * (1- % reduction in value at 8 months)* (average number of connections made that led to sales or purchase or resulted in an agreement) * number of buyer or producer representatives * discount factor

Producers: ($443)*.95) * (2.7) * (93) * 0.75 = $95,108

Buyers: ($2,036)*.90) * (2.5) * (97) * 0.75 = $146,592

LESSONS LEARNED

- Total specialty crop attendance at each event was calculated based on the number of unique farms (and unique buyers). While each may have had multiple people present, only the farm or buyer was counted. For example, Growing Washington attended the 2011 NW Washington Farm-to-Table trade meeting and brought 3 farmers. But Growing Washington only counted as 1 specialty crop producer. The same goes for Haggen Foods, which attended the same meeting and brought 5 buyers. While total attendance captures all participants, the number of specialty crop producers is understated. The number of unique farm and food buying businesses is used in calculating average sales; including all members from any farm or food buying entity would dilute the sales figures. Reporting can be improved by counting all specialty crop producers as well as the number that are unique.
- One remaining Farm to Table event was not accomplished due to CHC staffing change, readiness of community partners and timing. CHC changed Program Managers in January 2011. This was during prime workshop planning season, November to March, when the main specialty crop harvests are completed and farmers have more time to attend events. CHC worked to complete the one remaining workshop, but was unable to achieve this due to lack of community readiness and partnership. Successful and sustainable Farm to Table events rely heavily on working with producers and support organizations in the community in which CHC is trying to serve. These events work to create connections that go beyond the one event and grant lifecycle with the intention of building capacity within those communities to carry on these efforts. CHC did reach out to several communities who had expressed interest or were planning events where Farm to Table would be appropriate; however, timing of the remaining event was not possible by the end of the grant cycle. CHC is continuing to pursue these connections and organize events with communities who are interested.
- The nature of Farm to Table connections makes it difficult to separate specialty crop producers from non-specialty crop producers. Buyers, processors, distributors, support organizations and even consumers are vital attendees at these events because they are the other half of the solution. Specialty crop producers benefit from non-specialty crop producers coming to the events. Grant partners found successful ways to support non-specialty crop producer attendance through in-kind, food donations, sponsorships and in some cases, charging a fee to cover the costs of their attendance.
- There is a lot of demand for specialty crops.
- Events were held on weekdays to attract buyers. Depending on the community and local events, market days were avoided.
- Groups of regional producers have increasingly come together to form “food hubs,” aggregating products, selling wholesale and being able to meet needs of larger distributors and buyers. New types of retail outlets have formed, such as hybrid Co-op models.
- Some communities have come up against larger barriers of processing, distribution and demand as they have continually scaled-up their operations and relationships.
- There is a great potential to work more closely with Latino and other minority farmer groups.

- No event was the same; each event had its own challenges and successes. As much as staff plans and prepares, staff need to be flexible.
- Producers and buyers who succeeded in the "speed networking" tended to be outgoing while those who were shyer had less success.
- Networking sessions might have been more efficient if done over rectangular tables that allowed people to sit face to face rather than around large tables that seat eight guests.
- Providing a time and space for small-scale producers to meet with buyers is not something that can be easily quantified. People who work to produce food have schedules that don't easily allow for them to meet with prospective buyers or with their peers to compare notes on daily challenges. The distance between farms is often great making meeting difficult. These events allowed for both of the conversations to happen.
- A person who excels as a food producer may not have similar success with marketing their own products. Coaxing food from the earth or fish on to a boat are both very different than promoting and marketing a product. It is a lot to expect one person to do both of these jobs or have the skills required of each of the jobs.
- Distribution is still one of the largest hurdles for small-scale producers. Each year the topic was discussed and the problem remains.
- Events were found to be great opportunities for not only existing farm operations, but also for perspective new specialty crop producers to learn more about new markets and how to connect with the other producers, buyers and community support organizations in their communities.
- Events attracted specialty crop processors looking to value-add specialty crop products, further extending the pool of interested buyers.
- Coordinators were elated with the enthusiasm met in communities where agriculture existed on a much larger, commercial or commodity scale. For instance, producers in the South Central WA region said, "we're too big to be small and we're too small to be big," demonstrating a need to find more niche markets and sell more directly to consumers and buyers.
- Connections were made and stronger networks were inarguably built; however, the goal to increase participating specialty crop producers' sales by an average of $800 per year was difficult to track.
- It was difficult to get high participation in follow up surveys. Day of surveys were collected on paper and as attendees left; however, follow up surveys were required to attempt to capture post-event sales and connection data.
- The low response rate to the spring and fall surveys made for a weak data set to mine for quantitative information. Sales numbers are often viewed as private information and it may have been off putting to some to reveal this information even though confidentiality was assured.
- The fact that attendees did not respond to the survey may simply mean they were busy with the detail of running a business. Often email communications are prioritized down to what must be dealt with to keep the business going. If you are an independent food producer, completing a survey might not make the cut no matter how much you benefited from attending a workshop.
- The increased number of exit survey responses was a result of handing out the surveys before the closing remarks and allowing five minutes for people to fill them out. Building time into the agenda for this to happen paid off with the highest number of exit surveys complete over the three year cycle.
- The design of the survey is important. In the case of the F2C2 results, it is the feeling of SCC and Sonntag that sales were better than reported by the surveys we analyzed. The annual decrease in to date sales was considered and discussed by SCC and Sonntag. The survey that was used only asked for information on sales generated from *new* connections made at F2C2. The survey did not inquire about sales brokered at F2C2 between producer and their existing clients. One of the comments that was often made by F2C2 guests was that they welcomed the networking time at F2C2 to not only make new connections, but also to make contact with current business partners. A suggestion for future surveys would be to include a question about existing sales relationships.

- Relationships take time to build and nurture. For instance, directly quantifying the exact impact of the Meet & Greets was a challenge. Producers often found it hard to draw the direct links between new sales and connections made that these events, and often chefs would leave these events inspired, reporting later that they added these local crops to their menus, but not necessarily from the specific producers at these events. Thus, while the overall result is one of a significant expansion in the use of local ingredients by local chefs, it is hard to tangibly prove the role the Meet & Greets played. Still, producers continue to volunteer their time and product to make these events happen, and chefs continue to attend, and they all express that they see significant value in the events toward building an expanded local food economy, regardless of our ability to track the specific impact these particular events are having on it.

CONTACT PERSON

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ADDITIONAL INFORMATION

Donations and in-kind matching was given in the form of staff and organizing time, local products, audio and visual equipment, travel expenses, venue rental, speaker fees, catering services, linens, video and media production, and more. Total cash and in-kind match came to **$167,985.22.**

Media, photos and video samples:

- Farm-to-Table Trade Meeting Photos & Announcements: http://www.flickr.com/photos/52574920@N08/
- Interview for Rural TV: TV For a Growing World, 9/11/12 about Tri-Cities Farm-to-Table Event: http://myruraltv.com/?q=news/phoner-sarah-wilcox
- Tri-Cities Herald, 8/23/12: http://www.tri-cityherald.com/2012/08/23/2071421/farm-to-table-event-for-sept-14.html
- Grow Northwest Magazine, 3/2/12: http://www.grownorthwest.com/2012/03/farm-to-table-trade-event-sustainable-ag-conference-coming-up/
- F2C2 2011 Photos: https://picasaweb.google.com/114677509525596970523/SeattleChefsCollaborativeF2C22011
- Seattle Chefs Collaborative Facebook Albums for Meet & Greets and F2C2 2012: http://www.facebook.com/media/set/?set=a.10150640626023955.406896.332210008954&type=3#!/seattlechefs

Websites:

- Cascade Harvest Coalition: http://www.cascadeharvest.org/programs/farm-table
- Seattle Chefs Collaborative: http://seattlechefs.org/event/seventh-annual-farmer-fisher-chef-connection
- Sustainable Connections: http://sustainableconnections.org/news/sc-press-releases/calling-all-food-buyers-and-producers-2013nw-farm-to-table-trade-event-march-15

END OF REPORT

WSDA Contract NO K274

Produce Layout Design and Handling

March 2010

India

Project Summary:

Background:

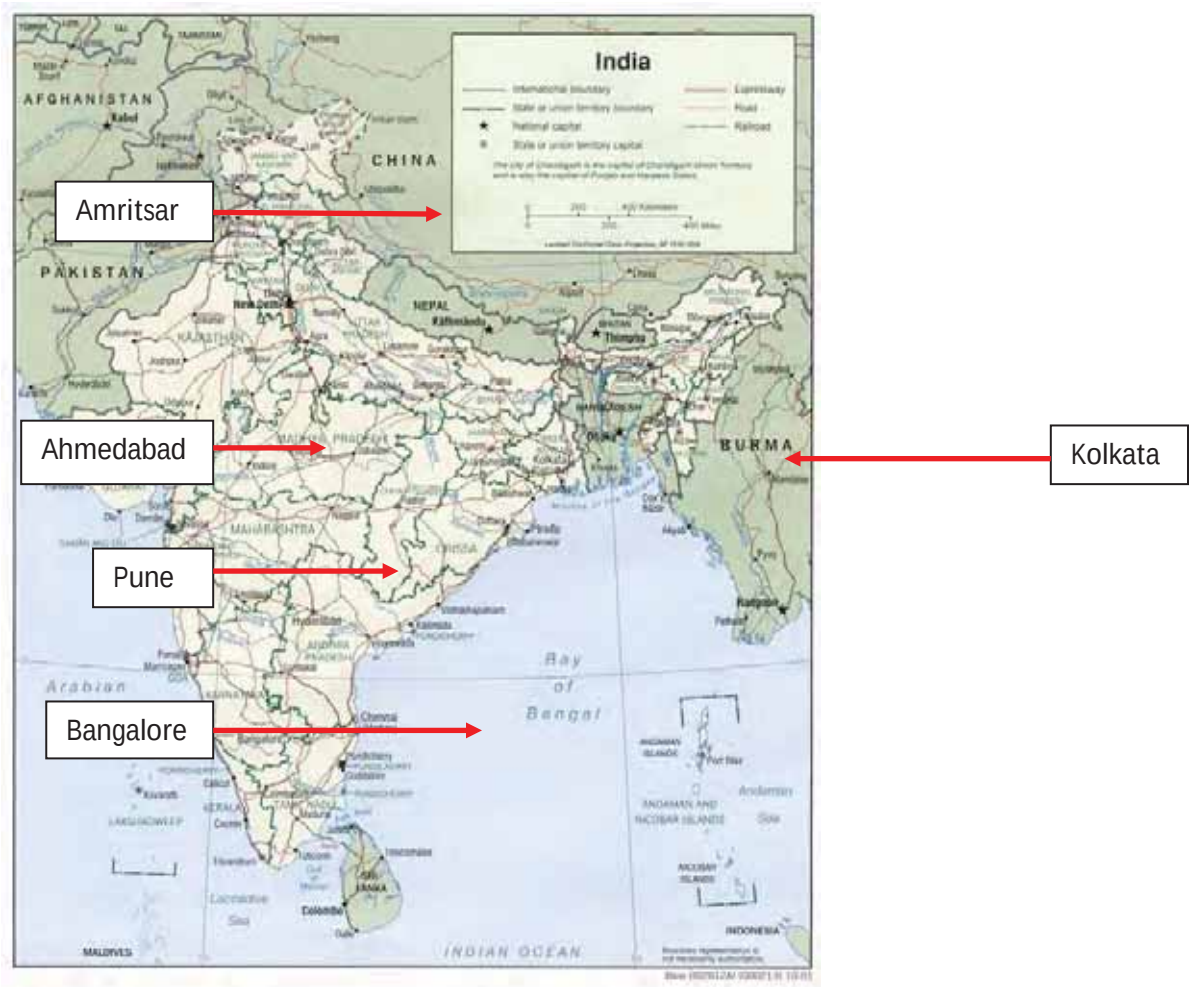
The Washington State Department of Agriculture and Washington Apple Commission (WAC) commissioned John Baker of Produce Marketing Australia to deliver a series of retail training programs in March 2010 to representatives from a range of supermarket chains operating in India. The program built on the structure successfully used in seven countries in 2008 through to March 2010.

A feature of the India program, repeated after the success of similar workshops in January 2009, was to undertake one mixed retailer workshop in each of five important markets across India – Kolkata, Bangalore (repeat), Pune, Ahmedabad and Amritsar. This meant scheduling some practical retail visits on the day prior to each workshop and the balance at the end of the workshop. In no other country has there been the degree of cooperation among retailers to share participation with their 'competitors'.

In addition, arranging venues, promotion of the workshops to multiple retailers in each location and coordination of logistics (travel, accommodation, sourcing product for the workshops etc) all required greater input from SCS Group, Washington Apple Commission's (and USA Pears) representative in India. Their on-the-ground execution of the program was a significant contributor to the success of the workshops.

The schedule and number of registered participants were:

- Tuesday 23 March: Kolkata - 32 participants from 4 retailers - Spencers, Metro Cash & Carry, Big Bazaar and Garden Fresh
- Thursday 25 March: Bangalore- 60 participants from 10 retailers – Aditya Birla Retail (More), Spencer's Retail, Namdharis, Foodworld Supermarkets, Big Bazaar, Metro Cash & Carry, Heritage Foods, Reliance, Spar Hypermarkets, Fresh & Fresh
- Saturday 27 March: Pune – 25 participants from 7 retailers - Aditya Birla Retail (More), Spencer's Retail, Big Bazaar, Metro Cash & Carry (Mumbai), Nature's Basket, Reliance, AB Retail Chain
- Monday 29 March: Ahmedabad - 20 participants from 4 retailers – Reliance, Big Bazaar, More, Star Bazaar (a TATA/Tesco joint venture), plus 1 importer company, 1 wholesaler and 1 supplier (Agri Fresh, who supply to Reliance)
- Wednesday 31 March: Amritsar - 16 participants from 3 retailers – Best Price (Bharti Wal Mart), Hyper City Retail, Reliance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The Brief:

To provide training to at least five hypermarket/supermarket chains in produce department layout design and produce handling, as set forth below:

1. Conduct store visits (at least one per retailer) and visit retail outlets for each of the participating retailers to assess:
    a. Current performance with the participating products, especially apples
    b. General store layout and performance in fresh produce (front and back) - receival, storage, handling, cold chain, food safety, product range, display, promotions etc
    c. Meet with store staff to determine
        i. Profile of customer base – how often and when (time of day) do they shop for regular items (top up), discretionary products (and what are they) and impulse items. This has implications for where imported products fit, "Fresh @ 5" merchandising if shopping is later in the day etc
        ii. Existing levels of knowledge and information in the areas to be covered
2. Conduct workshops (half day) customized for each participating retailer (or collectively for smaller retail groups) that will include:
    a. Product and merchandising information that may include the following products: Washington apples (the main emphasis), USA pears, Northwest cherries, table grapes, berries, summer fruit, Washington potatoes, carrots and onions
    b. Information on cold chain and food safety requirements; trends in fresh produce; developments in organics
    c. Retail concepts and ideas from other markets (USA, Australia, New Zealand, etc.) that may be applied in India.

3. Follow up with store visits (half-day) to participating retailers to provide further guidance on practical applications of information from workshops, clarify any issues raised in implementation of the training and provide feedback.
4. Prepare all resource materials and make available to participants: product specific and generic information; store concepts and any other relevant training materials in English, with translations, printing and distribution to be handled by WAC.
5. Provide a written report at the end of the project with an evaluation of pre and post-project merchandising and handling activities of the participating retailers, with recommendations for follow-up activities for both WAC and/or any participating Agricultural Trade Office staff. Contractor may use participant evaluations to assist in this evaluation, including:
    a. "open book" assessment by attendees at conclusion of each workshop, to reinforce key messages and assess level of knowledge achieved
    b. Participant survey of value and effectiveness of workshops and materials.

Implementation:

For the 2009/10 series of workshops, the Washington Apple Commission was joined as a partner by Pear Bureau Northwest (USA Pears), Northwest Cherry Growers and Washington State Potato Commission. These organisations were consulted in the development and approval of their respective components of the content. They were also consulted prior to the workshops about the status of the market and any particular messages they wanted emphasised.

The program for the workshops consisted of three components:

1. Pre-workshop retail visits, to undertake element 1 of the brief
2. Deliver half-day workshops (element 2 of the brief) and
3. Undertake follow-up store visits with participants, to review and discuss application of the information from the workshop (element 3)

Retail Profile:

Profiles of some of the participating retailers (updated from the original information sourced from the SCS Group 2009 retail report):

- **Reliance Retail Limited – Reliance Fresh stores.** Reliance Industries Limited (RIL) is the largest private sector company of the Reliance Group led by Mukesh Ambani. RIL is the owner of Reliance Retail Limited. Year Established: 2006.
- **Spencer's – RPG India Group.** Ownership structure: India's first national supermarket chain, started as JV between Dairy Farm International and RPG Group. Since then JV partners have parted ways and the chain is currently owned by RPG Group. Year Established: 1996.
- **More – Aditya Birla Group.** The cement-to-cell phone conglomerate operates over 600 More small/medium supermarkets, plus a small number of More Megastore hypermarkets Like others who have come recently to supermarket retailing (through the purchase of Trinthera Retail in 2007) the grand expansion plans have been reassessed, with 39 More stores recently being closed.

- **Foodworld – RPG Group.** Ownership status: RPG Enterprises is one of India's largest industrial conglomerates. With over 20 companies in its fold, the group has a strong presence in 8 business sectors. Foodworld retail chain is their foray into retail market. Year established: 1996.
- **Namdharis – Namdhari Seeds.** Ownership status: Namdhari Fresh was founded by Thakur Uday Singh of Namdhari Seeds in Bangalore. Year established: 2000.
- **Big Bazaar - Pantaloon Retail (India) Limited.** Pantaloon Retail (India) Limited operates multiple retail formats in both the value and lifestyle segment of the Indian consumer market. Headquartered in Mumbai (Bombay), the company operates over 12 million square feet of retail space, has over 1,000 stores across 71 cities in India and employs over 30,000 people.
- **Star Bazaar –** a joint venture between TATA Group and Tesco, with seven large format stores across India.
- **Best Price –** a joint venture between Bharti and Wal Mart with one store, in Amritsar, modelled on a mini wholesale version of Sam's Club. 10 to 15 additional stores are planned over the next three years including five in 2010. The company also has 65 Easy Day smaller format supermarkets across north India
- **Hyper City –** The company has seven hypermarkets across India, with the Amritsar store opening in early March, and a show case of what can be achieved in Indian retail, especially in fresh produce.

Workshop Content:

Each workshop was different, as already reported, but based around a standard content, structured into five units:

1. Product management, including ordering, receival, storage, temperature and ethylene management (i.e. primarily back-of-store management).
2. Ticketing, display and promotions (front-of-store)
3. Cleaning and sanitation
4. Product Information, using Washington apples, USA Pears, Northwest Cherries and Washington potatoes as case studies in implementing units 1 and 2, and also including the other products listed in the brief. In addition, and to make the workshop of more value to participants and US suppliers, additional products were added, including citrus, bananas, pineapples, tomatoes, melons and cabbage
5. Retail trends, developments and concepts, using photographs from a range of retailers in the USA, Australia, New Zealand, Europe, Latin America, Asia, India, Egypt and Abu Dhabi, to highlight developments, such as catering to convenience, organics, local/direct sourcing and diverse retail concepts.

Through each of the first three units, nine goals were included. e.g. order daily for daily demand, First-In First-out, only display what you can sell in one day. These goals were reinforced at the end of the Unit 5, together with an exercise asking participants to identify a personal or store goal, as a result of participating in the workshop.

Program Delivery:

(1) Pre-workshop visits:

(a) A visit was made with the WAC representative to a selection of stores which would be represented at the subsequent workshop in each city. Because of the large number of retailers participating in the workshops in each city, store coverage had to be staggered so that all retailers were visited over the course of the five workshops.

(2) Workshops:

(a) Hard copies (in colour) of the Power Point presentation were made available to participants. The hard copy was also used for note-taking.

(b) An electronic copy of the workshop presentation was also provided to each participant, for subsequent reviewing and refreshing of the information. At the same time, a Washington Apple Handling Guide (wall chart) was presented to each participant.

(c) Digital "Washington apple" thermometers were provided to each participant, so they could identify and monitor the coolest and warmest locations in their cool rooms, with the message to locate apples, cherries and pears in the coldest part of the cool room. Their use in the refrigerated section at the front of the store was also explained. The effective use of these thermometers was demonstrated during the post-workshop store visits. Additional thermometers were supplied to the WAC representative, for wider distribution

(d) Samples and examples were used where possible to reinforce key messages in the different workshop units. For example, a range of apple and pear varieties, and retail and promotion resources were used to support product information in Unit 4 of the workshop. In addition, an end-panel of a Washington apple Red Delicious carton was used to educate participants about the information shown – count, heavy pack, blush, variety, inspection stamp etc. The end panel also served as a useful model for the other partner products.

(e) Staff from the SCS Group presented the content for the Washington apple and USA pears case studies in Unit 4. Additional India-specific apple information about each product was incorporated in the presentation. As in previous workshops in other countries, using the in-country representatives worked very well, and helped cement relationships with retailers.

(f) To reinforce the key messages, exercises and quizzes (with small prizes) were conducted during each unit. This proved to be an effective way to encourage participation, as well as highlighting and reinforcing the information presented. For example, the exercise in how to display different apple varieties, using colour as a key for decision-making, and also allowing for other factors, such as price, size, popularity and end use (e.g. health image of Granny Smith and potential to use chilli/spices as cross-merchandising to increase sales), created excellent interaction between participants.

(g) At the end of each workshop, participants were asked to complete and return an evaluation form. In the evaluation, they were asked to rate the value of each of the units presented, whether they would make changes in any practices in each of the five units

presented, and if so what those changes would be. They were also asked to record the best feature of the workshop, as well as making suggestions for improvement.

(h) During the time the Evaluation was being completed the Washington apple industry and retail videos were shown. The Hindi version of the videos was used in Ahmedabad and Amritsar.

(i) "Certificates of Completion" were subsequently mailed to all participants.

(j) The Ahmedabad workshop was attended by Amit Aradhey, the Agricultural Specialist with USDA/FAS and located in Delhi.

(3) Post-workshop store visit:

The purpose of the post-workshop visits was to use practical examples to reinforce the key information delivered in the workshop and how it could be applied at store level. Because participants at each workshop were drawn from a number of retailers, and to ensure all stores were covered, some of the practical implementation messages had to be delivered during the pre-workshop store visit, so that all store formats could be covered.

Elements of the store visits included:

a) Involving the produce department managers, when available, to explain what they were implementing in various locations (back and front) and why. In all stores there was good interaction between participants.
b) Starting at the back of the store, where these facilities existed (India is almost unique in that the vast majority of stores have little, if any, back room infrastructure. In particular there is a distinct absence of cool rooms) to demonstrate practical implementation of Unit 1 (product management) and Unit 3 (cleaning and sanitation).
c) Emphasising the importance of moving temperature-sensitive products (such as apples, pears and cherries) from receival to the correct storage as quickly as possible, even if no cool rooms were available. In a number of stores there was the added complication of the produce team not being responsible for receival, resulting in product being left in hot ambient conditions.
d) The Washington apple thermometers were used to identify the range of temperatures in the cool room and refrigerated cabinets, and show participants how to use their thermometers when they returned to their own stores.
e) The need was highlighted for high cleanliness and sanitation standards, which were sometimes lacking.
f) Front-of-store features (units 2, 3 and 4) – what customers see as they enter the store, displaying in product categories, the importance of lighting, effective use of colour breaks and signage, stock rotation (FIFO when restocking displays), and enhancing touch points with customers (through strategic use of signage to provide information such as nutrition features, product uses etc), what to store in refrigerated display areas (in priority), cleaning and sanitation.

US Product Comments:

Washington Apples: Red Delicious was seen in all participating stores. Granny Smith and Gala were also in many stores, and Golden Delicious was seen in one store. This range of Washington apples was sufficient to show at each of the workshops and use in display exercises in Unit 4.

USA Pears: Anjou and Red Anjou were known by all the participants, with Red Anjou being more available at the time of the workshops. Both varieties were featured in the presentations.

Northwest Cherries: Retailers reported there had been no imports of Northwest cherries. They were nervous about the combination of high retail prices for imported cherries and the limited number of customers able to afford the product.

Washington Potatoes: Similarly there have been no fresh Washington potatoes imported into the market. Nonetheless there was good interest from retailers about the range of varieties and end uses of Washington potatoes.

Results and Evaluation:

148 participants attended the workshops, with each workshop ranging in size from 16 to 55 participants. Overall, 134 evaluation forms were completed and returned by participants. The profile of responses was:

Retailer	**Responses**	**Participants**
Workshop 1 - Kolkata	28	32
Workshop 2 - Bangalore	53	55
Workshop 3 - Pune	22	25
Workshop 4 - Ahmedabad	16	20
Workshop 5 - Amritsar	15	16
Total	**134**	**148**

Workshop Evaluation by Participants:

Results from the evaluations were as follows:

Workshop Unit	**Rating (1-5)**	**% indicating they will make changes**
1. Product Management		
Workshop 1 - Kolkata	4.1	76
Workshop 2 - Bangalore	4.0	67
Workshop 3 - Pune	3.9	68
Workshop 4 - Ahmedabad	4.0	73

Workshop 5 - Amritsar	4.3	58
AVERAGE	**4.1**	**69**

2. Display, Ticketing and Promotions

Workshop 1 - Kolkata	4.3	77
Workshop 2 - Bangalore	4.5	79
Workshop 3 - Pune	4.2	79
Workshop 4 - Ahmedabad	4.1	47
Workshop 5 - Amritsar	4.3	50
AVERAGE	**4.3**	**72**

3. Cleaning and Sanitation

Workshop 1 - Kolkata	4.0	57
Workshop 2 - Bangalore	4.1	54
Workshop 3 - Pune	4.2	53
Workshop 4 - Ahmedabad	3.5	53
Workshop 5 - Amritsar	4.6	33
AVERAGE	**4.1**	**52**

4. Product Information, Care and Handling

Workshop 1 - Kolkata	4.3	76
Workshop 2 - Bangalore	4.6	56
Workshop 3 - Pune	4.2	63
Workshop 4 - Ahmedabad	4.0	50
Workshop 5 - Amritsar	4.6	67
AVERAGE	**4.4**	**61**

5. Retail Concepts, Trends and Developments

Workshop 1 - Kolkata	4.1	62
Workshop 2 - Bangalore	4.1	53
Workshop 3 - Pune	4.1	47
Workshop 4 - Ahmedabad	4.3	45
Workshop 5 - Amritsar	4.6	27
AVERAGE	**4.2**	50

Participants were also asked to list specific changes they would make in each Unit area, where they had nominated changes would be made in those areas. Most common responses were as follows:

Unit 1: Product Management

Kolkata:

- Improve knowledge of current temperature management and implement
- Improve correct handling of different products
- Improve FIFO execution

Bangalore:

- More attention to receival and handling
- Better implementation of FIFO
- Forecasting sales for more accurate ordering
- Improve logistics, cold chain and physical handling
- Provide back room training to store staff
- Better cold storage management – optimum temperatures
- Maintain cold chain and avoid temperature abuse

Pune:

- Change receival identification to better manage FIFO
- Improve temperature management and handling knowledge
- Put high value exports in right temperature, and code
- Handle products carefully

Ahmedabad:

- Improve awareness of requirements to people in DC
- Use FIFO for quick rotation and sales results
- Use correct storage temperature for fruit and vegetables

Amritsar:

- Order quality product
- Maintain FIFO process
- Keep better track of product for FIFO
- Improve storage practices as shown

Unit 2: Display, Ticketing and Promotions

Kolkata:

- Use ticketing concepts presented in the workshop to better and easily inform customers
- Make displays more colourful and impactful, to increase sales

Bangalore:

- Use ticketing to provide information to customers, such as nutrition
- Colour combinations are very important
- Provide customers information – reference books

- Display products innovatively
- Use more cross-merchandising
- Offer more promotions
- Good display is a must and will be communicated across the store team

Pune:

- Highlight products through promotions and ticketing
- Use colour to create better displays
- Use colour, size and price points to determine displays
- Make it easy for customers to shop
- Use cross-merchandising
- Improve quality to increase sales
- Put each fruit type (e.g. apples) in categories
- Use ticketing to highlight promotion items – makes it easy for customers
- Implement new standards of ticketing
- Show product images and nutrition on ticketing

Ahmedabad:

- Opt for cross-merchandising
- Create more awareness with promotions
- Improve POP and display environment
- Make better use of in-store announcements
- Provide more information/knowledge to customers
- Use different colours for promo/non-promo ticketing
- Practise FIFO with displayed fruits and vegetables

Amritsar:

- My ticketing will be improved
- Provide additional customer information through signage
- Better product presentation through displays and ticketing
- Uplift from promotions

<u>Unit 3: Cleaning and Sanitation</u>

Kolkata:

- More sanitation and hygiene is needed
- Train staff in better cleaning and hygiene practices

Bangalore:

- Keep the chiller unit sanitised
- Develop regular cleaning practices to enhance hygiene and customer friendly
- Improve cleaning during supply chain
- Replace shelving with stainless steel and clean frequently
- Sanitise products and cleanliness of store and equipment used

- Implement daily cleaning and sanitisation procedures
- Educate staff to maintain sanitation; maintain highest standards

Pune:

- Daily cleaning each morning, plus sanitation
- Stress importance of cleaning to staff; sanitation is most important in modern retail formats
- Ensure store is dust-free, germ-free and pest-free
- Sanitise and clean the chiller regularly
- Train staff in cleaning and sanitation

Ahmedabad:

- Try to change to best practices
- Develop a house-keeping check list
- Clean and tidy floors then sanitise
- Implement the broad practices described, at store level
- Improve sanitation in product display areas and storage
- Better cleaning practices for melons
- Make this the utmost priority

Amritsar:

- Better awareness of the difference between cleaning and sanitation by associates, and application

<u>Unit 4: Product Information, Care and Handling</u>

Kolkata:

- Apply better product care and handling by store staff
- Use product information to educate store staff, who can then give proper information to customers
- Implement Washington apple, and citrus handling tips
- Use product information to educate customers
- Try display competitions to motivate staff

Bangalore:

- FIFO back and front of store
- Handle apples and pears sensitively; focus on handling
- Communicate product information to staff
- Pass on information on new products/varieties to customers
- Train staff in handling and product knowledge
- Display product information in store for customers

Pune:

- Handle products carefully
- Train and communicate product information to store staff

- Cushion sensitive products like bananas, papayas, apples
- Practise FIFO at front of store
- Interact with customers
- Keep imported fruits in chiller

Ahmedabad:

- Share product knowledge from workshops with team
- Handle products with extra care and train floor people
- Improve product displays
- Focus on customer information and service
- Better care and handling of Washington apples, US pears
- Put product images with product information on ticket

Amritsar:

- Handle products with care, especially high value apples, pears and reduce "dump"
- Provide leaflets on nutritional value, special features

<u>Unit 5: Retail Concepts, Trends & Developments</u>

Kolkata:

- Displays and cross-merchandising
- Temperature needs for fruit and vegetables
- Implement some of the wonderful display ideas

Bangalore:

- Trial innovative ideas in retail
- New display techniques
- More quality products
- Try to use promotional offers
- Train staff on proper display, signage
- Cross-merchandising and colour concepts for apples

Pune:

- Improve to achieve customer convenience and satisfaction
- Offer varietal choice with good display
- Offer more training

Ahmedabad:

- Put forward ideas to senior management
- Different display ideas; customer service
- Make more customer awareness of retail concepts

Amritsar:

- Use merchandising, cross-merchandising and other techniques

Responses to the other evaluation questions were:

What was the best feature of the training program?

Kolkata:

- Information about product management, handling and displays
- Examples through photos
- Interaction with other retailers
- Very interactive – Q&A etc
- Snapshot of various worldwide displays/trends, promotions – global overview
- Friendly atmosphere, good presentation, good communication methods

Bangalore:

- Product handling and case study information
- Sharing essential information
- Modern retail display information
- Display information and techniques
- Product knowledge and workshop interaction
- Techniques used in different countries
- Ticketing and promotion
- Taking the participants' views on display
- Visual merchandising
- It was live and interactive

Pune:

- Information about display and techniques
- Increased retail knowledge and product information
- Washington apple information, including cross-merchandising
- How to increase fruit and vegetable profitability
- Interaction, visual slide and world-wide sharing experience
- John Baker's enthusiasm and energy
- Product management

Ahmedabad:

- Complete platform of learning
- Product information; different display styles in other countries
- Learn about foreign stores
- Learning about building customer relationships
- Better ticketing and promotions
- Excellent presentation and very good content
- How to handle/merchandise Washington apples
- Exposure to world-wide store displays/merchandising/product mix

Amritsar:

- Specific product information care and handling
- Interactive rather than teaching
- One of the best training workshops ever attended and will definitely make a valuable addition
- Information on handling, care and display
- Information on correct storage conditions
- Videos (industry and retail) and in local language

How can the program be improved?

Kolkata:

- Keep delivering from time to time/frequently
- More photos
- More practical through more store visits
- Sample Washington apple and US pear varieties
- Case studies of Indian retailers
- More product technical information – taste, maturity etc

Bangalore:

- Explain agricultural methods and harvesting, including apples
- Include some business aspects
- Provide details of nutritional benefits of apples, etc
- Use more photos and videos
- Give more vegetable information
- More information on sourcing
- Include more ideas to reduce waste
- More case studies
- Include back room operations

Pune:

- Explain in local language for easier understanding (multiple)
- More on ordering and handling
- Conduct two times a year so more people get knowledge
- Information on shrink/salvage management
- Allow more time

Ahmedabad:

- Provide information on product characteristics and usages
- Video on receiving, sorting/grading and handling
- Translate presentation/workshops in Hindi (multiple)
- Practical demonstration for handling fruits

- More practical demonstrations
- More store visits and shop-floor training

Amritsar:

- Present in regional language (multiple)
- Information on more products
- Have product samples to show different qualities
- Senior and junior level employees should both attend to make it more valuable

Review and Recommendations:

1. Language: When the workshops were delivered in 2009 in the main cities and markets, language was not raised as an issue, when the content was presented in English. This time, with the workshops being delivered in emerging markets, such as Pune and Ahmedabad, using English was a barrier to understanding the information for a significant (although minority) number of participants. It appears language was an issue mostly for store-level staff. This is the only market where the workshops have been delivered in English and may have to be reconsidered if more workshops are planned, especially if more store staff are attending.

2. Follow-up: At all workshops (not just India) the offer has been made to respond to any follow-up issues that retailers may have and to submit them through the in-country representative. An alternative discussed with Sumit Saran from SCS Group was to have a 'chat-room' or equivalent within the WAC web site ("Friends of the Pacific North West"), where retailers (from all countries involved with the workshops) could share information, log questions etc amongst themselves. In addition, the links from the workshops could be strengthened even further.

3. Evaluation Comments: There are many good comments about how the program could be improved, with numerous suggestions about the need for additional information and more practical exercises. The issue then becomes one of time for delivery of the workshops. An alternative could be to have some of the suggested information (e.g. product handling and storage details) as supplementary notes to the workshop content.

4. Additional Product Information: The request from a number of countries for additional information on the nutrition features and benefits of fruits and vegetables could be addressed by producing a separate brochure/leaflet for distribution at the workshops. Ideally the information could cover the top 20 fruits and top 20 vegetables, rather than limited to the sponsor-organisation products, so that it is more beneficial to participants.

5. Product sampling: At the conclusion of workshops in other countries, the observation has been made that with the high turnover of store-level staff, many of them have not had the

opportunity to sample the full range of apples and pears available from the Pacific Northwest, even though they were regularly asked by customers about the different tastes of the different varieties. Sampling was trialled in one of the workshops and had only limited value – with the lesson being there needs to be a high proportion of store level staff at the workshops to gain worthwhile value.

6. Infrastructure: India is unique in modern retailing with the lack of investment in the infrastructure essential to deliver high quality fresh produce. There is no better testament to this that the comments of the Indian Prime Minister at a Food Industry Conference, when he said the three main constraints facing the food industry were:
    a. "Lack of infrastructure for post harvest handling and storage,
    b. Absence of adequate cold chain facilities, and
    c. Fragmented supply chain"

    As a result, until these fundamental constraints are addressed, some of the workshop content is beyond the influence of the participants (e.g. back room management when there is no back room)

7. Participation of Representative's Staff: The benefits of having staff of the in-country representative attending the workshops and presenting some of the Unit 4 content were again highlighted. In the case of India, having the same company representing both Washington apples and US pears also made coordination easier. Participation was Kolkata and Bangalore – Sumit Saran; Pune and Ahmedabad – Mansi Ahuja; Amritsar – Keith Sunderlal. Their local representatives/merchandisers were also involved in the workshops.

Acknowledgements:

My thanks to the many people contributed to the success of the workshops, including:

- Sumit Saran, Keith Sunderlal and Mansi Ahuja and their support staff at SCS Group in India
- Rebecca Baerveldt, Export Manager, Washington Apple Commission, Wenatchee
- Staff from the various retailers for their enthusiastic participation in the workshops.

John Baker
Chief Executive
Produce Marketing Australia

6 April 2010

WSDA Contract NO K274

Produce Layout Design and Handling

April 2010

The Middle East

Project Summary:

Background:

The Washington State Department of Agriculture and Washington Apple Commission (WAC) commissioned John Baker of Produce Marketing Australia to deliver a series of retail training programs in April 2010 to representatives from a range of supermarket chains operating in Dubai. The program built on the structure successfully used in ten countries in 2008 through to March 2010.

Five workshops were conducted, with 105 participants attending from 13 different retail companies. Two major retailers in Dubai/Sharjah were represented at each of the first three workshops. The fourth workshop involved three retailers. The last workshop included participants who travelled from Abu Dhabi for the workshop. In addition, several smaller retailers were invited to attend the workshops. The schedule and number of registered participants were:

- Sunday 18 April: T Choithram & Sons, Union Co-ops, Sunrise City Supermarkets - 24 participants
- Monday 19 April: Al Maya Group Supermarkets, Spinneys, New West Zone, Waitrose - 24 participants
- Tuesday 20 April: Geant, Emirates Co-op – 15 participants
- Wednesday 21 April: Lulu Hypermarket, Giant/Safestway - 24 participants
- Thursday 22 April: Lifco, Abu Dhabi Coop, Union Co-ops - 18 participants

NOTE: After attending the first workshop and gaining good benefits from attendance, Union Co-ops requested the opportunity to send more of their staff to a subsequent workshop.

Pre-workshop store visits (to a store from each of the participating retailers) were undertaken on Friday 16 April and on Saturday 17 April.

The WAC (and USA Pears) representatives in the Middle East, Lina Kanaan and Bassam Bousaleh, were instrumental in making the workshops a success, through their attention to detail prior to the workshops and support during the workshops, including:

- assisting to make the workshop content of most relevance to the participating retailers
- obtaining the support of the major retailers operating in Dubai
- scheduling the workshops
- coordinating the attendance of representatives of the US ATO
- translating the presentation, arranging interpreters, and arranging venues and
- the collation and translation of the individual evaluation reports

The Brief:

To provide training to at least five hypermarket/supermarket chains in produce department layout design and produce handling, as set forth below:

6. Conduct store visits (at least one per retailer) and visit retail outlets for each of the participating retailers to assess:
    a. Current performance with the participating products, especially apples
    b. General store layout and performance in fresh produce (front and back) - receival, storage, handling, cold chain, food safety, product range, display, promotions etc
    c. Meet with store staff to determine
        i. Profile of customer base – how often and when (time of day) do they shop for regular items (top up), discretionary products (and what are they) and impulse items. This has implications for where imported products fit, "Fresh @ 5" merchandising if shopping is later in the day etc
        ii. Existing levels of knowledge and information in the areas to be covered
7. Conduct workshops (half day) customized for each participating retailer (or collectively for smaller retail groups) that will include:
    a. Product and merchandising information that may include the following products: Washington apples (the main emphasis), USA pears, Northwest cherries, table grapes, berries, summer fruit, Washington potatoes, carrots and onions
    b. Information on cold chain and food safety requirements; trends in fresh produce; developments in organics
    c. Retail concepts and ideas from other markets (USA, Australia, New Zealand, etc.) that may be applied in Dubai.
8. Follow up with store visits (half-day) to participating retailers to provide further guidance on practical applications of information from workshops, clarify any issues raised in implementation of the training and provide feedback.
9. Prepare all resource materials and make available to participants: product specific and generic information; store concepts and any other relevant training materials in English, with translations, printing and distribution to be handled by WAC.
10. Provide a written report at the end of the project with an evaluation of pre and post-project merchandising and handling activities of the participating retailers, with recommendations for follow-up activities for both WAC and/or any participating Agricultural Trade Office staff. Contractor may use participant evaluations to assist in this evaluation, including:
    a. "open book" assessment by attendees at conclusion of each workshop, to reinforce key messages and assess level of knowledge achieved
    b. Participant survey of value and effectiveness of workshops and materials.

Implementation:

Washington Apple Commission was joined as a partner by Pear Bureau Northwest (USA Pears), Northwest Cherry Growers and Washington State Potato Commission. These organisations were

consulted in the development and approval of their respective components of the content. They were also consulted prior to the workshops about the status of the market and any particular messages they wanted emphasised.

The program for the workshops consisted of three components:

4. Pre-workshop visit to a store from each retailer, to undertake element 1 of the brief
5. Deliver half-day workshops (element 2 of the brief) and
6. Undertake follow-up store visits with participants, to review and discuss application of the information from the workshop (element 3)

Retail Profile:

The following summary was provided by Bassam Bousaleh:

Choithram is one of the biggest supermarket groups in the Middle East. They have at least 16 stores in Dubai alone and 26 stores across the UAE.
Union Co-ops is a local chain, with 4 hypermarkets and large 8 supermarkets
Sunrise City has around 10 smaller-format supermarkets
Geant, a French-backed hypermarket retailer, currently has one enormous store in Dubai (in Ibn Battuta Mall). They also have stores in Kuwait and Qatar
Spinneys, the South African backed chain, has at least 10 stores in Dubai and are affiliated to two Waitrose Stores, one in The Mall of Dubai and the other in Dubai Marina Mall.
Al Maya Group has a mix of 28 large supermarkets and hypermarkets
LuLu has stores across the six countries of the GCC (Gulf Cooperation Council) including 6 hypermarkets in Dubai
Emirates Coop has 6 stores in Dubai and 11 in total in the Emirates
Giant (8 stores) **and Safestway** (1 store) are owned and managed by the one parent company
Lifco (Lebanese Fruit Company) has 4 small to medium sized supermarkets
Abu Dhabi Coop has at least 10 stores, covering a range of hypermarket, class A supermarkets and smaller store formats.

Workshop Content:

Each workshop had a standard content, structured into five units:

6. Product management, including ordering, receival, storage, temperature and ethylene management (i.e. primarily back-of-store management).
7. Ticketing, display and promotions (front-of-store)
8. Cleaning and sanitation
9. Product Information, using Washington apples, USA Pears, Northwest Cherries and Washington potatoes as case studies in implementing units 1 and 2, and also including the other products listed in the brief. In addition, and to make the workshop of more value to

participants and US suppliers, additional products were added, including citrus, bananas, pineapples, tomatoes, melons, cabbage and onions

10. Retail trends, developments and concepts, using photographs from a range of retailers in the USA, Australia, New Zealand, Europe, Latin America, Asia, India, Egypt and Abu Dhabi, to highlight developments, such as catering to convenience, organics, local/direct sourcing and diverse retail concepts.

Through each of the first three units, nine goals were included. e.g. order daily for daily demand, First-In First-out, only display what you can sell in one day. These goals were reinforced at the end of the Unit 5, together with an exercise asking participants to identify a personal or store goal, as a result of participating in the workshop.

Program Delivery:

(4) Pre-workshop visits:

(a) A visit was made with WAC representatives to the each of the retailer's stores to be used for the post–workshop visit.

(5) Workshops:

(a) Prior to the workshop, the presentation was translated into Arabic by a professional official translator. A new initiative was to include both the English and Arabic content on each slide. This is a good technique to consider for the future, especially where there is a mix of language capability among participants e.g. this could be a useful approach in India, where some store-level staff struggle with the English-only slides and presentation.

(b) Hard copies in colour of the Arabic version of the Power Point presentation were made available to participants. The hard copy was also used for note-taking.

(c) An electronic copy of the workshop presentation was also provided to each participant, for subsequent reviewing and refreshing of the information.

(d) Digital “Washington apple” thermometers were provided to each participant, so they could identify and monitor the coolest and warmest locations in their cool rooms, with the message to locate apples, cherries and pears in the coldest part of the cool room. Their use in the refrigerated section at the front of the store was also explained. The effective use of these thermometers was demonstrated during the post-workshop store visits. Additional thermometers were supplied to the WAC representative, for wider distribution to retailers. CD's of Washington Apple Commission Merchandising Kit and the USA Pears slicers and packers were also distributed to participants.

(e) Simultaneous translation was arranged for the first workshop, when a number of participants indicated beforehand they were not conversant in English. Using simultaneous translation meant there was no disruption to the presentation and there was no loss of time, and content did not have to be abbreviated.

(f) Samples and examples were used where possible to reinforce key messages in the different workshop units. For example, a range of apple and pear varieties, and retail and promotion resources were used to support product information in Unit 4 of the workshop. In addition, an end-panel of a Washington apple Red Delicious carton was used to educate participants about the information shown – count, heavy pack, blush, variety, inspection stamp etc. The end panel also served as a model for the other partner products.

(g) Lina Kanaan presented the content for the Washington apple case study in Unit 4. Bassam Bousaleh presented some of the content for USA Pears. Additional information about Washington apple and USA Pear promotion opportunities were incorporated in the presentations. As in previous workshops in other countries, using the in-country representatives worked very well, helped cement relationships with retailers, there was no need for translation and provided variety in the workshop content.

(h) To reinforce the key messages, exercises and quizzes (with small prizes) were conducted during the workshops. This proved to be an effective way to encourage participation, as well as highlighting and reinforcing the information presented. For example, the exercise in how to display different apple varieties, using colour as a key for decision-making, and also allowing for other factors, such as price, size, popularity and end use (e.g. cooking), created excellent interaction between participants.

(i) At the end of each workshop, participants were asked to complete and return an evaluation form. In the evaluation, they were asked to rate the value of each of the units presented, whether they would make changes in any practices in each of the five units presented, and if so what those changes would be. They were also asked to record the best feature of the workshop, as well as making suggestions for improvement. The results were translated and collated by Lina Kanaan and are shown later in the report.

(j) Where possible, the Certificate of Completion and the WAC cool-room thermometer were presented in exchange for the completed evaluation form.

(k) The Regional Director of the U.S. Agricultural Trade Office in Dubai Mr. David Williams and two of his team attended the first workshop, and Mr. Williams also gave opening remarks.

(6) Post-workshop store visit:

The purpose of the post-workshop visits was to use practical examples to reinforce the key information delivered in the workshops and how it could be applied at store level. Each of the two main retailer groups attending each workshop was visited.

Elements of the store visits included:

g) Involving the produce department managers, when available, to explain what they were implementing in various locations (back and front) and why. This generated good interaction between participants.

h) Starting at the back of the store, to demonstrate practical implementation of Unit 1 (product management) and Unit 3 (cleaning and sanitation).

i) Emphasising the importance of moving temperature-sensitive products (such as apples, pears and cherries) from receival to the correct storage as quickly as possible (summer temperatures regularly exceed 100 degrees F).

j) The Washington apple thermometers were used to identify the range of temperatures in the cool room and show participants how to use their thermometers when they returned to their stores. Most cool rooms had plastic curtains on the doors, but improvements in their use were also noted.

k) Cleanliness and sanitation standards, especially the highly sensitive area used for preparing cut fruits and vegetables, were highlighted.

l) Front-of-store features (units 2, 3 and 4) – what customers see as they enter the store, displaying in product categories, the importance of lighting, effective use of colour breaks and signage, stock rotation (FIFO when restocking displays), and enhancing touch points with customers (through strategic use of signage to provide information such as nutrition features, product uses etc), what to store in refrigerated display areas (in priority), cleaning and sanitation.

US Product Comments:

Washington Apples: Seven Washington apple varieties were purchased for display and profiling during the workshops. Commercially, the most popular variety was Red Delicious, followed by Gala and Granny Smith, then Golden Delicious, Fuji, Cripps Pink, Jonagold, Pacific Rose and Braeburn. Some stores were also stocking additional varieties, such as Cameo and Ambrosia. An added complexity was the number of countries supplying the same variety. For example five sources of Gala (US, France, Chile, New Zealand and South Africa) were often seen in stores; Granny Smith from US and France were common, along with Fuji from China and the US.

USA Pears: Anjou and Red Anjou were available in all the retail chains participating in the workshops. Many additional varieties were stocked, including Conference and Forelle from Europe, Bartlett and Packham from South Africa, and Ya pears from China.

Northwest Cherries: There were no cherries from any source in the market at the time of the workshops. However, a number of retailers suggested they would stock small volumes of Northwest cherries during the supply season.

Washington Potatoes: It was a pleasure, at last, to see fresh Washington potatoes in the market. A number of stores were stocking Russett potatoes (mostly from Washington and some from Idaho), along with small volumes of cream/yellow potatoes and red (Pontiac?) potatoes. The main source of potatoes at the time was large and cheap product from Saudi Arabia.

Results and Evaluation:

105 participants attended the workshops, with each workshop ranging in size from 15 to 24 participants. Overall, 102 evaluation forms were completed and returned by participants. The profile of responses was:

Retailer	Responses	Participants
W'shop 1: Choithram, Union Co-ops, Sunrise City	22	24
W'shop 2: Al Maya, Spinneys, New West Zone, Waitrose	24	24
W'shop 3: Geant, Emirates Co-op	15	15
W'shop 4: Lulu, Giant/Safestway	23	24
W'shop 5: Lifco, Abu Dhabi, Union Co-ops **	18	18

Total	**102**	**105**

Workshop Evaluation by Participants:

Results from the evaluations were as follows:

Workshop Unit	**Rating (1-5)**	**% indicating they will make changes**
1. Product Management		
W'shop 1: Choithram, Union Co-ops, Sunrise City	3.8	61
W'shop 2: Al Maya, Spinneys, New West Zone, Waitrose	4.3	38
W'shop 3: Geant, Emirates Co-op	4.0	43
W'shop 4: Lulu, Giant/Safestway	4.0	100
W'shop 5: Lifco, Abu Dhabi, Union Co-ops	3.9	87
AVERAGE	**4.0**	66
2. Display, Ticketing and Promotions		
W'shop 1: Choithram, Union Co-ops, Sunrise City	4.2	50
W'shop 2: Al Maya, Spinneys, New West Zone, Waitrose	4.2	54
W'shop 3: Geant, Emirates Co-op	4.3	43
W'shop 4: Lulu, Giant/Safestway	4.2	91
W'shop 5: Lifco, Abu Dhabi, Union Co-ops	4.1	100
AVERAGE	**4.2**	66
3. Cleaning and Sanitation		
W'shop 1: Choithram, Union Co-ops, Sunrise City	4.4	39
W'shop 2: Al Maya, Spinneys, New West Zone, Waitrose	4.3	38
W'shop 3: Geant, Emirates Co-op	3.7	29
W'shop 4: Lulu, Giant/Safestway	4.3	83
W'shop 5: Lifco, Abu Dhabi, Union Co-ops	3.8	53
AVERAGE	**4.2**	50
4. Product Information, Care and Handling		
W'shop 1: Choithram, Union Co-ops, Sunrise City	4.1	50
W'shop 2: Al Maya, Spinneys, New West Zone, Waitrose	4.2	42
W'shop 3: Geant, Emirates Co-op	4.3	43
W'shop 4: Lulu, Giant/Safestway	4.4	72
W'shop 5: Lifco, Abu Dhabi, Union Co-ops	4.1	71
AVERAGE	**4.2**	56

5. Retail Concepts, Trends and Developments		
W'shop 1: Choithram, Union Co-ops, Sunrise City	3.9	44
W'shop 2: Al Maya, Spinneys, New West Zone, Waitrose	4.1	36
W'shop 3: Geant, Emirates Co-op	3.7	57
W'shop 4: Lulu, Giant/Safestway	4.5	100
W'shop 5: Lifco, Abu Dhabi, Union Co-ops	4.2	67
AVERAGE	**4.1**	59

***Union Co-ops – Workshop 5. After attending the first workshop and gaining good benefits from attendance, Union Coops requested the opportunity to send more of their staff to a subsequent workshop.*

Participants were also asked to list specific changes they would make in each Unit area, where they had nominated changes would be made in those areas. Most common responses were as follows:

Unit 1: Product Management

- Improve care and handling
- Correct temperature, including managing ethylene
- Receival and storage
- More careful product handling
- Follow FIFO
- Change storage area practices
- Maintain freshness and quality in back room
- Change purchasing for better product flow
- Better handling on receival and into storage
- Keep stock fresh by keeping it moving
- Control our ordering
- Improve storage practices
- Temperatures for receival and storage will be checked
- Move product quickly from receival
- Store product in correct condition
- Better handling of produce in back store
- Modify all our cool room set up including doors, fans, ventilation and product placement and stocking

Unit 2: Display, Ticketing and Promotions

- Cross merchandising is good idea
- Try to use more colours for display
- Good displays and tidy; more important than price

- Better ticketing, including product information and photos of inside and outside of product
- More attention to good display
- Product information on tickets
- Better customer communication and information at weighing station
- Improve displays and better ticketing
- Check lighting
- More effective information systems to educate customers
- Use colour for more effective displays and ticketing
- Provide nutrition information to customers
- Customer information on POS
- Use better display and ticketing
- Place product in categories
- Display with colour combinations
- Highlight promotion products
- Conduct more promotions
- Will change displays and ticketing
- Organize the front store displays in terms of appeal, smell, ticketing and most importantly know-how to control FIFO
- Follow latest display, ticketing and promotions to achieve the benefit for the store and customers

Unit 3: Cleaning and Sanitation

- Improve and sustain cleaning and sanitation
- Ensure hygienic procedures
- Make changes to cleaning procedures
- Hygiene for staff as well as display and product
- Make use of head covers and gloves
- 'Clean as you go' training for all staff
- Keep display areas clean; staff need to be clean
- Adopt more hygienic standards
- Review cleaning and sanitation schedule
- More staff training (multiple)
- Improve contract cleaning and sanitation requirements
- Good cleaning and hygiene practices to be implemented
- Make sure of hygiene in storage areas
- Make sure fruits and back of store are cleaned and sanitized
- Clean melons to remove dust
- Improve sanitation
- Regular checking and monitoring of the sanitization and cleaning procedures applied by staff

Unit 4: Product Information, Care and Handling

- Use product origin on ticketing (high expat clientele)
- Train staff on how to handle product
- Give more product information to customers
- Double check items when going on display
- FIFO at front and back for products
- Combine product information with sampling
- Improve merchandising, storage, display, handling
- See the department from the customers' view
- Provide information to merchandisers
- More customer education
- Handle fruit carefully
- Educate staff about safe and proper product handling
- Do good displays and have activities
- Brief staff about right way to handle product
- FIFO back and front
- Stop dumping apples and pears
- Use promotions better
- Make more product available to customers
- Provide pear ripeness guide to avoid damage by customers
- Train staff and provide them with information on care and handling
- Re-consider storage techniques and handling of produce at back-of-store
- Revise the storage process and will monitor accuracy of storage temperatures
- Provide staff, on regular basis, with product information on care and handling
- The information in this section was very useful and it positively influenced my perceptions / knowledge of the products presented. I will apply all the handling techniques related to Washington Apples and USA Pears carefully

Unit 5: Retail Concepts, Trends & Developments

- Try as much as possible to satisfy customers' needs
- Start cross-merchandising and colour combination
- Create separate organic section
- Apply customer service ideas
- Try new display concepts
- More cross-merchandising
- Try new display ideas
- Try new concepts from other markets
- Use better service and promotions
- Better display and promotions
- Use cross-merchandising
- Use photographs on tickets and try new ideas
- Will research new concepts and will apply it as much as possible (multiple)
- Give the customers the impression that our stores are up-to-date always

- Make our customers more aware of our new retailing trends in terms of better displays and better product quality

Responses to the other evaluation questions were:

What was the best feature of the training program?

- A great experience
- Slides and practical exercises; well arranged
- Exposed to new ideas
- How to make nice displays and attention to detail
- Detailed product information
- Merchandising techniques
- The retail tour around the world
- Understanding information on the end of apple carton
- Good presentation and professional presenter – motivating and easy to understand
- How to give customers healthy product, product knowledge and how to handle product
- Display ticketing and promotion ideas we can apply
- Using FIFO at back and front of store
- Using five senses to create best atmosphere for customers
- Opportunity for self improvement
- Seeing display and other ideas from around the world
- Good and practical explanations
- Learning about the importance of lighting
- In-depth knowledge about products and trends
- Product information and displays, ticketing, promotion
- More knowledge about Washington products
- Improved our knowledge on care and handling
- 'Check the neck' for ripeness
- Back room activities; ripe pear awareness
- Product management and retail concepts (multiple)
- Cleaning and sanitation
- Product management and ticketing information
- More knowledgeable by attending workshop
- All of it, especially retail around the world
- Learning about handling different fruits
- New product knowledge
- Communication of ideas in a simple and practical way
- Product and customer handling
- All aspects involved in product handling and storage
- Product displays and promotion ideas from all over the world
- Display, ticketing and promotions unit. Cross merchandizing idea was very useful
- Maintaining attractive displays and rotating/restocking products – FIFO

- How to attract new customers, generate excitement and cater to customers need for clean and healthy products
- Sharing and exchanging of ideas
- Group discussions, quizzes and the world retail tour were the best parts

How can the program be improved?

- Encourage more people to attend
- Show the varieties mentioned in the workshop
- Hands-on/practical applications should be given more time
- Extend the duration to more than one day
- Conduct more of these training programmes (multiple)
- Visiting the store and giving more information
- Explain cleaning and sanitation in more detail
- Include more fruit and vegetable items
- It should be more practical
- Provide different training for merchandisers
- More of the same
- More practical for display and cleaning
- Show more slides from around the world
- Information on logistics
- How to educate customers on varieties etc
- More study (information) on production
- More information on hygienic practices
- More interaction
- Address technical issues with more hands-on / practical application in-store
- Keep us updated and informed of all developments related to produce retailing concepts and trends (multiple)
- Follow-up and periodic recurrence of such a program (multiple)
- Practical / hands-on sessions are essential. Longer time should be given for applications
- Additional lectures and hands-on experience are needed

Review and Recommendations:

A wrap-up meeting was held after the last workshop with Lina Kanaan and Bassam Bousaleh. They reported the best features of the workshops were the interaction with participants, through exercises and questions, the broad range of information presented and the practical implementation at store level.

They reported the significant benefits of the workshops for them were:

- An expanded retail contact data base and
- More credibility for them with retailers. A good example was the initial ‘resistance’ by a French-national (in a senior management role) during a pre-workshop store visit

and his subsequent enthusiastic response at the workshop and post-store visit

8. Translation: For this workshop, the Power Point presentation was translated into Arabic in such a way that both English and Arabic appeared on each slide. This is an excellent approach, especially where there is a mix of language skills. In Dubai there are many workers in produce from countries like India, so featuring both languages was beneficial in communication. This approach could also be useful in other countries.

   For example, the presentations in India are made and shown in English. In some workshops, lower-level staff who attended the workshops had some difficulty with understanding English. It may be useful to have English and Hindi shown on each Power Point slide in future (an idea which needs to be checked with the local representatives).

9. Information Pack for participants: In addition to providing participants with a hard copy and a soft copy of the presentation, consideration could be given to including other resources which could be of value for retailers and stimulate long-term recall about the partner products. Such items could include product leaflets, Washington apple knife, USA Pear slicer (which was included in Dubai), Northwest cherry sizer, potato resource materials etc

10. Wax, c.a. storage and GMOs: Nowhere has the issues of wax on apples, mis-information about c.a. storage, and questions on whether fruits are genetically modified, been more prevalent than in Dubai. Much of the concern by retail staff about wax seems to come indirectly through customers from the internet. In addition, several questioned if chemicals were used for long-term (c.a.) storage. While retailers were satisfied with the responses it may be an area that needs further consideration and communication.

11. Industry Videos for a retail audience. Segments of both the apple and pear industry videos were used during breaks in the workshop. However, for retailers they are too long and much of the information is not relevant to them. Retailers appear to be most interested in receiving basic information about growing, harvesting, grading, packing etc. This information could be condensed into a five minute presentation/chapter for each product (apples, pears, cherries and potatoes), with an introduction about the special features of the Pacific Northwest. It could even be feasible to dub the video/DVD into different languages. This would not only provide additional educational information, it would also help address some of the concerns relating to wax, c.a. storage etc.

12. Mix of Participants: As in many other countries, the reps have some difficulty in encouraging retailers to give up a day of their staff's time to attend the workshops. As a result, it is in the hands of the retailers to determine who will attend. In Dubai, one of the gaps in attendance was people with responsibility for training. Now that retailers have experienced the value of

participation it should be an easier task in future to suggest sending a better cross-section of skills/responsibilities. Workshops have provided the greatest value to retailers when they nominate staff with a range of skills.

13. Participation of Representative's Staff/Merchandisers: As in other counties, consideration should be given to arranging the attendance of merchandisers and others, who are regularly visiting stores and in contact with retailers, so they are up-skilled and also aware of the information presented to retailers, so consistent messages can be delivered. The representatives reported they also improved their knowledge by attending the workshops.

Acknowledgements:

My thanks to the many people contributed to the success of the workshops, including:

- The WAC (and USA Pears) representatives in the Middle East, Lina Kanaan and Bassam Bousaleh
- Rebecca Baerveldt, Export Manager, Washington Apple Commission, Wenatchee
- Staff from the various retailers for their enthusiastic participation in the workshops.

John Baker
Chief Executive
Produce Marketing Australia

4 May 2010

WSDA Contract No K274

Produce Layout Design and Handling

February 2010

Mexico

Project Summary:

Background:

The Washington State Department of Agriculture and Washington Apple Commission (WAC) commissioned John Baker of Produce Marketing Australia to deliver a series of retail training programs in February 2010 in Mexico. The program built on the structure successfully used in six other countries in 2008 through to January 2010.

Three workshops were conducted. Each workshop was for the retailer Soriana. The schedule and number of registered participants were:

- Wednesday 17 February: Monterrey (32 registered; 35 attended)
- Friday 19 February: Mexico City (35 registered; 50 attended)
- Monday 22 February: Tijuana (35 registered; 43 attended)

Pre-workshop store visits were undertaken in each city on the day prior to the respective workshop.

The WAC representative in Mexico, Juan Carlos Moreira, was instrumental in making the workshops such a success through the preliminary work prior to the workshops and support during the workshops, including:

- assisting to make the workshop content of most relevance to the participating retailers
- obtaining the support of from Soriana
- scheduling the workshops
- coordinating participation by the USA Pears representative
- translating the presentation, arranging interpreters, and arranging venues and
- the quick collation and translation of the individual evaluation reports

The Brief:

To provide training through at least three workshops, in produce department layout design and produce handling, as set forth below:

11. Conduct store visits (at least one per retailer) and visit retail outlets for each of the participating retailers to assess:
    a. Current performance with the participating products, especially apples
    b. General store layout and performance in fresh produce (front and back) - receival, storage, handling, cold chain, food safety, product range, display, promotions etc
    c. Meet with store staff to determine
        i. Profile of customer base – how often and when (time of day) do they shop for regular items (top up), discretionary products (and what are they) and impulse items. This has implications for where imported products fit, “Fresh @ 5” merchandising if shopping is later in the day etc

ii. Existing levels of knowledge and information in the areas to be covered

12. Conduct workshops (half day) customized for each participating retailer (or collectively for smaller retail groups) that will include:
    a. Product and merchandising information that may include the following products: Washington apples (the main emphasis), USA pears, Northwest cherries, table grapes, berries, summer fruit, Washington potatoes, carrots and onions
    b. Information on cold chain and food safety requirements; trends in fresh produce; developments in organics
    c. Retail concepts and ideas from other markets (USA, Australia, New Zealand, etc.) that may be applied in Mexico.
13. Follow up with store visits (half-day) to participating retailers to provide further guidance on practical applications of information from workshops, clarify any issues raised in implementation of the training and provide feedback.
14. Prepare all resource materials and make available to participants: product specific and generic information; store concepts and any other relevant training materials in English, with translations, printing and distribution to be handled by WAC.
15. Provide a written report at the end of the project with an evaluation of pre and post-project merchandising and handling activities of the participating retailers, with recommendations for follow-up activities for both WAC and/or any participating Agricultural Trade Office staff. Contractor may use participant evaluations to assist in this evaluation, including:
    a. “open book” assessment by attendees at conclusion of each workshop, to reinforce key messages and assess level of knowledge achieved
    b. Participant survey of value and effectiveness of workshops and materials.

Implementation:

The workshop content was based on the content used in late November 2009 in China and January 2010 in Russia.

Washington Apple Commission was joined as a partner by Pear Bureau Northwest (USA Pears), Northwest Cherry Growers and Washington State Potato Commission. These organisations were consulted in the development and approval of their respective components of the content. In addition, Luis Moreno, the representative for USA Pears in Mexico was invited to attend the workshops and deliver the pear component of the workshop. Northwest Cherries is also represented by Juan Carlos Moreira. There is no representative for Washington Potatoes.

One change of note to the content, after experience in Russia, was to add an introduction to Unit 4 - "Why US Pacific Northwest". In addition each of the four partner-products (apples, pears, cherries and potatoes) had a similar introduction, developed in consultation with each partner organisation.

The program for the workshops consisted of three components:

7. Pre-workshop visit to each store, to undertake element 1 of the brief
8. Deliver half-day workshops (element 2 of the brief) and

9. Undertake follow-up store visits with participants, to review and discuss application of the information from the workshop (element 3)

Soriana Profile:

Soriana is a grocery and department store retail chain corporation headquartered in Monterrey and Mexico's second largest retailer. The company currently operates under the brands Clubes City Club, Hipermart, Mercado Soriana, Soriana and Super City (store). Super City is the company's convenience store division brand. It operates supermarkets and department stores for consumer and wholesale markets. Soriana competes primarily with Wal-Mart, H-E-B, Comercial Mexicana, Chedraui, S-Mart and Walmex. As of December 2009 Soriana had more than 471 stores in 138 cities in Mexico. It also had six distribution centers.
(Source: Wikipedia)

Soriana Chief Executive Officer Ricardo Martin says "the company aims to challenge top retailer Wal-Mart de Mexico (WALMEXV.MX) by expanding out of its heartland in northern Mexico", although Wal-Mart has three times the number of stores across the country at around 1,400 outlets. Soriana will add 40 new stores to its network this year, the company's chief financial officer, Aurelio Adan, told Reuters in December. About a quarter of those openings will be a new, yet-to-be-named store format aimed at small cities where Soriana will offer staples as well as drugstore, bakery and tortilla-making services.
(Source: Reuters, February 8, 2010)

Workshop Content:

Each workshop was different, as already reported, but based around a standard content, structured into five units:

11. Product management, including ordering, receival, storage, temperature and ethylene management (i.e. primarily back-of-store management). This included a diagram and description in Spanish, showing variations in cool-room temperatures and where to store different products
12. Ticketing, display and promotions (front-of-store)
13. Cleaning and sanitation
14. Product Information, using Washington apples, USA pears, Northwest cherries and Washington potatoes as case studies in implementing units 1 and 2, and also including the other products listed in the brief. In addition, and to make the workshop of more value to participants and US suppliers, additional products were added, including citrus, bananas, pineapples, tomatoes, melons and cabbage
15. Retail trends, developments and concepts, using photographs from a range of retailers in the USA, Australia, New Zealand, Europe, Latin America, Asia, India, Egypt and Abu Dhabi, to highlight developments, such as catering to convenience, organics, local/direct sourcing and diverse retail concepts.

Through each of the first three Units, nine Goals were included e.g. order daily for daily demand, First-In First-out, only display what you can sell in one day. These goals were reinforced at the end of the Unit 5, together with an exercise asking participants to identify a personal or store goal, as a result of participating in the workshop.

Program Delivery:

(7) Pre-workshop visits:
   (a) In each city, a visit was made with the WAC representative to the Soriana store to be used for the post–workshop visit. In each case, the store and the workshop were either in the same building or close.

(8) Workshops:
   (a) Hard copies in black-and-white of the Spanish version of the Power Point presentation were made available to participants (3 slides per page). The hard copy was also used for note-taking.
   (b) An electronic copy of the workshop presentation was also provided to Soriana management for distribution to participants. A copy was requested and supplied for downloading on the Soriana intranet, the first time such a request has been made. This means the information will be available to all Soriana staff, and not just those attending the workshops.
   (c) Digital "Washington apple" thermometers were provided to each participant, so they could identify and monitor the coolest and warmest locations in their cool rooms, with the message to locate apples, cherries and pears in the coldest part of the cool room. Their use in the refrigerated section at the front of the store was also explained. The effective use of these thermometers was demonstrated during the post-workshop store visits. Additional thermometers were supplied to the WAC representative, for wider distribution to retailers.
   (d) Consecutive translation was undertaken by the WAC representative
   (e) Samples and examples were used where possible to reinforce key messages in the different workshop units. For example, a range of apple and pear varieties, and retail and promotion resources were used to support product information in Unit 4 of the workshop.
   (f) Juan Carlos Moreira presented the content for the Washington apple and Northwest cherry case studies in Unit 4. Additional information about Washington apple and Northwest cherry promotion opportunities in Mexico was incorporated in the presentation. Similarly, USA Pear content was presented by Jesus Perez Olarte, a staff member of the Mexican representative. Using the in-country representatives worked very well, helped cement relationships with retailers, there was no need for translation and provided variety in the workshop content.
   (g) To reinforce the key messages, exercises and quizzes (with small prizes) were conducted during each unit. This proved to be an effective way to encourage participation, as well as highlighting and reinforcing the information presented. Mexico had up to eight Washington apple varieties available (Red Delicious, Golden Delicious, Gala, Braeburn, Ambrosia, Cameo, Granny Smith and Rome). The display exercise provided an added challenge and participants willingly shared their ideas, which showed that this number of varieties can be effectively displayed, using colour as a key for decision-making, and also allowing for other factors, such as price, size, popularity and end use (cooking for Rome).

(h) At the end of each workshop, participants were asked to complete and return an evaluation form. In the evaluation, they were asked to rate the value of each of the units presented, whether they would make changes in any practices in each of the five units presented, and if so what those changes would be. They were also asked to record the best feature of the workshop, as well as making suggestions for improvement. The results were subsequently translated and collated by Juan Carlos Moreira and his team and are shown later in the report.
NOTE: this was the first time the evaluation forms were completed after the store visit (when the Certificates of Completion, thermometers and Washington apple promotion guide were also presented); participants were able to see and discuss the value of the workshop content in the practical store setting, then provide a rating.

(i) The Agricultural Marketing Specialists with the Agricultural Trade Office (ATO) attended workshops in Monterrey and Mexico City.

(3) Post-workshop store visit: The purpose of the post-workshop visits was to use practical examples to reinforce the key information delivered in the workshop and how it could be applied at store level.

Elements of the store visits included:

m) Involving the produce department managers and their staff, when available, to explain what they were implementing in various locations (back and front of store) and why. This generated good interaction between participants.
n) Starting at the back of the store, to demonstrate practical implementation of Unit 1 (product management) and Unit 3 (cleaning and sanitation).
o) Emphasising the importance of moving temperature-sensitive products (such as apples, pears and cherries) from receival to the correct storage area as quickly as possible.
p) The Washington apple thermometers were used to identify the range of temperatures in the cool room and show participants how to use their thermometers when they returned to their stores. Most cool-rooms had plastic curtains on cool room doors.
q) Cleanliness and sanitation, especially the highly-sensitive area used for preparing cut fruits and fresh juices, was very good, both at back-of-store and front-of-store.
r) Front of store features (units 2, 3 and 4) – what customers see as they enter the store, displaying in product categories, the importance of lighting, effective use of colour breaks and signage, stock rotation (FIFO when restocking displays), and enhancing touch points with customers (through strategic use of signage to provide information such as nutrition features, product uses etc), what to store in refrigerated display areas (in priority), cleaning and sanitation.

US Product Comments:

Washington Apples: The most common choice of apples was Red Delicious, Golden Delicious, Gala, Granny Smith and Rome. As in a number of other countries, an important step was to educate participants that Rome was a cooking apple, rather than a snacking apple and that appropriate signage would help educate customers. Other varieties also stocked in some stores included Braeburn, Ambrosia and Cameo. The main competition came from local production of

cheaper Golden and Red Delicious, based around Chihuahua. Chinese Fuji apples were also available.

USA Pears: Anjou, Red Anjou and Bosc were the varieties available. Store staff was familiar with all varieties. Staff was less aware of the features of Chinese Ya Pears and Nashi, which were also stocked in most stores.

Northwest Cherries: There were no cherries from any source in the market at the time of the workshops. Most participants were familiar with cherries being available in summer from the Pacific Northwest. However, it was very useful to present more detailed information on the range of varieties available (Reds and Rainier), the relative advantages of loose v. packaged cherries (and the various packs available), and effective storage, display and merchandising techniques.

Washington Potatoes: Apart from Tijuana, only local potatoes were available in Soriana. This results from a particular quarantine situation, where Washington potatoes are permitted access only close to the border in Mexico. The circumstances were well explained by Juan Carlos Moriera. Washington Russett potatoes were available in Tijuana. However, at all three workshops there was very good interest in the range of varieties available from Washington State, as well as the many different uses for the varieties.

Results and Evaluation:

128 participants attended the workshops, with each workshop ranging in size from 1 to 35 participants. Overall, 118 evaluation forms were completed and returned by participants.

Retailer	**Responses**	**Participants**
Workshop 1 - Monterrey	27	35
Workshop 2 - Mexico City	48	50
Workshop 3 - Tijuana	43	43
Total	**118**	**128**

Workshop Evaluation by Participants:
Results from the evaluations were as follows:

Workshop Unit	**Rating (1-5)**	**% indicating they will make changes**
1. Product Management		
Workshop 1 - Monterrey	4.5	100
Workshop 2 - Mexico City	4.7	85
Workshop 3 - Tijuana	4.7	93
AVERAGE	**4.6**	**91**
2. Display, Ticketing and Promotions		

Workshop 1 - Monterrey	4.2	100
Workshop 2 - Mexico City	4.7	90
Workshop 3 - Tijuana	4.7	85
AVERAGE	**4.6**	**90**

3. Cleaning and Sanitation

Workshop 1 - Monterrey	4.2	85
Workshop 2 - Mexico City	4.6	85
Workshop 3 - Tijuana	4.7	85
AVERAGE	**4.6**	**85**
4. Product Information, Care and Handling		
Workshop 1 - Monterrey	4.6	100
Workshop 2 - Mexico City	4.6	85
Workshop 3 - Tijuana	4.7	90
AVERAGE	**4.7**	**91**
5. Retail Concepts, Trends and Developments		
Workshop 1 - Monterrey	4.4	78
Workshop 2 - Mexico City	4.7	83
Workshop 3 - Tijuana	4.6	73
AVERAGE	**4.6**	**78**

Participants were also asked to list specific changes they would make in each Unit area, where they had nominated changes would be made in those areas. Most common responses (Summarized by Juan Carlos) were as follows:

Unit 1: Product Management

- The most frequent actions the group will adopt in their daily activities are: Firstly the correct placement of the fruit into the cold storage considering the rotation; the management since the product is received keeping the proper temperature and times adopting FIFO
- Secondly, they got better ideas to exhibit and display the fruit in order to make them attractive increasing sales.
- Finally the supervisors attending the seminar will transmit the acquired knowledge to all Heads of fruit department they are responsible for.

Unit 2: Display, Ticketing and Promotions

- The most frequent actions the group will adopt in their daily activities are: Firstly, they will make changes to improve the signage in supermarkets (unification, classification, taking care of NOT creating visual pollution)
- Secondly, they will implement the publication containing information about the products, their benefits and uses for customers
- Finally, they will improve displays fruit in order to making them highlight, so then sales increase.

Unit 3: Cleaning and Sanitation

- They will improve their established cleaning and sanitization procedures, and will follow up in detail the product exhibition in both outside and inside cold storage
- In the case that supermarkets don´t have any cleaning and sanitization plan, they will implement it based on the information acquired in the seminar.

Unit 4: Product Information, Care and Handling

- The most frequent action the groups will adopt are : Firstly, give information to customers by direct conversation, or requesting support to Buyer Manager in order to give flyers about the quality usage, and benefits of fruits
- Secondly, they will be careful with the reception in warehouse, taking care of keep the cold chain and arrangement of each single product in the sales floor, in order to show only the daily sale, so then avoid shrink. They will have special attention with fine fruit
- Finally, the supervisors attending the seminar will give direct training about the acquired knowledge to all Heads of fruit department they are responsible.

Unit 5: Retail Concepts, Trends & Developments

- The most frequent action they will change are: Firstly, in some supermarkets will develop a plan to improve fruit display, others are taking into account implementing new ideas and suggestions mentioned in the seminar; in order to make it attractive for the customers' sight, for instance: combining colours, cross merchandising, bulky exhibitions, and increase sales
- Another frequent change they expressed was: to improve their customer service, giving information about products in a kindly and effectively way. "Customer is first"

Responses to the other evaluation questions were:

What was the best feature of the training program?

- The complete knowledge for the product management in detail
- The dynamics on the sales floor
- Experiences shared about other countries with video and photos
- Learn about Washington apples, the seasons and all process to pick an apple, the clear explanation and that was imparted by an experienced person.

How can the program be improved?

- Most of the groups expressed that was an excellent course, complete and detailed. Some requirements are:
- To make it longer, more days, a couple of days maybe
- To do more dynamics in sales floor, give more courses like this one and
- To include all people in working on the department.

Review and Recommendations:

14. The revised content in Unit 4 (developed and approved with the program partners after the workshops in Russia in January), covering products from the Pacific Northwest, was a significant improvement on earlier versions. The new content included;
    a. A general introduction on the features and benefits of products grown in, and marketed from, the Pacific Northwest e.g. ideal growing conditions, grade and food safety standards, retail support etc
    b. Specific features about each of the four partner products (apples, pears, cherries and potatoes)

15. All the apple, pear and cherry content in Unit 4 were presented by the respective in-country representatives. This resulted in:
    a. Raising the profile of the reps with participants (produce managers, store managers, Soriana regional merchandisers, training and marketing staff)
    b. Building relationships with participants
    c. Saving time by not needing to translate the content for participants

16. More emphasis needs to be placed on ensuring the relevant in-country representatives review and adjust the standard content for their product in Unit 4, prior to the workshop, to ensure it is relevant to the local situation, and to add other useful content (e.g. local promotion examples). The management of the USA Pear content was not satisfactory, especially at the first workshop in Monterrey. Even though the standard content was supplied to the country representative prior to the workshop, it was not used. Separate content was brought and delivered to the workshop, resulting in:
    a. Logistics issues at the workshop, with computers having to be changed during the workshop, interrupting the flow of the presentation
    b. Some of the content had already been presented (e.g. the role of ethylene in fruit ripening)
    c. Some of the content was not relevant to the purpose of the workshop (e.g. supply chain)
    d. The presentation took more than double the allotted time to deliver, and

e. Most importantly for USA Pears, the printed content made available to participants was different to that presented, creating some confusion. In addition there was no take-home copy of the presented material.

Adjustments were made at subsequent workshops, by incorporating and rationalizing the content into the existing presentation.
Note; These comments are not a reflection on Jesus Perez Olarte, who did an excellent job in presenting the content given to him to present.

Contact has already been made with the WAC representatives in Thailand, India and Dubai, to reinforce to them and any other partner representatives the need to review, amend and/or add relevant content to the standard presentation.

17. This was the first occasion where the workshop evaluations were completed at the conclusion of the store visits, as the workshop venues and the store were in the same building. At all previous workshops, the evaluations have been completed at the conclusion of the morning workshop.

    The consistently high ratings, together with the high percentage of participants intending to make changes, is likely to have resulted from the practical discussion during the subsequent store visit about the workshop content. As a result, this approach is likely to give a more realistic assessment of the impact of the workshops. Where practical, it is planned for participants at future workshops to complete the evaluations after the store visits.

18. The value of having a mix of retail backgrounds in the workshops was again highlighted. Traditionally the main contact in Soriana for the country representatives has been the category buyers, who are not necessarily interested in promotions. The workshops were valuable in establishing new linkages with HR/Training staff, regional merchandisers and the newly-established Marketing Department. The new linkages with the Marketing Department should lead to much better support from Soriana for promotion activities in future.

    In addition, the Training Department intends to place the workshop presentation on the Soriana intranet, where it can be accessed by all staff. An additional benefit of the workshops for Soriana was the bringing together for the first time of many of their store-level staff. In Mexico City in particular, Soriana management used the occasion to introduce all the staff to each other.

19. Much of the promotion activity in Mexico is undertaken at store level, through in-store sampling, merchandising etc. Leaders from some of the sampling/merchandising teams attended the workshops and found participation was most useful through:

a. Learning practical information about the retail environment and
b. Meeting store managers and produce managers.

If further workshops are planned in Mexico (Wal-Mart, Superama, H-E-B, etc), consideration could be given to expanding the number of merchandisers attending the workshops, so they also can build relations with store staff and be presented with practical information, which they can deliver on regular store visits.

Acknowledgements:

My thanks to the many people contributed to the success of the workshops, including:

- Juan Carlos Moreira, Washington Apple Commission representative in Mexico, and his staff
- Jesus Perez Olarte, who presented the USA Pear content
- Rebecca Baerveldt, Export Manager, Washington Apple Commission, Wenatchee
- Soriana staff for their enthusiastic participation in the workshops and Soriana management for agreeing to participate in the initiative and providing access to both the front and back of the produce departments in their stores.

John Baker
Chief Executive
Produce Marketing Australia

March 2010

WSDA Contract NO K274

Produce Layout Design and Handling

January 2010

Russia

Project Summary:

Background:

The Washington State Department of Agriculture and Washington Apple Commission (WAC) commissioned John Baker of Produce Marketing Australia to deliver a series of retail training programs in January 2010 to representatives from a range of supermarket chains operating in Russia. The program built on the structure successfully used in five countries in 2008 and 2009.

Three workshops were conducted on consecutive days (18 to 20 January) in Moscow, followed by two workshops on consecutive days (21 and 22 January) in St Petersburg, after an overnight train journey between the two cities, together with a last-minute workshop held on 23 January. Pre-workshop store visits were undertaken in Moscow on the day prior to the first workshop. All the workshops were specific for individual retail chains.

Of the six countries where the workshops have now been delivered, Russia was probably the most difficult to gain the support and co-operation of the retailers, reflected in the numerous different ways the workshops were delivered. In summary:

- Metro Cash & Carry: electronic (video/DVD) workshop developed
- Azbuka ("Alphabet of Taste"): three hour workshop, with no pre- or post-workshop store visit permitted
- Union of Independent Retailers: almost an all-day workshop, concluding at 6.30pm
- Lenta ("Ribbon"): standard workshop and post-workshop store visit
- O'Key: standard workshop and pre-and post-workshop visit
- Land: 90 minute abridged presentation to Category Manager for fresh foods

The efforts and contribution of Irina Koziy the WAC representative in Russia, laid the foundation for the success of the workshops, including:

- assisting to make the workshop content of most relevance to the participating retailers
- obtaining the support of participating retailers
- scheduling the workshops
- translating the presentation, arranging interpreters, and arranging venues
- coordinating the presentations by Angelika Krasovskaya, representing USA Pears
- the quick collation and translation of the individual evaluation reports

The Brief:

To provide training to at least five hypermarket/supermarket chains, in produce department layout design and produce handling, as set forth below:

16. Conduct store visits (at least one per retailer) and visit retail outlets for each of the participating retailers to assess:
    a. Current performance with the participating products, especially apples

b. General store layout and performance in fresh produce (front and back) - receival, storage, handling, cold chain, food safety, product range, display, promotions etc
c. Meet with store staff to determine
    i. Profile of customer base – how often and when (time of day) do they shop for regular items (top up), discretionary products (and what are they) and impulse items. This has implications for where imported products fit, "Fresh @ 5" merchandising if shopping is later in the day etc
    ii. Existing levels of knowledge and information in the areas to be covered

17. Conduct workshops (half day) customized for each participating retailer (or collectively for smaller retail groups) that will include:
    a. Product and merchandising information that may include the following products: Washington apples (the main emphasis), USA pears, Northwest cherries, table grapes, berries, summer fruit, Washington potatoes, carrots and onions
    b. Information on cold chain and food safety requirements; trends in fresh produce; developments in organics
    c. Retail concepts and ideas from other markets (USA, Australia, New Zealand, etc.) that may be applied in Russia.
18. Follow up with store visits (half-day) to participating retailers to provide further guidance on practical applications of information from workshops, clarify any issues raised in implementation of the training and provide feedback.
19. Prepare all resource materials and make available to participants: product specific and generic information; store concepts and any other relevant training materials in English, with translations, printing and distribution to be handled by WAC.
20. Provide a written report at the end of the project with an evaluation of pre and post-project merchandising and handling activities of the participating retailers, with recommendations for follow-up activities for both WAC and/or any participating Agricultural Trade Office staff. Contractor may use participant evaluations to assist in this evaluation, including:
    a. "open book" assessment by attendees at conclusion of each workshop, to reinforce key messages and assess level of knowledge achieved
    b. Participant survey of value and effectiveness of workshops and materials.

Project Approach

Implementation:

The workshop content was based on the content used for similar workshops in China in November/December 2009. Irina Koziy reviewed the content and made suggestions, such as more information on tropical fruits and adding more photos, for incorporation in the presentation.

Washington Apple Commission was joined as a partner by Pear Bureau Northwest (USA Pears), Northwest Cherry Growers and Washington State Potato Commission. These organisations were consulted in the development and approval of their respective components of the content. In addition, Angelika Krasovskaya, the representative for USA Pears in Russia was invited to attend the workshops and deliver the pear component of the workshop (there are no

representatives for Northwest Cherries and Washington Potatoes). Ksenia Evdokimova from USA Pears attended both workshops in St Petersburg.

The format for the first workshop, scheduled with Metro Cash & Carry, had to be altered because they were unable to organise staff to attend a face-to-face workshop. As a result, an electronic (video) workshop was developed for them. The format involved a combination of visiting one of the Metro stores to shoot still photos for the presentation and recording the balance of the content in a room at the Marriott Hotel. The main content in the electronic workshop included:

- Product information, highlighting the content of Unit 4 of the presentation. Samples of apples, pears, cherries (Red and Rainier from Chile), potatoes (red, white and cream from Belgium), stone fruit (southern hemisphere), grapes and grapefruit were used to reinforce the main points about US products and their features, compared with product from other suppliers
- The place of products in food service, which is a significant market segment supplied by Metro, and
- Display and handling techniques for US products in the Metro environment.

The electronic workshop will be supplied to Metro and, with some modification, placed on the WAC Russia web site, for use by a wider retail audience.

While it was disappointing not to conduct a regular workshop for Metro, this alternative was a good outcome.

For Azbuka ("Alphabet of Taste"), a regular format could not be negotiated, so a three-hour workshop was the best compromise. This resulted in the focus of the content being on product information, international developments, and front-of-store activities (Unit 2). At least the ice has been broken, as a request was made at the conclusion of the workshop for further workshops.

A last minute addition to the program was an abbreviated presentation to the Category Manager for fresh foods (including fresh produce) with Land supermarkets in St Petersburg. This workshop was held late Saturday 23 January at the Astoria Hotel, with the translation undertaken by Maria, a merchandiser for WAC. Fortunately, a quick pre-workshop store visit was possible, to make the presentation as relevant as possible.

The program for the remaining workshops consisted of three components:

10. Pre-workshop visit to each store, to undertake element 1 of the brief
11. Deliver half-day workshops (element 2 of the brief) and
12. Undertake follow-up store visits with participants, to review and discuss application of the information from the workshop (element 3)

The participating stores and the schedule were as follows:

Date	Activity	Supermarket
Saturday, January 16	Supermarket Visits in Moscow	• Metro Cash & Carry • Union of Independent Retailers • Azbuka (Alphabet of Taste) • Carousel (product purchases)
Monday, January 18	Electronic Workshop developed for Metro	• Metro Cash & Carry
Tuesday, January 19	Workshop for Azbuka. Venue: Training Center Practical: No store visit approved	• Azbuka (Alphabet of Taste)
Wednesday, January 20	Workshop for Union of Independent Retailers. Venue: Courtyard Marriott Practical: Small/medium store close by Overnight train travel to St Petersburg	• Union of Independent Retailers
Thursday, January 21	Workshop for Lenta. Venue: Training Center Practical: Adjacent store	• Lenta
Friday, January 22	Workshop for O'Key. Venue: Training Center Practical: Adjacent store	• O'Key
Saturday, 23 January	Abbreviated workshop; for Land supermarkets Venue: Astoria Hotel Practical: Pre-workshop visit only	• Land

In general there was more interaction and interest in the St Petersburg workshops, with the exception of the Union of Independent Retailers in Moscow, although this is not reflected in the evaluation results.

A profile of the participating supermarkets in the program is as follows (information was sourced from Irina Koziy and the participating supermarkets):

Metro Cash & Carry: The German-owned hypermarket retailer is member-based, as in other countries. They service mostly small businesses, and there appear to be opportunities for both

retail and food service sales. An electronic workshop was developed for them, as reported earlier. It was not possible to visit their back-room operations when approval was given to photograph in the store for the video.

Azbuka ("Alphabet of Taste"): This company is one of three upscale supermarkets in the Moscow region, with around 25 stores. Currently they are not stocking Washington apples, showing a preference for French supplies. An additional objective of this workshop was to highlight the benefits of stocking Washington apples. They were a difficult chain to work with, as no access to the back-room of the store was permitted in the pre-workshop visit. They requested a three hour, rather than four hour, workshop (resulting in only minor reference to Unit 5 in the time available) and no post-workshop store visit was allowed. However, the workshop attendees, including their fresh produce training team, warmed to the workshop and were good contributors. At the conclusion of the workshop, the fresh produce category manager actually requested more workshops in the future.

Union of Independent Retailers: This group has 40 banner groups within its membership of 1,200 stores spread throughout Russia, ranging mostly from small to medium-sized supermarkets. The workshop participants were drawn from senior management from approximately 15 chains within the group. The interest in the workshop by this group is reflected in one participant travelling from as far as central Siberia (4,000km and a four-hour flight) and another group making a six-hour car journey. The store used for the practical visit was very small, with only a limited back-room area and no refrigerated storage. However, there was excellent discussion during the store visit about how to best manage under these circumstances, as well as commenting on how front-of-store improvements could be made, in areas such as display and handling. This group was interested not only in activities at store level, but also areas such as storage and handling practices in Distribution Centers. The workshop content was adjusted accordingly. This workshop generated very good discussion and questions, resulting in the departure for the store visit having to be delayed for over 30 minutes.

During the store visit, some of the participants themselves pointed out the benefit of having more clearly defined fruit and vegetable (and pickle) sections in the produce department, plus the use of vertical category displays in the refrigerated cabinets. The chain was also innovative in its use of wobblers/danglers on the shelves of the adjacent dairy and deli cabinets to highlight promotion items. Wobblers were at right-angles to the shelf and used a combination of graphics and colour to differentiate the different types of promotions (e.g. television specials, press ads etc).

The number of groups in the Union, their geographic spread and the total number of stores suggests further workshops would be a good investment.

Lenta: This hypermarket chain caters mostly for working class customers. Many of their 50+ stores are located in St Petersburg close to subway stations. Participants included a mix of store

level staff and strong representation from their training team. Stores have a combination of refrigerated and non-refrigerated display areas.

This was the largest workshop and the store visit was broken into two groups, for maximum impact and ease of management.

O'Key: This chain of around 15 hypermarkets is more upscale than Lenta, reflected in the quality of product, staff knowledge and experience, and the produce displays. Most of the participants were store level staff, and there was very good discussion during the workshop and subsequent store visit. During the late afternoon store visit it seemed evident the store had higher customer numbers than the Lenta store the previous day. There were many participant requests (declined) to indicate who was better - O'Key or Lenta.

Land: This chain currently has four small to medium-sized upscale stores in St Petersburg, with a fifth scheduled to open in March. Some of the display and merchandising techniques in the workshop were of particular interest to apply in the new store, including having more clearly defined categories (including apples and pears) for customers, as well as offering both loose and packaged fruit.

Metro, Azbuka, Lenta and O'Key are all in the top Russian retail chains, according to the USDA 2007 GAIN Report.

Workshop Content:

Each workshop was different, as already reported, but based around a standard content, structured into five units:

16. Product management, including ordering, receival, storage, temperature and ethylene management (i.e. primarily back-of-store management). This included a diagram and description in Russian, showing variations in cool-room temperatures and where to store different products
17. Ticketing, display and promotions (front-of-store)
18. Cleaning and sanitation
19. Product Information, using Washington apples and USA Pears as case studies in implementing units 1 and 2, and also including the other products listed in the brief. In addition, and to make the workshop of more value to participants and US suppliers, additional products were added, including citrus, bananas, pineapples, tomatoes, melons and cabbage
20. Retail trends, developments and concepts, using photographs from a range of retailers in the USA, Australia, New Zealand, Europe, Latin America, Asia, India, Egypt and Abu Dhabi, to highlight developments, such as catering to convenience, organics, local/direct sourcing and diverse retail concepts.

Through each of the first three Units, nine Goals were included. e.g. order daily for daily demand, First-In First-out, only display what you can sell in one day. These goals were

reinforced at the end of the Unit 5, together with an exercise asking participants to identify a personal or store goal, as a result of participating in the workshop.

Program Delivery:

(9) Pre-workshop visits:

(a) A visit was made to a store from each of the retail chains participating in the training program (except Lenta in St Petersburg, where time did not permit). As noted earlier, acceptance of the visit varied between the chains.

(b) Something not seen before in any of the counties where the program has been delivered was evidence of chilling injury/damage to the skin of apples and pears. This is likely to have occurred along the supply chain in Russia, where fruit has probably been exposed to temperatures as low as -30 degrees Celsius in the past month, due to the coldest January in western Russia in the past 20 years. Unfortunately the damage is often not evident until fruit is displayed in the store. The importance of keeping fruit above freezing point at all times was stressed in the workshops.

(c) The WAC and USA Pear Russian representatives also attended the visits.

(10) Workshops:

(a) Hard copies in colour of the Russian version of the Power Point presentation were made available to participants (2 slides per page). This format meant that colour photos in units 4 and 5 were large enough to show the different messages being communicated. The hard copy was also used for note-taking.

(b) The workshop presentation was downloaded to the ARTEL-Center (American Retail Trade E-Learning Center - Global USDA Co-operators project resource that contains educational courses and articles for Russian retailers) web site. The link for downloading it (http://artel-center.ru/user_files/seminar-ru.pdf) was provided in the handout materials.

(c) Digital "Washington apple" thermometers were provided to each participant, so they could identify and monitor the coolest and warmest locations in their cool rooms, with the message to locate apples, cherries and pears in the coldest part of the cool room. Their use in the refrigerated section at the front of the store was also explained. The effective use of these thermometers was demonstrated during the post-workshop store visits.

(d) Consecutive translation was undertaken by a specialist interpreter

(e) Samples and examples were used where possible to reinforce key messages in the different workshop units. For example, a range of apple and pear varieties, and retail and promotion resources were used to support product information in Unit 4 of the workshop.

(f) Irina Koziy presented the content for the Washington apple case study in Unit 4. Additional images from Russian Washington apple promotions were incorporated in the presentation. Similarly, USA Pear content was presented by Angelika Krasovskaya. Using the in-country representatives worked very well, helped cement relationships with retailers, there was no need for translation and provided variety in the workshop content.

(g) The sampling of apple and pear varieties by participants was a new initiative by the representatives. This idea worked extremely well and should be considered for future workshops. Of particular importance was being able to emphasise, through tasting that Rome, which was readily available, was a cooking apple.

(h) To reinforce the key messages, exercises and quizzes (with small prizes) were conducted during each unit. This proved to be an effective way to encourage participation, as well as highlighting and reinforcing the information presented. For example, participants were asked to show how the different apple (e.g. Red Delicious, Gala, Fuji and Granny Smith) and pear (Anjou, Red Anjou and Forelle) varieties available could be used to make effective displays.

(i) At the end of each workshop, participants were asked to complete and return an evaluation form. In the evaluation, they were asked to rate the value of each of the units presented, whether they would make changes in any practices in each of the five units presented, and if so what those changes would be. They were also asked to record the best feature of the workshop, as well as making suggestions for improvement. The results were subsequently translated and collated by Irina Koziy and are shown later in the report.

(j) Where possible, the Certificate of Completion and the WAC cool-room thermometer were presented in exchange for the completed evaluation form. This approach is worth considering for future workshops

(k) Olga Kolchenikova, Agricultural Marketing Specialist with the ATO in Moscow attended the Azbuka and Union of Independent Retailers workshops. Svetlana Ilyina, her counterpart in St Petersburg, attended the Lenta workshop.

(3) Post-workshop store visit:

The purpose of the post-workshop visits was to use practical examples to reinforce the key information delivered in the workshop and how it could be applied at store level.

Elements of the store visits included:

s) Involving the produce department managers, when available, to explain what they were implementing in various locations (back and front) and why. This generated good interaction between participants.

t) Starting at the back of the store, to demonstrate practical implementation of Unit 1 (product management) and Unit 3 (cleaning and sanitation).

u) Emphasising the importance of moving product from receival to the correct storage conditions in winter, to avoid chilling injury.

v) The Washington apple thermometers were used to identify the range of temperatures in the cool room and show participants how to use their thermometers when they returned to their stores. A suggestion was made to install plastic curtains (or air curtains) on cool room doors, where they were absent (e.g. O'Key) to help with temperature management.

w) Front of store features (units 2, 3 and 4) – what customers see as they enter the store, displaying in product categories, the importance of lighting, effective use of colour breaks and signage, stock rotation (FIFO when restocking displays), developing the weighing station into an information centre (most weighing stations in Russia are 'self-serve' rather than being staffed - Land was the exception) and enhancing this point of contact with customers, communication and information with customers, what to store in refrigerated display areas (in priority), cleaning and sanitation.

US Product Comments:

Washington Apples: There is strong competition for Washington apples from a combination of local production, imports from the former Soviet bloc (e.g. Poland) and imports from Western Europe (e.g. France). In all the participating chains, except Alphabet of Taste, there was at least Washington Red Delicious being stocked. The most commonly ranged varieties were Red Delicious and Granny Smith, followed by Gala. At least two of the chains also stocked Rome, so the opportunity was taken by Irina in all workshops to emphasise this variety was a cooking apple rather than a snacking apple.

The most comprehensive range of Washington apples was seen in Carousel hypermarkets (part of X5, the largest retailer in Russia). They stocked nine varieties, including Red Delicious, Granny Smith, Gala, Fuji, Braeburn, Ambrosia, Rome, Pink Lady© (Cripps Pink) and Cameo©. This chain was an excellent source of product to demonstrate at the workshops.

USA Pears: Store penetration of USA pears was excellent, with Anjou, Red Anjou and Forelle available in all the participating stores except Alphabet of Taste. In many cases USA pears were offered both loose and packaged (trays with overwraps) and often in the refrigerated section of the produce department.

The different levels of availability for apples and pears was explained by pears having been available for some time and the Washington apple supply season in Russia only just getting under way.

Northwest Cherries: At the time of the workshop, Red and Rainier cherries were being supplied from Chile. Fruit was seen in the majority of participating retailers in Moscow, and Red cherries in O'Key in St Petersburg (although workshop participants said both types had been available during the season), and in the traditional markets, which appeared to have the best quality. Because of their high cost, all the cherries sighted in supermarkets were packaged (trays with overwraps) and displayed in the refrigerated section of the produce department, normally with berries. In the two traditional markets visited, fruit was displayed loose, but customers could not self-select. Samples of both Red and Rainier cherries were purchased in a traditional market to demonstrate at the Moscow workshops. The approach generated good interest for Northwest cherries in their season.

Washington Potatoes: Russian potatoes, reportedly one variety, were everywhere. What was surprising was the number of stores with a range of high quality, packaged varieties available from Belgium, Netherlands, France and Israel (white, cream and red). There was good interest at the workshops in the range of potato types available from Washington, and their uses. The features of appeal to participants also included the technology used in production, post-harvest and storage, grading, packing and marketing, to deliver consistent quality over a long part of the season. In addition to retail sales, there could be opportunities in food service, such as in the baked-potato fast food chain regularly observed in Moscow and St Petersburg. From experience and sampling, Washington Russets would be far superior for the purpose than the variety currently being used by the chain.

Results and Evaluation:

139 participants attended the workshops, with each workshop ranging in size from 1 to 35 participants.

Overall, 100 evaluation forms were completed and returned by participants. The profile of responses was:

Retailer	Responses	Participants
Workshop 1 - Metro Cash & Carry (electronic)	NA	NA
Workshop 2 - Alphabet of Taste	19	36
Workshop 3 - Union of Independent Retailers	30	35
Workshop 4 - Lenta	28	42
Workshop 5 - O'Key	23	25
Workshop 6 - Land (personal presentation)	NA	1
Total	**100**	**139**

Workshop Evaluation by Participants: Results from the evaluations were as follows:

Workshop Unit	Rating (1-5)	% indicating they will make changes
1. Product Management		
Workshop 2 - Alphabet of Taste	4.9	5
Workshop 3 - Union of Independent Retailers	4.3	20
Workshop 4 - Lenta	4.9	11
Workshop 5 - O'Key	4.9	0
AVERAGE	**4.7**	**10**
2. Display, Ticketing and Promotions		
Workshop 2 - Alphabet of Taste	5.0	21
Workshop 3 - Union of Independent Retailers	4.5	10
Workshop 4 - Lenta	4.9	11
Workshop 5 - O'Key	4.9	4
AVERAGE	**4.8**	**11**

3. Cleaning and Sanitation

Workshop 2 - Alphabet of Taste	5.0	5
Workshop 3 - Union of Independent Retailers	4.3	13
Workshop 4 - Lenta	4.8	11
Workshop 5 - O'Key	4.9	0
AVERAGE	**4.7**	**8**
4. Product Information, Care and Handling		
Workshop 2 - Alphabet of Taste	5.0	0
Workshop 3 - Union of Independent Retailers	4.4	17
Workshop 4 - Lenta	4.9	11
Workshop 5 - O'Key	4.8	9
AVERAGE	**4.7**	**10**
5. Retail Concepts, Trends and Developments		
Workshop 2 - Alphabet of Taste	4.9	16
Workshop 3 - Union of Independent Retailers	4.2	17
Workshop 4 - Lenta	4.9	0
Workshop 5 - O'Key	4.9	4
AVERAGE	**4.7**	**9**

Participants were also asked to list specific changes they would make in each Unit area, where they had nominated changes would be made in those areas. Most common responses were as follows:

Unit 1: Product Management

- Adjustment to Russian retail
- More information on working with suppliers
- More detail on ethylene sensitivity (Comment: to be supplied)
- Proper cleaning and sanitation of fresh produce
- More practical examples
- Category management and pricing

Unit 2: Display, Ticketing and Promotions

- More detailed information

- Displays in other countries
- Examples of actual promotional activities
- Practical master-class on display arrangements
- Suggestions on the category location in the store

Unit 3: Cleaning and Sanitation

- More details
- More on the visual appeal improvement
- More practical examples
- Store employee uniform

Unit 4: Product Information, Care and Handling

- More information on storage rules
- More exact information
- Working in (and with) the distribution center and transportation
- More information on ethylene sensitivity
- More information on other fruits and sampling

Unit 5: Retail Concepts, Trends & Developments

- More information and examples (Comment: in a number of the workshops, this Unit had to be abbreviated, because of extended discussion in earlier units)
- More practical information
- Formulate tendencies in thesis (Comment: not sure what this means in practice)
- Forecasts for 2011
- More on working with personnel

Responses to the other evaluation questions were:

What was the best feature of the training program?

- Apples and pears tastings
- Information on fruit storage requirements
- Washington apples information
- Worldwide experience of display arrangements
- Promotional activities and ideas
- Displays layout
- Product coding on receival
- US products information
- Importance of first-in, first-out (back and front of store)
- Units 1, 2 and 3
- Color breaks in the layout

- Brochures, printed materials
- Practical class in the store. Experience exchange
- Display layouts in foreign countries
- Units 2 and 4

How can the program be improved?

- Add communication with consumers
- More exact information on fruits ordering and purchasing
- More discussion on the retail stores examples
- More details on category management
- More time for discussion. Four hours was not enough (Comment: In this market, I agree)
- Select one store and follow through all the procedures from ordering and receival to sales
- Prolong
- More examples
- Information on further processing of low quality fruits
- Add information on proper cleaning and sanitation of fresh produce storage
- Temperature control at storage, transportation and display
- Add master-classes
- Include information of fresh produce diseases and quality problems

Photo Gallery:

The workshops' photo-galleries are located at:
http://bestapples.ru/user_files/gallery/av
http://bestapples.ru/user_files/gallery/sns
http://bestapples.ru/user_files/gallery/lenta
http://bestapples.ru/user_files/gallery/ok

Review and Recommendations:

20. The basic program structure and content worked, including pre- and post-store visits, plus the workshop. There was sufficient flexibility to make substantial modifications to satisfy the various retail groups. One improvement would be to have advance information on the background of participants (e.g. store level, senior management etc), so the presentations could be adjusted accordingly.

21. Prior consultation with the country representative about the mix of products in the presentation (that are not part of the brief) was most beneficial. In Russia there was interest in other tropical fruits and a section on pineapples was added. Information was also provided on request about avocados. This flexibility in the program adds to its attractiveness for participating retailers. This practice will be continued with workshops in other countries.

22. Using the country representatives to present almost all the content for apples and pears in Unit 4 was an improvement on the level of involvement from earlier workshops. In future, the country representatives (apples and other products where relevant) should be encouraged to have this level of involvement wherever possible.

23. The "WAC" thermometers were again a very useful workshop tool, in showing managers how to implement better cool-room storage conditions for apples, pears and cherries.

24. As with previous workshops, arranging the attendance of managers responsible for fresh produce training will help disseminate the information to a wider audience within the participating retailers.

25. Despite the difficulty in initially gaining the support of some of the retailers, they warmed to the workshops, as shown by their responses in the evaluations, especially Alphabet of Taste.

26. During the production of the electronic (video) workshop, the role of the workshops in being an important means to an end (sales of product from the Pacific Northwest), rather than an end in itself, was reinforced. For apples, pears, cherries and potatoes, the following questions were asked and answered:
    a. What makes each of these products different from the competition?
    b. Why should retailers favour these products over the competition?

    The generic answers include:
    - excellent growing conditions (soil, water, climate) for high quality production
    - technology used in production, harvesting, storage and marketing
    - long lines of consistent quality product available over an extended season
    - the range of varieties available
    - industry product standards and specifications against which retailers can confidently order and plan
    - government food safety requirements
    - retail support through training and promotions etc.

    It is recommended that an introduction is added to Unit 4, highlighting these features, as well as developing specific responses to each of the two questions for each product (apples, pears, cherries and potatoes) from the Pacific Northwest.

27. At the review meeting with Irina Koziy and Angelika Krasovskaya, after the final workshop in St Petersburg, another option was developed to help reinforce the reasons why Russian retailers should stock products from the Pacific Northwest. Consideration could be given to arranging a mission of Russian retail purchasing specialists at a time of year (August?) when they can best see and experience the production, harvesting, grading, packing and dispatch of apples, pears, cherries and potatoes, as well as learning about the specific features of each product that makes them different to the competition (e.g. the range of uses for different apple and potato varieties).

28. There appears to be demand for more workshops in Russia. Satisfying the demand falls into two categories:
    a. Reaching more retailers (in the major cities and regional centers) with the same workshop format and
    b. Providing a different level of information, based around category management, for those retailers who participated in this round of workshops. The comments on suggestions for improvements in the evaluation responses are quite different to those received from any other market, and revolve around more detailed management of product and people, from distribution centers to the front-of-store.

Acknowledgements:

My thanks to the many people contributed to the success of the workshops, including:

- Irina Koziy, Washington Apple Commission representative in Russia, and Alexander and their staff
- Angelika Krasovskaya, USA Pears representative in Russia
- Rebecca Baerveldt, Export Manager, Washington Apple Commission, Wenatchee
- Retailers who kindly offered the use of the training facilities, as well as providing access to both the front and back of the produce departments in their stores

John Baker
Chief Executive
Produce Marketing Australia

28 January 2010

WSDA Contract NO K274

Produce Layout Design and Handling

March 2010

Thailand

Project Summary:

Background:

The Washington State Department of Agriculture and Washington Apple Commission (WAC) commissioned John Baker of Produce Marketing Australia to deliver a series of retail training programs in March 2010 to representatives from a range of supermarket chains operating in Thailand. The program built on the structure successfully used in seven countries in 2008 through to January 2010.

Produce Marketing Australia's Marketing Services Manager Mark Baker also travelled to Thailand (at no cost to the project) for the workshops. His previous experience in lighting and back-room management practices was a real bonus for the delivery of the workshops.

Five workshops were conducted, all in Bangkok, with a record 255 participants. Each workshop was for a single retail chain. The schedule and number of registered participants were:

- Monday 8 March: Big C - 58 participants
- Tuesday 9 March: Tops - 60 participants
- Wednesday 10 March: Carrefour – 50 participants
- Thursday 11 March: Siam Makro - 75 participants
- Friday 12 March: Tesco-Lotus - 12 participants

With the exception of Tesco-Lotus, who sent no store-level staff, all workshops had a high representation of store-level staff, along with other departments, such as merchandising, buying, marketing, logistics and training.

Pre-workshop store visits were undertaken on Saturday 7 March to a store from each of the participating retailers.

The WAC (and Northwest cherries) representative in Thailand, Phornthip Poolprasert (PT), was instrumental in making the workshops such a success, through the preliminary work prior to the workshops and support during the workshops, including:

- assisting to make the workshop content of most relevance to the participating retailers
- obtaining the support of all the major retailers operating in Thailand
- scheduling the workshops
- coordinating the attendance of representatives of the ATO, USA Apples and US Potato Board
- translating the presentation, arranging interpreters, and arranging venues and
- the collation and translation of the individual evaluation reports

The Brief:

To provide training to at least five hypermarket/supermarket chains in produce department layout design and produce handling, as set forth below:

21. Conduct store visits (at least one per retailer) and visit retail outlets for each of the participating retailers to assess:
    a. Current performance with the participating products, especially apples
    b. General store layout and performance in fresh produce (front and back) - receival, storage, handling, cold chain, food safety, product range, display, promotions etc
    c. Meet with store staff to determine
        i. Profile of customer base – how often and when (time of day) do they shop for regular items (top up), discretionary products (and what are they) and impulse items. This has implications for where imported products fit, "Fresh @ 5" merchandising if shopping is later in the day etc
        ii. Existing levels of knowledge and information in the areas to be covered
22. Conduct workshops (half day) customized for each participating retailer (or collectively for smaller retail groups) that will include:
    a. Product and merchandising information that may include the following products: Washington apples (the main emphasis), USA pears, Northwest cherries, table grapes, berries, summer fruit, Washington potatoes, carrots and onions
    b. Information on cold chain and food safety requirements; trends in fresh produce; developments in organics
    c. Retail concepts and ideas from other markets (USA, Australia, New Zealand, etc.) that may be applied in Thailand.
23. Follow up with store visits (half-day) to participating retailers to provide further guidance on practical applications of information from workshops, clarify any issues raised in implementation of the training and provide feedback.
24. Prepare all resource materials and make available to participants: product specific and generic information; store concepts and any other relevant training materials in English, with translations, printing and distribution to be handled by WAC.
25. Provide a written report at the end of the project with an evaluation of pre and post-project merchandising and handling activities of the participating retailers, with recommendations for follow-up activities for both WAC and/or any participating Agricultural Trade Office staff. Contractor may use participant evaluations to assist in this evaluation, including:
    a. "open book" assessment by attendees at conclusion of each workshop, to reinforce key messages and assess level of knowledge achieved
    b. Participant survey of value and effectiveness of workshops and materials.

Implementation:

The workshop content was similar to that used successfully in workshops delivered in February in Mexico. Content in Unit 4 for both Thailand and Mexico had been modified and significantly improved, after experience in January 2010 in Russia.

This involved adding an introduction to Unit 4 - "Why US Pacific Northwest". In addition each of the four partner-products (apples, pears, cherries and potatoes) had a similar introduction, developed in consultation with each organisation.

Washington Apple Commission was joined as a partner by Pear Bureau Northwest (USA Pears), Northwest Cherry Growers and Washington State Potato Commission. These organisations were consulted in the development and approval of their respective components of the content. They were also consulted prior to the workshops about the status of the market and any particular messages they wanted emphasised. Phornthip Poolprasert also represents Northwest Cherry Growers. In addition, Richard Lieu, the representative for USA Pears based in Singapore and covering Thailand was advised of the program and attended one of the workshops. There is no representative for Washington Potatoes.

The program for the workshops consisted of three components:

13. Pre-workshop visit to a store from each retailer, to undertake element 1 of the brief
14. Deliver half-day workshops (element 2 of the brief) and
15. Undertake follow-up store visits with participants, to review and discuss application of the information from the workshop (element 3)

Retail Profile:

(From Phornthip Poolprasert)

For Washington apples, USA pears, Northwest cherries, as well as other imported fresh fruits i.e. grapes, stone fruits, persimmon, kiwifruit, the key retailers are the major four hypermarkets/ superstores.

- Tesco-Lotus carries the largest stock of Washington apples, partly because of the numbers of outlets. Tesco-Lotus have a number of formats e.g. hypermarket/superstore, Value, Talad, Express and are now adapting some of their outlets to Community Malls. (Hypermarket 81 outlets, Value 31 outlets, Talad 59 outlets, Express 460 outlets)
- Big C (superstore/hypermarket) 67 outlets
- Carrefour 41 outlets
- Makro (the only cash-n-carry) 44 outlets, with two more to open by the end of April. Makro is a member-based wholesaler

Plus the leading supermarkets:

- Tops 114 outlets
- Foodland 11 outlets
- Villa 18 outlets
- The Mall 9 outlets
- Max Value 10 outlets
- Rim Ping 4 outlets (in Chiangmai - northern part of Thailand)

Workshop Content:

Each workshop was different, as already reported, but based around a standard content, structured into five units:

21. Product management, including ordering, receival, storage, temperature and ethylene management (i.e. primarily back-of-store management).
22. Ticketing, display and promotions (front-of-store)
23. Cleaning and sanitation
24. Product Information, using Washington apples, USA Pears and Northwest Cherries as case studies in implementing units 1 and 2, and also including the other products listed in the brief. In addition, and to make the workshop of more value to participants and US suppliers, additional products were added, including citrus, bananas, pineapples, tomatoes, melons and cabbage
25. Retail trends, developments and concepts, using photographs from a range of retailers in the USA, Australia, New Zealand, Europe, Latin America, Asia, India, Egypt and Abu Dhabi, to highlight developments, such as catering to convenience, organics, local/direct sourcing and diverse retail concepts.

Through each of the first three units, nine goals were included. e.g. order daily for daily demand, First-In First-out, only display what you can sell in one day. These goals were reinforced at the end of the Unit 5, together with an exercise asking participants to identify a personal or store goal, as a result of participating in the workshop.

Program Delivery:

(11) Pre-workshop visits:
- (a) A visit was made with the WAC representative to the each of the retailer's stores to be used for the post–workshop visit.

(12) Workshops:
- (a) Hard copies in black and white of the Thai version of the Power Point presentation were made available to participants (3 slides per page). The hard copy was also used for note-taking.
- (b) An electronic copy of the workshop presentation was also provided to each participant, for subsequent reviewing and refreshing of the information.
- (c) Digital “Washington apple” thermometers were provided to each participant, so they could identify and monitor the coolest and warmest locations in their cool rooms, with the message to locate apples, cherries and pears in the coldest part of the cool room. Their use in the refrigerated section at the front of the store was also explained. The effective use of these thermometers was demonstrated during the post-workshop store visits. Additional thermometers were supplied to the WAC representative, for wider distribution to retailers.
- (d) Consecutive translation was undertaken by an interpreter for the first three workshops. For the subsequent workshops, the WAC representative and one of her staff provided the interpretation.

(e) Samples and examples were used where possible to reinforce key messages in the different workshop units. For example, a range of apple and pear varieties, and retail and promotion resources were used to support product information in Unit 4 of the workshop.

(f) Phornthip Poolprasert presented the content for the Washington apple and Northwest cherry case studies in Unit 4. Additional information about Washington apple and Northwest cherry promotion opportunities in Thailand was incorporated in the presentation. As in previous workshops in other countries, using the in-country representatives worked very well, helped cement relationships with retailers, there was no need for translation and provided variety in the workshop content.

(g) The USA Pears representative Richard Lieu travelled from Singapore to attend and present the USA Pear information at one of the workshops (Siam Makro). Kraipob Pangsapa from the United States Potato Board also attended one workshop, which was beneficial in explaining the current status of access and tariffs for Washington potatoes.

(h) To reinforce the key messages, exercises and quizzes (with small prizes) were conducted during each unit. This proved to be an effective way to encourage participation, as well as highlighting and reinforcing the information presented. For example, the exercise in how to display different apple varieties, using colour as a key for decision-making, and also allowing for other factors, such as price, size, popularity and end use (e.g. cooking for Rome), created excellent interaction between participants.

(i) At the end of each workshop, participants were asked to complete and return an evaluation form. In the evaluation, they were asked to rate the value of each of the units presented, whether they would make changes in any practices in each of the five units presented, and if so what those changes would be. They were also asked to record the best feature of the workshop, as well as making suggestions for improvement. The results were subsequently translated and collated by Phornthip Poolprasert and are shown later in the report.

(j) Where possible, the Certificate of Completion and the WAC cool-room thermometer were presented in exchange for the completed evaluation form.

(k) Three of the workshops were attended by the US Agricultural Attaché Orestes Vasquez and the Agricultural Marketing Specialist Sukanya Sirikeratikul. The Agricultural Attaché presented the Certificates of Completion at these workshops.

(13) Post-workshop store visit:

The purpose of the post-workshop visits was to use practical examples to reinforce the key information delivered in the workshop and how it could be applied at store level. At all previous workshops where there has been a large number of participants (more than 30), two groups have had to be formed, to be able to manage the numbers in the back and front of store. This has meant the second group has had to wait over one hour for the first group to finish. Because of the attendance of Mark Baker at the Bangkok workshops, he was able to take one group through practical aspects of back-of-store management while John Baker covered front-of-store practices. The groups were then swapped, meaning there was no wasted time for participants. This was a most effective approach in managing the large numbers at each workshop (Tesco–Lotus had only a small number of participants and permitted the practical session only at the front of the store - a store which was being used as a test for a new format).

Elements of the store visits included:

x) Involving the produce department managers, when available, to explain what they were implementing in various locations (back and front) and why. This generated good interaction between participants.
y) Starting at the back of the store, to demonstrate practical implementation of Unit 1 (product management) and Unit 3 (cleaning and sanitation).
z) Emphasising the importance of moving temperature-sensitive products (such as apples, pears and cherries) from receival to the correct storage as quickly as possible.
aa) The Washington apple thermometers were used to identify the range of temperatures in the cool room and show participants how to use their thermometers when they returned to their stores. Most cool rooms had plastic curtains on the doors.
bb) Cleanliness and sanitation standards, especially the highly sensitive area used for preparing cut fruits and fresh juices, were very good, both at back-of-store and front-of-store.
cc) Front-of-store features (units 2, 3 and 4) – what customers see as they enter the store, displaying in product categories, the importance of lighting, effective use of colour breaks and signage, stock rotation (FIFO when restocking displays), and enhancing touch points with customers (through strategic use of signage to provide information such as nutrition features, product uses etc), what to store in refrigerated display areas (in priority), cleaning and sanitation.

US Product Comments:

Washington Apples: Seven Washington apple varieties were available at the time of the workshop. The most popular variety was Red Delicious, followed by Gala and Granny Smith. Some stores also stocked other varieties – Golden Delicious, Fuji, Cameo and Ambrosia. Rome apples from east coast USA were also observed. At each of the workshops, during the practical exercise to show how to display the different varieties, the point was made to consider displaying all the snacking apples together and separate from Rome, which is a cooking apple.

USA Pears: Anjou, Red Anjou and Bosc were available in most of the retail chains, with the exception of Siam Makro. Tesco-Lotus had only Red Anjou available on the day of the workshop. A particular challenge for pears is the general belief that pears are eaten “crunchy”, because of experience with Chinese pear varieties (Ya pear Fragrant pear etc). At each workshop, the ripening of pears to enhance the flavour and eating experience was emphasised.

Northwest Cherries: There were no cherries from any source in the market at the time of the workshops. All the participating retailers reported they stocked Northwest cherries, during the season, at least in the high-end and expatriate shopper stores. Information on the impact on sales of secondary locations for Northwest cherries created good interest when presented by PT.

Washington Potatoes: There were no fresh Washington potatoes in the market. The attendance of the local US Potato Board representative at the second workshop was very useful, as he was able to explain that Washington potatoes had recently been granted access, but a high tariff of 127% was restricting sales. He also reported this barrier was being worked on by US authorities.

There was a high level of interest in the wide range of varieties and their uses available from Washington State.

Results and Evaluation:

255 participants attended the workshops, with each workshop ranging in size from 12 to 75 participants. Overall, 236 evaluation forms were completed and returned by participants. The profile of responses was:

Retailer	**Responses**	**Participants**
Workshop 1 - Big C	58	58
Workshop 2 - Tops	53	60
Workshop 3 - Carrefour	47	50
Workshop 4 - Siam Makro	67	75
Workshop 5 - Tesco-Lotus	11	12
Total	**236**	**255**

Workshop Evaluation by Participants:

Results from the evaluations were as follows:

Workshop Unit	**Rating (1-5)**	**% indicating they will make changes**
1. Product Management		
Workshop 1 - Big C	4.1	13
Workshop 2 - Tops	4.0	13
Workshop 3 - Carrefour	3.8	17
Workshop 4 - Siam Makro	4.1	25
Workshop 5 - Tesco-Lotus	4.0	9
AVERAGE	**4.0**	17
2. Display, Ticketing and Promotions		
Workshop 1 - Big C	4.0	9
Workshop 2 - Tops	4.0	15
Workshop 3 - Carrefour	3.9	24
Workshop 4 - Siam Makro	4.1	22
Workshop 5 - Tesco-Lotus	4.0	9
AVERAGE	**4.0**	17

3. Cleaning and Sanitation		
Workshop 1 - Big C	3.9	4
Workshop 2 - Tops	3.9	6
Workshop 3 - Carrefour	3.8	13
Workshop 4 - Siam Makro	3.9	20
Workshop 5 - Tesco-Lotus	3.6	18
AVERAGE	**3.9**	11
4. Product Information, Care and Handling		
Workshop 1 - Big C	4.0	7
Workshop 2 - Tops	4.2	9
Workshop 3 - Carrefour	3.9	13
Workshop 4 - Siam Makro	4.0	19
Workshop 5 - Tesco-Lotus	4.0	0
AVERAGE	**4.0**	12
5. Retail Concepts, Trends and Developments		
Workshop 1 - Big C	4.0	7
Workshop 2 - Tops	4.1	8
Workshop 3 - Carrefour	3.7	20
Workshop 4 - Siam Makro	3.9	17
Workshop 5 - Tesco-Lotus	4.2	0
AVERAGE	**3.9**	12

Participants were also asked to list specific changes they would make in each Unit area, where they had nominated changes would be made in those areas. Most common responses were as follows:

Unit 1: Product Management

- Arrange produce products using FIFO method
- Adjust produce storage per retail training
- Adjust temperature in cold room to suit respective fruits and vegetables
- Adjust the order to make sure products are sold in one day
- Improve working efficiency, thus less shrinkage
- Learn more about Ethylene. Re-arrange how to put fruits and vegetable in cool room
- Practice receival and storage learned from the training
- Priority stress on the shrinkage

- Train our staff to have better knowledge of product management

Unit 2: Display, Ticketing and Promotions

- Arrange fruits and vegetables in display area by the season
- Attractive/striking displays help increase sale volume for our outlet
- Big promotional signage at weighting station
- Bigger signage for incentive promotion program to attract customers to our display
- Change the package to reduce the shrinkage
- Change the ticketing according to what I learnt from the training
- Develop effective cross merchandising products
- Display fruits and vegetables that can sell in one day, enough display help reduce the shrinkages
- Grouping display for both imported fresh fruits, and vegetables i.e. category management, cooking
- Increase customers' confidence in us
- Informative signage regarding health benefit from individual products
- Make display area and price signage are not blocking customers' view, i.e. not too high
- Make good use/adapt/adjust from the displays showed by John at the training
- Put up more POS
- Show the inside of fruits to attract customers' attention
- Standard signages apply to all stores
- Train our staff to know more about the product so they can educate our customers
- Use color break as well lighting to attract customers' attention

- **Unit 3: Cleaning and Sanitation**

- Have the time table for checking the cleaning and sanitation on daily basis
- Improve the importance of cleanliness and sanitation
- Keep display space clean all the time
- Practice back and front, in terms of cleanliness and sanitation

Unit 4: Product Information, Care and Handling

- Pay more attention in handling imported fresh fruits
- Care and handling especially "Berry" group or cherries
- Educate customer to know about imported fresh fruits (varieties, seasons, etc)
- FIFO
- Store refrigerated stock first

Unit 5: Retail Concepts, Trends & Developments

- Displays from around the world, presented by the trainer, are of great use

Responses to the other evaluation questions were:

What was the best feature of the training program?

- Additional knowledge of imported fresh fruits, photos of displays around the world is a real plus
- Best interesting unit is care and handling
- Best sharing idea session
- Good translation
- Improve care and handling as well as display
- Learn there are more varieties of WA
- Mr. John Baker is a very good retail trainer, with in-depth knowledge in produce, great communicator
- Product management for increase sale volume and decrease shrinkage
- Question and answer during the session
- The training is clearly distinguished by using various samples
- Training is accompanied by the real thing i.e. sample of respective imported fresh fruits
- Training photos enhance the subject to be more interesting
- Well prepared, well presented training, very good information cover produce in general

How can the program be improved?

- Better time management/précis the training program
- Change the training location because of the traffic (Big C)
- Display photos from Thailand market will be of great help. C**omment:** photos from the country where the workshop is being held are not included, in the interests of confidentiality
- Display photos showed do not apply to Makro, if there are cash and carry store displays it will help. **Comment:** reflects the importance of background information on retailers
- Ethylene gas in details, especially after back store training **Comment:** a link to information on ethylene-producing and ethylene-sensitive products can be provided.
- Have more activities and games during training **Comment:** noted for the future
- Photos of storage rooms in other countries **Comment:** a good suggestion, but hard to obtain
- Product tastings during training **Comment:** see Recommendations
- Show fruits with bad quality and how to correct them **Comment:** juice, cut fruit options
- The training is excellent. We will use it to improve the service in Big C
- Training hours are too short (Tesco-Lotus) **Comment:** the shortened workshop at Tesco-Lotus was done at the request of their senior management. More time was spend in-store in an attempt to compensate (senior management did not participate)

Review and Recommendations:

29. Evaluation Comments: The comments above, on best features and areas for improvement, are a good reflection of the high standards and level of interest shown in the workshops

30. Product sampling: With the high turnover of store-level staff, many of them have not had the opportunity to sample the full range of apples and pears available from the Pacific Northwest, even though they were regularly asked by customers about the different tastes of the different varieties. Providing the opportunity to sample the different varieties, perhaps during the mid-workshop break (normally after Unit 3), would be a good way of providing them with additional information and experience on the varieties available. This point was also reinforced in the evaluations from one of the workshops.

31. Best Practice Guide for Distribution Center staff. At each workshop there was good representation of staff with Distribution Center responsibilities. Many of the principles about back-room product management at store level (receival, storage, temperatures, ethylene management) apply equally to Distribution Centers. Development of a simple Best Practice Guide of Distribution Centers, featuring generic and product-specific information, would be very useful in helping to both maintain product quality and continue to build relationships with retailers, not only in Thailand but in all countries where products from the Pacific Northwest are being marketed.

32. Improving Efficiencies of the Store Visits. The presence of Mark Baker during the post-workshop visits made a significant difference to improving the effectiveness of this component of the training, as there was no down-time when there was a large number of participants (normally where there are more than 30 participants there needs to be two groups to be able to accommodate them in the store visits. If some way can be found to enable two people to concurrently handle the back and front of store components when there are more than about 30 participants, it would be more effective and retailers would be more receptive, because the time of their staff is being used more effectively.

33. Mix of Participants: The value of having a mix of retail backgrounds in the workshops was again highlighted. At the first four workshops the mix of store staff and people from other departments meant there was excellent cross-sharing of information and experience. At the Tesco-Lotus workshops, no store staff was nominated to participate, and the benefits to the organisation would have been greater if there had been store staff involved.

34. Participation of Representative's Staff: The benefits of having staff of the in-country representative attending the workshops were again highlighted. All the WAC representative staff reported the workshops had been of great value to them in increasing their general

retailing knowledge as well as product-specific knowledge (Certificates of Completion were also presented to them, in recognition of their participation).

Acknowledgements:

My thanks to the many people contributed to the success of the workshops, including:

- Phornthip Poolprasert, Washington Apple Commission representative in Thailand
- Rebecca Baerveldt, Export Manager, Washington Apple Commission, Wenatchee
- Staff from the various retailers for their enthusiastic participation in the workshops.

John Baker
Chief Executive
Produce Marketing Australia
16 March 2010

Sri Lanka and India Retail Training

Final Report

To

Washington Apple Commission

Produce Marketing Australia

FEBRUARY 2011

Background:

The Washington State Department of Agriculture and Washington Apple Commission (WAC) commissioned John Baker of Produce Marketing Australia to deliver a series of retail training programs in January/February 2011 to representatives from a range of supermarket chains operating in Sri Lanka and India. This was the third round of workshops in India since 2009, with a significant difference being the emphasis in this program in reaching retailers in second tier cities such as Coimbatore, Cochin and Jaipur.

This was the first time the program had been delivered in Sri Lanka, and the results show there was strong justification for doing so.

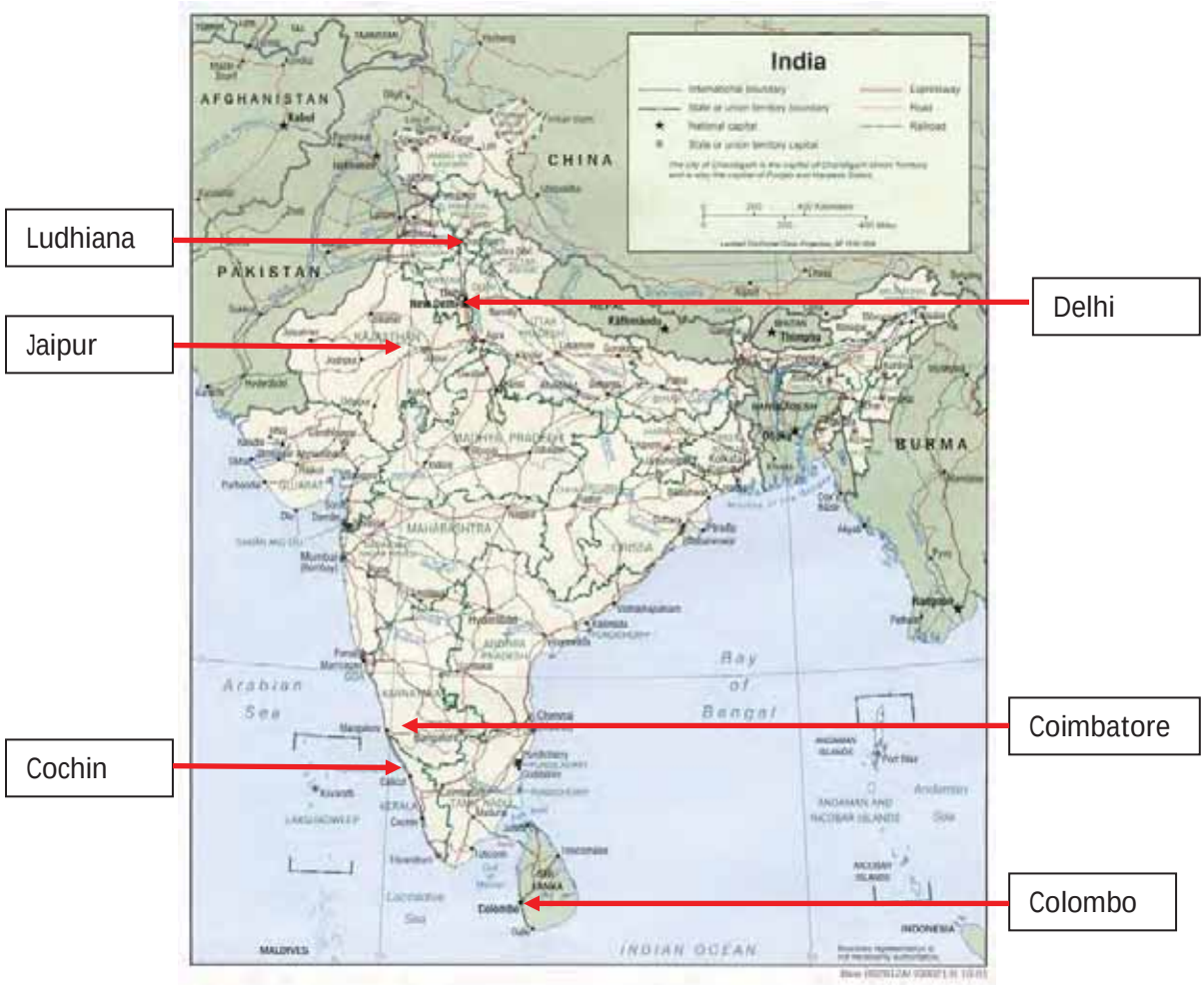
Eight workshops were conducted, with 352 participants attending from 21 retail chains. The schedule and number of registered participants were:

Sri Lanka (Colombo):

- Thursday 20 January: Keells supermarkets. 49 participants
- Friday 21 January: Cargills Food City supermarkets. 64 participants

India:

- Tuesday 25 January: Coimbatore. Mixed retailer workshop. Six chains participated, including Aditya Birla Retail Limited – Trinethra More, Kovai Pazamudir Nilayam, Spencer's Retail Limited, Niligiri's Supermarket, Independent Pazamudir Nilayam, Bharti Walmart Supermarkets. 31 participants
- Friday 28 January: Cochin. Mixed retailer workshop. Three chains participated, including Aditya Birla Retail Limited – Trinethra More, Spencer's Retail Limited, Mithra Super Market. 24 participants
- Monday 31 January: Delhi. Bharti Walmart supermarkets. 53 participants
- Tuesday 1 February: Delhi Reliance Fresh supermarkets. 47 participants
- Thursday 3 February: Ludhiana. Bharti Walmart supermarkets. 70 participants
- Saturday 5 February: Jaipur. Mixed retailer workshop. Seven chains participated, including Reliance Retail Limited, Hypercity, Gokul Vatika, Pantaloon Retail India Limited – Big Bazaar, REI Agro Ltd - "6/Ten" Neighborhood Convenience Stores, Kashmiri Fruit Centre, SRS international. 14 participants



Pre-workshop store visits were undertaken to a representative store from most participating retailers. Because of the high number of retail chains represented at the mixed workshops in India, it was not possible to visit them all. Similarly, it was sometimes not possible to visit all the different retailers for post-workshop visits, even when these visits continued into the following day. In these instances, private meetings were offered at the conclusion of the workshops, to provide observations, feedback and suggestions arising from the pre-workshop visits.

The SCS Group was represented at the workshops as follows:

- Sri Lanka: Rachna Sharma
- Coimbatore and Cochin: Radhakrishna Kurup, who also translated the presentation in Cochin. Keith Sunderlal attended and presented at the Coimbatore workshop.
- Delhi: Sumit Saran and Keith Sunderlal. The Bharti Walmart presentation was translated by Sumit Saran.
- Ludhiana: Dhruv Sood, who also translated the presentation.
- Jaipur: Amarja Sharma, who also translated the presentation.

The Brief:

To provide training to at least five hypermarket/supermarket chains in produce department layout design and produce handling, as set forth below:

26. Conduct store visits (at least one per retailer) and visit retail outlets for each of the participating retailers to assess:
    a. Current performance with the participating products, especially apples
    b. General store layout and performance in fresh produce (front and back) - receival, storage, handling, cold chain, food safety, product range, display, promotions etc
    c. Meet with store staff to determine
        i. Profile of customer base – how often and when (time of day) do they shop for regular items (top up), discretionary products (and what are they) and impulse items. This has implications for where imported products fit, "Fresh @ 5" merchandising if shopping is later in the day etc
        ii. Existing levels of knowledge and information in the areas to be covered
27. Conduct workshops (half day) customized for each participating retailer (or collectively for smaller retail groups) that will include:
    a. Product and merchandising information that may include the following products: Washington apples (the main emphasis), USA pears, Northwest cherries, table grapes, berries, summer fruit, Washington potatoes, carrots and onions
    b. Information on cold chain and food safety requirements; trends in fresh produce; developments in organics
    c. Retail concepts and ideas from other markets (USA, Australia, New Zealand, etc.) that may be applied in Sri Lanka and India.
28. Follow up with store visits (half-day) to participating retailers to provide further guidance on practical applications of information from workshops, clarify any issues raised in implementation of the training and provide feedback.
29. Prepare all resource materials and make available to participants: product specific and generic information; store concepts and any other relevant training materials in English, with translations, printing and distribution to be handled by WAC.
30. Provide a written report at the end of the project with an evaluation of pre and post-project merchandising and handling activities of the participating retailers, with recommendations for follow-up activities for both WAC and/or any participating Agricultural Trade Office staff. Contractor may use participant evaluations to assist in this evaluation, including:
    a. "open book" assessment by attendees at conclusion of each workshop, to reinforce key messages and assess level of knowledge achieved
    b. Participant survey of value and effectiveness of workshops and materials.

Implementation:

The partners in the program were Washington Apple Commission, who coordinated the 2010/11 retail workshop program, Pear Bureau Northwest (USA Pears), Northwest Cherry Growers and Washington State Potato Commission.

These organisations were consulted in the development and approval of their respective components of the content. They were also consulted prior to the workshops about the status of the market and any particular messages they wanted emphasised.

The program for the workshops consisted of three components:

16. Pre-workshop visit to a store from each retailer, to undertake element 1 of the brief
17. Deliver half-day workshops (element 2 of the brief) and
18. Undertake follow-up store visits with participants, to review and discuss application of the information from the workshop (element 3)

Retail Profile:

Retailers in Sri Lanka had store-level infrastructure similar to most small to medium-sized supermarkets in developed markets. This comprised receival, storage and handling facilities at the back of the store, together with refrigerated and ambient display areas for fruits and vegetables at the front of the store.

In India, by contrast most of the small supermarkets (Spencers, Reliance, Nilgiris etc) had only small areas at the front for fruits and vegetables, and rarely were there any refrigerated displays for fresh produce. Deliveries were commonly received through the front of stores, as there were no back areas, and all deliveries were immediately placed on display, at ambient temperatures.

Sri Lanka: Modern retailing is dominated by Cargills Food City supermarkets, with 151 stores throughout the country. The company was the first, in 1983, to introduce supermarket retailing to Sri Lanka.

Keells has 42 stores.

An emerging chain is Arpico, with four supercenters/small hypermarkets and six supermarkets. Although a workshop was not held for this chain, a store visit was arranged and comments provided to management.

The following comprehensive profile of Indian retailers was supplied by SCS Group:

S. No	Retail	Stores	Location	Format
1.	**Reliance Fresh** is the convenience store format as part of the retail business of Reliance Industries of India. Since its inception in 2006, **Reliance Retail Limited (RRL)** has grown into a gigantic organization. Through these years, RRL increased its footprint to more than 900 stores in 80 cities across 14 states in India. A typical Reliance Fresh store has an area of approx. 3,000-4,000 sq ft and caters to a catchment area of 2-3 km. Their expansion plans boast of 3,000 stores, 2,500 supermarkets and 1,000 hypermarkets by 2010.	900	All across India	Hyper, Super & Convenience
2.	**Hypercity Retail India Limited** is part of Mumbai-based K Raheja Corp, which also owns the Shoppers Stop chain of department stores. This retail format was established in 2006 in Mumbai, and currently has 4 Hypermarket formats. HyperCITY provides a truly international shopping experience, where customers can shop in comfort in a large, modern, & exciting environment. It offers a wide and contemporary range of innovative products, sourced from both local and international markets. The product range covers: Foods, Home ware, Home Entertainment, Hi-Tech, Appliances, Furniture, Sports, Toys & Fashion.	6	Jaipur, Mumbai, Amritsar, Hyderabad & Bhopal	Hyper
3.	The Group's foray into the retail sector began in 2006, when it acquired Trinethra, the south-India based chain of stores. May 2007 **saw Aditya Birla Retail Limited (ABRL)**, launching their own brand of stores **MORE**. Till end of 2009, the company set up over 581 supermarkets and hypermarkets. The	581	All across India	Hyper, Super & Convenience

	supermarkets have a minimum size of 2,500 sq ft, while hypermarkets are larger with a minimum size of 50,000 sq ft. The Group has acquired a significant majority shareholding in Trinethra Super retail Limited from India Value Funds. Trinethra Super retail Limited is a leading supermarket and convenience chain with over 170 stores under the Trinethra and Fabmall brands. Its operations span across the four states of Andhra Pradesh, Tamil Nadu, Karnataka and Kerala.			
4.	Future Value Retail Limited is a wholly owned subsidiary of **Pantaloon Retail (India) Limited** led by its format divisions **Big Bazaar and Food Bazaar.** The company operates 120 Big Bazaar stores, 170 Food Bazaar stores, among other formats, in over 70 cities across the country, covering an operational retail space of over 6 million square feet.	170	All across India	Super & Convenience
5.	The **"6Ten"** Neighbourhood Convenience Stores are a division of the over Rs 1000 crores REI Agro Ltd, India's leading producer and exporter of basmati rice. The Company has recently decided to hive off this division by forming REI Six Ten Retail Ltd The retail division comprises of over 35 retail outlets in the North India region. Their other backend facilities including processing/packing units etc. The Company targets to open over 50 stores in next one year.		North India	Super & Convenience
6.	**Kovai Pazhamudir Nilayam (KPN)** has today emerged as a retail chain selling high quality fruits and vegetables in South India. At present they operate 19 stores across various	09 05	Chennai-Tamil Nadu Coimbatore-Tamil Nadu	Super & Convenience

	South India cities	02 02 01	Erode-Tamil Nadu Tirupur-Tamil Nadu Tanjore-Tamil Nadu	
7.	**The Heritage Group** is one of the fastest growing private sector enterprises in India. **Fresh@** is a unique chain of retail stores promoted by Heritage Foods - the leading dairy brand in South India. It operates 84 stores across South India at present.	43 13 28 **2**	Hyderabad-Andhra Pradesh Bangalore-Karnataka Chennai-Tamil Nadu	Super & Convenience
8.	**Nilgiris** is South India's leading chain of retail stores providing consumers a shopping experience that hinges around freshness of produce, superior quality and better value. From humble beginnings in the hills around Ooty and Coonoor at the turn of the twentieth century, Nilgiris has grown from being a Dairy Farm specializing in butter to a supermarket chain of over 90 stores spread across India's southern states.	90	South India	Supermarket Chain
9.	**Independent Pazhamudir Nilayams**	20	Coimbatore	Supermarkets
10.	**Varkeys Bakery and Supermarket** is the leading supermarket chain in Kerala, India. Providing all the needs of a household under one roof, it has made its mark as a "single stop shop" for its customers. The stores follow a uniform "Policy" emphasizing importance on the Quality, Price and service. They operate 10 stores in the Southern state of Kerala	10	Kerala	Supermarkets

In addition, the Bharti Walmart representative at the Ludhiana workshop reported there are now 125 'Easy Day' retail outlets in India, including 80 in the region north of Delhi (Punjab and Haryana).

Workshop Content:

Each workshop had a standard content, structured into five units:

26. Product management, including ordering, receival, storage, temperature and ethylene management (i.e. primarily back-of-store management)
27. Ticketing, display and promotions (front-of-store)
28. Cleaning and sanitation
29. Product information, using Washington apples, USA pears, Northwest cherries and Washington potatoes as case studies in implementing units 1 and 2, and also including the other products listed in the brief. In addition, and to make the workshop of more value to participants and US suppliers, additional products were added, including citrus, bananas, pineapples, papaya, tomatoes, melons, cabbage and onions
30. Retail trends, developments and concepts, using photographs from a range of retailers in the USA, Australia, New Zealand, Europe, Latin America, Asia, India, Egypt, and Abu Dhabi/ Dubai, to highlight developments, such as catering to convenience, organics, local/direct sourcing and diverse retail concepts.

Through each of the first three units, nine goals were included. e.g. order daily for daily demand, First-in First-out, only display what you can sell in one day. These goals were reinforced at the end of the Unit 5, together with an exercise asking participants to identify a personal or store goal, as a result of participating in the workshop. Not all goals were relevant, especially for those retailers without back-room operations.

Program Delivery:

(14) <u>Pre-workshop visits:</u>

(a) A visit was made with the WAC representative to a store from each participating retailer.

(15) <u>Workshops:</u>

(a) An electronic copy of the English version of the workshop presentation, and the industry video, were made available to each participant.

(b) Digital "Washington Apple" thermometers were provided to each participant, so they could identify and monitor the coolest and warmest locations in the refrigerated sections at the front of their stores. Many retailers did not have any refrigeration for fruits and vegetables and the use of general-purpose refrigeration for the storage of high value fruits was recommended, where possible. The use of the thermometers in cool rooms, distribution centres and refrigerated units at the front of the store was explained.

(c) The presentations were made in English only in Sri Lanka. This was also intended in India, but it soon became obvious many participants struggled without translation into Hindi or local languages. As a result, the SCS representative (and a participant-volunteer in Coimbatore) translated the presentation, other than for the Reliance workshop in Delhi.

(d) Samples and examples were used where possible to reinforce key messages in the different workshop units. For example, a range of apple varieties and retail and promotion resources, were used to support product information in Unit 4.

(e) The SCS representative attending the workshops presented the case study for the Washington apples and USA Pears. As in previous workshops in other countries, using the in-country representatives worked very well, helping cement relationships with retailers and providing variety in the workshop delivery.

(f) To reinforce the key messages, exercises and quizzes (with small prizes) were conducted during the workshops. This is always an effective way to encourage participation, as well as highlighting and reinforcing the information presented. Two examples were how to display different apple varieties (using colour as a key for decision-making, and also allowing for other factors, such as price, size, and origin), and appealing to all the senses of customers through daily activity and promotions.

(g) At the end of each workshop, participants were asked to complete and return an evaluation form. In the evaluation, they were asked to rate the value of each of the units presented, whether they would make changes in any practices in each of the five units presented, and if so what those changes would be. They were also asked to record the best feature of the workshop, as well as making suggestions for improvement. In Sri Lanka, the evaluation forms were exchanged in return for a WAC thermometer and the Certificate of Completion, helping to achieve high response rates. This was not always possible in India.

(h) US Embassy representation: In Sri Lanka, the Commercial Specialist, Adrian Mendis, attended the first workshop. In India, the Agricultural Specialist with the ATO in Delhi attended the workshop for Bharti Walmart.

(16) Post-workshop store visit:

The purpose of the post-workshop visits was to use practical examples to reinforce key information delivered in the workshops, and show how it could be applied at store level.

Elements of the store visits included:

dd) Back-of-store, in Sri Lanka and occasionally in India, to demonstrate practical implementation of Unit 1 (product management) and Unit 3 (cleaning and sanitation).

ee) Emphasising the importance of moving temperature-sensitive products (such as apples, pears and cherries) from receival to the correct storage as quickly as possible (temperatures commonly exceed 90 degrees F, coupled with high humidity). This was particularly important where receival and storage were on different levels of the store (such as some of the Food City stores in Sri Lanka),

resulting in extra time being needed to move products into storage.

ff) The Washington apple thermometers were used to identify the range of temperatures in cool rooms and refrigerated display units, and show participants how to use their thermometers when they returned to their stores.

gg) Highlighting the importance of high cleaning and sanitation standards, both at the front of the store and in back-room operations areas. Front-of-store features (units 2, 3 and 4) – such as what customers see as they enter the store, displaying in product categories, the importance of lighting, effective use of colour breaks and signage, stock rotation (FIFO when restocking displays), and enhancing touch points with customers (through strategic use of signage to provide information such as nutrition features, product uses etc), what to store in refrigerated display areas (in priority), more effective use of Weighing Stations, cleaning and sanitation.

US Product Comments:

In Sri Lanka there was a limited range of products from the Pacific Northwest, with only Washington apples available. In India Washington apples and USA pears were available.

Washington Apples:
Sri Lanka: Red Delicious was seen in all participating stores. Granny Smith were available in some stores.
India: Red Delicious was seen in all participating stores. Granny Smith and Gala were also available in a number chains.

USA Pears:
Sri Lanka: No pears were sighted, although retailers said they do stock Anjou and Forelle from time to time.
India: Anjou and Red Anjou were available in the market at the time of the workshops and generally known by most participants, even though not all stores were stocking US pears. Both varieties were featured in the presentations.

Northwest Cherries:
Sri Lanka: No cherries were available from any source, although Southern Hemisphere cherries were retailed in some upscale stores in very small volumes.
India: No cherries were available from any source at the time. Some retailers reported small volumes of Northwest cherries entered the market in 2010. As reported last year, they were nervous about the combination of high retail prices for imported cherries and the limited number of customers able to afford the product.

Washington Potatoes:
In both Sri Lanka and India only local potatoes were available.

Results and Evaluation:

352 participants attended the workshops, with each workshop ranging in size from 14 to 70 participants. Overall, 311 evaluation forms were completed and returned by participants. This was an excellent response rate. The profile of responses was:

Retailer	Responses	Participants
W'shop 1: Colombo. Keells	48	49
W'shop 2: Colombo. Cargills	61	64
W'shop 3: Coimbatore. Mixed Retailer Workshop – 6 retailers	21	31
W'shop 4: Cochin. Mixed Retailer Workshop - 3 retailers	18	24
W'shop 5: Delhi. Bharti Walmart	51	53
W'shop 6: Delhi. Reliance Fresh	44	47
W'shop 7: Ludhiana. Bharti Walmart	55	70
W'shop 8: Jaipur. Mixed Retailer Workshop – 7 retailers	13	14
Total	**311**	**352**

Workshop Evaluation by Participants:

Workshop Unit	Rating (1-5)	% indicating they will make changes
1. Product Management		
W'shop 1: Colombo. Keells	4.1	60
W'shop 2: Colombo. Cargills	3.9	84
W'shop 3: Coimbatore. Mixed Retailer Workshop – 6 retailers	4.4	61
W'shop 4: Cochin. Mixed Retailer Workshop - 3 retailers	4.2	94
W'shop 5: Delhi. Bharti Walmart	4.0	18
W'shop 6: Delhi. Reliance Fresh	4.1	30
W'shop 7: Ludhiana. Bharti Walmart	4.4	16
W'shop 8: Jaipur. Mixed Retailer Workshop – 7 retailers	4.3	8
AVERAGE	**4.1**	**46**
2. Display, Ticketing and Promotions		
W'shop 1: Colombo. Keells	4.2	58
W'shop 2: Colombo. Cargills	4.1	80
W'shop 3: Coimbatore. Mixed Retailer Workshop – 6 retailers	4.5	55

W’shop 4: Cochin. Mixed Retailer Workshop - 3 retailers	4.3	78
W'shop 5: Delhi. Bharti Walmart	4.1	18
W'shop 6: Delhi. Reliance Fresh	4.6	27
W'shop 7: Ludhiana. Bharti Walmart	4.4	22
W'shop 8: Jaipur. Mixed Retailer Workshop – 7 retailers	4.2	15
AVERAGE	**4.3**	**45**

3. Cleaning and Sanitation

W’shop 1: Colombo. Keells	3.8	63
W’shop 2: Colombo. Cargills	3.7	74
W’shop 3: Coimbatore. Mixed Retailer Workshop – 6 retailers	4.5	52
W’shop 4: Cochin. Mixed Retailer Workshop - 3 retailers	4.4	78
W'shop 5: Delhi. Bharti Walmart	4.0	20
W'shop 6: Delhi. Reliance Fresh	4.0	23
W'shop 7: Ludhiana. Bharti Walmart	4.2	22
W'shop 8: Jaipur. Mixed Retailer Workshop – 7 retailers	4.1	15
AVERAGE	**4.0**	**43**

4. Product Information, Care and Handling

W’shop 1: Colombo. Keells	4.1	58
W’shop 2: Colombo. Cargills	4.0	80
W’shop 3: Coimbatore. Mixed Retailer Workshop – 6 retailers	4.6	42
W’shop 4: Cochin. Mixed Retailer Workshop - 3 retailers	4.3	67
W'shop 5: Delhi. Bharti Walmart	4.1	22
W'shop 6: Delhi. Reliance Fresh	4.5	23
W'shop 7: Ludhiana. Bharti Walmart	4.4	24
W'shop 8: Jaipur. Mixed Retailer Workshop – 7 retailers	4.2	15
AVERAGE	**4.2**	**43**

5. Retail Concepts, Trends and Developments

W’shop 1: Colombo. Keells	3.9	50
W’shop 2: Colombo. Cargills	3.9	61
W’shop 3: Coimbatore. Mixed Retailer Workshop – 6 retailers	4.5	45
W’shop 4: Cochin. Mixed Retailer Workshop - 3 retailers	4.5	61
W'shop 5: Delhi. Bharti Walmart	4.0	10
W'shop 6: Delhi. Reliance Fresh	4.0	30
W'shop 7: Ludhiana. Bharti Walmart	4.3	20

W'shop 8: Jaipur. Mixed Retailer Workshop – 7 retailers	4.4	15
AVERAGE	**4.1**	**35**

COMMENT: The lower response rate to making changes by participants from Bharti Walmart and Reliance can be explained by the fact that while store staff may wish to make changes, corporate policy, which is driven by plan-o-grams and other 'modern' retailing concepts, prevents them from doing so. Similarly, participants at the Jaipur workshop may not have been confident about making changes, plus there was a higher proportion than usual of people from Distribution Center and Buying operations, rather than store operations.

Participants were also asked to list specific changes they would make in each Unit area, where they had nominated changes would be made in those areas. Most common responses were as follows:

Unit 1: Product Management

Keells, Colombo:

- Practice FIFO (Back and front)
- Maintain temperature standards
- Order daily for daily demand
- Improve cool chain, check temperatures

Cargills Food City:

- Review ordering, receiving, storage
- Identify products on receival for FIFO
- Order daily for daily demand to reduce shrinkage
- Change staff attitudes
- Colour codes for FIFO
- Increase range of fruits and vegetables in the store

Mixed Workshop Coimbatore (there were few comments because most stores do not have back rooms):

- Indent (order) daily
- Decrease the volume ordered, order more frequently, to increase sales (and reduce waste)

Mixed Workshop Cochin:

- Better ordering, receiving, storage
- Control purchasing and ordering better
- Indent (order) based on daily sales
- Use the space in general purpose chillers to store high value fruits
- Keep exhaust fans working near chillers to avoid heat
- Order as per requirements

Bharti Walmart, Delhi:

- Check ordering – use historical data
  COMMENT: Many of the participants were from small 'Easy Day' formats, which have no back-end storage.

Reliance, Delhi:
- Monitoring and handling pears in DC (Supply Chain team)
- Better indenting/ordering
- Maintain FIFO, especially high value imports

Bharti Walmart, Ludhiana:
- Consider promotions when ordering
- Receiving and storage should fit according to temperature
- Manage temperatures better
- Now I know, I can reduce dumping of fruit
  COMMENT: All the participants were from small and medium (the majority were medium stores) 'Easy Day' formats, which have no back end storage.

Mixed Workshop Jaipur:
- Communicate fruit management

Unit 2: Display, Ticketing and Promotions

Keells, Colombo:
- Improve displays in refrigerated cabinets
- Ticketing has to be more prominent and informative
- Incorporate information in training modules
- Categorize products for display
- Promote product features
- Don't spray fruits

Cargills Food City:
- Display techniques to make products more visible
- Ticketing can be improved
- Make displays colourful
- Appeal to the senses
- Cross merchandising

Mixed Workshop Coimbatore:
- Use colour for effective displays
- Uniformity of ticketing
- Take steps to reduce high wastage
- Display ticketing with larger letters

Mixed Workshop Cochin:
- Use colour combinations better

- More attractive colour and ticketing
- Provide more information about the products on tickets
- Concentrate more on ticketing that will impress the customer
- Update display, ticketing and promotions

Bharti Walmart, Delhi:
- Try to make new information on ticketing
- Practice FIFO on a daily basis
- Focus on colour and lighting

Reliance, Delhi:
- More product information on tickets
- New display techniques and colour combinations

Bharti Walmart, Ludhiana:
- Put product descriptions on tickets
- Will work to improve displays
- Communicate better with customers
- Use the weighing area for up-selling
- Implement description of 'seedless' fruits
- Display in categories
- Use ticketing to communicate more

Mixed Workshop Jaipur:
- Improve display and ticketing

Unit 3: Cleaning and Sanitation

Keells, Colombo:
- Check cleaning and sanitation standards
- Stress difference and importance of cleaning and sanitation
- Need to learn how to maintain high hygiene standards
- Larger stores do well. Need to look critically at smaller stores

Cargills Food City:
- Improve consistency of cleaning
- Improve cleaning and hygiene standards
- Clean storage – clean environment
- Train all staff to keep back area clean and sanitized
- Ensure cool room is clean and neat
- Standardize cleaning procedures

Mixed Workshop Coimbatore:
- Stress importance of cleaning to staff

- Improve back office sanitation
- Separate old stock and damaged fruit

Mixed Workshop Cochin:

- Keep the surfaces of the weighing station clean
- Improve cleaning and sanitation
- Ensure cleaning is better for customers
- Make every place in the store hygienic
- We will improve ourselves to make our shops more clean and sanitized

Bharti Walmart, Delhi:

- Make store bacteria free and clean
- Sanitation of the cutting areas
- Monitor constantly

Reliance, Delhi:

- More focus on sanitation
- Prepare guide for staff
- Follow routine for cleaning and sanitation

Bharti Walmart, Ludhiana:

- Sanitize knives
- Do cleaning and sanitation more deeply
- More focus on cleaning and hygiene

Mixed Workshop Jaipur:

- Develop ‘clean store any time’ guarantee
- Clarify cleaning and sanitation with staff

Unit 4: Product Information, Care and Handling

Keells, Colombo:

- Educate staff more about product handling
- Educate trainers
- Implement good communication with customers and staff
- Ensure careful product handling
- Promote nutrition of products

Cargills Food City:

- Practice FIFO
- Improve handling to minimize damage
- Train staff to handle sensitive products
- Educate staff about products
- Better care and handling

- Change display/stacking methods

Mixed Workshop Coimbatore:

- Handle products carefully
- Dust free, disease free, FIFO
- Communicate with customers; provide more information to customers
- We will use gloves for handling
- Separate 'ripe'/'semi-ripe' fruit (pears) for quick customer selection, and reduce wastage

Mixed Workshop Cochin:

- Make down-line staff aware of care and handling
- Teach the staff the products information, care and handling
- Check the quality (maturity) of pears

Bharti Walmart, Delhi:

- Don't keep potatoes in light
- Make displays like slides
- Put product information on tickets
- Share information with my associates

Reliance, Delhi:

- Maintain the cold chain
- More focus on imported SKUs – chiller only; not ambient
- Train staff with information presented
- Handle products more carefully
- Improve pear handling

Bharti Walmart, Ludhiana:

- Provide more product information to customers
- Take more care with perishables
- Communicate regarding new arrivals
- Use pictures and promotion materials as displays

Mixed Workshop Jaipur:

- Improve care and handling
- Show differences between apple varieties

Unit 5: Retail Concepts, Trends & Developments

Keells, Colombo:

- Better merchandising
- Display and handling
- Adopt best practices to our existing policies

- New ways to introduce new fruits
- Cross merchandising
- Prepare paper for projects department and higher management

Cargills Food City:

- Look at developing organics
- Display techniques
- Improve merchandising and promotions
- Cross merchandising
- Promoting our producers/farmers
- Improve display and clear clutter

Mixed Workshop Coimbatore:

- Advertise at front of shop and at entrance
- Adopt features to satisfy customers
- We will introduce new imported fruits frequently
- Improve lighting, like other countries

Mixed Workshop Cochin:

- We will allow our staff to visit other outlets in our city
- Use photos and other information to promote our farmers (suppliers)
- Utilize POS for impulse selling

Bharti Walmart, Delhi:

- Focus on correct ordering
- More effective ticketing
- Better weighing area

Reliance, Delhi:

- Help customers with their buying
- Develop new display concepts
- Interact better with customers

Bharti Walmart, Ludhiana:

- Make more impactful displays
- Use colour concepts to display fruits
- Differentiate displays into categories
- Include new and seasonal items

Mixed Workshop Jaipur:

- Trial some concepts

Responses to the other evaluation questions were:

What was the best feature of the training program?

Keells, Colombo:

- The Washington apple video (the new version, and many responses with this comment)
- Product management and ticketing
- Product display, merchandising and handling
- Storage information
- New trends of modern trade (retail)
- Ticketing and promotions

Cargills Food City:

- The Washington apple video (the old version, and a number of responses)
- Learning about apple varieties
- Display methods and product knowledge
- Product management
- Exposure to retail markets around the world
- Making displays colourful
- Improving FIFO in storage and displays
- 'Only display what you can sell in one day'
- Ticketing
- Merchandising
- Q and A sessions
- Audio-visual aids used
- It will help our day-to-day operations

Mixed Workshop Coimbatore:

- Learn more about sales and quality
- Display and ticketing
- Slides and pictures
- Helped us to know how to increase sales
- Personal interviews at store visits
- Helped understand best practices
- Learn about products, plus how to retail better, especially from other countries

Mixed Workshop Cochin:

- Learn about other countries display and practices
- Information about growing, handling, packing in the US
- Very interactive and informative
- Helped us familiarize with international selling methods
- Good knowledge about apples and other products

- Details about fruits and how to display; maintenance; cleaning
- Cleaning and sanitation
- Know about racking, display and ticketing
- Product knowledge and product handling

Bharti Walmart, Delhi:

- Will help my company profitability
- Display techniques
- FIFO
- Group activity; audience involvement; interactive
- Product management and display
- Good presentation and translation
- Extra knowledge about ticketing and promotions
- International fruit and vegetable displays
- Apple waxing information
- Shrink and damage ideas – salads and juice

Reliance, Delhi:

- Good exchange through open discussion
- Product display and handling
- Product knowledge – care and handling
- US product information and varieties
- Handling imported apples and pears
- Display, ticketing and promotions
- Innovative use of ticketing
- Merchandising techniques
- International retail slides; best practices
- FIFO management

Bharti Walmart, Ludhiana:

- Product display techniques
- Product knowledge
- Practical examples
- Display, ticketing and promotion techniques
- Cleaning and sanitation
- How to maintain the presentation of the fruit and vegetable area
- Interactive and 2-way communication
- I now know a lot about apple category
- Product knowledge to improve standards of handling
- Hindi translation made it easy for everyone to understand

Mixed Workshop Jaipur:

- Improve my knowledge and gave good ideas for sales and profits
- Good pictures and examples
- Display, ticketing and promotions

- Knowledge will help improve shelf life
- Good store display pictures
- Good communication of information by sharing between participants

How can the program be improved?

Keells, Colombo:

- Sample product
- More time on nutrition value of fruits
- Have programs like this regularly and supplement
- More practical activities, such as display
- More printed material to share with staff
- Need/take more time – full day
- Videos of foreign retail
- Overcome the language barrier

COMMENT: The evaluations were completed before the store visit, where participants are exposed to the more practical nature of the workshop. In most circumstances this is the only practical option to achieve a satisfactory evaluation return/response rate

Cargills Food City:

- More explanation on in-store promotions and value-added/cut product range
- Define cleaning and sanitation in more detail
- Expose information to all our staff
- Need practical session
- Use more video clips
- More activities – role plays, group exercises etc
- On-the-job training
- Sample the different Washington apple varieties
- More emphasis on vegetable storage and handling
- More techniques on minimizing waste
- Language is a problem for some

COMMENT: Again the evaluations were completed before the store visit. In addition Cargills limited the store visit to around only 15 of the 60+ staff who participated in the morning workshop. While the reduced numbers were unfortunate, the smaller group included the company's Chief Operating Officer throughout the store visit. He had also attended most of the workshop in the morning and was obviously dedicated to improving the performance of the fruit and vegetable department within all Cargills' 151 stores.

Mixed Workshop Coimbatore:

- Translate into local language (Tamil) – many responses
- Communication could be better
- Conduct training more often
- Make more relevant for small retailers

Mixed Workshop Cochin:

- Full day needed
- Information on nutrition

Bharti Walmart, Delhi:

- More videos and picture displays with big screen and good light management
- More Indian fruit and vegetable examples
- Sample apple and pear varieties
- More elaboration and interaction
- More specific for India, especially smaller store formats
- Should be in local language

Reliance, Delhi

- More video time
- More training programs
- Increase number of training days
- More post-harvest information, including storage and handling (Supply chain team)
- More about merchandising
- Sample apple and pear varieties
- Information on fruit quality and shelf life under Indian conditions
- Training CD in local language – easier to cascade down to store staff
- Present in local language – easier to understand
- Expand training to all store staff
- Train the trainer programs (Training team)

Bharti Walmart, Ludhiana:

- Include nutrition value, especially of imported fruits
- More India examples and India modern retail concepts (several comments)
- Sample/taste imported fruit
- More on sanitation processes

Mixed Workshop Jaipur:

- More store pictures
- Hold training more often

Review and Recommendations:

For previous workshops, recommendations have related to how the program can be improved, based on evaluation responses, observations and feedback with in-country representatives. While suggested improvements have been noted and will be implemented where practical, for this report, a different approach has been taken.

In addition to measuring the success of the workshops through the evaluation responses, there are other practical measures that could be monitored by the local representatives, as a result of the workshops. In Sri Lanka, both retailers were enthusiastic to make improvements, to increase

sales and profitability. At the post-workshop visits, in particular, copious notes were taken by management at all levels.

By contrast, in India the level of note-taking/recording of discussions was significant in its absence at post-workshop visits. To cover both sets of circumstances, some suggested improvements, and how they can be measured and monitored, are shown below. Many of the recommendations were discussed and agreed with participants at the time. These can be shared by the SCS Group with the respective retailers and monitored accordingly.

SRI LANKA

Keells goals:

1. All stores with plastic curtains on cool room doors
2. Washington apple displays consolidated, not multiple
3. Cool room temperatures reduced to at least 8 and preferably 6
4. Lighting and ticketing improvements

Cargills Food City:

The COO of Food City said he wants to achieve a doubling of sales and trebling of gross profits in the fruit and vegetable department in six months, as a result of the workshop. A blueprint to achieve this goal could be (in order of impact, ease and cost of implementation):

1. Consolidate displays i.e. one display per product, such as Washington apples
2. Move fruit to the front of the fruit and vegetable department /refrigerated display i.e. the customer sees/enters the fruit section before vegetables
3. Reduce temperature of refrigerated display cabinets to maximum 8 degrees, and preferably maximum 6 degrees
4. Lighting: Use Triphosphor fluorescent lights and 'Cool White' down lights; implement procedures to make sure all lights are working and clean
5. Ticketing. Use more informative ticketing
6. Communication: Tell your story (farmers, scholarships etc) to customers through images, plus images of F & V; revamp weighing stations – work space
   Measures: Number of stores where fruit has been moved to front of department (from back); Washington apple displays consolidated, not multiple; Number of stores with refrigeration display temperature no more than 8 degrees; more detailed ticketing and better lighting; double sales and treble gross profit in F & V within 6 months.

INDIA

Coimbatore:

Highlights were the participation of:

1. The young CEO of Pazhamudir Nilayam, Senthil Natarajan, who travelled from Chennai specifically for the workshops and made a major contribution by not only sharing ideas

but also volunteering to translate the presentation into Tamil, the local language. This initiative made a major difference to the success of the workshop.

2. Mr. S. Thiyagarajan, the Regional Fruit & Vegetable Manager for Spencer's, responsible for approximately 100 stores. During the post-workshop store visit with him and his team, a commitment was made to some significant changes and improvements in their stores. As he detailed in a subsequent email "I just would like to convey my thanks for the visit you paid to our outlet at Coimbatore. It was very useful guidance for our team. Definitely, we will change our strategy to selling only fruits, and increase our sales". This strategy was developed during discussions about their inability to compete with traditional retailers (street vendors) in selling low-value vegetables.

   Potential measures to monitor are:

   - Number of Spencer's stores converted to fruit only
   - Number of stores using general purpose refrigeration units to store high-value fruits, such as apples and pears. This initiative evolved from discussions about displaying only enough product to sell in one day and storing back-up stocks in refrigeration units, in the absence of back rooms and cool stores in their formats.

   Mr. Thiyagajan had previously been the fruit and vegetable manager with Heritage ("Fresh @") in Chennai, where he attended a retail training workshop. He reported making a number of changes, as a result of the workshop and sales increased significantly. These changes included reducing display space for individual products, allowing quality to be better maintained and also allowing for an expanded range of fruits to be displayed; better lighting; improved cleanliness and store ambience.

3. The manager responsible for the expansion of Bharti Walmart into Southern India. He had travelled 400km (250 miles) to attend the workshops. It seemed obvious their arrival will stimulate competition and improve the performance of modern retailers generally.

In addition, 11 members of the media attended this workshop. It was fortunate Keith Sunderlal was available to respond to issues raised by participants about the use of wax on apples.

Cochin:

After the experience in Coimbatore about using general purpose refrigeration for storing high value products, like Washington apples (in the absence of any back room refrigerated storage), an additional slide was added to the presentation, with the messages:

- Display only what you can sell in one day; or smaller displays early, larger later in each day (busiest time is from 6pm onwards)
- Store balance of high value products in general purpose chiller
- Remove chiller-unit heat with extractor fans

These messages were received enthusiastically by participants, as all three of the participating retailers were in this position. Suggestions discussed with these retailers, during private sessions with each, were (in order of importance, ease of application and cost):

1. Use spare space in general purpose chillers to store Washington apple stocks not on display
2. Implement improved cleaning
3. Ensure exhaust fans are working, to remove heat from chiller unit motors, especially when they are located close to the fruit and vegetable department
4. Expand the range of fruit products and the varieties of each product (this can be achieved by displaying less product of each variety and keeping stocks in refrigeration)
5. Improve lighting i.e. ensure all the lights are working. In the longer term use white light to highlight freshness (triphosphor white fluorescent lights)

Spencer's were very keen to apply the suggestions, which were described as an Indian solution to circumstances unique to India (i.e. no refrigerated storage or display units). As a result, a measure of success of the workshops could be the level of implementation of these ideas in their stores in Kerala. They offered to keep SCS Group advised on progress with implementation. Their manager commented the ideas, particularly the use of refrigeration, would improve their sales for Washington apples, USA pears and other high value fruits, by giving their staff more confidence to order, manage and sell more product.

Delhi:

Reliance: While in Cochin the opportunity was taken to visit a Reliance store, in preparation for their Delhi workshop. As a result of this visit, where approval was given to take photos, additional material was prepared for inclusion just for this workshop. Specifically, emphasis was placed on the importance of lighting and the more effective use of the refrigerated display area used for high value fruits and vegetables. The usefulness of these slides was reinforced at the post-workshop visit, where the produce chiller was not being utilized effectively and lighting could be significantly improved. Both of these issues need the involvement of management more senior than store staff for improvements to be implemented. Management representatives were present at the visit.

Improvements could be measured and monitored as follows:

1. Reducing the operating temperature of the chiller units to 8 degrees Celsius or less
2. Displaying apples together as a category, rather than separately, using good colour combinations for effective display
3. Use of white fluorescent lights (not yellow) in the produce department, including chiller units

Delhi and Ludhiana:

Bharti Walmart: Photos from the post-workshop visit to the smaller format ‘Easy Day’ format store in Delhi were used in the Ludhiana presentation to show how improvements could be made

in merchandising and display at the front of stores. In the 90 minutes between the workshop and the post-workshop visit, many of the suggested improvements had been implemented, a good measure of the value of the workshop. These and other subsequent suggested improvements included:

1. Using the chiller in the fruit and vegetable department to display/store high value and perishable fruits, such as imported apples, rather than low value and non-perishable soft drinks
2. To minimize damage to apples in transit from DC to stores, especially Granny Smith, use tray liners from shipper cartons in the retail crates
3. Display fruits first in the fruit and vegetable department
4. Display fruits (apples, pears, tropical fruits etc) in single location categories, rather than in multiple locations
5. Reposition weighing stations so staff face customers when they are being served
6. Display heavy products (e.g. melons) at the front of displays, for ease of access by customers

Jaipur:

The attendance of seven different organisations made up for the lower number of participants, by being able to share the information across a wider range of retailers, from larger hypermarkets to much smaller retail formats. The program was amended specifically for this audience and included some of the material developed for the Delhi and Ludhiana workshops, showing how storage, display and handling could be improved in small to medium format stores. Overall, the improvements listed above could also apply to Jaipur retailers.

In addition, the presence of Distribution Center staff resulted in an impromptu workshop on correct storage in DCs. The lesson from this exercise was the potential to extend the training program along the supply chain, to include product management in DCs.

Additional Comments:

35. Language: As reported elsewhere, English-only is a barrier when the workshops are presented in secondary cities in India, such as Coimbatore and Cochin. The situation was resolved on-the-run in both these locations. The choice of hard copies of the presentation in English and local languages (as implemented in Malaysia) would also benefit participants.

36. Additional Product Information - Nutrition: As in 2010, there were a number of requests for additional information on the nutrition features and benefits of fruits and vegetables. This could be achieved by covering the top 20 fruits and top 20 vegetables, including all the partner products.

37. Product Sampling: In a number of countries, including India, evaluation responses, particularly from store-level staff, have regularly requested the sampling of US apple and pear varieties as part of the workshop program, possibly because staff have never tasted the products.

38. Industry DVD: The new Washington apple industry video adds considerably to the impact of the presentation, especially as sub-titles are also available. The video was used to lead into Unit 4 of the presentation and was a positive feature, according to many evaluation responses.

39. Category Management: The Category Management training program, first developed in late 2010 at the request of the WAC representative in Russia, was shared with the team in India, who believed it could be useful and of interest in those retailers who collect sales data which can be analysed. This program could be an adjunct to the current retail training and would be relevant to managers who are generally higher up the management chain. From experience in Russia, the best format is likely to be a 90 to 120 minute round-table workshop with a small number of category managers, who have an important influence on fresh produce within their chains.

40. Participation of Representative's Staff: The benefits of having staff (and merchandisers) of the in-country representative attending the workshops (and presenting some of the Unit 4 content) were again highlighted.

Acknowledgements:

My thanks to the many people contributed to the success of the workshops, including:

- Sumit Saran, Keith Sunderlal and their staff at SCS Group in India
- Rebecca Baerveldt, Export Manager, Washington Apple Commission, Wenatchee
- Staff from the various retailers for their enthusiastic participation in the workshops.

John Baker
Chief Executive
Produce Marketing Australia
February 18, 2011

Attachment 1: "In Their Own Words" — What Members are Saying About FoodHub

"FoodHub is great; I had no idea all those farmers were out there. With a click of a button I have immediate access to a world of possibilities. It's just what I need."
— School food buyer, Beaverton Public Schools,

"It saves all the work of trying to research and figure out who the right contact person is. It's all right there; it's great."
— Brian O'Driscoll, Springbank Farm

Brian and Michelle O'Driscoll, Springbank Farm

"I've had a lot of success in posting inquiries saying 'I'm looking for this product or that product' and ultimately having people respond and making a connection."
— Melissa Williams, Restaurateur, Adam's Sustainable Table

"When I joined FoodHub I was just so excited because it made my life so much easier. All of the growers are there, in one place."
— Rebecca Andersson**,** Know Thy Food Buying Club

Scot Laney, Eat Oregon First

"It's a pretty seamless way to get to know people that it may have been more difficult for us to find on our own."
—Distributor, Eat Oregon First

"FoodHub is a great way for us to reach out to distributors and restaurants and caterers. It cuts out a lot of the leg work and makes the initial contact a friendlier experience."
— John Bannerman, Wilderness Poets

"Direct sourcing is at the core of our purchasing philosophy, and FoodHub certainly expedites the process. By creating a marketplace for these small and mid-sized growers, FoodHub enables Grand Central Bakery to support local economies while giving our customers a product of exceptional quality."
— Cuisine Manager, Grand Central Bakery

FoodHub has been a great way for us to find local sources. We want to keep these smaller farmers in business, and the only way to do that is if we're all buying from them.

— Susan Baker, Food Club Buyer, Columbia County Natural

Ambrose Calcagno, CalFarms

"It's a unique opportunity to market ourselves to a wide variety of buyers. It gives us credibility with new customers. We did a deal with Portland Public Schools through FoodHub. Before, that would have been a contact I wouldn't have thought of, but FoodHub helped us set that up and it was a real good experience for us."

— Farmer, CalFarms

"We're not planting more crops; instead we're planting more of the crops that grow better here. We used to raise 30 different varieties to take to farmers' markets. Now I grow 16 crops that do really well here and I sell it all because of the connections I've made on FoodHub."

— Phil Greif, pd Farms

"It's a great way for making introductions. As a marketing tool it's huge."

— Farmer, Big B Farms

Matt and Frank Battilega, Big B Farm

"With sales, most of the time it's boots on the ground. FoodHub allows us to not have to work the phones or put boots on the ground. It allows us to hit a lot of people very quickly. I believe it has all the tools companies need to make the connections they need.

As a small grower we'll be able to extend our market and reach out to where we want to do business without having to invest the time to physically go out there. It's a one stop shop. … With FoodHub you're able to leverage your time and expedite the process. There's no tool I'm aware of in the marketplace that can do that and that's so interactive.

FoodHub is advancing food grown and harvested locally. It literally connects the dots. And it's not just a one way tool for sellers, it saves a headache for buyers too."

— Pete Mulligan, Bull Run Cider

Attachment 2: FoodHub Connections Stories

Bella Terra Gardens ↔ Wahluke School District

They are a local food triple threat. As growers, packagers and distributors in Zillah, WA, **Bella Terra Gardens** – along with the other branches of their company, Barbee Orchards and Obert Cold Storage – bring local produce to local buyers. They've been in business since 1914 and had one food market left to explore: local schools.

But they didn't learn that schools were buying more local items by word-of-mouth. They found them on FoodHub.

Since joining FoodHub last fall, Gregg Everts of Bella Terra said he has made five connections with buyers from their Spokane, Seattle and Portland delivery triangle.

"The attitude among a lot of distributors seems to be 'go big or go home', but we don't want to go big. We just want to serve local people," Everts said, "and we're finding great success with FoodHub. Those five people we connected with will know five other people. It's just a snowball effect that's helped us get more business."

While searching the Marketplace for local buyers he saw a post from **Wahluke School District** Nutritional Services Director Diane Hyndman, based in Matawa, WA, about 60 miles away. Now, Everts is discussing plans to replace the current cucumbers and tomatoes on the school's salad bar with Bella Terra's locally grown products.

"It's a learning relationship for us," Hyndman said when asked about transitioning more school food to local. "Cucumbers and tomatoes were easy to transition to local because those were already things we were buying in bulk."

While tomatoes and cucumbers are a good start, Hyndman expects Bella Terra will bring more to the table.

"Right now we're starting out small at two cases a week, but we're hoping there's potential for growth. If they have a truck up here already it's advantageous to see what else they could bring," she said. And for Hyndman it's all about planning ahead. Since she's joined FoodHub, Hyndman said, seeing who's available on the horizon has become clearer.

"I think FoodHub is a great tool to learn who is in your regional neighborhood and learn what they're producing," she said. "It's hard to know what farms are 40 miles out there. They might be out of our immediate community, but still close enough to get food from. It gives me a real sense of who's in my area. FoodHub brings the farmers market right into my office."

"This is our first year that we're selling to schools," said Everts, "and it's because we got on FoodHub and got connected. It's easily accessible, it's right there in front of you on the computer, and it's just easy to get online and access points of interest."

Sassafras Catering ↔ Wobbly Cart Farm

About a year ago, Sassafras Catering in Portland, Oregon started canning. With only a staff of two, they churn out 200 jars at a time of delectable treats like apple chutney and pickled pears.

"We use 50 to 100 pounds of product for each batch," said canning manager Jennifer Brooks, "and that's just for the main ingredients. Then there's everything else that goes into it."

When Jennifer needed a local source for Sassafras' Sunchoke Relish, she turned to FoodHub.

After placing a "Wanted" post in the FoodHub Marketplace, she connected with Joseph Gabiou of Wobbly Cart Farm, a grower and recent FoodHub Member in Rochester, Washington. Now, she's hoping that Joseph will not only be able to grow sunchokes for her, but also a list of 12 other essential ingredients to support Sassafras' line of nine canned goods.

"It was really exciting to sign up, find Jennifer in the Marketplace, use the communication tool to get ahold of her, and the day after, be talking to her, " said Joseph who signed up for FoodHub to find another way of getting excess produce to market during peak seasons.

"We're hoping that with the connections we find on FoodHub we can extend and refine our product line, keeping our quality and production scale high with a small staff," said Jennifer, who didn't think she would have connected with Wobbly Cart outside of FoodHub.

"I think FoodHub is going to set a standard for farmers and chefs connecting year-round, instead of just at events like the Farmer-Chef Connection," Jennifer said.

David Douglas School District ↔ Treasure from Heaven Farm

Treasure from Heaven Farm sits in the northeast corner of Oregon, near the border with Idaho. On five acres, Andrea Sandberg and her family raise tree fruits, berries, and vegetables; free range geese, chickens and ducks to reduce the insects and mulch the crops; Nigerian milking goats; and pigs.

The small farm, which is fairly new, grew out of the Sandbergs' unreserved enthusiasm for gardening. In their first years, they supplied CSA members and the La Grande Farmers Market. Upon joining FoodHub and reading Marketplace posts, Andrea discovered that Portland-area food buyers were requesting many of the products that Treasure from Heaven grows and raises. The Sandbergs now sell fruits to the David Douglas and Beaverton School Districts—"We feel that it is a privilege to have our produce served to school children," she says—and whole pigs and farm fresh eggs to Portland fine dining restaurants.

"FoodHub is such a great resource for us small farmers out in Baker County," Sandberg proclaims.

Sound Food ↔ Flying Dog Farms

When they moved to Grapeview, Washington, seven years ago, Sue Sampson and her family embarked on a grand experiment.

They called their experiment **Flying Dog Farm**, took classes in farming and ranching at their local extension office, and dug in. After five years of growing pastured pork, and with her business steadily expanding, Sampson knew she needed to start another experiment, this time in marketing. That's when she found FoodHub.

"I was trying different things," Sampson said, "so I thought I would invest in FoodHub and see where it led me."

Recently, FoodHub led her to Bainbridge Island and a connection with FoodHub Associate Member **Sound Food**, which works to strengthen the food network in Washington State's West Sound. While trying to help a local retailer source pastured goods for their freezer, Sound Food's Carolyn Goodwin logged into FoodHub and started searching.

"We wanted to include frozen, vacuum packed, USDA inspected pastured meats in the offering there," Goodwin said. "Sourcing can be a real issue for sustainable, USDA inspected meats so I turned to FoodHub, found Sue, and voila, I called! It was a big win-win, all made possible by FoodHub."

Now, according to Goodwin, not only are they planning to source pork from Flying Dog Farm, but are also considering stocking the beef and lamb Sampson recently added to her ranching repertoire.

With her foot in the door and more eyes on her farm, Sampson plans to approach other grocers and restaurants in the Bainbridge area to market her meats.

"We're really excited about this connection," Sampson said. "Bainbridge Island is an untapped market and FoodHub has opened up a new avenue for us."

Attachment 3: FoodHub Photo Gallery

FoodHub was honored to host a March meeting on regional food hubs, working in collaboration with USDA Rural Development. Ecotrust's Billy Frank Junior Conference Center was filled to capacity for the event, which brought together region food system stakeholders including farmers, government and nonprofit organizations, and professional and trade associations.

Ecotrust Food and Farms Vice President Deborah Kane with USDA Oregon Rural Development Director Vicki Walker and USDA Washington Rural Development Director Mario Villanueva.

FoodHub and Farm to School Program staff helped to facilitate conversation among stakeholders throughout the day.

Dr. Kathleen Merrigan, USDA Deputy Secretary, addresses the crowd in her keynote presentation.

Slideshow: FoodHub in Action

In July, 2001, *Sustainable Business Oregon* featured a story by editor Christina Williams, "FoodHub unveils facelift, readies to go national", which included a photo slideshow highlighting some of the site's users. With gratitude to *Sustainable Business Oregon* and the *Portland Business Journal*, the slideshow is included below, along with other images from FoodHub, the FoodHub Blog, and our records.

Slideshow: FoodHub in action

(1) With more than 2,200 members in five western states, the connections made between farm and table are many. Read on to learn more about Tricia Butler of Sassafras Catering (above), one of many who use FoodHub for their businesses.

(2) FoodHub, launched in February 2010, unveiled a redesign in July. A site that was known as the Match.com of the local food industry added the "Web 2.0" features to make it more of a robust social network and search engine for the food business.

(3) Deborah Kane, Ecotrust's vice president of food and farms for the nonprofit think tank Ecotrust, oversaw the launch of FoodHub and traveled to Washington, D.C., in July to take the local-food innovation message to the white house.

(4) Matt Battilega is a fourth-generation farmer and a recent graduate of Oregon State University who went looking for a technologically savvy way to connect his family farm's crops with buyers. "FoodHub is a Facebook for farmers," Battilega said.

Slideshow: FoodHub in Action

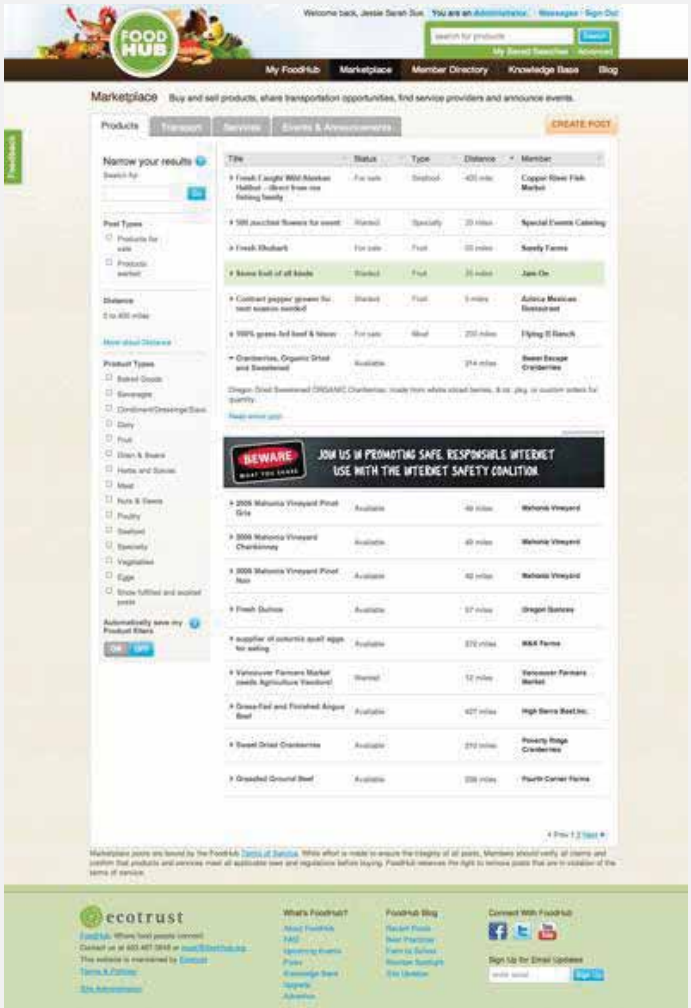
(Sustainable Business Oregon)

(5) Battilega's Big "B" Farm Inc. found a buyer for its rhubarb in Grand Central Bakery, which bought it up for pies and galettes. Now it's harvest time for zucchini.

(6) Grand Central Bakery of Portland and Seattle has been a leader in working directly with farmers for ingredients, but depends on FoodHub to fill in the gaps as it did when the bakery was in need of between 250 and 350 pounds weekly of rhubarb. This chard is from a Sauvie Island farm.

(7) Danille Tyrrel, a lead cook at Grand Central, takes chicken out of the cooler from Eat Oregon First, a distributor in Portland that is an active FoodHub user. "We grow a lot of our own stuff, but we never seem to have quite enough," said Eat Oregon First's founder Scot Laney.

(Slideshow continued next page)



(8) The new-and-improved FoodHub features more sophisticated search functionality and a marketplace that offers featured listings.

Slideshow: FoodHub in Action

(Sustainable Business Oregon)

(9) Ivan Maluski of Tipping Tree Farm is finding an ally in FoodHub as he moves more heavily into heritage animals such as these —Large Blacks and Tamworth reds, which he his cross-breeding.

(10) Maluski keeps 50 heritage turkeys on Tipping Tree Farm and has leased 40 additional acres for the

(11) Maluski keeps a day job as conservation director for the Sierra Club, so he appreciates the business-development services offered online by FoodHub.

(12) "Sourcing has always been the hardest part of our job, and FoodHub has helped relieve some of the pain," said Tricia Butler, founder of Sassafras Catering, a maker of artisan preserves.

(13) Butler used FoodHub to find growers of the specialty crops she needed for relishes and chutneys, including sunchokes.

(14) Finding reliable farm connections has allowed Sassafras Catering to ramp up production, allowing the two-person Portland company to start selling preserves on the shelves at Whole Foods.

Lean Against the Truck

In early October, partnering with Whole Foods Market, the FoodHub team fielded the first face-to-face networking opportunity exclusively for FoodHub members. The event was a response to feedback from wholesale food buyers who expressed the desire to meet the producers face to face and get to know the people behind the products. For two and a half hours at this pop-up marketplace, sellers promoted their goods and wholesale buyers perused the impromptu stalls.

Deborah Kane checks in with the FoodHub team at the registration table, while buyers and sellers mingle at a pop-up marketplace. The two groups were able to get acquainted, make deals on site, or exchange contact info for later follow up.

To make her sipping vinegars, Sage and Sea proprietress Deb Tabor sources specialty crops from WA and OR producers including Maryhill Orchards, Unger Farms, and Persephone Farm.

Staged in the heart of the city, the purpose of this event was to capture the sense of informal interaction that might happen if food buyers could visit with wholesale sellers at a farm, ranch, or commercial kitchen.

A selection of the products, including specialty crops, featured by the producers who attended the event. Blossom Vinegars, based in Portland, creates specialty vinegars with fresh, whole fruits and herbs from throughout the region, with vinegars including Blueberry Basil, Raspberry, and Walla Walla Onion.

This successful event can serve as a model for future wholesale marketplaces that will allow FoodHub members to make face-to-face connections. More information about this first event is available on the FoodHub blog, along with more photos from the event: http://food-hub.org/news/2011/10/friendly-faces-from-lean-against-the-truck/.

Appendices to Final Report for Project #6*: Cut Flowers: Developing Sustainable Insect Management Techniques*

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Appendix A

The Cut Flower Industry: Overview

The US cut flower industry has changed dramatically in recent decades, significantly altering the conditions under which Washington cut flower growers compete to sell their products. Dominant trends in the cut flower industry include:

- Increased volume and price competition from imported cut flowers,
- Increased sales of cut flowers through general retailers (e.g. grocery stores), and
- Increased sales of cut flowers through internet based companies.

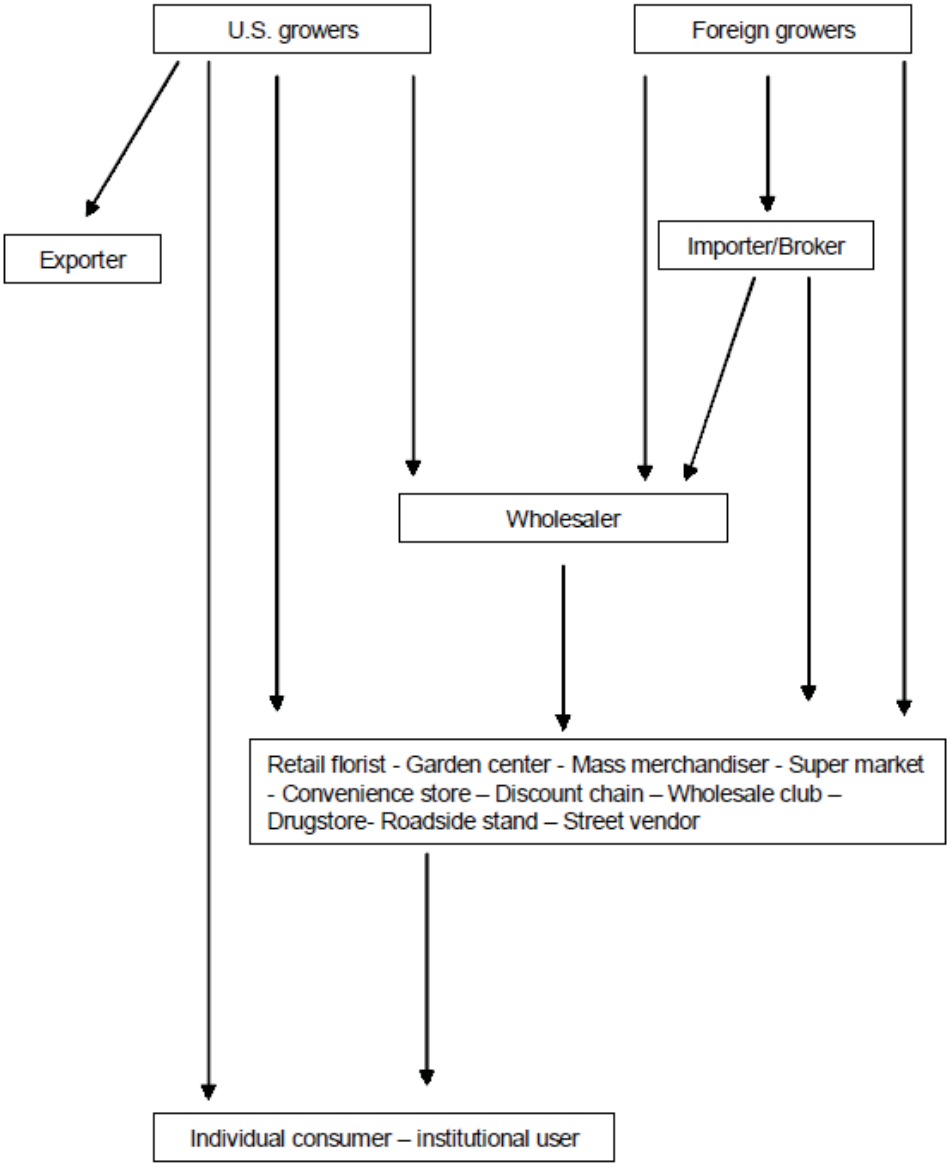
These interrelated factors have changed the cut flower supply chain in the US and made it more difficult for small, regional growers to reach consumers and compete for sales. Figure 1 (below) from the US International Trade Commission illustrates the flow of fresh cut flowers from the grower to the final consumer. Foreign growers currently supply most of the fresh cut flowers sold in the United States. Although different sources[1] disagree about the exact import share, it is generally estimated to be between 70-80 percent with Columbia, Ecuador, and Canada being the top three supplying countries. The import shares of the top-selling fresh cut flowers in the US—roses, carnations, chrysanthemums, alstroemeria, tulips, lilies, and mini-carnations—are likely to be even higher. Increasingly flowers are being sold through mass merchandisers, supermarkets, wholesale clubs, etc.

[1] The California Cut Flower Commission reports that imported cut flowers and green currently account for 79 percent of the total US supply by dollar volume (2012). Based on Global Trade Atlas and USDA data, a report by Agriculture and Agri-Food Canada reports that the import share of cut flowers consumed in the US was 73 percent in 2009. The Society of American Florists (SAF) reports that "upwards of 85% and as high as 98% of the most common fresh cut flowers: roses, carnations, chrysanthemums, etc., are imported, mostly from South America" in an undated section of floral industry statistics. The SAF also reports that imports account for 71% of all fresh flowers sold by dollar volume in the US (2010).

Production costs in other countries are drastically lower, and flower varieties have been developed for optimal shipping characteristics and longevity. Domestic production of traditional[2] cut flowers for commercial sale has all but disappeared. Domestic growers are instead focusing on growing specialty cut flowers where they have a competitive advantage. In 2011, the wholesale value of Washington State's cut flowers was over $22 million, over half of which was tulips (USDA 2011 Floriculture Crops Summary). Washington State is the second largest state producer of cut flowers behind California (cut flower wholesale value of $277 million in 2011). USDA estimates for the number of cut flower producers and crop values for Washington is likely to be underestimated due to characteristics of Washington flower growers; Hmong flower farmers and smaller, diversified farms with a small cut flower component are likely underrepresented in the Census of Agriculture data on cut flower producers.

[2] Traditional cut flowers include roses, chrysanthemums, and carnations. Specialty cut flowers include everything else.

Figure 1
Major distribution channels for fresh cut flowers in the United States



Source: U.S. International Trade Commission.

Appendix B

The Cut Flower Industry: How Cut Flowers are Bought and Sold in Washington State

Industry Interviews

To better understand the competitive market in which Washington flower growers participate, we conducted interviews with industry members to understand how cut flowers are bought and sold in Washington and where local growers currently fit. We spoke with employees at three floral wholesalers, one growers cooperative wholesale market, three local grocery chains, three national grocery chains, two studio florists, one distributer, and one floral design educator. Interview topics included cut flower sourcing, types of cut flower customers and their needs, definitions of "quality" for cut flowers, and experience with or perceptions about locally grown flowers. From these interviews, we gathered information about how different types of businesses source cut flowers and what their primary needs are:

- **Floral wholesalers** primarily source product from South America, California, and the flower auction in Vancouver, B.C. and sell mainly to florists and grocery stores. Price, quality, and volume were the most important product characteristics. Some wholesalers buy from local growers during the season; usually the grower contacts the wholesaler about product available for sale. One wholesaler was actively seeking local sources citing the trend toward local and the superior quality of some local products (e.g. dahlias). Wholesalers are market intermediaries and must price competitively; prices paid to growers tend to be lower to allow for the wholesaler's mark-up. Growers, however, benefit from selling a greater volume to one buyer, due to costs of doing business with multiple buyers.
- **National, mass merchandisers (grocery stores)** primarily source flowers through their own national distribution systems or through large, local wholesalers and do not have the flexibility to work with local growers. Floral products are ordered months in advance for specials and seasonal promotions which are standardized across all stores in the chain. Some individual store floral departments have a small degree of flexibility to order through local wholesalers, who sometimes source local flowers, but the vast majority of flowers sold come from South

America. Floral sales tend to be a very small percentage of total store sales, but grocery customers like the convenience and price of "grab-and-go" bouquets.

- **Values-driven retailers (oriented toward organic, "natural", local, or other specialty products)** were already sourcing some locally grown flowers or seemed interested in doing so if 1) growers were willing to work with the store's purchasing processes, often centralized in a local or regional headquarters office, 2) floral products were pre-packaged or prepared for easy display in-store and delivered regularly, and 3) the retailer could still set prices their customers would be willing to pay after adding their own mark-up. This class of grocery retailers included one national grocery chain and three regional grocery chains.
- **Studio florists** are interested in local sources for high quality, unique flowers, but still need to purchase flowers from traditional floral wholesalers. Most florists' customers would not be willing to pay what it would cost to source 100% locally or sustainably grown flowers (e.g. Veriflora). Event florists (e.g. weddings) in particular require a high degree of predictability and color consistency to fulfill their customers' orders, which is a challenge when sourcing local product. Product quality is of utmost importance since florists' products are expected to last in formal settings (e.g. as decoration in businesses or high-end retail stores) and may be closely observed or photographed, as in weddings.

Several themes about locally grown flowers, definitions of quality, and level of consumer education and awareness about locally grown flowers also emerged from the interviews:

- **Definitions of cut flower quality differed greatly by flower type, but freshness, correct stage of (bloom) harvest, long stem length, and lack of blemishes** were the most common quality characteristics mentioned by all interviewed.
- **Locally grown flowers are perceived to be fresher and generally of good quality**, but challenges to sourcing more locally grown flowers included seasonality (high volume for short window of time), unpredictable harvest schedule, correct varieties for cut flower use (versus "garden flowers"), and lack of integration between individual growers and retailers' purchasing systems/ processes.
- **In general, the end consumer is not requesting locally or sustainably grown flowers**. If a business was sourcing locally grown flowers, it was usually because a) good quality, local

flowers were available at the right time and price or b) sourcing locally or sustainably grown flowers aligned with the business' values or strategies. In a few notable cases, values-driven businesses took significant steps to adapt and compromise in order to work with local growers. Businesses (grocery retailers, florists, and growers) that source/sell locally grown flowers repeatedly mentioned the lack of consumer awareness about geographic origin and cut flower production practices, altered consumer perceptions of quality, price, diversity, and vase life due to the prevalence of imported products, lack of knowledge about proper care of cut flowers, and decreased demand for cut flower sales in the current economy.

From the industry interviews, it would seem Washington cut flower growers can face many barriers (awareness, willingness to pay, institutional purchasing processes, seasonality, scale, etc.) when trying to sell flowers. Washington cut flower growers, however, are engaging in creative marketing ventures both individually and through collective efforts to overcome these barriers and challenges. The Seattle Wholesale Growers Market Cooperative (SWGMC) is one such creative, collective venture. In the two years since it opened in 2011, SWGMC has grown in its membership and customer base by marketing high quality, locally grown flowers in the heart of a Seattle industrial district, predominantly selling to florists and some local grocery retailers.

Washington cut flower growers are also utilizing multiple direct marketing outlets in order to receive retail prices from the consumer. Direct marketing channels include farmers markets, roadside stands, U-pick farms, and bouquet sales through Community Supported Agriculture (CSA) or other subscription type services. Ninety-three percent of Washington State farmers markets (or 86 markets) said their market offered cut flowers in 2009, according to a recent survey involving the same economics researchers as the present project. Pike Place and other Seattle area farmers markets are known for Hmong cut flowers in particular, but competition is very intense. Members of the Hmong community and farmers market managers have expressed frustration at the "saturation" of cut flowers at farmers markets and are interested in seeking alternative, profitable markets for Hmong growers. Some Hmong and traditional (non-Hmong) cut flower growers supply flowers and florist services for special events, such as weddings. The extent to which cut flower growers use or rely on direct marketing outlets is not well documented.

Having gained a better understanding of how cut flower are bought and sold in Washington and the needs of different business customers, we turned next to cut flower growers. Our objective in talking to Washington cut flower growers was to understand their farms and operations, marketing strategies, challenges and opportunities, plans for the future, and resource and information needs. Knowing more about cut flower farms will allow us to identify which market channels present the greatest opportunities for Washington growers, and what actions growers can take to effectively market their cut flowers.

Appendix C

Surveys of Cut Flower Growers in Washington State

We conducted two surveys of Washington cut flower growers, targeting both current and aspiring growers. The first survey was conducted as a "clicker survey" during the (February) 2012 Specialty Cut Flower Growers School at the WSU Mount Vernon research station, primarily attended by people ("future") interested in selling flowers for the first time. Informed by these initial results, we conducted a more second more comprehensive, statewide, online survey of former, current, and future cut flower growers in Washington. Collective results from these two surveys are summarized below.

Growers School ("Clicker") Survey

Methods: A short marketing survey was conducted to better understand Growers School participants' current or planned cut flower marketing activity and information needs. The survey consisted of 15 multiple choice questions and was conducted as a "clicker survey". This technology utilizes TurningPoint software to instantly generate survey results within a PowerPoint presentation as participants answer questions using individual, hand-held radio frequency clickers. Forty-seven people participated.

Results: Forty-seven growers school attendees participated in the Growers School "clicker" survey. Over half were new to growing and marketing cut flowers (57%) while the remainder had been growing cut flowers for many years, but had little marketing experience. Consistent with an early stage of business, many growers wanted additional information on developing a marketing plan. Most growers (52%) intended to market flowers for primary or secondary income, and another 26% planned to use flowers to diversify a current farm business. As a group, growers most commonly sold or planned to sell flowers through farmers markets, on-farm or U-Pick sales, direct to florists, or through subscription services. In the long-run, many growers hoped to sell primarily through the Seattle Wholesale Growers Market (27%) or through on-farm or U-Pick sales (27%). Participants valued consistent sales and a relationship with the buyer most when selecting a sales channel. Time and labor available for growing were the top challenges facing individual growers, followed by market access and

access to financial resources. Participants felt competition from imported flowers and customers' low price expectations were the greatest challenges facing all Northwest-grown cut flower growers.

WA Cut Flower Growers (Online) Survey

Methods: The email contact list was built by identifying Washington farms with a cut flower component in the WSU Small Farms Farm Finder data base, Washington Tilth publications, county direct marketing farm guides, the Association of Specialty Cut Flower Growers membership list, contact lists from two years of cut flower growers school attendees, vendor lists on farmers market web pages, and general internet searches for Washington cut flower growers. In building the list, several limitations were clear. A significant number of cut flower growers do not have an online presence (e.g. a website or other profile) or do not have a listed email address (particularly vendors at small farmers markets, Hmong farmers, casual U-Pick operations, etc.). Also, some growers identified in older sources appeared to have since quit growing or selling cut flowers. Given the spectrum of growers on the list, survey questions were adapted for former ("exited"), current, and future growers (growers school attendees). The original email list consisted of 308 growers. After sending out the survey, 23 bounced back due to bad addresses leaving 285 contacted growers. Sixty-one growers fully completed the survey for a response rate of 21% (Table 1).

Table 1 WA Cut Flower Survey Response

	Complete	Partial	Total
Current growers	47	7	54
Future growers	12	4	16
Exited growers	2	1	3
Total	**61**	**12**	**73**
CF Growers Contacted			**285**
Response Rate (Total)			**73/285= 26%**
Response Rate (Complete)			**61/285= 21%**

Results: Seventy-three Washington growers partially or completely responded to the survey; 74% are current cut flower growers, 22% are future cut flower growers, and 4% are former cut flower growers. Results from future and current growers are combined here; future work will analyze each segment separately. In questions specific to farm operations or marketing, future growers were prompted to answer questions according to their *planned* operations, marketing, etc. In analyzing current and future cut flower growers, three distinct groups emerged: full-time flower farms, diversified food farmers, and "side business" flower farms. The next stage of analysis will look at these grower segments separately.

A. Cut Flower Farms

Most farms grew flowers on a very small scale. Fifty-five percent of growers used less than 1 acre for commercial cut flower production, while 19% used between 1 and 3 acres, 20% used 3 to 6 acres, and 6% reported using 6 or more acres. Total farm size (all crops) was 5 acres or less for 75% of respondents; larger farms ranged from 10 to 400 acres. Thirty-six percent of farms grow 10 or fewer general cut flowers crops (e.g. peonies, sunflowers, snapdragons), while another 36% were very diversified and grew over 30 general flower crops. Top-selling crops mentioned were dahlias, sunflowers, zinnias, and peonies.

Fifty-eight percent of growers said they used organic practices as much as possible, but were not certified. Only 13% of growers were certified organic. Several postharvest management practices are known to increase the longevity of cut flowers and many were utilized by respondents: cold storage facility or cooler (37%), floral preservatives (27%), and hydrating solutions or dips (22%). Eleven growers conduct their own vase life tests. Twenty-five percent of growers indicated they did not use any post-harvest practices. Several growers only sold U-pick flowers, so postharvest management was not a concern for them.

B. Cut Flower Labor

(Current) growers were asked how many full-time vs. part-time and seasonal vs. annual employees were hired for the cut flower portion of their business. Preliminary analysis seems

to indicate that diversified farms were not able to separate out labor for the cut flower portion of their farms. This is very understandable given the overlapping time and tasks on small, diversified farms so further analysis is needed to determine what reported labor can be attributed to cut flower planning, production, and marketing activities.

Total labor hours per week on and off season varied greatly. Forty-seven percent of growers reported 40 or few labor hours per week (fulfilled by self-employed owners, paid employees, and unpaid family members or volunteers). Twenty-seven percent reported between 100-500 total weekly, on-season labor hours used for activities related to cut flower production and marketing.

C. Marketing

(Current) growers sell through a wide variety of channels. Only five growers (10%) sold all of their products through wholesale channels, indicating that retail channels (defined as sales to the final customer, i.e. “direct marketing”) are important to most Washington cut flower growers. In fact, 26 current growers (52%) only sold through direct marketing channels. The most commonly used direct marketing channels were farmers markets and do-it-yourself wedding/event sales (Table 2). The most commonly used wholesale channel was sales to florists (Table 2).

Table 2 Marketing Channels Used by Current WA Cut Flower Growers

	N	Percent of Growers Using Channel
Wholesale Channels		
Floral wholesalers	51	10%
Supermarket chains, grocery, and mass marketers	51	12%
Florists and event planners	51	33%
Other growers	51	12%
Direct Marketing (Retail) Channels		
Farmers market customers	50	46%
Subscription bouquet customers or CSA shareholders	50	20%
Do-it-yourself (DIY) wedding and event customers	50	44%
Full service wedding and event customers	50	14%
Roadside stand	50	30%
U-Pick	50	22%

Growers choose the most profitable, convenient, or personally satisfying sales channel(s) by evaluating their business goals, time, costs, potential returns, and many other factors. Most growers identified consistent sales (83%), fair price (73%), and "relationship with buyer" (67%) as the most "important" factors in deciding where to sell flowers, using a five point scale. As a group, growers "usually" or "always" used pricing strategies based on comparison with other growers' prices (79%), setting high prices initially and adjusting by sales (43%), and cost of production (42%).

To understand growers' future goals for their businesses, we asked whether they wanted to increase, maintain, or decrease cut flowers sales through listed wholesale and retail channels in the future (Table 3). In general, growers were more interested in increasing sales through direct marketing channels compared to wholesale channels. More growers wanted to increase (wholesale) sales to florists and sales through farmers markets and wedding/event customers (both bulk sales to "DIY" customers and flowers plus value-added florist services).

Table 3 Relative to where you currently sell cut flowers, would you like to increase, maintain, or decrease sales in the future through the following channels?

	N	Increase	Stay the Same	Decrease
Wholesale Channels				
Floral wholesalers	45	27%	18%	4%
Supermarket chains, grocery, and mass marketers	44	30%	14%	5%
Florists and event planners	49	**53%**	12%	2%
Other growers	41	10%	20%	2%
Direct Marketing (Retail) Channels				
Farmers market customers	47	**43%**	21%	6%
Subscription bouquet customers or CSA shareholders	47	36%	13%	0%
Do-it-yourself (DIY) wedding and event customers	47	**51%**	19%	0%
Full service wedding and event customers	44	**43%**	11%	5%
Roadside stand	44	39%	11%	5%
U-Pick	42	29%	12%	5%

D. Cut Flower Farm Businesses

Growers were asked why they sold (or planned to sell) cut flowers, and were allowed to identify multiple motivations. The responses in Table 4 suggest that some growers rely on income from cut flower sales more than other (e.g. for "primary income"):

Table 4 Why do you sell (or plan to sell) cut flowers? (N=62)

For primary income	26%
For supplemental income	52%
To diversify my farm business	47%
To fund my personal hobby	15%
Other: *to beautify farm, beneficial insect habitat, love to grow flowers, customers love flowers, for public benefit*	19%

Actual annual cut flower sales varied greatly across respondents, but with most growers generating small sales annual sales. Fifty-three percent of current growers said they have less

than $5,000 in cut flower sales annually (N=45 growers). Other growers derive substantial income from cut flowers; 22% sell $5,000-$19,999, 16% sell $20,000-$39,999, and 9% sell $40,000 or more cut flowers annually. We asked growers about the relative importance of farm income and cut flower sales to their overall household income. Nearly half of growers (46% or 21 growers) derive 25% or less of their household income from farm income, of which cut flowers may be a small part (Table 5). For most growers, cut flowers were one part of a larger farm business; only nine growers (20%) said cut flowers sales comprised 75-100% of their farm income. Six growers (13%), however, depend heavily on cut flowers sales; their farm income is 75-100% of their total household income, and 50% or more of farm income is from the sale of cut flowers. Future analysis will consider how growers' farms, products, and optimal marketing strategies differ by the importance of cut flower sales to household income.

Table 5 Relative Share of Cut Flower and Total Farm Income to Total Household Income

		Percent of total farm income from cut flower sales.				
		1-25%	26-50%	51-75%	76-100%	Total
Percent of total household income from total farm sales.	1-25%	13	2	1	5	**21**
	26-50%	3	2	2	1	**8**
	51-75%	3	2	1	0	**6**
	76-100%	5	0	3	3	**11**
	Total	**24**	**6**	**7**	**9**	**46**

E. Opinions and Needs

Growers were given a set of opinion statements and asked to indicate the degree to which they agreed or disagreed with the statements (Table 6). As a group, growers were neutral or split over whether they had experienced demand for their flowers because they were locally or sustainably grown. The low mean and larger standard deviation for "I have noticed increased demand for my cut flowers because they are sustainably or organically grown" indicates that growers' responses were more divided on this statement, and slightly more disagreed with the statement. Slightly more growers felt they had cooperative relationships with other area growers, compared to competitive. Nearly all growers agreed that education was an important

part of marketing cut flowers and that Washington cut flower growers would benefit from a statewide campaign.

Table 6 WA Cut Flower Grower Opinions (1=strong disagree, 5=strongly agree)

	N	Mean	S.D.
A. I have noticed increased demand for my cut flowers because they are locally grown.	52	3.13	0.89
B. I have noticed increased demand for my cut flowers because they are sustainably or organically grown.	48	3.42	0.90
C. Having a sustainable growing certification is very important to marketing my cut flower products locally.	44	2.93	1.04
D. My relationship with other cut flower growers in my area is competitive.	51	3.04	1.00
E. My relationship with other cut flower growers in my area is cooperative.	46	3.54	0.89
F. Educating customers is an important part of marketing my cut flower products.	57	4.11	0.72
G. WA cut flower growers would benefit from a statewide marketing campaign.	56	4.38	0.75

Health insurance coverage is a growing challenge for small, self-employed farmers and may be a limiting factor in whether people can limit off-farm income and expand their farm businesses. Twenty-three percent of respondents (12 growers) said they did not have health insurance and 34% were self-employed and paid for their own coverage, which some noted was expensive and/or inadequate. Twenty-three percent were covered by insurance from an off-farm job.

Growers were asked what resources they needed in order to start, expand, or maintain their cut flower business (Table 7). “Time to grow” (52%) and “time to market” (55%) cut flowers were the most common needs, followed by knowledge about marketing and selling cut flowers (48%). Off-farm employment likely limits growers’ time, as suggested by the marginal contribution of cut flower sales to most respondents’ household income in the previous section.

Table 7 What to you need to start, maintain, or expand your cut flower business?

I need access to land.	10%
I need access to capital.	34%
I need more time to devote to growing cut flowers.	52%
I need more time to devote to marketing and selling cut flowers.	55%
I need more knowledge about growing cut flowers.	39%
I need more knowledge about marketing and selling cut flowers.	48%
I need more knowledge about business planning and management.	13%

Appendix D

Hmong Flower Farmers, Farmers Markets, and a Bouquet Pricing Study

The majority of the Washington Hmong community live, farm, and sell cut flowers in King, Snohomish, and Pierce County. Hmong flowers are a signature of Seattle area farmers markets, where Hmong flower growers sell the vast majority of their products. Competition between cut flower vendors at Seattle area farmers markets has become incredibly intense, to the point that some markets are limiting the number of flower vendors. The number of Hmong growers and impressive volume of flowers has driven prices down, or prevented prices from rising over time to match production costs. As a result, some Hmong farmers are seeking ways to improve profits within current markets or are interested in finding profitable alternatives to farmers markets. Some Hmong farms also sell flowers to special event customers through connections made at farmers markets and at roadside stands near their farms. Many have diversified into growing and selling more vegetables.

Cultural and generational factors present very real challenges when identifying ways to improve Hmong flower farms' profitability. The Hmong community has lived and farmed in Washington since the mid-1970s, but today the older generation does most of the growing and marketing. Children and grandchildren help on busy market days, but very few intend to farm as a career, so shorter-term solutions to assist the older generation may be most appropriate. While Hmong growers are skilled farmers and have a good sense of what customers want, few if any keep current, written production and marketing records on which to evaluate current profitability and alternative opportunities.

Bouquet Pricing Study

Over 90% of Washington farmers markets offer cut flowers and the growers survey summarized previously clearly shows that many cut flower growers rely on this sales channel. Of the 99 markets responding to a recent phone survey of Washington farmers market managers, 44 markets said they had Hmong vendors. Since the majority of Hmong growers sell at farmers markets in Seattle and the surrounding area, we designed a farmers market bouquet pricing study in order to document the price level for fresh cut flowers (sold as mixed bouquets) at farmers markets. Results and data on bouquet prices will:

1) Give Hmong growers a basis for comparison when evaluating current profitability and alternative market opportunities in terms of per stem or per bouquet prices,
2) Estimate Hmong farm crop values for crop insurance purposes, and
3) Document product characteristics and competition in regionally specific farmers market sales channels.

Methods: The bouquet pricing study was carried out as follows:

1. Choose farmers markets (FMs) based on different size, different neighborhoods, logistics of attending the market (different days/time and location), and whether market had flower vendors based on online vendor list or word-of-mouth.
2. Attend market, walk through and count vendors by type, take general photos of market/vendors.
3. Buy 1 mixed flower bouquet from each flower vendor at the most common price level. Bouquet size should be comparable to grocery store mixed bouquets.
4. Record observable data and talk to flower vendors to gather the following information as completely as possible:

Observe and record:
Farm name, location
Vendor booth location within market
Vendors present (gender, age, kids?)
Whether vendor also sold produce
Vendors' price points
Price of bouquet purchased for study
Ask vendor:
Vendors' instruction for care of flowers
Vendors' expected vase life
Names of any unknown flower types

5. Take bouquets home, photograph each original bouquet before disassembling.
6. Disassemble bouquet and count number of stems of each flower type. Photograph disassembled bouquet.

7. Estimate per stem prices at farmers markets using relative per stem prices[3] obtained from Seattle Wholesale Growers Market Cooperative (SWGMC).

Results:

Farmers Markets: The number of flower vendors per market ranged from 1-11 at the 6 farmers markets visited for this study; Pike Place was the 7th market and was analyzed separately. All flower vendors were Hmong. In some markets, flower vendors were interspersed with other vendor types. In other markets, flower vendors were positioned in a long line of stalls and it was difficult to distinguish one farm from another.

Bouquets: Thirty-six bouquets were purchased from 7 different farmers markets. The most common bouquet prices observed were $5, $7, $8, $10, and $15. At some markets, the most common price level was $5 while at others $10 was most common. At the time of the price study in late-August, lilies, dahlias, asters, sunflowers, and gladiolas were very common. The number of stems per bouquet ranged from 12-43, with an average of 23 stems.

Vase life: The same question was asked of every vendor when the bouquet was purchased, "How long should the flowers last?" The most common answers were "4-5 days" and "1 week". A few specified that the dahlias would only last a few days, while asters may last 2 weeks. Several volunteered additional care instructions to re-cut the stems frequently and replace vase water daily.

Price Level Comparisons: The relative price level of cut flowers at farmers markets was evaluated using pricing information from the Seattle Wholesale Growers Market Cooperative. It is very important to note that we are not assuming the flowers at the farmers markets in this study and the flowers at SWGMC are equivalent products. Prices and value are determined by many factors, including what customers are willing to pay for product attributes that they value in a product (e.g. longevity, convenience, volume, quality, etc.). Mixed bouquet customers who buy from farmers markets are a distinctly different customer segment from those who buy mixed bouquets from SWGMC. We assume these customer segments have different expectations and willingness to pay for the attributes they

[3] Prices were the prices SWGMC growers received for flowers used in mixed bouquets, sold to SWGMC's retail customers. Since both SWGMC prices and farmers market prices are what the grower receives, they are comparable with the understanding that no data was collected about relative quality (freshness, stem length, stage of harvest, longevity, etc.). SWGMC prices were used a weights to estimate per stem prices for farmers market bouquets, and for comparison of revenue potential in different sales channels.

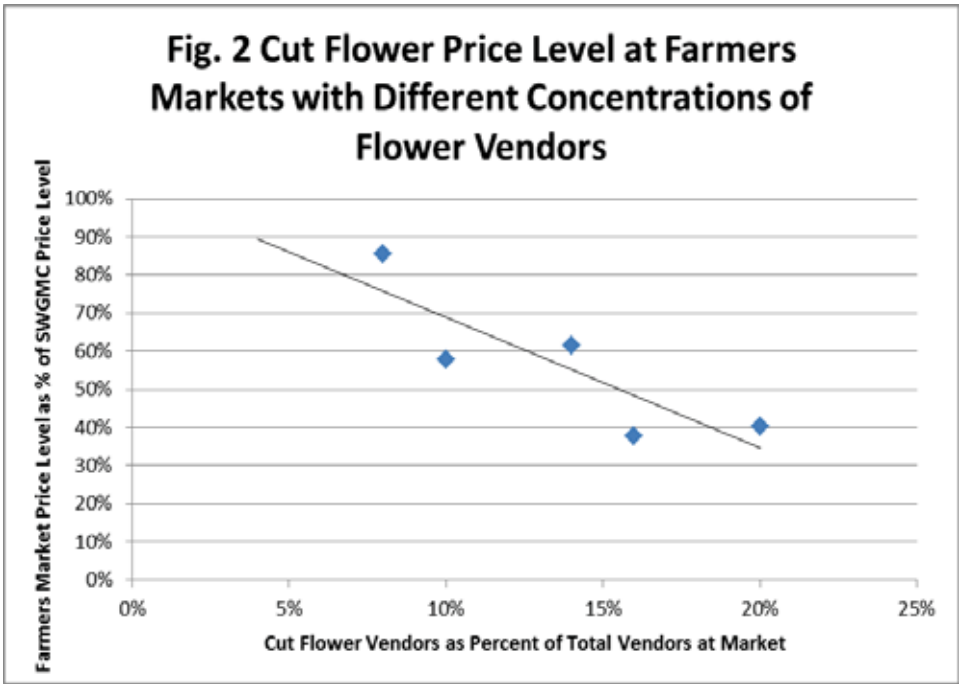
perceive and value in a product. This bouquet pricing study does not include any quality assessments or other subjective comparisons between cut flower products.

Prices received by SWGMC growers are a useful point of comparison for several reasons. First, both SWGMC prices and farmers market prices are the price the grower receives for flowers used in mixed bouquets. Second, most SWGMC flower growers are full-time flower farmers who rely on a profitable farm business for their livelihood. Hence, the prices they set reflect the revenue needed make a (modest) living beyond covering production and labor costs. Third, both SWGMC and farmers market vendors are marketing a "local" product, an attribute many customers value. Comparing the price level and market requirements at these two local outlets will be useful for growers deciding which type of market channel to pursue.

The average price of a mixed bouquet at a farmers market was 53% of the price of a bouquet with the same number of stems and flower types at SWGMC. One farmers market's average price level was only 14% lower than SWGMC (i.e. the farmers market prices were 86% of SWGMC prices) while another farmers market was 64% lower than SWGMC (i.e. the farmers market prices were 38% of SWGMC prices). The effect of competition between flower vendors within an individual farmers market was very apparent. To illustrate this, we graphed the cut flower price level at each farmers market[4] (as a percentage of SWGMC prices) against the percentage of cut flower vendors at each farmers market (Figure 2). For example, the furthest right data point was a farmers market where 20% of all vendors (10 out of 50) were flower vendors. The cut flower price level at this market was very low: 40% of the SWGMC price level.

The trend line in Figure 2 shows that farmers markets with a higher concentration of cut flower vendors (all Hmong vendors, in this study) had a lower average cut flower price level. All estimated farmers markets' per stem prices were lower than SWGMC prices, suggesting that product/quality attributes and customers' willingness to pay may also differ between these market channels.

[4] One market was dropped because it only had one vendor and was an outlier.



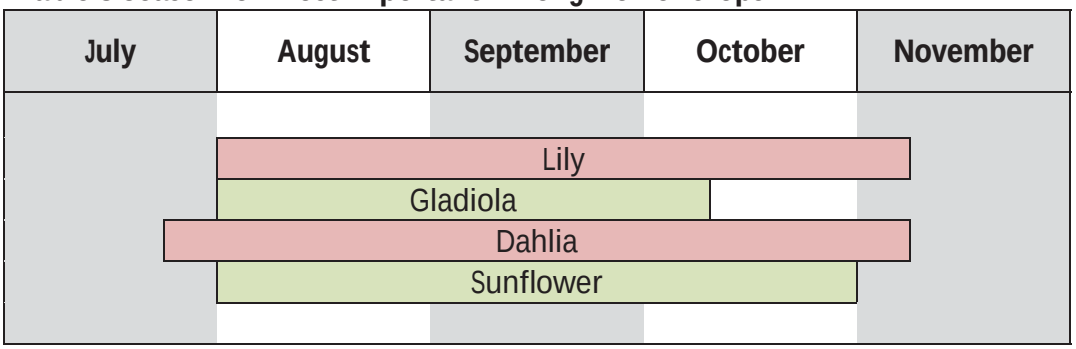
Conclusions and Next Steps: Our data confirms that the price level of cut flowers at Seattle area farmers markets is low, compared to one other local market channel (SWGMC). The data also suggests a strong relationship between the concentration of flower vendors and the price level at an individual farmers market. Farmers market managers could help flower vendors raise their price level by limiting the number of cut flower vendors and designing a market layout that intersperses cut flower vendors with other vendors, avoiding concentrations of flowers vendors where it is difficult to distinguish between farms. Hmong farms could seek ways to differentiate their products within a farmers market, or seek markets where there are fewer flower vendors. In order to expand beyond farmers markets, further analysis is needed to assess specific farms' flower characteristics (e.g. stem length, stage of harvest, longevity, insect and disease damage, etc.) and the requirements of conducting business with different market outlets.

Hmong Farm Harvest Data

Two Hmong flower farms were compensated for recording daily flower harvest and waste volumes for several flower crops during the 2011 season. The results allow us to map the harvest season (Table 8) and estimate crop values based on estimated per stem retail prices (from the farmers market bouquet

pricing study) and saleable product volumes per season. The bouquet pricing study took place over one week at the end of August which is mid-season for lilies, gladiolas, dahlias, and sunflowers.

Table 8 Season for Most Important Hmong Flower Crops



*Based on harvest data from two Hmong flower farms.

The Hmong farms tracked harvest data by recording the number of buckets harvested for each flower type. One farm also tracked daily waste, which included unsold or damaged product. On average, daily waste was 30-40% of daily harvest volume. The retail value of each bucket harvested (Table 9) was estimated using average per stem retail prices from the farmers market bouquet pricing study.

Table 9 Hmong Farm Harvest Volume and Farmers Market Retail Value

	Lily	Gladiola	Dahlia	Sunflower
Stems per bucket	22	40	43	30
Est. farmers market retail price per stem	$ 0.54	$ 0.42	$ 0.34	$ 0.65
Bucket Retail Value	**$ 11.88**	**$ 16.80**	**$ 14.62**	**$ 19.50**

Since the two Hmong farms differed in size, crop values for the specific farms involved were not calculated. Instead, different harvest volume scenarios were considered in Table 10 and the total season retail value per crop was calculated. We assumed average season length of 10 weeks for lilies, 9 weeks for gladiolas, 14 weeks for dahlias, and 8 weeks for sunflowers based on the two farms' average 2011 season lengths. In calculating the net retail value for the season, we assumed 35% of harvested flowers were unsold/damaged (waste). For example, a medium acreage Hmong farm might harvest an average of 60 buckets of dahlias per week (2,580 stems) over a 9 week season. The retail value of each bucket at average farmers market price would be $14.62. Over the 9 week season, assuming 35% of

harvested product will be unsold or damaged (average 18 buckets waste per week), the dahlia crop is worth an estimated $7,983.

Table 10 Total Season Crop Values at Low, Medium, and High Harvest Level Scenarios

	Lily	Gladiola	Dahlia	Sunflower
Avg. Weeks in Season	**10**	**9**	**14**	**8**
	Harvest Levels Scenarios, Net 30% Waste			
Low Harvest: Avg. Buckets per Week	**20**	**20**	**20**	**20**
Retail Value per Week	$ 238	$ 336	$ 292	$ 390
Retail Value per Season	$ 2,376	$ 3,024	$ 4,094	$ 3,120
Retail Value per Season, Net 35% Waste	**$ 1,544**	**$ 1,966**	**$ 2,661**	**$ 2,028**
Medium Harvest: Avg. Buckets per Week	**60**	**60**	**60**	**60**
Retail Value per Week	$ 713	$ 1,008	$ 877	$ 1,170
Retail Value per Season	$ 7,128	$ 9,072	$ 12,281	$ 9,360
Retail Value per Season, Net 35% Waste	**$ 4,633**	**$ 5,897**	**$ 7,983**	**$ 6,084**
High Harvest: Avg. Buckets per Week	**100**	**100**	**100**	**100**
Retail Value per Week	$ 1,188	$ 1,680	$ 1,462	$ 1,950
Retail Value per Season	$ 11,880	$ 15,120	$ 20,468	$ 15,600
Retail Value per Season, Net 35% Waste	**$ 7,722**	**$ 9,828**	**$ 13,304**	**$ 10,140**

Harvest and waste volumes here are based on data from two farms only, so it is not known whether they are representative of all Hmong farms. However, the pricing data and crop value calculation used here could be applied to other Hmong farms if season length and harvest and waste volumes are known. Data on per stem prices will be made available to the Hmong community and may provide incentives for farms to keep harvest, waste, and sales records in order to evaluate current profitability, estimate crop values, and compare with alternative market opportunities.

Washington Wine Commission

Washington State Wine Seminar- Mexico City
January 20th, 2011
Final Report

Prepared by Marco Albarrán Arozarena
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Imalinx- Mexico
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January 25th, 2011

Washington State Wine Seminar- Mexico City
January 20th, 2011
Final Report

Summary

After the "Washington Wine Experience Cancun" in 2010, it was identified an opportunity to increase awareness and coverage of Washington State Wines in Mexico City. With this in mind, the WSWC authorized a "Washington State Wines Introduction Seminar" conducted on January 20th, 2010 consisting of the following:

1. A seminar by Juan Muñoz Oca, Winemaker from Columbia Crest to **36 trade members**, covering Washington Geography, wine industry in the state, main varietals and terroir.

2. A Tasting for the same audience, with 14 Washington State labels from 5 wineries available in the country.

The activity was coordinated by Imalinx, In-country contractor for WSWC with assistance from Mexican Sommeliers' Association (AMS) and the Agricultural Trade Office- Mexico City (ATO). As of January 25th, we have identified at least 3 publications in blogs and social media and we expect to have printed coverage in newspapers and specialized magazines in the following month.

Seminar ran without execution issues and allowed Imalinx to obtain additional information about the Wine industry and the participating wineries. The only remark is the limited Washington Wine availability in the Mexico City Area that reduced the number of showcased labels.

Activity Development

After the Washington Wine Experience in Cancun, Imalinx sent a note to ATO informing of results. Allan Mustard, Minister of Agriculture from the Embassy of U.S. in Mexico, asked for further activities to develop the Mexican Market in addition to resort areas in the country. WSWC programmed a seminar that was combined with a business visit of Juan Muñoz Oca to Latin America in January 2011.

Mexican contractor, Imalinx, contacted the AMS to manage the event. Imalinx coordinated communication with WSWC, wineries, importers and distributors; supervised general logistics and printed materials. AMS obtained a high-end restaurant in Polanco District to host the event and invited 50 industry guests, having a total attendance of 36 people plus staff.

Imalinx contacted the following wineries with presence in Mexico City and its representatives to inform of the seminar:

-	CSM/ Columbia Crest	Importer (Vinoteca) provided wine and participated in event
-	Two Mountain	Winery owner attended event
-	L'ecole 41	Importer (VVB)provided wine and participated in event
-	Long Shadows	Importer (ECM) provided wine, did not attend event
-	Pacific Rim	Wine sent through Imalinx, importer did not attend event.
-	Hedges	Importer (Vinoteca) cancelled participation two days before the event due to lack of inventory in Mexico City
-	Milbrandt	Importer (Jaso) did receive shipment from U.S. in time

The seminar started at 9:30 a.m. with opening words from Luis Cárdenas, president of AMS followed by an Introduction by Allan Mustard, Minister of Agriculture from the U.S. Embassy in Mexico. At 10:00 a.m. Juan Muñoz started the seminar for one hour, followed by tastings. Event finished by 1 p.m.

To complement the seminar and tasting, AMS conducted a tasting of 4 wines representative of the Washington industry with Top Mexican sommeliers. Featured wines where Columbia Crest Merlot and Riesling, Columbia Crest Two Wines Riesling, CSM Cabernet and L'ecole 41 Merlot. Right after, the guests enjoyed wines from Pacific Rim, Long Shadows and Two Mountain poured by AMS staff.

Imalinx translated "Washington Wines Introduction" presentation to Spanish for seminar. We also prepared a binder with the 70-slide presentation, along with additional information about Washington State's grape varieties, AVA's and Wineries available in Mexico that was provided to each participant to the seminar. This information was very useful for guests because they could obtain additional data and contacts from importers that did not attend the event. Other printed materials included 4 diplomas, a tasting mat, and tech sheets of wines.

Conclusions and recommendations

- Good attendance with specialized guests, highly regarded as training for Mexican sommeliers.

- Awareness of Washington Wines in Mexico City is minimal. Very few industry members had knowledge of Washington Wine industry in the area. It is recommended to continue communication with this circle to create an "exclusive feel" and an eventual trend pursuing additional volume.

- Distribution in Mexico City area is limited to CSM/Columbia Crest by Vinoteca and L'Ecole 41 by VVB. Other importers do not have the product available or considered for this market. We recommend the wineries to define with importers if there is any opportunity to expand distribution in Mexico City in addition to mature markets such as Cabo and Cancun.

- Guests mentioned that U.S. wines have 20% duty into Mexico making them expensive. We recommend wineries to offer entry-level wines for this market considering up to 8 USD ex-works price to reach a retail price in Mexico not higher than 14 USD.

- We expect reasonable media coverage in following weeks that will be shared with WSWC and importers.

Picture Gallery

Seminar Panoramic view

Participation by AMS President

Tasting coordinated by AMS VP

Mexican Sommelier of the Year- Marcos Flores

Allan Mustard, Patrick Rawn, Juan Muñoz

Tasting Long Shadows

Tasting with Long Shadows, Pacific Rim and Two Mountain

Publications as of January 25th

http://debybeard.com/blog/

Deby Beard. Opinion Leader Blog

Washington Wines in Mexico (Press release)

Banfi Mariani Family acquires Pacific Rim (description and wines)

Washington Wine Commission

Washington Wine Experience Cancun
October 6th, 2010
Final Report

Prepared by Marco Albarrán Arozarena
Commercial Director
Imalinx- Mexico
Marco.albarran@imalinx.com

October 14th, 2010

Washington Wine Experience Cancun
October 6th, 2010
Final Report

Summary

Washington Wine Commission (WWC) identified enormous potential for export growth in the Mexican market and secured funds from the Agricultural Marketing Service's Specialty Crop Block Grant program to execute the "Washington Wine Experience Cancun" last October 6th 2010, consisting of the following:

1. A seminar by Shayn Bjornholm, Director of Education of the WWC to **46 trade members**, covering Washington Geography, wine industry in the state and main varietals, and a comparative tasting with other U.S., Australian and Mexican Wines.

2. A Tasting event for the HRI, with the attendance of **165** sommeliers, Food and Beverage managers from hotels and restaurant owners, where **10 Washington Wineries'** representative presented **59 different wines, with 24 different varietals and blends.**

This activity will be followed up by a "Washington by the glass promotion" in coordination with WWC members and local importers/ distributors in a date yet to be confirmed.

Initial comments from Mexican Attendees and Washington Winemakers indicate positive results that should result in sales increase for WWC members in the region:

"thank you for all your hard work and efforts to make this event a huge success !
Great to see so many F&B managers and sommeliers showed up and showed great interest in Washington Wines,"

- Alexandra LaFontaine, Business Development Manager Export, Ste Michelle Wine Estates

"very well attended, great seminar, quality tasters"

- Tom Hedges, Owner, Hedges Family Estate

"Congratulations for the event, there is no doubt that goals where achieved. I really believe that doors have been opened for more activities from Washington Wines"

- Jerome Luciani, Food and Beverage Director, Hilton Resort Cancun

The Washington Wine Experience Cancun did not have major execution issues. However, wine samples provided by wineries for the event arrived only one day before the activity causing stress to the participants. Imalinx (contractor) planned to have wines at least five days before the event in Cancun, however tropical storm "Matthew" in the Atlantic caused floods in Southeast Mexico early October, severing all ground highways to Cancun and delaying the shipment. An airfreight was arranged and wines arrived without problems for the event.

Activity Development

Project was defined with Lily Huynh, WWC Exports Manager; Eric Rosenberg and Josh Weiner, from Bryant Christie Inc. During initial stages it was recommended to focus activities in Mexico City being the largest market in the country and home of the largest wine importers in the country. However, Washington Wineries required executing the Tasting in Cancun because of the high volume sold in this touristic destination.

Once the location was agreed, Imalinx quoted several locations choosing Hilton Resort Cancun for the event due to its easy access from Cancun's Hotel zone and from Riviera Maya area, where high end resorts are located. The contract with Hilton included a room block for 20 U.S. exhibitors, room rental and or'deuvres for 100 people, A/V equipment for the seminar, signage and additional personnel for guest registration and control.

Imalinx considered the design and delivery of 50 printed invitations for the seminar in the Cancun area and 250 tasting booklets. All printed materials were designed in-house by WWC to ensure image consistency, having Imalinx translating texts and proofreading designs. All printed materials were done in Mexico.

To ensure attendance to the seminar and tasting our team did the following:

- Sent electronic and printed invitation to seminar to 50 people.
- Sent electronic invitation for tasting to 250 people.
- Called to 100 key contacts in Cancun to confirm participation in both seminar and tasting.
- Released 4 e-newsletters targeted to the National Wine Industry.
- Contacted Sommelier, Concierge, Restaurant, Hotel Associations to increase coverage of event.
- WWC sent the electronic invitation to seminar and tasting to its participating members.
- Created a contact email address vinosdewashington@imalinx.com, receiving 76 confirmations by this mean.

Samples final packing list was finished in September 10th in Seattle and Imalinx asked for a FEP (Free Entry Permit) to U.S. Embassy in Mexico to reduce tariffs and costs to WWC. Due to a major holiday in Mexico and a delay by Mexican authorities the FEP was not available on time. On September 17th, another customs agent/ freight forwarder was contracted. Wines left Sept. 22nd from Seattle, arriving on Monday 27th to Laredo, TX and by Wednesday 29th to Mexico City.

That day, Tropical Storm "Matthew" hit ground in Southeast Mexico, causing the worst floods in 34 years and collapsing the 3 highways going to Southern Mexico as well as secondary roads. Freight forwarder did not inform delays timely, so Imalinx had to coordinate airfreight, with samples arriving in Cancun that night and Tuesday morning. Imalinx is in the process of obtaining a partial refund to WWC from the ground transportation company.

Seminar conducted by Shayn started at 5:45 p.m. and had the participation of Tom Hedges, Butch Milbrandt and Alexandra Lafontaine as panelists with the participation of 45 attendees. Trade tasting started at 7:15 p.m. having winemakers and Mexican distributors sharing their wines with 169 Mexican attendees.

During all the activity development there was strong support from Jerome Luciani, Food and Beverage Director at Hilton Resort Cancun and Patrick Jouault from World of Wines (Distributor for SCM. They both have recently attended the Washington Wine Experience and they became "converted" to Washington wines. Mr. Luciani has even featured a full page of Washington wines in the wine list of the Hotel's restaurant, designated the ·1 restaurant in Cancun by Trip Advisor.

Conclusions and recommendations

- Activity was successful regarding attendance and awareness in Cancun area, with compliments from the attendees regarding the quality of the wines and organization of the event.

- It was a good approach to start in an already established market for U.S. Wines such as Cancun. It is recommended to expand activities to other cities in the market to increase consumption among Mexican consumers.

- Menu promotion timeline has to be agreed during October 2010 with wineries and WWC to gain momentum from the seminar and tasting. Also, budget has to be confirmed with WWC and BCI to plan additional activities in Mexican market.

- We have to follow up with companies to ensure that new distribution is achieved with Mexican prospects and be ready to assist with additional information on exporting to Mexico.

- It is necessary to take actions to have samples in location at least 3 weeks before future events and have communications flowing constantly between wineries, WWC and Imalinx. Also, ATO Mexico will be more actively involved in the FEP process to ensure delivery on time.

- For future activities, we recommend defining a communications calendar between WWC, BCI, wineries, their distributors, and Imalinx to make sure that details and information is timely shared between all parties.

- It is recommended to invite different distributors from Mexico to the Washington Wine Experience. Our suggestions are:

1.	Francisco Domenech	La Castellana	fcodomenech@vvb.com.mx
2.	Ricardo Torreblanca	Club del Gourmet	rtorreblanca@clubdelgourmet.com.mx
3.	Richard Clair	Ferrer y Asociados	richard@ferrer.com.mx
4.	Paulina Barberena	Costco	pbarberena@costco.com.mx
5.	José Luis Baque	La Europea	compras@laeuropea.com.mx
6.	Ricardo Nuño	Freixenet	ricardonuno@prodigy.net.mx

Photo Gallery

Ryan Patrick Wineries

Chateau Ste. Michelle

Two Mountain Wines

Duck Pond/ Desert Wind

Guest List

Washington Wine Experience: Mexico 2010
October 5th, 2010
Hilton Cancun Golf & Spa resort

Nº	Name	Industry	Company	Position	Email
1	Daniela Chagoya Casso	Restaurant	La Destileria	Sales Manager	eventoscancun@ladestileria.com.mx
2	Oscar Duvigneau	Distributor	Freixenet	Representative	ventasfreixenet@prodigy.net.mx
3	Ricardo Nuño	Distributor	Freixenet	Representative	ricardonuno@prodigy.net.mx
4	Silvia Reza	Social Organization	Casa Xiipaal	Media Coordinator	sylviaconsultas@yahoo.com.mx
5	Silvestre Vazquez	Hotel	Hilton	Food & Beverage Manager	silvestre.vazquez@hilton.com
6	Alejandro A. Rojas	Hotel	Mandarin Oriental	Executive Sous Chef	arojas@mohg.com
7	Veronica Losa Rodriguez	Hotel	JW Marriott Cancun	Restaurant Manager	veronica.losa@marriotthotels.com
8	Maricarmen Mendoza	School	Universidad Anahuac Cancun	Tourism School Coordinator	maricarmen.mendoza@anahuac.mx
9	Rafael España	Restaurant	La Destileria	Public Relations Manager	eventoscancun@ladestileria.com.mx
10	Carlos Rudich	Hotel	Dreams Riviera Cancun	Food & Beverage Manager	crudich@dreamresorts.com
11	Alejandro Cazares	Hotel	Le Meridien	Food & Beverage Manager	acazares@meridiencancun.com.mx
12	Martha Arcos	Distributor	Viña Pasion por el vino	Sommelier	marqu0203@hotmail.com
13	J. Facundo Sanchez Lugo	Restaurant	Bubba Gump Aeropuerto Int. Cancun	Cheff	fac_27@yahoo.com.mx
14	Jaqueline Cardoso	Hotel	Be Live	Concierge Manager	jcardoso@belivehotels.mx
15	Alvaro Boom	Hotel	Westin Hotel & Resorts	Asistant Food & Beverage	alvaro.boom@westin.com
16	Alberto Garza	Distributor	Viña Pasion por el vino	General Manager	vmaralberto@prodigy.net.mx
17	Carlos Perez	Hotel	Azul Sensatori	Food & Beverage Manager	cperez@azulsensatori.com
18	Miguel de la Cruz Perez	Bar	El Rincon del Vino	Manager	elrincondelvino10@gmail.com
19	Leda Gamboa Rojas	Bar	El Rincon del Vino	Manager	elrincondelvino@prodigy.net.mx
20	Edwin Mitsunga	Hotel	Grand Residences	Manager	emitsunaga@royalresorts.com
21	Josue de Avila Forasteri	Distributor	World of Wines	Sales	jworldofwine@yahoo.com.mx
22	Alberto Garcia	Social Organization	CANIRAC	Director	direccion.canirac.cun@gmail.com
23	Alexandre de Brower	Hotel	Now Jade	General Manager	adebrower@nowresorts.com
24	Hector L. Carrillo	Distributor	Vini Club	Wine Club	viniclubmerida@hotmail.com
25	Felipe Briseño	Distributor	La Europea	Sales Manager	ventascumbres@laeuropea.com.mx
26	Elliot Diaz Yepis	Distributor	Covi	Wine Director	entre_vinos@yahoo.com.mx
27	Georgina Medina	Hotel	Le Meridien	Concierge	concierge@meridiencancun.com.mx
28	Stephany Altbach	Restaurant	Terraneo	Sales Manager	elmosteph50@hotmail.com
29	Marcelo Mendoza	Hotel	Rosewood Mayakoba	Restaurant Manager	mayakoba.casadellago@rosewoodhotels.com
30	Enrique Hernandez	Hotel	Royal Resorts	Asistant Food & Beverage	ehernandez@royalresorts.com
31	Rosalia Tovar	Distributor	Vini Club	Wine Club	
32	Enrique Verduzco	Hotel	Ocean Coral & Turquesa	Food & Beverage Manager	ayb.hpc@h10.es
33	Fernando R. Betanzos	Social Organization	CANIRAC	Public Relations Manager	rp.afiliacion.canirac@gmail.com
34	Paola Lechuga	Hotel	The Ritz Carlton	Conference Concierge	
35	Juan Carlos Ortiz	Hotel	The Ritz Carlton	Cost and Beverage Manager	juancarlos.ortiz@ritzcarlton.com
36	Javier Vales	Hotel	Royal Resorts	Corporative Restaurant Manag	jvales@royalresorts.com
37	Francisco J. Moreno Mendez	Distributor	ECM de Vinos	Manager	fco_moreno@prodigy.net.mx
38	Damian Merlo	Restaurant	Tinto	General Manager	gerencia@restaurantetinto.com
39	Christian Flores	Florist	Driada	Supplier	driada@floreriadriada.com
40	Francisco Domenech	Distributor	Vinos Viñedos y Bodegas	Director	fcodomenech@vvb.com.mx
41	Edgar Castro	Restaurant	La Destileria	Floor Manager	edgar_234@yahoo.com
42	Ricardo Padilla	Imports Agency	Kuehne + Nagel	Cancun Accoun Executive	ricardo.padilla@kuehne-nagel.com
43	David Argaez	Hotel	Presidente Intercontinental	Food & Beverage Manager	davide_argaez@interconti.com
44	Karina Gamboa Gamboa	Distributor	Covi	Wine Director	cgamboa@grupocovi.com
45	Valente Can Aviles	Distributor	World of Wines	Sales	vcan_84@hotmail.com
46	Antonio Guillermo Voysest	Distributor	Douro	Sales	antoniodouro@hotmail.com
47	Ricardo Lara	Hotel	The Ritz Carlton	Buyer	lara.ricardo@ritzcarlton.com
48	Alessio Giribaldi	Hotel	Desire Resorts	Sommelier	ayb@desireresorts.com
49	Felipe Reynaga	Hotel	Desire Resorts	Chef	cheffdsr@desireresorts.com
50	Edgar Murcia	Hotel	Hotel Excellence	Manager	murcialo@hotmail.com
51	Carlos Salas	Consultant	Independent	Wine Consultant	erubie@hotmail.com
52	Alexandre Rioux	Hotel	Maroma Resort & Spa	Chef	arioux@maromahotel.com
53	Manuel Rivero Rivero	Sommelier School	UT Cancun	Principal	mrivero@utcancun.edu.mx
54	Amado Garcia	Hotel	Presidente Intercontinental	Asistant Food & Beverage	
55	Humberto Monelli	Hotel	Presidente Intercontinental	Asistant Food & Beverage	
56	Manuel Silva	Hotel	Now Jade	Sommelier	sommelier.nowrc@nowresorts.com
57	Francisco Moreno	Distributor	EMC de Vinos	Manager	fco_moreno@prodigy.net.mx
58	Jose Esau	Hotel	Hilton	F&B Manager	storm_crowz@hotmail.com
59	Alexis Scharer	Hotel	Maroma Orient Express	Sommelier	
60	Eduardo Herrera	Media	Oscar Cadena Network	Reporter	oscarcadena@hotmail.com
61	Alejandro Jaimes	Hotel	Moon Palace	Sommelier	alexwines@hotmail.com
62	Gerardo Jimenez	Restaurant	Habichuela Sunset	Sommelier	somegjm@hotmail.com
63	Marcela Barrera	School	UT Cancun	Instructor	mbarrera@utcancun.edu.mx
64	Leticia Ibarra	School	La Salle	Instructor Tourism	turismolasalle@edu.mx
65	Jose Luis Hernandez	School	La Salle	Instructor Tourism	jluish8@yahoo.com
66	Carlos A Jimenez Nordes	Hotel	Royal Playa del Carmen	Sommelier	amigosommelier@hotmail.com
67	Eric Welson	Distributor	World of Wines	Manager	
68	Jean Francois Girault	Hotel	Hotel La Amada	Chef	jfgirault@laamadahotel.com
69	Luciana Amexley	Restaurant	Chianti	Sommelier	
70	Roberto Gomez	Restaurant	Chianti	F&B Manager	
71	Mario Sanchez	Restaurant	Chianti	Manager	
72	Miguel Briones	Restaurant	Chianti	Maitre'D	mbriones@cofenader.com
73	Alfonso Hernandez	Hotel	JW Marriott Cancun	Sommelier	
74	Jose Alfonso Furkeb	Restaurant	Bubba Gump Aeropuerto Int. Cancun	manager	alonsokgt3@yahoo.com.mx
75	Marco A. Vega	Restaurant	Bubba Gump Aeropuerto Int. Cancun	Maitre'D	bgcancun@meracorporation.com
76	Erika Canto Flores	Restaurant	Señor Frogs	Manager	erikacanto@andermail.com
77	Facundo Sanchez	Restaurant	Bubba Gump Aeropuerto Int. Cancun	bf&B manager	fac_27@yahoo.com
78	Demian Fuentes	Bar	Cava 2033	manager	demian@cavaveinte33.com
79	Alma Quiñones	Hotel	Le Meridien	Manager	
80	Rodolfo Pacheco	Hotel	Now Jade	General Manager	redpach@hotmail.com

81	Miguel Argueta	Hotel	Hilton	Food & Beverage	
82	Luis Hernandez Cabrera	Restaurant	Harrys	Waiter	
83	Gener Gomez	Hotel	Hilton	Waiter	gener_cua@hiltoncancun.com.mx
84	Fernando Zua	Hotel	Hilton	Waiter	
85	Luis Sierra	Hotel	Royal Resorts	F&B Manager	jvales@royalresorts.com
86	Corina Rodriguez Lemus	Hotel	Hacienda Tres Rios	F&B Manager	coris1388@hotmail.com
87	Jennifer Flores Diaz	Hotel	Hacienda Tres Rios	concierge	jenny_lajuana@hotmail.com
88	Bernardo Lopez	Hotel	Hilton	Waiter	chimbale@hotmail.com
89	Fernando Cue	Hotel	Rosewood Mayakoba	F&B Manager	rainbowmagicfer@hotmail.com
90	Jorge Dominguez	Hotel	Valentin Imperial	Maitre'D	georgemaitre73@hotmail.com
91	Jaqueline Eligio	Hotel	Valentin Imperial	Concierge	
92	Victor Raya	Hotel	Royal Resorts	Food & Beverage	
93	Michel Thenot	Consultant	Independent	consultant	
94	Fabiola Cea	Hotel	Fairmont Mayakoba	concierge	flabs_2003@hotmail.com
95	Bertha Fricke	Hotel	Fairmont Mayakoba	concierge	bertha.fricke@farimont.com
96	Sebastian Murcino	Media	Le Chef	Director	info.lechef@gmail.com
97	Alma Delia Campuzano	Hotel	The Ritz Carlton	Culinary Center	
98	Miguel Solorio	Hotel	Azul Sensatori	Chef	chef@azulsensatori.com
99	Elfego Lassard	Restaurant	Lorenzillos	Sommelier	
100	Ericka Heinecke	Hotel	Crown Paradise	ventas	ventas@crownparadise.com
101	Jouke Veenstra	Hotel	Azul Fives	Sommelier	
102	Diego Ayala Barajas	Hotel	Gran Melia Cancun	Chef	
103	Jessica Perez	Hotel	Now Jade	Asistant Food & Beverage	
104	Jasmin Ines	Hotel	Iberostar	Concierge	jasmin.ines@hotmail.com
105	Sergio Rebollo	Hotel	Iberostar	Finance Director	srscaceres@hotmail.com
106	Sergio Espinosa	Distributor	Vini Club	distributor	viniclub@hotmail.com
107	Giovanny Olivo Ramirez	Hotel	Barcelo Tucancun	Food & Beverage Manager	
108	Armando Delo	Hotel	Banyan Tree Mayakoba	Asistant Food & Beverage	
109	Gina Medina Joffroy	Hotel	Le Meridien	concierge	concierge@meridiencancun.com.mx
110	Maria Esther Escalona Cid	Social Organization	CANIRAC	Public Relations Manager	cancuncanirac@gmail.com
111	Benjamin Salas	Hotel	The Ritz Carlton	Buyer	rc.recepcion.mercancia@ritzcarlton.com
112	Kritsia Ivette Gomez	Hotel	Hilton	Asistant Food & Beverage	trishas_28@hotmail.com
113	Mariana Langer	Hotel	Fairmont Mayakoba	Concierge	Mariana.Langer@fairmont.com
114	Eva German	Hotel	Fairmont Mayakoba	Concierge	vrstgkmn@gmail.com
115	Pablo Lomelin	Catering	Gourmet Events	Cater	pablo@gourmetevents.com.mx
116	Juan Alberto Cervantes	Hotel	Fairmont Mayakoba	Concierge	cervantes_alberto@hotmail.com
117	Francisco Rogelio Esequiel	Restaurant	Las Tentaciones	Food & Beverage Manager	roystar3@hotmail.com
118	Irene Hoolczuck	Hospitality	Cancun Center	Public Relations Manager	irene@cancuncenter.com
119	Cairo Morales	Hotel	Marriott Casamagna	Concierge	cairo.morales@marriotthotels.com
120	Sarahy Zapata	Hotel	Excellence Playa Mujeres	Concierge	club.rpm@excellence-resorts.com
121	Marcos Manuel Martinez	Hotel	Fairmont Mayakoba	Concierge	marc_lapa@hotmail.com
122	Juan Jose Garcia	hotel	The Ritz Carlton	Concierge	
123	Ana Luisa Retis	Hotel	The Ritz Carlton	Concierge	
124	Aldo Novoa	hotel	The Ritz Carlton	Concierge	
125	Glendy Hernandez	Hotel	The Ritz Carlton	Concierge	
126	Rodolfo Gonzalez	Hotel	Le Meridien	Concierge	
127	Anaya Amilco	Hotel	Le Meridien	Concierge	
128	Ricardo Robles	Hotel	The Ritz Carlton	Concierge	richi_robles@hotmail.com
129	Javier Trujillo	Hotel	The Ritz Carlton	Concierge	javier_tr@hotmail.com
130	Gabriel Mendez	Hotel	The Ritz Carlton	Concierge	
131	Carlos Sanchez	Hotel	Excellence Playa Mujeres	Concierge	
132	Luis Fernando Castro	Hotel	Grand Velas	Sommelier	
133	Lep Zueita	Hotel	Omni Cancun	Compras	
134	Monica Gonzalez	Hotel	Omni Cancun	Concierge	
135	German Rodriguez	Hotel	Omni Cancun	Concierge	
136	Carlos Silva	Hotel	Royal Hideaway	Sommelier	
137	Teodoro Cruz	Hotel	Royal Hideaway	Bar Manager	
138	Levy Nyx Carreño	Hotel	Gran Melia Cancun	Cheff	
139	Alonso Loria	Hotel	The Ritz Carlton	Barman	
140	Ariel Morales	Restaurant	Tinto	Co- Manager	
141	Oscar Coto	Hotel	Azul Sensatori	Sommelier	
142	Janeyky Hernandez	Hotel	The Ritz Carlton	TSA	
143	Javier Ramos	Hotel	Banyan Tree Mayakoba	Bar Manager	
144	Laura Fariel	Hotel	Grand Paraiso Iberostar	Concierge	
145	Fernanda Carrera	Hotel	Grand Paraiso Iberostar	Concierge	
146	Andres Lypynsky	Distributor	Exim	Purchasing manager	lypa@yahoo.com.ar
147	Roman Atriano Rodriguez	Hotel	Fairmont Mayakoba	Asistant Food & Beverage	romanokapara@hotmail.com
148	Ursula Arguelles	Hotel	Omni Cancun	Asistant Food & Beverage	
149	Jesus Baños	hotel	Omni Cancun	Concierge	concierge@omnicancun.com.mx
150	Manuel Fonz	Hotel	Be Live	Public Relations Manager	rrppmblga@believehotels.com
151	Eloisa Valencia	Hotel	Fairmont Mayakoba	Concierge	eloisa.valencia@fairmont.com
152	Chavarin Quiñones	Hotel	Azul Fives	Concierge	microbit@hotmail.com
153	Martha Nava	Hotel	Fairmont Mayakoba	Concierge	lolita_mnav@hotmail.com
154	Felipe Molina	Hotel	Fairmont Mayakoba	Asistant Food & Beverage	
155	Leticia Alvarez	Hotel	Iberostar	Concierge	leticia.alvarez@iberostar.com
156	Marcus Yuque	Hotel	Azul Sensatori	Sommelier	myuque@gmail.com
157	Jaime Rout	Hotel	Barcelo	Asistant Food & Beverage	Chef@barcelotucancun.com
158	Vanessa Castro	Hotel	JW Marriott Cancun	Concierge	
159	Cristina Jebe	Distributor	World of Wines	Staff	
161	Pamela Gonzalez	Hotel	Iberostar	Concierge	

Washington State Wine Events in India, September 2011

A Report for the Washington State Wine Commission

By: **Gaurav Anand**
Wine Forays

September 2011

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Original Campaign Objectives

Promote WA State Wine to Hotels, Restaurants and the Wine Trade in India

Win 'mind share' for WA state wines among the F&B establishment and trade. Create familiarity and recall for participating labels to increase their sales

Labels to include those currently distributed in India, and those seeking to enter the market

Provide a platform for forging links between wine importers/wine trade and WA state wineries

Simply put, the goal was to create BUZZ for Washington State Wines in India

Profile of Events Planned

Activity	Target Audience	Draw	# of Sessions Planned
Trade Tasting	Salespeople, F&B staff, purchasing managers, sommeliers, wine journalists.	Tasting of top wines from an exciting wine region.	1 Each in Mumbai and New Delhi.
Wine Dinner	Select influencers – restaurant owners, Hotel GM's, Magazine Editors/Press, Director/Heads of import companies.	High quality wine dinner with a small select group of people. Chance to meet with winery reps.	1 Each in Mumbai and New Delhi.

One of the goals of the wine dinners was to emphasize the versatility and suitability of Washington State Wine for pairing with Indian food.

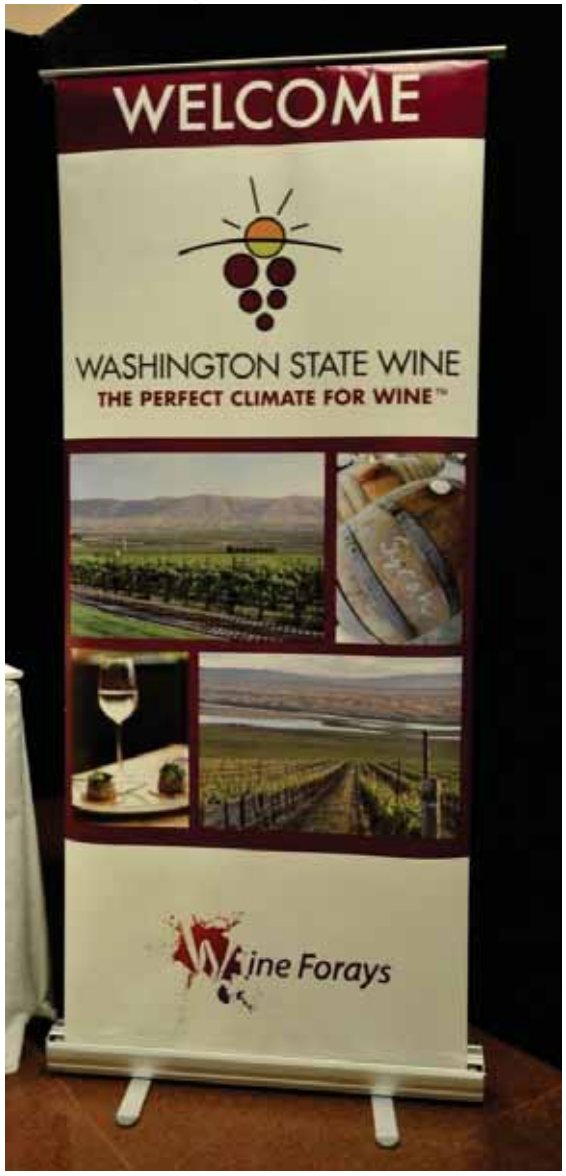
Events Held & Participation Summary

Events were held in the two largest metropolitan wine markets of India

City	Location	Date	Targeted Participants	Number of attendees*
Mumbai	Wine Dinner at 'Ziya', The Oberoi, Nariman Point	Sept 5, 2011	35	27
Mumbai	Trade Tasting at The Leela Mumbai	Sept 6, 2011	65	55
New Delhi	The Oberoi, New Delhi	Sept 8, 2011	65	80+
New Delhi	The Oberoi ,New Delhi	Sept 9, 2011	35	29

**Does not include WSWC Staff, Exhibitors or Wine Forays Staff*

Wine Forays


WELCOME
WASHINGTON STATE WINE
THE PERFECT CLIMATE FOR WINE™
Wine Forays

Participant Feedback

Gautam Anand, *Vice President – ITC Ltd. (Hotels Division)**

Very impressed by the Seated Dinner at the TOND, curated by Sommelier Gaurav Anand (Wine Forays) hosted by Washington State Wine Commission, in the Presence Of HE the US Ambassador. Loved the Eroica Riesling 2010, paired with Marinated Palm Hearts, Tandoori Cottage Cheese followed by a Chateau Ste Michelle Chardonnay with Chicken & Morel Stew, a Seven Hills Viognier served with Chettinad style Lamb chops, a... fabulous Chateau Ste Michelle Merlot 2009, With the Cheese & finally a superb Powers Muscat Canelli 2010.*

I have suggested that these wines, become a part of the Wine Menu Listings of ITC Hotels.

Gautam Anand, *Vice President – ITC Ltd. (Hotels Division)* (Seated to extreme right)*

Notes:

*TOND stands for The Oberoi New Delhi

*ITC Hotels is one of the largest and most important luxury hotel chains in India and Mr. Gautam Anand is considered one of the top hotel-industry leaders in the country.

Participant Feedback

Neethu Seth, *Director- Wine Rack (Mumbai based importer)*

Attended the Mumbai Trade Tasting

The event was extremely well coordinated and executed. Prior to the event the follow up and information communicated was excellent. I was fully aware of where I needed to be and when. The flow of the event was smooth with no hitches. The tasting proceeded in a fluent very accessible manner. Also there were just right number of people at the event so that we could all get the chance to have fairly lengthy conversations with the relevant exporters/producers.

This kind of event is extremely helpful to an importer like me because it gives us the opportunity to try several wines from a region at one go, and also allows us to interact on a one to one basis with producers. This far more effective than communicating over email or telephone. I would definitely attend future events as well. Many of the wines were exceptional in quality, and we enjoyed about 80% of the wines. Only a few whites were a little disappointing.

The variety at dinner was very well matched to the wines we were tasting and the quality of food served was also very impressive. As you know the only thing one should change is the live Salmon counter.

I really didn't know too much about Washington as a wine producing state other than the fact that it's one of the up and comers in the US. I will definitely look at the Washington wine section in wine menus going forward.

Participant Feedback

Gauri Devidayal, *Proprietor – The Table (one of the top wine restaurants in Mumbai)*

Attended the Mumbai Wine Dinner

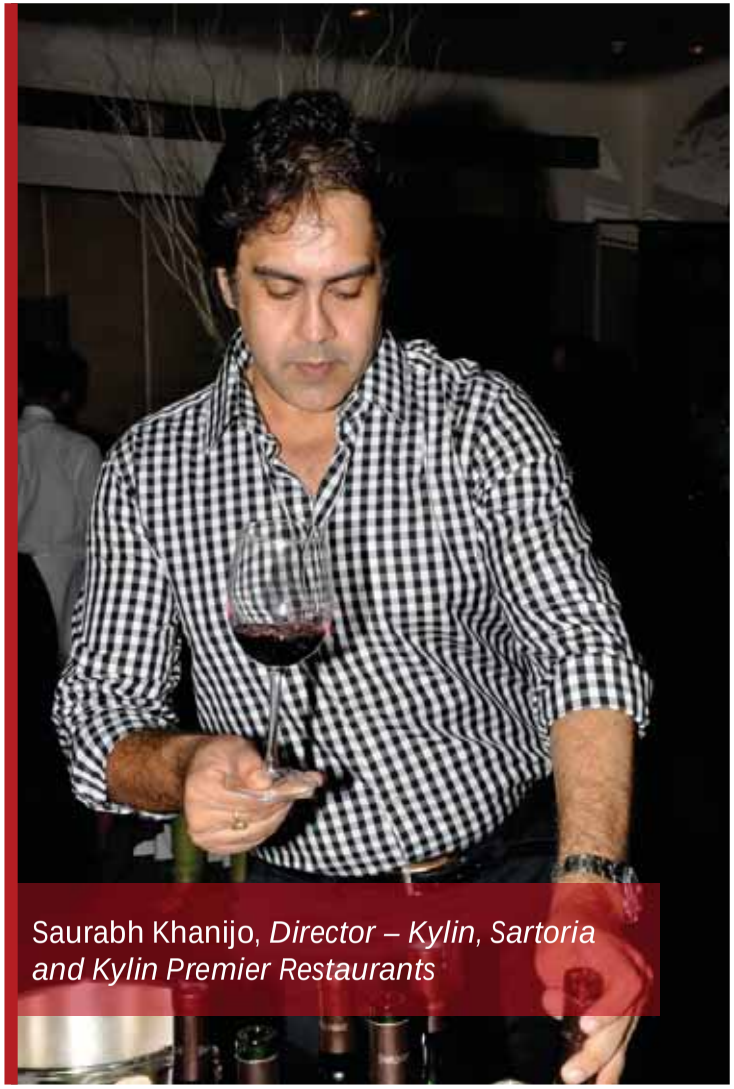
I think it was an absolutely brilliant idea to have an event like this which promoted the Washington State wines, particularly because the US portfolio in India has traditionally been dominated by Californian wines. The first step was to bring awareness of the wines to the Indian market, but more importantly the wine tasting dinners confirmed that this is a quality product. Following this introduction to the Washington State wines, I will certainly consider listing some of them at The Table in the near future.

Participant Feedback

Saurabh Khanijo, *Director – Kylin, Sartoria and Kylin Premier Restaurants*

Attended the Delhi Trade Tasting and Wine Dinner.

The events were organized beautifully and the best part is that the execution was very wine friendly. Especially doing the events over 2 days with the trade tasting on the first day and the proper pairing the wine with food at the dinner on the second day was really good. It completely enhanced the whole experience. To be frank, I wouldn't have come on the second day if I hadn't become such a fan of Washington wines. We go to several tastings like Chilean or Australian wine events, but this was very well planned. After the tasting I have already initiated the order for all my 3 restaurants to have Columbia Crest and Chateau Ste Michelle - which are available in India. Will introduce others as well once they get to one of the wine importers. Though having attended these events, one idea my partners and I are considering is to import some of these wines ourselves as they really are good quality and match up to Napa or Bordeaux region's wines.



Saurabh Khanijo, *Director – Kylin, Sartoria and Kylin Premier Restaurants*

Participant Feedback

Aman Dhall, *Director – Brindco Sales*

Largest wine importer in India and also the largest importer of Washington State and California Wine to India

Poured wines at the Delhi Trade Tasting, and attended the Delhi wine dinner. The Brindco team poured wines at the Mumbai Trade Tasting as well.

Washington State Wine Commission's recent events in both Delhi and Mumbai where professionally organized with a clear focus to provide knowledge of the region. Trade Dinners where attended by leading Food & Beverage Professionals and opinion leaders; had a lasting influence on the quality and value offered by Washington.

Aman Dhall, *Director – Brindco Sales*

Participant Feedback

Al Portney, *Vice President – International Sales at Chateau Ste Michelle Wine Estates*

Attended all events in Delhi and Mumbai as an Exhibitor

All events were well organized. Quality of guests were excellent, they were well informed and eager to engage.

Still in the process of getting follow ups. I sent out emails to all importers with prices from the brands I represent. I heard back from Wine Park they are not yet prepared to take on other brands. High Spirits has replied on 14 Hands, discussing pricing and expectations.

Will send out follow up emails end of week to those who have not replied.

Al Portney, *Vice President – International Sales at Chateau Ste Michelle Wine Estates*

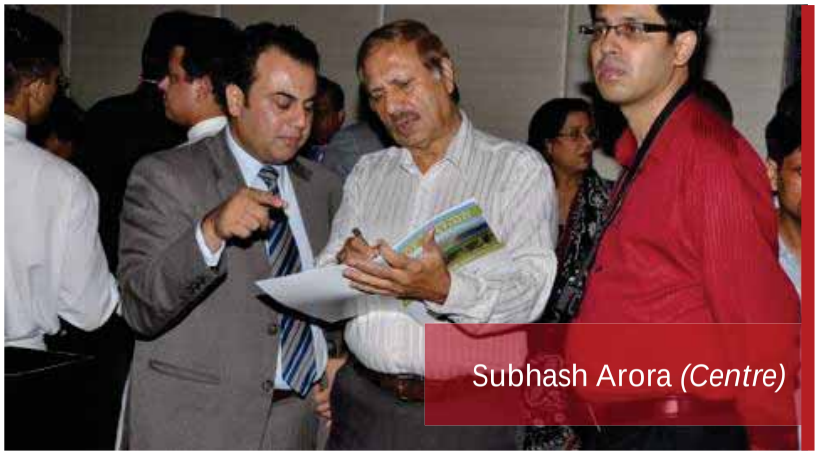
These things usually do not result in orders just yet. It will take a few months. If I get 1-2 new importers then it will be a success. I am confident it will happen. There is certainly a greater sense of awareness for WA than ever before. Business with the on premise trade who came will improve for the brands all ready imported. I have been assured of new listings from Brindco.

Look forward to doing more activities in the future.

Snapshots from Press Coverage

Subhash Arora – *writing for DelWine*
(Largest circulation trade e-newsletter dedicated to wine).
Attended both events in Delhi.

Washington wines have been improving in quality at a fast pace and their higher quality wines are relatively lower priced. However, the WSWC will need continued efforts and a medium- term commitment to India to build up an alternative to California as the US wine supplier.



Subhash Arora *(Centre)*

Reva K Singh – *Editor of Sommelier India Wine Magazine (India's only print publication dedicated to wine and the culture around wine).* Attended both events in Delhi.

The two-day event in Delhi saw 12 wineries represented at the tasting on the first day at the roof-top Connaught of The Oberoi, New Delhi followed by an exclusive wine dinner the next day at The Oberoi Nilgiri. True to form, The Oberoi produced an excellent Indian five-course meal at which we had the opportunity to enjoy six wines competently paired by Gaurav Anand of Wine Forays who rose admirably to the challenge of matching Washington State Wines with Indian food.

Reva K Singh – *Editor of Sommelier India Wine Magazine (left)*

Presence of the US Ambassador at the dinner in Delhi and the US Consul General in Mumbai helped raise the profile of the events

US Ambassador to India A. Peter Burleigh addresses the audience at the Delhi Wine Dinner.

Key Importers who attended

Sr. No.	Organization	Attendee
1	Sula	Rajeev Samant (CEO) and Sula's head of international division
2	Fine Wines n More	Craig Wedge (Vice President and Buyer)
3	Wine Park	Vishal Kadakia (Director)
4	Wine Society of India	Danielle D'Lima (GM) along with her key team
5	Wine Rack	Neethu Seth (Director)
6	Mohan Brothers	Rohit Mehra (Chairman), Ashok Chadha (CEO), Paras Anand (Sales Head).
7	Amfora	Ranjit Gupta (Head)
8	High Spirits	Sanjeev Gupta (Head)
9	Brindco	(as exhibitors)
10	Berkmann Wine Cellars	(as exhibitors)
11	Agnetta International	(as exhibitors)

In a country with only a handful of 'quality' importers – this is as good a performance as we could have hoped for. Only Aspri's absence was disappointing (Sonary's absence was expected as they had declined to attend)

Communication Plan Followed

Webpage

Webpage www.wineforays.com/washingtonwine
6 weeks before events

High quality, clean web page with key information (intro to the events, target audience, dates, list of participating wineries and links to each winery page).

Communication Plan Followed

Email Campaign

- Email campaign was used to create buzz and excitement about the events, with consistent messages about the quality and value offered by WA wine
- Used a database segmented by city, type of organization (hotel, restaurant, importer, press)
- Email campaign started with 'teaser' email 5 weeks before the event. Emails were sent almost every week thereafter.
- Email campaign continued to the morning of the events – with the final reminder going out on the day of each event.
- Emails were sent using a professional third-party software: each recipient was addressed by name and content was customized (depending on their city and type of organization)

Washington Wine Event in Mumbai is Today

Dear Gaurav,

The Washington State Wine event in Mumbai is finally here. You are on the guest list. The walk-around tasting starts 7.00 P.M. at The Leela, Mumbai, and will go on till late in the evening. Dinner will also be served.

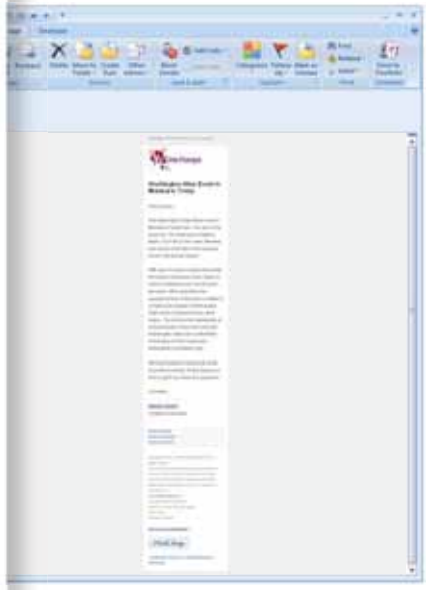
With over 75 wines to taste, this will be the largest showcase of any region to come to India this year. For the past two years, *Wine Spectator* has awarded scores of 90 points or better to a higher percentage of Washington State wines compared to any other region. Do not miss the opportunity of enjoying some of the best wine that Washington State has to offer! More information on the events and participants is available here

We look forward to seeing you at the event this evening. Please drop me a line or call if you have any questions.

Sincerely,

Gaurav Anand
Certified Sommelier

follow on Twitter
friend on Facebook
forward to a friend



Communication Plan Followed

Personalized Invitation Cards

- Personalized 'named' printed invitation cards – timed to reach participants two weeks before events
- Almost 400 invitation cards sent out

Recommendations for future market development activity

Follow-up with importers who have expressed interest in WA wine.

- Each opportunity is very specific in nature and should be followed up as such
  (e.g. Sula's interest in Covey Run, FWM's interest in Snoquamie,
  High Spirits in 14 Hands, Amfora in Hedges etc)
- Make sure importers have price lists of wineries they're interested in
- Make sure that they receive a follow-up call
- Each of these opportunities needs to be treated as a sale to be closed within a targeted timeframe

Focus more on wines at the lower end of the price spectrum.

- The higher priced wines should definitely be present – but their sales potential will be initially limited due to high custom duties and excise taxes.

Recommendations for future market development activity

Recognize the unique operating circumstances of Indian importers

- Indian importers face high regulatory costs and a market that is currently small (albeit growing). WA suppliers/wineries should be encouraged to co-invest in the market with their importer (share brand registration and marketing costs, pitch in to host wine dinners, travel to the market for joint selling etc).

The first events have helped WA State capture mindshare of the Trade

- The events have made an impression with the Trade, including with high-level decision makers. For this to translate into tangible results – WSWC should continue to invest in market development activities in India in future years. Chilean, Australian, Italian, and French events are fixtures on the Indian wine calendar that happen every year. WA needs to have a similar commitment for the next 3-5 years to compete effectively.

More winery Principal's should make the journey to India for future events

- While sending wine here is a good first step, their presence here could help them seal the deal with an importer quickly

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ATTACHMENT FOR K281 – Stem Number, Tuber Set & Size Dist Relationships for Specialty Potato Cultivars

Table 1A. Effects of gibberellic acid (GA3) on plant emergence (35 DAP), stem numbers, tuber set, average tuber weight, yield and grade of **Cal White** potatoes in **2011**. Yield data is presented as A, B and C tuber size classes. Seed-tubers were stored at 4°C from Oct. 10, 2010 to April 5, 2011. The seed was cut (50-64-g seedpieces), treated April 8, 2011 by immersing for 5 min in solutions of GA and stored for 3 days at 48°F until planting. Seed was planted in replicated plots at the WSU Othello Research Unit on April 11, 2011. Vines were mowed 105 days after planting (July 25, 2011). Tubers were harvested August 4, 2011 (115 DAP). P-levels for polynomial trends of yield components with GA concentration are presented below the table (LSD, least significant difference at P<0.05).

[GA] ppm	Emerg %	Stems Plant^{-1}	Cal White Tuber Yield (T/A) (2011)							U.S. #1 Tubers + <113 g			Crop Value (% control)			
			Mkt. #1	C's (10-66g)	B's (67-91g)	A's (92-360)g	>360g	#2's	Total	g tuber^{-1}	plant^{-1}	1000's A^{-1}	C's	B's	A's	Total
0	5	2.9	26.8	1.17	1.21	21.9	2.48	1.06	27.8	158	8.5	156	0	0	0	0
2	47	4.5	27.9	2.15	2.29	22.2	1.11	1.15	28.9	130	10.6	196	84	89	1.4	11.8
4	57	4.4	25.7	2.54	2.46	20.3	0.26	2.09	27.7	117	10.8	200	117	103	-7.3	7.6
8	81	5.3	21.3	2.57	2.58	15.5	0.52	3.69	24.9	107	9.7	178	120	113	-29	-11.0
$LSD_{.05}$	22	0.7	2.7	0.38	0.56	2.5	0.80	1.40	2.4	17	0.9	17				
Lin	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.10	0.10				
Quad	0.05	0.10	0.05	0.01	0.01	0.10	0.01	0.01	0.10	0.05	0.01	0.01				
Dev	NS	0.05	NS	NS	NS	NS	NS	0.01	NS	NS	NS	NS				

Table 1B. Effects of gibberellic acid (GA3) on plant emergence (31 DAP), stem numbers, tuber set, average tuber weight, yield and grade of **Cal White** potatoes in **2012**. Yield data is analyzed as A, B and C tuber size classes. Seed-tubers were stored at 4°C from mid-October to April 9, 2012. The seed was cut (50-64-g seedpieces), treated April 9, 2012 by immersing for 5 min in solutions of GA and stored for 2 days at 48°F until planting. Seed was planted in replicated plots at the WSU Othello Research Unit on April 13, 2012. Vines were mowed 91 days after planting (July 12, 2012). Tubers were harvested July 24, 2012 (103 DAP). P-levels for polynomial trends of yield components with GA concentration are presented below the table (LSD, least significant difference at P<0.05).

[GA] ppm	Emerg %	Stems Plant^{-1}	Cal White Tuber Yield (T/A) (2012)							U.S. #1 Tubers + <113 g			Crop Value (% control)			
			Mkt. #1	C's (10-66g)	B's (67-91g)	A's (92-360)g	>360g	#2's	Total	g tuber^{-1}	plant^{-1}	1000's A^{-1}	C's	B's	A's	Total
0	38	3.5	18.0	1.27	1.96	14.6	0.20	0.37	18.4	116	7.6	141	0	0	0	0
0.5	52	4.0	17.8	1.38	1.73	14.4	0.27	0.39	18.2	119	7.5	138	8.7	-11.7	-1.4	-1.1
1	72	4.6	19.3	1.82	2.29	14.7	0.47	0.66	19.9	110	8.6	159	43.3	16.8	0.7	7.3
2	81	4.5	18.4	1.73	2.17	14.3	0.26	0.95	19.4	112	8.2	151	36.2	10.7	-2.1	3.8
4	77	5.1	15.9	2.01	1.96	11.9	0	2.12	18.0	103	7.6	141	58.3	0	-18.5	-7.5
$LSD_{.05}$	18	0.5	2.2	0.46	0.68	1.73	0.42	0.67	2.12	12.2	1.13	21				
Lin	0.01	0.01	0.05	0.01	NS	0.01	NS	0.01	NS	0.05	NS	NS				
Quad	0.01	0.1	0.05	NS	NS	NS	NS	NS	0.1	NS	0.1	0.1				
Cubic	NS	0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS				
Dev	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.1	0.1				

Table 2A. Effects of gibberellic acid (GA3) on plant emergence (35 DAP), stem numbers, tuber set, average tuber weight, yield and grade of **Chieftain** potatoes in **2011**. Yield data is analyzed as A, B and C tuber size classes. Seed-tubers were stored at 4°C from Oct. 10, 2010 to April 5, 2011. The seed was cut (50-64-g seedpieces), treated April 8, 2011 by immersing for 5 min in solutions of GA and stored for 3 days at 48°F until planting. Seed was planted in replicated plots at the WSU Othello Research Unit on April 11, 2011. Vines were mowed 109 days after planting (July 29, 2011). Tubers were harvested August 8, 2011 (119 DAP). P-levels for polynomial trends of yield components with GA concentration are presented below the table (LSD, least significant difference at P<0.05).

[GA] ppm	Emerg %	Stems Plant^{-1}	Chieftain Tuber Yield (T/A) (2011)							U.S. #1 Tubers + <113 g			Crop Value (% control)			
			Mkt. #1	C's (10-66g)	B's (67-91g)	A's (92-360)g	>360g	#2's	Total	g tuber^{-1}	plant^{-1}	1000's A^{-1}	C's	B's	A's	Total
0	0	2.3	25.7	1.5	2.5	21.2	0.6	1.0	26.7	132	9.8	179	0	0	0	0
2	8.3	3.6	26.5	3.1	3.4	19.4	0.5	0.4	26.9	107	12.5	226	35	35	-8.5	9.2
4	7.5	3.8	25.2	3.6	3.5	17.9	0.2	1.3	26.5	101	12.4	226	38	38	-16	7.7
8	14.2	3.9	21.0	3.6	3.1	14.2	0.1	0.8	21.8	94	11.4	204	22	22	-33	-7.4
$LSD_{.05}$	11.2	0.6	3.7	0.8	NS	3.0	0.4	0.6	3.5	10	2.2	39				
Lin	0.05	0.01	0.01	0.01	NS	0.01	0.01	NS	0.01	0.01	NS	NS				
Quad	NS	0.01	NS	0.01	NS	NS	NS	NS	NS	0.01	0.05	0.05				
Dev	NS	NS	NS	NS	NS	NS	NS	0.01	NS		NS	NS				

Table 2B. Effects of gibberellic acid (GA3) on plant emergence (31 DAP), stem numbers, tuber set, average tuber weight, yield and grade of **Chieftain** potatoes in **2012**. Yield data is analyzed as A, B and C tuber size classes. Seed-tubers were stored at 4°C from mid October to April 9, 2012. The seed was cut (50-64-g seedpieces) April 9, 2012, treated April 11, 2012 by immersing for 5 min in solutions of GA and stored for 2 days at 48°F until planting. Seed was planted in replicated plots at the WSU Othello Research Unit on April 13, 2012. Vines were mowed 91 days after planting (July 12, 2012). Tubers were harvested July 24, 2012 (103 DAP). P-levels for polynomial trends of yield components with GA concentration are presented below the table (LSD, least significant difference at P<0.05).

[GA] ppm	Emerg %	Stems Plant^{-1}	Chieftain Tuber Yield (T/A) (2012)							U.S. #1 Tubers + <113 g			Crop Value (% control)			
			Mkt. #1	C's (10-66g)	B's (67-91g)	A's (92-360)g	>360g	#2's	Total	g tuber^{-1}	plant^{-1}	1000's A^{-1}	C's	B's	A's	Total
0	10	2.0	16.0	3.9	4.0	8.2	0	0.1	16.1	68	11.7	215	0	0	0	0
0.5	33	2.9	17.2	5.9	4.6	6.7	0	0	17.2	61	14.3	259	51	15	-18	15.7
1	39	3.3	17.9	6.4	4.8	6.8	0	0.1	18.0	62	14.5	265	64	20	-17	22.2
2	61	4.3	18.5	7.5	5.2	5.8	0	0.1	18.6	59	16.0	288	92	30	-29	30.4
4	60	5.2	17.1	8.1	4.8	4.0	0.2	0	17.2	54	16.3	292	108	20	-51	25.3
$LSD_{.05}$	17	0.7	1.7	1.1	1.1	1.6	NS	NS	1.7	4.8	1.5	24				
Lin	0.01	0.01	NS	0.01	NS	0.01	NS	NS	NS	0.01	0.01	0.01				
Quad	0.01	0.05	0.01	0.01	NS	NS	NS	NS	0.01	NS	0.01	0.01				
Cubic	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS				
Dev	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.1	NS	NS				

Table 3A. Effects of gibberellic acid (GA3) on plant emergence (35 DAP), stem numbers, tuber set, average tuber weight, yield and grade of **Red LaSoda** potatoes in **2011**. Yield data is analyzed as A, B and C tuber size classes. Seed-tubers were stored at 4°C from Oct. 10, 2010 to April 6, 2011. The seed was cut (50-64-g seedpieces), treated April 8, 2011 by immersing for 5 min in solutions of GA and stored for 3 days at 48°F until planting. Seed was planted in replicated plots at the WSU Othello Research Unit on April 11, 2011. Vines were mowed 109 days after planting (July 29, 2011). Tubers were harvested August 8, 2011 (119 DAP). P-levels for polynomial trends of yield components with GA concentration are presented below the table (LSD, least significant difference at P<0.05).

[GA] ppm	Emerg %	Stems Plant^{-1}	Red LaSoda Tuber Yield (T/A) (2011)							U.S. #1 Tubers + <113 g			Crop Value (% control)			
			Mkt. #1	C's (10-66g)	B's (67-91g)	A's (92-360)g	>360g	#2's	Total	g tuber^{-1}	plant^{-1}	1000's A^{-1}	C's	B's	A's	Total
0	0	2.9	30.7	1.7	1.6	25.2	2.7	0.8	31.9	161	9.6	176	0	0	0	0
2	15	3.1	31.0	2.5	2.6	24.4	1.0	0.4	30.8	131	11.6	215	50	56	-3.2	6.4
4	29	3.7	28.7	2.8	3.7	21.9	0.9	0.6	29.9	117	12.1	223	67	125	-13	4.3
8	66	3.8	26.4	3.8	3.3	19.1	0.2	0.6	27.0	104	12.5	231	125	105	-24	0.3
$LSD_{.05}$	15	0.5	2.6	1.0	0.9	2.4	1.2	1.1	2.6	16.7	1.6	29.6				
Lin	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.10	0.01	0.01	0.01	0.01				
Quad	NS	NS	NS	NS	0.05	NS	NS	0.05	NS	0.05	0.05	0.05				
Dev	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS				

Table 3B. Effects of gibberellic acid (GA3) on plant emergence (31 DAP), stem numbers, tuber set, average tuber weight, yield and grade of **Red LaSoda** potatoes in **2012**. Seed-tubers were stored at 4°C from mid October to April 9, 2012. The seed was cut (50-64-g seedpieces) April 9, 2012, treated April 11, 2012 by immersing for 5 min in solutions of GA and stored for 2 days at 48°F until planting. Seed was planted in replicated plots at the WSU Othello Research Unit on April 13, 2012. Vines were mowed 91 days after planting (July 12, 2012). Tubers were harvested July 25, 2012 (104 DAP). P-levels for polynomial trends of yield components with GA concentration are presented below the table (LSD, least significant difference at P<0.05).

[GA] ppm	Emerg %	Stems Plant^{-1}	Red LaSoda Tuber Yield (T/A) (2012)							U.S. #1 Tubers + <113 g			Crop Value (% control)			
			Mkt. #1	C's (10-66g)	B's (67-91g)	A's (92-360)g	>360g	#2's	Total	g tuber^{-1}	plant^{-1}	1000's A^{-1}	C's	B's	A's	Total
0	33	3.8	18.5	3.1	3.0	12.4	0	0	18.6	88	10.6	196	0	0	0	0
0.5	63	4.4	20.3	3.2	3.7	13.4	0	0.2	20.5	90	11.3	209	3.2	23	8.1	9.1
1	80	4.5	20.4	3.4	3.9	13.0	0.1	0.1	20.6	91	11.1	205	9.7	30	4.8	10.2
2	88	4.9	19.4	4.7	4.1	10.4	0.1	0.1	19.4	76	12.7	234	52	37	-16	11.4
4	94	5.9	18.8	5.2	4.2	9.4	0	0.1	18.9	71	12.7	233	68	40	-24	12.0
$LSD_{.05}$	20	0.8	1.9	1.4	0.8	2.1	0.2	0.2	1.8	9.9	1.5	28				
Lin	0.01	0.01	NS	0.01	0.05	0.01	NS	NS	NS	0.01	0.01	0.01				
Quad	0.01	NS	NS	NS	0.1	NS	0.1	NS	NS	NS	NS	NS				
Cubic	0.05	NS	0.1	NS	NS	0.05	NS	NS	0.05	0.05	NS	NS				
Dev	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS				

Table 4A. Effects of gibberellic acid (GA3) on plant emergence (35 DAP), stem numbers, tuber set, average tuber weight, yield and grade of **Satina** potatoes in **2011**. Yield data is analyzed as A, B and C tuber size classes. Seed-tubers were stored at 4°C from Oct. 10, 2010 to April 5, 2011. The seed was cut (50-64-g seedpieces) and treated on April 8, 2011 by immersing for 5 min in solutions of GA. Cut seed was stored at 48°F until planting in replicated plots at the WSU Othello Research Unit on April 11, 2011. Vines were mowed 105 days after planting (July 25, 2011). Tubers were harvested August 4, 2011 (115 DAP). P-levels for polynomial trends of yield components with GA concentration are presented below the table (LSD, least significant difference at P<0.05).

[GA] ppm	Emerg %	Stems Plant^{-1}	Satina Tuber Yield (T/A) (2011)							U.S. #1 Tubers + <113 g			Crop Value (% control)			
			Mkt. #1	C's (10-66g)	B's (67-91g)	A's (92-360)g	>360g	#2's	Total	g tuber^{-1}	plant^{-1}	1000's A^{-1}	C's	B's	A's	Total
0	2	3.3	24.0	3.5	3.9	16.4	0.1	0.1	24.0	96	12.3	228	0	0	0	0
2	66	5.1	29.6	5.4	5.7	18.5	0	0.2	29.8	87	16.8	310	53	45	13	26.7
4	77	5.0	27.6	5.7	6.0	15.9	0	0.2	27.8	83	16.5	304	61	51	-3.0	19.5
8	87	4.9	23.3	5.5	5.4	12.4	0	0.2	23.5	78	14.7	271	57	36	-24	2.9
$LSD_{.05}$	21	0.4	1.6	0.6	0.8	1.6	0.1	0.2	1.5	4.1	0.8	15.1				
Lin	0.01	0.01	0.01	0.01	0.05	0.01	0.1	0.05	0.01	0.01	0.01	0.01				
Quad	0.01	0.01	0.01	0.01	0.01	0.01	0.1	NS	0.01	0.01	0.01	0.01				
Dev	0.10	0.01	0.01	0.10	NS	0.05	NS	NS	0.01	NS	0.01	0.01				

Table 4B. Effects of gibberellic acid (GA3) on plant emergence (31 DAP), stem numbers, tuber set, average tuber weight, yield and grade of **Satina** potatoes in **2012**. Yield data is analyzed as A, B and C tuber size classes. Seed-tubers were stored at 4°C from mid-October to April 9, 2012. The seed was cut (50-64-g seedpieces), treated April 9, 2012 by immersing for 5 min in solutions of GA and stored for 2 days at 48°F until planting. Seed was planted in replicated plots at the WSU Othello Research Unit on April 13, 2012. Vines were mowed 91 days after planting (July 12, 2012). Tubers were harvested July 24, 2012 (103 DAP). P-levels for polynomial trends of yield components with GA concentration are presented below the table (LSD, least significant difference at P<0.05).

[GA] ppm	Emerg %	Stems Plant^{-1}	Satina Tuber Yield (T/A) (2012)							U.S. #1 Tubers + <113 g			Crop Value (% control)			
			Mkt. #1	C's (10-66g)	B's (67-91g)	A's (92-360)g	>360g	#2's	Total	g tuber^{-1}	plant^{-1}	1000's A^{-1}	C's	B's	A's	Total
0	12	3.3	19.6	3.4	3.7	12.4	0.1	0.1	19.6	89	10.8	200	0	0	0	0
0.5	49	4.1	21.7	2.6	3.5	15.7	0	0	21.7	97	11.0	203	-26	-5	27	7.1
1	68	4.6	20.4	3.1	3.9	13.2	0	0.3	20.7	92	10.9	202	-10	5	7	1.6
2	78	4.6	20.2	3.2	3.8	9.9	0	0.2	20.4	91	11.0	202	-7	3	-20	-13.1
4	93	4.8	17.7	4.0	3.9	12.2	0	0.1	17.8	79	11.1	204	15	6	-2	4.3
$LSD_{.05}$	20	0.7	1.9	0.8	NS	2.2	NS	0.2	1.9	8	NS	NS				
Lin	0.01	0.01	0.01	0.05	NS	0.01	NS	NS	0.01	0.01	NS	NS				
Quad	0.01	0.05	0.05	NS	NS	0.05	NS	NS	0.05	0.05	NS	NS				
Cubic	0.05	0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS				
Dev	NS	NS	0.1	NS	NS	0.05	NS	0.05	NS	NS	NS	NS				

Table 5A. Effects of gibberellic acid (GA3) on plant emergence (35 DAP), stem numbers, tuber set, average tuber weight, yield and grade of **Yukon Gold** potatoes in **2011**. Yield data is analyzed as A, B and C tuber size classes. Seed-tubers were stored at 4°C from Oct. 10, 2010 to April 6, 2011. The seed was cut (50-64-g seedpieces) and treated on April 8, 2011 by immersing for 5 min in solutions of GA. Cut seed was stored at 48°F until planting in replicated plots at the WSU Othello Research Unit on April 11, 2011. Vines were mowed 105 days after planting (July 25, 2011). Tubers were harvested August 4, 2011 (115 DAP). P-levels for polynomial trends of yield components with GA concentration are presented below the table (LSD, least significant difference at P<0.05).

[GA] ppm	Emerg %	Stems Plant^{-1}	Yukon Gold Tuber Yield (T/A) (2011)							U.S. #1 Tubers + <113 g			Crop Value (% control)			
			Mkt. #1	C's (10-66g)	B's (67-91g)	A's (92-360)g	>360g	#2's	Total	g tuber^{-1}	plant^{-1}	1000's A^{-1}	C's	B's	A's	Total
0	2.5	2.4	23.3	1.3	1.5	19.3	1.1	0.1	24.1	138	8.2	151	0	0	0	0
2	10	4.2	23.1	1.9	1.9	19.1	0.2	2.1	25.2	125	9.4	169	48	24	-1	5.3
4	31	4.3	19.3	2.0	1.9	15.1	0.3	3.4	22.7	110	8.6	158	53	25	-22	-12
8	35	4.0	15.1	2.2	1.6	11.3	0.1	4.9	20.1	98	7.6	138	70	2	-42	-28
$LSD_{.05}$	26	0.9	3.1	0.5	0.6	2.3	0.8	1.7	2.4	8.9	1.0	20				
Lin	0.05	0.01	0.01	0.01	NS	0.01	0.05	0.01	0.01	0.01	0.05	0.10				
Quad	NS	0.01	NS	0.10	0.10	NS	NS	NS	NS	NS	0.05	0.05				
Dev	NS	NS	NS	NS	NS	0.10	NS	NS	NS	NS	0.10	NS				

Table 5B. Effects of gibberellic acid (GA3) on plant emergence (31 DAP), stem numbers, tuber set, average tuber weight, yield and grade of **Yukon Gold** potatoes in **2012**. Seed-tubers were stored at 4°C from mid October to April 9, 2012. The seed was cut (50-64-g seedpieces) April 9, 2012, treated April 11, 2012 by immersing for 5 min in solutions of GA and stored for 2 days at 48°F until planting. Seed was planted in replicated plots at the WSU Othello Research Unit on April 13, 2012. Vines were mowed 91 days after planting (July 12, 2012). Tubers were harvested July 25, 2012 (104 DAP). P-levels for polynomial trends of yield components with GA concentration are presented below the table (LSD, least significant difference at P<0.05).

[GA] ppm	Emerg %	Stems Plant^{-1}	Yukon Gold Tuber Yield (T/A) (2012)							U.S. #1 Tubers + <113 g			Crop Value (% control)			
			Mkt. #1	C's (10-66g)	B's (67-91g)	A's (92-360)g	>360g	#2's	Total	g tuber^{-1}	plant^{-1}	1000's A^{-1}	C's	B's	A's	Total
0	18	1.4	14.4	0.7	1.9	11.6	0.1	0.8	15.2	114	6.3	116	0	0	0	0
0.5	41	2.2	15.9	1.3	3.0	11.6	0	1.2	17.1	95	8.1	150	90	54	0	13.6
1	50	2.4	14.4	1.2	3.2	9.9	0	1.5	15.8	91	7.7	143	82	63	-14	2.5
2	57	2.8	13.2	1.3	3.4	8.5	0	2.2	15.4	84	7.7	142	94	77	-27	-5.1
4	63	3.2	10.9	1.5	3.3	6.1	0	2.9	13.8	76	7.2	133	116	70	-48	-20.5
$LSD_{.05}$	14	0.5	1.7	0.4	0.8	1.7	NS	0.9	1.6	11	1.2	22				
Lin	0.01	0.01	0.01	0.01	0.05	0.01	NS	0.01	0.01	0.01	NS	NS				
Quad	0.01	0.05	NS	0.1	0.01	NS	NS	NS	NS	0.05	0.05	0.05				
Cubic	0.1	NS	NS	0.1	NS	NS	NS	NS	NS	NS	0.1	0.1				
Dev	NS	NS	NS	NS	NS	NS	NS	NS	0.1	NS	NS	NS				