

**Kentucky**

**12-25-B-1070**

**Specialty Crop 2010 Farm Bill**

**Final Report**

**December 23, 2012**

**Prepared by: Joshua Lindau**

**Final Performance Report**  
**Specialty Crop Block Grant 2010**

**Project 1: Developing Diversified High Tunnel Systems to Enhance Food Security and Specialty Crop Production in Kentucky**

**Project Summary**

High tunnel production systems have received increasing press in public interest and agricultural policy spheres in recent years. From success stories in urban areas increasing urban food security and providing employment to rural producers gaining access to early or late-season markets, high tunnel technologies are growing in popularity for their ability to extend the growing season and provide increased food availability. However, the potential for high tunnel technology to provide year-round produce is largely untapped, and is currently comprised of a few diversified growers and many others that focus on production of 1-2 crops to capture early and late-season market windows for price premiums. In this project we developed and established diversified high tunnel specialty crop rotations for year-round production in Kentucky. The rotations were designed to focus on consistent production to provide increased food security, consistent cash flow and sustainable soil management. Rotations included traditional high-value high tunnel crops, as well as root vegetables, greens and legumes. The systems were managed using low-input fertility regimes that would be applicable to both low-income and organic growers. Given the potential for soil salinization and the general effects of these intensive systems on soil quality, an area of project focus was the design/build and management of movable high tunnels. To our knowledge, this is the only high tunnel research facility at a Land Grant University that has replicated movable and stationary high tunnels. The establishment of this facility was directly funded by this work.

**Project Approach**

High tunnels are becoming increasingly visible in the horticulture industry and in public and policy spheres for their significant potential to increase the production of specialty crops. This demand for direct market fruits and vegetables throughout the year due is fueled in part by increased consumer interest in “buying local,” healthy local foods initiatives, and the like. High tunnels (unheated, plastic-covered greenhouses) are a promising technology for extending the production season. Adoption of high tunnel technologies are being supported both by markets as well as policy initiatives such as USDA Natural Resource Conservation Service’s (NRCS) Environmental Quality Incentive Program (EQIP) Seasonal High Tunnel Initiative. Since the initiation of this project, the Kentucky NRCS has approved cost shares on over 200 high tunnels in the state in 2011, and were slated to match this quantity in 2012 (Deena Wheeby, KY NRCS personal communication).

1.

The purpose of this project was 1) to establish a high tunnel research project at the University of Kentucky Organic Farming Research and Education Unit focused on

enhancing the sustainable production of a diversity of specialty crops, 2) to develop crop rotations that enhance food security in rural and urban areas through consistent production of nutritious foods, and 3) to develop low input fertility regimes that enhance soil and environmental quality and reduce input costs in high tunnel systems. Our experimental design was centered on developing two replicated high tunnel systems that were intended to maximize crop rotation and diversification within the context of each system. As such, two high tunnel systems were developed for this project, each with three replicate tunnels: a) a “stationary” (standard) high tunnel system, and b) a “movable” high tunnel system where the structures are physically moved multiple times per year to increase the opportunities for cover cropping, natural rainfall, and a break in the intensive tillage cycles that are a part of standard high tunnel production. In both high tunnel systems, emphasis was placed on balancing production of “traditional” high-value, high tunnel crops (tomatoes, strawberries, and peppers) with crops produced year-round to increase the availability of nutritious local specialty crops, including legumes, greens, and root vegetables.

Both high tunnel systems were managed in the context of low-external input systems; that is, relying on biological sources of soil fertility and pest control, and scale-appropriate technologies. As such, fertility was managed through composts, pelletized poultry manures, and cover crops. The majority of tractor operations were conducted using a BCS walk behind tractor purchased for the project, and associated soil-working implements, and using high tunnels that would be accessible to growers in Kentucky. The high tunnel kits purchased for the project are common commercially available models that are of the size covered by the NRCS cost-share. These “out-of-the-box” kits were used as designed in the stationary systems, and modified in a design-build process by the project team for the movable tunnels. (It should be noted that it was not intentional that our high tunnels were the exact square footage that is covered by the NRCS cost-share, it has proven useful for policy and public outreach purposes to demonstrate these size of tunnels in our public programming.)

The project implementation timeline is listed briefly below (Table 1). The remainder of this report describes the process by which the infrastructure was developed and novel design-build components, rotations developed for each system that were the result of the iterative process of refining these systems throughout this work, and the extensive extension and outreach that became integral to this project with the rapid increase in high tunnel interest in the state that occurred during the timeline of this project.

### **Goals and Outcomes Achieved**

The measurable outcomes that were originally proposed in this project, and the outcomes achieved are detailed below.

Development of suggested planting dates, fertility and management guidelines and enterprise budget data for a suite of diverse high tunnel grown crops. We have developed general planting window guidelines for crops grown during the duration of the project, and are now in the process of collecting the second full year of yield data on the 13 crops used in our final rotations. These crops include carrots, beets, leafy greens, head lettuce, salad mix, arugula,

strawberries, tomatoes, peppers, eggplant, pea, beans, and cucumber. As far as we know, we are still currently the only field research site at Land Grant Research Farms with movable and replicated high tunnels. Interest in this research from farmers and policy makers has been significant throughout the duration of the project (see Table 5).

**Table 5. Extension and educational programming during the reporting period.**

<b>Date</b>	<b>Extension Program Title</b>	<b>Presenter</b>	<b>Number of Attendees</b>
9/2/2011	UK Sustainable Agriculture and Food Systems Working Group "First Friday"	Krista Jacobsen, Mark Williams	~45
9/6/2011	In-Field Vegetable Production Training: Moveable High Tunnels	Krista Jacobsen	15
10/8/2011	KY Farm Start Beginning Farmer Training	Mark Williams	12
10/24/2011	Plant Production Systems Lab (UK Course No. PLS 386)	Krista Jacobsen	34
4/17/2012	NRCS State Leadership Team tour	Krista Jacobsen, Tim Coolong	10
7/18/2012	Community Farm Alliance Agricultural Legacy (Beginning Farmer) Training	Krista Jacobsen	40
8/3/2012	UK Sustainable Ag Apprentice Workshop	Krista Jacobsen	15
8/7/2012	UK Horticulture Farm Field Day	Krista Jacobsen	~60
9/7/2012	UK Sustainable Agriculture and Food Systems Working Group "First Friday"	Mark Williams, Alex Hessler (Jacobsen Graduate Student)	~75
10/17/2012	Washington and Madison County Master Gardener Groups	Krista Jacobsen	18
10/24/2012	Plant Production Systems Lab (UK Course No. PLS 386)	Krista Jacobsen	36
11/20/2012	NRCS/UK Extension Agent training	Krista Jacobsen, Tim Coolong, Kenny Seebold and Kate Little (NRCS)	20
11/29/2012	NRCS/UK Extension Agent training	Same as above	35
1/8/2013	KY Fruit & Vegetable Growers Association Meeting	Krista Jacobsen	~175

Use economic, soil quality and plant production data to develop future high tunnel systems research proposals. The research questions generated by the team during the course of the project are largely related to quantifying the overall environmental “costs and benefits” of diversified high tunnel production. These systems are highly intensive energetically, from the use of plastic and steel, and there are key nutrient loss pathways that we do not understand due to the protected nature of the tunnel environment, such as nutrient leaching losses and greenhouse gas losses. Further, it is unclear how this intensification is balanced by the benefits of crop diversification. These questions about the key nutrient loss pathways, effects on soil quality, and efforts to reduce the “ecological footprint” of these systems have driven the development of several grant proposals during the timeline of the project. These are listed below:

Jacobsen, K.L. (PI), and B. Rowell. Soil and Water Conservation in Seasonal High Tunnels: Evaluating Approved Practices and New Innovations for Resource Conservation. Kentucky NRCS Conservation Innovation Grant Program. \$146,741. 2013- 2016.

Jacobsen, K.L. (PI), J.R. Schramski, O. Wendroth. Toward Sustainable Nitrogen and Carbon Cycling on Diversified Horticultural Farms Serving Community Food Systems. NIFA-AFRI Foundational Programs. \$498,429. 2013-2017.

Jacobsen, K.L. (PI), T. Coolong (co-PI). Building technical support capacity for Kentucky’s high tunnel specialty crop producers. Kentucky Department of Agriculture Specialty Crops Block Grant Program. Funded, \$50,791. 2012 – 2014.

Woods, T. (PI), K.L. Jacobsen, C. Cassady, B. Rowell, M. Batty. Prosperity Under Plastic: High tunnel crops to increase small farm incomes in Appalachia. NIFA-AFRI Foundational Programs. \$499,898. 2013-2017. (*In review*)

## **Beneficiaries**

Engage a network of current and potential high tunnel growers. We envisioned this project becoming a “flagship” high tunnel research station, with a network of 3-4 satellite sites with single tunnels throughout the state, specifically targeted in Eastern Kentucky and Louisville. We did obtain matching funds on a recent KY NRCS Conservation Innovation grant (2013-2017) to fund construction of high tunnels on community partner sites in partnership with the organization Grow Appalachia (GA). The GA group have been outspoken advocates and have done much work to build smaller-scale high tunnels in order to improve community food security on the household level. A high tunnel related to this project was installed in November, 2013 at the Robinson Center for Appalachian Resource Sustainability in Quicksand, KY. We will continue to work with GA and managers at both the BDVP and Robinson Center to collect data on high tunnel heat retention in these smaller scale tunnels, and provide production guidance as requested. Jacobsen is also beginning to work in Jefferson County, KY with County Cooperative Extension on the installation of high tunnels on their community garden sites.

## **Lessoned Learned**

One major lesson learned throughout the course of the experiment is how to manage for the high degree of winter weather variability that can occur in our region, especially driven by cloudy weather. From Jacobsen's work with producers in the northeastern and southeastern US, she has observed a gradient in management philosophies due to climate. In the Northeast, high tunnel growers tend to design their planting plans to have plants mature by Thanksgiving, and harvest from the mature plants (digging root vegetables as needed for markets, harvesting mature greens plants, etc.) during the lowest light and temperature intervals of the year (generally mid-November to mid-February). However, growers in the Southeast continue to plant and achieve new crop growth during this time period due to higher solar intensity and generally warmer temperatures than in the Northeast. In the years of this project, we experienced both a fairly cold winter (2010-2011) and an unseasonably warm winter (2011-2012). As such, we have adopted a management philosophy designed to buffer risk, which is to manage the tunnels as growers in the Northeast do, generally aimed at establishing overwintering crops by Thanksgiving. After this point, we do plant head lettuces as beds of other crops mature and are harvested, but we do not direct seed crops until mid-February. In warm years when crops mature faster, we will include some direct seeded, short-season cutting greens such as salad mixes and arugula to fill rotational gaps. Thus, it is a compromise philosophy – manage like a “northern tunnel,” but be prepared to use some tricks from the south (high value, short window crops grown in the winter) to maximize productivity out of the rotation.

Another lesson learned is regarding movable high tunnel design. Overall, the system must be as simple as possible with as little removal of parts as possible to minimize pre- and post-move labor. This is especially true in end wall design, due to the shifting in the base width that can occur when ski-based models are used. This is a function of the camber force (downward pressure due to the weight of the tunnel bows that causes the base to “splay” further than its original 30' width). Although we have not seen adverse effects on the high tunnel structures due to this, and can generally correct any shifting using tractor forks and pry bars once the tunnel is moved, the re-assembly of end walls was extremely labor-intensive with the original design and was only possible with the help of the Horticulture Research Farm crew. As such, end walls were modified to be removed only when necessary, such as when moving over a trellised crop.

We also learned the high tunnel production that the construction and management of the site needed to conduct high quality research and keep the site well-maintained was well beyond the student and PI labor that was originally proposed. As such, some grant funds were expended to hire a member of the farm crew who is a skilled carpenter to help in end wall design and building, as well as materials and supplies to modify the structures, optimize irrigation efficiency, etc. (as discussed in the final financial report below).

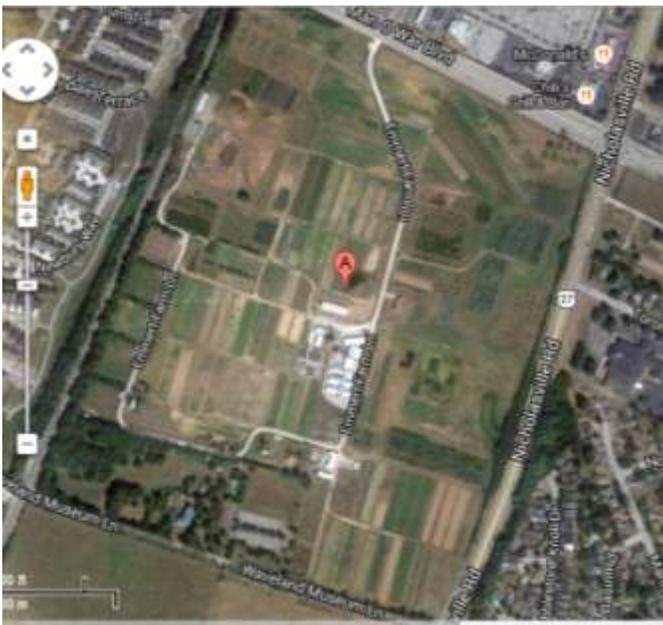
## Contact Person

Krista Jacobsen, Assistant Professor  
Department of Horticulture  
N318 Ag Sciences North  
University of Kentucky  
Lexington, KY 40546  
Office: (859) 257-3921

## Additional Information

***Aerial view of the UK High Tunnel Research Facility, located at the UK Horticulture Research Farm, Organic Unit, 4321 Emmert Farm Lane, Lexington, KY 40514***  
(photo courtesy of Google Earth).

### UK Horticulture Research Farm





**Stationary High Tunnels**

**Mobile High Tunnels**

## Final Financial Report

The final financial summary report is detailed by category in Table 6 below. As noted in the “Lessons Learned” section, it was necessary to redirect student salary allocated in the proposal to staff salary to facilitate the design-build of the movable high tunnel end walls. Additional funds for materials were also necessary for the end wall work, as well as fairly complex irrigation infrastructure that required a number of fittings, etc. to accommodate the movable site design (shown in Appendix A). These project issues explain the increased materials cost and decreased overall labor expenditures in the final report relative to the original project request.

**Table 6. Final financial summary report, 2010-2013.**

	Cumulative <u>11/1/2010-9/15/2013</u>
Salaries	\$ 4,470.00
Fringe Benefits	\$ 616.79
Travel	\$ -
Registration Fees	\$ -
Research Subject Payments	\$ -
Trainee Tuition & Fees	\$ -
Services	\$ -
Subscriptions	\$ -
Professional Services	\$ -
Other	\$ -
Rent/Lease Building	\$ -
Sub-Ct <\$25,000	\$ -
Sub-Ct >\$25,000	\$ -
Materials & Supplies	\$ 51,925.75
Equipment	\$ -
<i>Direct</i>	<u>\$ 57,012.54</u>
Indirect @ 8%	<u>\$ 5,701.38</u>
<b>Total</b>	<b>\$ 62,713.92</b>
Cumulative Receipts	\$ 62,834.00
Cumulative Expenses	\$ 62,713.92
<b>Refund Due</b>	<b>\$ (120.08)</b>

## **Project 2 Title: Specialty Crop Recipe Development with Nutritional Research Component Grant; University of Kentucky Cooperative Extension Service**

### **Project Summary**

The specific goals of this project were to:

1. Increase consumer awareness of the availability and nutritional value of Kentucky specialty crops through new recipes.
2. Provide educational resources for Extension agent, producer, and others use to promote Kentucky products to local consumers.
3. Evaluate the effectiveness of recipe card dissemination and recipe demonstration on specialty crop consumption and purchase.

### **Project Approach**

Cooperative Extension agents in each of the 120 counties partnered with local producers and the Kentucky Department of Agriculture to adapt, develop, publicize and demonstrate recipes that promote Kentucky specialty crops. The recipes were designed to be healthy, tasty, easy to prepare and feature Kentucky-grown fruits, vegetables, herbs, nuts, etc. to promote purchase, preparation and consumption by the local consumer. Consumer taste panels critiqued the recipes and Dietetics students performed scientific product testing in university laboratories to develop a high quality product. The recipes were then disseminated via websites, point of purchase recipe cards, newsletters, Facebook and media (TV, print). Media releases and demonstration scripts were developed to complement each recipe. Extension agents also shared the recipes via demonstrations and sampling at various venues within the local community. Producers distributed recipe cards at local farmers' markets and through CSA distribution.

### **Goals and Outcomes Achieved**

The three program outcomes that were measured:

1. *To increase number and scope of teaching resources, recipes, and Kentucky Proud marketing materials for agents' use in promoting specialty crops to local consumers.*
2. *To increase consumer awareness and knowledge of selection, preparation, and storage of Kentucky Specialty Crops.*
3. *To increase consumer spending and producer income at Farmer's Markets venues.*

### **Beneficiaries**

*Extension Professionals:* Extension agents in each of the 120 counties have used and benefited professionally from the materials provided in this project. The recipe cards, media scripts and demonstration guides have been shared extensively by Nutrition education program assistants, Family and Consumer Sciences agents, Agriculture agents and Horticulture agents as well as Master Gardeners and Master Food Volunteers. The materials lend themselves well to be adapted to face-to-face, social media, television, radio, and print outreach efforts to maximize their potential reach.

*Producers:* Follow-up surveys by producers who have responded regarding the use of the recipe cards at farmers markets or CSA baskets have indicated that this is a powerful resource

to open the door for conversation with potential customers, a way to attract more traffic to their booths and a good point of purchase resource to encourage purchase of the featured product (FY2009 report). During this FY 2010 grant period a focus group of eight producers was convened in Franklin County. The producers indicated agreement with the 2009 report that the recipe cards were a good point of purchase resource for information about specific commodities at farmers' market. They felt that sampling the recipes with consumers would be an important way to increase sales. Currently there is more demand for recipe cards by producers than there is funding to print the cards. Web based access is encouraged.

*Consumers:* Consumers have been impacted based upon the surveys and Extension agent feedback. Over 1,247,400 recipe cards have been disseminated to consumers during this grant cycle. Based on the consistent feedback that 20% of the consumer survey respondents (FY 2009 report) indicate that they bought the featured Kentucky commodity after receiving the recipe card it is therefore possible that 20% of the recipe cards disseminated (n=249,480) could have generated revenue for local producers. At this time there is not a quantifiable metric to capture the economic benefit to the local food system of this project.

*Students:* DHN students have gained research and recipe development/adaptation experience in a real world setting through this service learning project. Classroom evaluations indicate high satisfaction with the project. Students value the application of this project and report that they feel a high level of accountability with this project because their recipe modifications will actually be utilized throughout the state of Kentucky. Students value this learner-centered teaching approach and indicate that this is one of the most impactful projects of their undergraduate nutrition coursework.

1. Secondary to recipe development, DHN students all report having a better knowledge and appreciation of Kentucky-grown commodities. Students feel more comfortable and confident in making fruit and vegetable recommendations. Prior to this project, many students had never heard of some of these local commodities, or did not know how the product could be used in food preparation. Given the importance of fruits and vegetables in a healthy diet, student knowledge of locally-grown produce is essential
- Lessoned Learned**
- Offer insights into the lessons learned by the project staff as a result of completing this project. This section is meant to illustrate the positive and negative results and conclusions for the project.
  - Provide unexpected outcomes or results that were a effect of implementing this project.
  - If goals or outcome measures were not achieved, identify and share the lessons learned to help others expedite problem-solving.

**Activities Performed and accomplishments toward Outcome 1**

Recipe Solicitation and Review	Kentucky Recipe Proud Database (KRPD) Advisory Committee is highly functioning and has met via face to face, conference calls, and web based sessions a minimum of 8 times during this grant period.
	Recipes have been solicited from multiple sources to submit for adaptation and testing. These sources include Extension agents, CES

	<p>program resources, local producers, and local consumers</p> <p>The KRPD Advisory Committee has submitted minimum of 30 recipes per semester to the NFS 304 Experimental Foods class for adaptation and testing (Spring 2012 = 30, Fall 2012 = 31, Spring 2013 = 32).</p>
Recipe Testing and Adaptation	<p>Recipes have been tested for Spring 2012, Fall 2012 and Spring 2013 by 118 students in the DHN classes. 60 recipes were tested/adapted and 30 have been approved for inclusion in the recipe database during this grant time period.</p> <p>A collaboration with the UK Food Systems Innovation Center resulted in recruitment of a broader base of consumers for the taste testing during Fall 2012. Ipads were used by the taste test panel to answer the panel questions for each recipe. This system allowed the faculty to have taste test results upon completion of the panel – increasing the speed which the committee had access to the data and ability to make decisions about moving recipes through the system.</p>
Final recipe database development	<p>18 recipe cards have been developed, published and included in the recipe database and linked on the web during the grant time period.</p> <ul style="list-style-type: none"> <li>Tomato Basil Bruschetta</li> <li>Green Bean Bundles</li> <li>Honey Raisin Muffins</li> <li>Easy Peach Cobbler</li> <li>Spinach Slaw</li> <li>Strawberry Green Tea</li> <li>Yellow Squash Ribbons</li> <li>Turnip Tater Mash</li> <li>Zippy Zucchini Cakes</li> <li>Red Potato Salad</li> <li>Country Ham and Broccoli Grits</li> <li>Kale and Potato Soup</li> <li>Beefy Stuffed Peppers</li> <li>Zippy Corn Chowder</li> <li>Summer Corn and Couscous Salad</li> <li>Stuffed Zucchini Boats</li> <li>Very Berry Salsa</li> <li>Strawberry Salsa</li> </ul>
Lesson Plan Development	<p>Lesson plans have been developed for each of the eighteen new recipe cards.</p>
Distribution of Recipes/Recipe Cards	<p>18 new recipe cards have been designed, published and 13,000 of each card have been distributed through Cooperative Extension agents in each county.</p> <p>Plate it Up Kentucky Proud campaign was again featured at the Kentucky State Fair including displays, demonstrations, video clips, and recipe card dissemination.</p> <p>All completed recipes have been included on the KDA Kentucky proud website at <a href="http://www.kyproud.com/recipes/index.aspx">http://www.kyproud.com/recipes/index.aspx</a></p> <p>Kentucky Proud Kitchen television show featured the project to air in</p>

	80 county market within the state.
	Two magazines (Kentucky Monthly and Kentucky Living) with statewide circulation have featured the project recipes in three issues.

**Activities Performed and accomplishments toward Outcomes 2 and 3:**

<p><i>All FCS agents were surveyed via Cooperative Extension reporting regarding their use of the cards.</i></p>	<p>Extension agents report distributing 1,247,400 cards during the grant time period. They report multiple uses of recipe cards: through farmers market point of purchase displays, demonstrations at markets, groceries, cooking schools, and Extension education programs. Four agents have been asked to feature the recipes at monthly television shows via cable access. Two magazines with statewide circulation have featured the project recipes in three issues.</p>
<p><i>Statewide consumer behavior change data will be compiled via program evaluation questions developed to complement lesson plans used by agents. Agents will collect and enter the evaluation data into the statewide CES reporting system annually.</i></p>	<p>Extension agents have access to an evaluation survey to use with clientele who participate in Plate it Up! Kentucky Proud programs/receive the recipe cards. This information is collected via a web-based reporting system beginning July 1, 2012. Currently consumers in ten counties were surveyed (Bath, Clay, Cumberland, Floyd, Franklin, Henry, LaRue, Lewis, Trigg, Wolfe). See Table 1. for results reported by agents.</p>
<p><i>A representative sample of specialty crop producers selling at local farmers' markets will be surveyed as to the difference in sales of product before and after distribution of the recipe cards.</i></p>	<p>A focus group of eight producers was convened in Franklin County. Two of the eight producers indicated their sales increased when they had recipe cards to give consumers. All producers indicated that sampling the recipe would be a more effective way to increase sales but they did not have the time or ability to follow the current rules required by public health. When asked how they used the cards the producers indicated they have given them to customers when customers ask how to make a particular fruit or vegetable. They were all in agreement that the cards save time in explaining to a customer how to store/freezer a fruit or vegetable.</p>

<p><i>A representative sample of consumers will participate in a survey to determine the impact of the recipe cards on their purchases.</i></p>	<p>Forty-three consumers participated in recipe sampling of Honey Muffins at a College of Agriculture outreach event. After sampling the Honey Muffins and receiving a copy of the recipe card consumers were asked about the influence of the card upon their purchase of Kentucky specialty crops. See Table 2 for results.</p>
---	---

Table 1. Ten county consumer survey of sampling and recipe cards on fruit or vegetable purchase.

<p>After tasting the samples of fruit/vegetables:</p>	
<p>1,121</p>	<p>Number of participants indicating that they are likely to buy fruits or vegetables</p>
<p>731</p>	<p>Number of participants indicating that the taste test contributed (at least somewhat) to their plans to try the recipe at home</p>
<p>After receiving recipe cards:</p>	
<p>1,048</p>	<p>Number of participants indicating that they are likely to buy Kentucky fruits or vegetables</p>
<p>821</p>	<p>Number of participants indicating that the recipe card contributed (those responding with "probably yes" and "definitely yes") to their plans to try the recipe at home</p>
<p>628</p>	<p>Number of participants indicating that the recipe cards influenced their decision to buy fruits and/or vegetables</p>
<p>418</p>	<p>Number of participants reporting that recipe cards helped them evaluate their nutritional needs</p>
<p>342</p>	<p>Number of participants reporting that the recipe cards helped them plan future purchases at the market/ grocery store</p>
<p>171</p>	<p>Number of participants who indicated that they purchased the fruit or vegetables featured on the card</p>
<p>446</p>	<p>Number of participants who indicated <u>plans to increase</u> their consumption of fruits <u>after participating in the program</u></p>
<p>536</p>	<p>Number of participants who indicated <u>plans to increase</u> their consumption of vegetables <u>after participating in the program</u></p>
<p>326</p>	<p>Number of participants who reported consuming at least 4-6 servings of fruit per day <u>before participating in the program</u></p>
<p>266</p>	<p>Number of participants who reported consuming at least 4-6 servings of vegetables</p>

	per day <u>before</u> participating in the program
Please complete the following only if you received follow-up surveys from participants after the program (within six months).	
60	Number of participants who <u>reported an increase</u> in their consumption of fruits after participating in the program
60	Number of participants who <u>reported an increase</u> in their consumption of vegetables after participating in the program
26	Number of participants who reported consuming at least 4-6 servings of fruit per day <u>after</u> participating in the program
26	Number of participants who reported consuming at least 4-6 servings of vegetables per day <u>after</u> participating in the program



Table 2. Consumer Response to Honey Muffin recipe card and sample

**1. As a result of TASTING the sample today, how likely are you to buy locally grown honey?**

#	Answer	Response	%
1	Definitely will not	0	0%
2	Probably will not	1	2%
3	Don't know	7	16%
4	Probably will	16	37%
5	Definitely will	19	44%
	Total	43	100%

Statistic	Value
Min Value	2
Max Value	5
Mean	4.23
Variance	0.66
Standard Deviation	0.81
Total Responses	43

## 2. Did the TASTE TEST contribute to your plan to try the honey recipe at home?

#	Answer		Response	%
1	Definitely not		0	0%
2	Probably not		4	9%
3	Maybe		13	30%
4	Probably yes		14	33%
5	Definitely yes		12	28%
	Total		43	100%

Statistic	Value
Min Value	2
Max Value	5
Mean	3.79
Variance	0.93
Standard Deviation	0.97
Total Responses	43

## 3. Would you have prepared the honey recipe if you had not tried the SAMPLE?

#	Answer		Response	%
1	Definitely not		5	12%
2	Probably not		11	26%
3	Undecided		10	23%
4	Probably yes		13	30%
5	Definitely yes		4	9%
	Total		43	100%

Statistic	Value
Min Value	1
Max Value	5
Mean	3.00
Variance	1.43
Standard Deviation	1.20
Total Responses	43

**4. As a result of receiving the RECIPE CARD, how likely are you to buy Kentucky honey?**

#	Answer		Response	%
1	Definitely will not buy		0	0%
2	Probably will not buy		0	0%
3	Undecided		6	14%
4	Definitely will buy		18	42%
5	Probably will buy		19	44%
	Total		43	100%

Statistic	Value
Min Value	3
Max Value	5
Mean	4.30
Variance	0.50
Standard Deviation	0.71
Total Responses	43

**5. Did the RECIPE CARD contribute to your plan to try the recipe at home?**

#	Answer		Response	%
1	All of the Time		4	10%
2	Often		15	36%
3	Sometimes		19	45%
4	Rarely		1	2%
5	Never		3	7%
	Total		42	100%

Statistic	Value
Min Value	1
Max Value	5
Mean	2.62
Variance	0.92
Standard Deviation	0.96
Total Responses	42

**6. RESPOND TO THE FOLLOWING FOUR QUESTIONS: RECIPE CARDS would help me make me feel more comfortable trying unusual products.**

#	Answer		Response	%
1	Never		0	0%
2	Rarely		0	0%
3	Sometimes		15	34%
4	Often		16	36%
5	All of the Time		13	30%
	Total		44	100%

Statistic	Value
Min Value	3
Max Value	5
Mean	3.95
Variance	0.65
Standard Deviation	0.81
Total Responses	44

**7. RECIPE CARDS would help me evaluate my nutritional needs.**

#	Answer		Response	%
1	Never		0	0%
2	Rarely		4	9%
3	Sometimes		15	34%
4	Often		15	34%
5	All of the Time		10	23%
	Total		44	100%

Statistic	Value
Min Value	2
Max Value	5
Mean	3.70
Variance	0.86
Standard Deviation	0.93
Total Responses	44

**8. RECIPE CARDS would help me decide how much of a product to purchase.**

#	Answer		Response	%
1	Never		0	0%
2	Rarely		1	2%
3	Sometimes		15	34%
4	Often		13	30%
5	All of the Time		15	34%
	Total		44	100%

Statistic	Value
Min Value	2
Max Value	5
Mean	3.95
Variance	0.79
Standard Deviation	0.89
Total Responses	44

**9. RECIPE CARDS would help me plan my future purchases at the market/grocery store.**

#	Answer		Response	%
1	Never		0	0%
2	Rarely		0	0%
3	Sometimes		16	37%
4	Often		18	42%
5	All of the Time		9	21%
	Total		43	100%

Statistic	Value
Min Value	3
Max Value	5
Mean	3.84
Variance	0.57
Standard Deviation	0.75
Total Responses	43

## Examples of developed resources

### Website for recipes

<http://www.kyproud.com/recipes/index.aspx>

### Social Media

[Facebook page](#)

### Example Recipe Card

[Tomato Basil Bruschetta Recipe](#)

### Example Media Script

[Kentucky Tomato Media Script](#)

### Example Demonstration Guide

[Tomato Basil Bruschetta Demonstration Guide](#)

## Evaluation Tools

[Overall Evaluation Tool for recipe card](#)

[Follow-up Evaluation Tool for recipe card](#)

## Videos

[YouTube - abc36noonnews - Plate it up with Beef & Broccoli](#)

[Spinach Slaw](#)

[Plate it Up Ky Proud Watermelon & Tomato Salad](#)

[Agriculture Commissioner discusses Plate it Up! Kentucky Proud](#)

## Refereed Journal Articles during the grant period

Stephenson, T., Stephenson, L. & Mayes, L. (2012). Engaging students in service learning through collaboration with Extension: A recipe for success with community partners. *Journal of North American Colleges & Teachers Agriculture*. 56(4), P 78-84.

Stephenson, T., Stephenson, L. Mayes, L. & Weber, K. (In Review). *Plate It Up! Kentucky Proud: A case study of a local food system fruit and vegetable point of purchase social marketing campaign. Case Studies in Public Health Communication and Marketing.*

Webber KH, Stephenson TJ, Mayes L, Stephenson L. (In Press). Characteristics of farmers market patrons: implications for promoting consumption of locally-grown produce. *World Applied Sciences Journal.*

## Presentations during the grant period

Stephenson, L. & Branscum, K. (2013). *Plate it Up! Kentucky Proud: A Statewide Approach to Building Local Food Systems*. Presentation to Georgia Department of Agriculture and Georgia Cooperative Extension Service administrators.

Johnson, J. & Plate it Up! Kentucky Proud Advisory Committee Members (2013). *Presentations with Pizzazz using Plate it Up! Kentucky Proud Resources* Statewide FCS Extension In-service Training. [Presentation PowerPoint](#)

### ***Examples of Extension Programs***

**Free Classes!**

*Plate it up!*



# Cheap, Fast & Healthy Every Tuesday

*Are you on a hectic schedule and tight budget?*

*Are you sick of going through the drive thru and ordering unhealthy food just because it's convenient?*

**Come join us on Tuesday nights for Cheap, Fast and Healthy!**

**Each 30 minute session will feature:**

**Cost Comparisons**

**Easy to Prepare Recipes**

**Tips on Shopping**

**Recipe Demonstrations**

**Samples**

**Take Home Recipe Cards**

**No need to pre-register, just show up!**

**Six Different Classes Offered at Both 10 AM & 6 PM**



**The Kitchen**  
located at the  
London Laurel County  
Farmers Market

10AM Classes	Featuring	6 PM Classes
June 4th:	Broccoli Pizza Corn	June 11th
June 18th:	Eggplant Parmigiana Herbed Pasta w/ Cherry Tomatoes	June 25th
July 2nd:	Veggie Calzones Farmer's Market Fruit Salad	July 9th
July 16th:	Pork Tenderloin Sliders Apple Salad	July 23rd
July 30th:	Vegetable & Beef Stir Fry Spinach Slaw	August 6th
August 13th:	Bourbon Steak Spring Harvest Salad	August 20th

For More Info Call:

**Laurel County  
Extension  
Office  
606-864-4167**



Educational programs of Kentucky Cooperative Extension serve all people regardless of race, color, age, sex, religion, disability, or national origin. University of Kentucky, Kentucky State University, U.S. Department of Agriculture, and Kentucky Counties, Cooperating. Disabilities accommodated with prior notification.



Television show



Health Fair Sampling



Russell County Farmers Market Sampling

# Plate it up! Kentucky Proud @ the Barren County AgFest

Barren County High School  
June 22, 2013



Join Mindy McCulley, Barren County  
Extension Agent for Family and Consumer Sci-  
ences in the Cooking Center, Main Hall for  
Plate it up! Kentucky Proud Demonstrations

11:30 am Very Berry Salsa

2:00 pm Red Potato Salad



COOPERATIVE  
EXTENSION  
SERVICE

**UK**  
UNIVERSITY OF  
**KENTUCKY**  
College of Agriculture

COOPERATIVE  
EXTENSION  
SERVICE



**Do you want to live a healthier lifestyle? Make better nutrition choices, get active and have fun?**

**Join the Webster County Extension Service and the Marion VA Nutrition Services to**



The Webster County Extension Service is partnering with the Marion Veterans Affairs (VA) Nutrition Services to offer a 5 session Healthy Lifestyle/Weight Management workshop. Each session will last 60-90 minutes and will include topics on eating well, how to sleep better, ways to move more and finding a healthy weight.

**When:** June 24, June 26, July 1, July 3, and July 8 @ 10:30am

**Where:** Webster County Extension Service  
1118 US Hwy 41A South  
Dixon, KY 42409

**Who:** Class is open to everyone including Veterans

*This class is FREE but you must call and register 639-9011.  
If you have any questions please ask for Katie Alexander, Family & Consumer Sciences Extension Agent or email [Katie.alexander@uky.edu](mailto:Katie.alexander@uky.edu)*



Agriculture and Natural Resources • Family and Consumer Sciences • 4-H Youth Development • Community and Economic Development



*Plate it UP Kentucky Proud  
Valentine Menu*

*New Potato and Asparagus Soup*

*Broccoli and Beef Stir Fry*

*Cabbage Noodle Casserole*

*Nutty Sweet Potato Biscuits*

*Blueberry Cream Cheese Pound  
Cake*



THURSDAY  
April 25, 2013

50¢

VOL 131 NO.  
2 SECTIONS / 24

BARREN COUNTY **ipinews.com**

# PROGRESS

## Glasgow Lacrosse takes on Lexington Sayre

A JOSE PUBLISHING, INC. NEWSPAPER • IPINews.COM

five day forecast

THURSDAY	64/41
FRIDAY	65/55
SATURDAY	68/55
SUNDAY	72/55
MONDAY	72/53

ASSAULT, DRUGS,  
THEFT, FRAUD

## Grand Jury indicts 17

The Barren County Grand Jury recently returned the following indictments:

**Steven Thomas Knowles**, 31, 421 Fairview Court, Bradfordville, KY for arson, 1st degree, class A felony; unlawful imprisonment, 1st degree, class D felony; terrorist threatening, 3rd degree, class A misdemeanor and assault, 4th degree minor injury, class A misdemeanor.

**James Dolans Fancher**, 20, 356 North Fancher Rd., Knott Lick for possession of a controlled substance, 1st degree (methamphetamine), class D felony and possession of drug paraphernalia, class A misdemeanor.

**Tyler Rand Scott**, 18, 573 Burkesville Rd., Glasgow for tampering with physical evidence, class D felony; receiving stolen property under \$500, class A misdemeanor and criminal mischief, 3rd degree, class B misdemeanor.

**Timmy Don Jackson**, 57, 10635 N. Skyline Dr., Floyd Knobs, TN for receiving stolen property, \$500 or more but less than \$10,000, class D felony; criminal mischief, 1st degree, class D felony and leaving the scene of an accident/faulty to render aid, class A misdemeanor.

**Christopher Allen O'Brien**, 33, 23308 Louisville Rd., Cave City for theft of property lost, mislaid, or delivered by mistake, \$500 or more but less than \$10,000, class D felony; persistent felony offender, 1st degree and persistent felony offender, 1st degree.

**Barbara Ann Still**, 32, 23308 Louisville Rd., Cave City for theft of property lost, mislaid, or delivered

See INDICTMENTS, A11

## Summer Shade man arrested in Crain death

IPINews REPORTS

On Saturday, April 20, officials with the Hart County Sheriff's Department arrested 19-year-old Daniel Hostetler of Summer Shade on a charge of Manslaughter, first degree.



Daniel Hostetler

The charge is in connection with the disappearance of Brandon Tyler Crain of Manfordsville, Kentucky. Crain's body was recovered from the Gross River after being found by a fisherman at the Woodlawn constituency of Butler County on April 29th of last year.

Crain had been missing since January 2012, after he reportedly walked away from his mother's home on East Center Street in Manfordsville around 2 a.m. Officials conducted an extensive search for Crain, initially involving about 80 volunteers along with Hart County Sheriff's and Kentucky State Police and Edmonson County

See CHAIN DEATH, A11



## TRUSTEE RONNIE TUCKER Fullfilling SCRTC campaign promise

By JEFF JOBE



Some 20 months ago in August 2011, a front-page story in this newspaper reported on a series of discussions between this newspaper and representatives of South Central Rural Telephone Cooperative, specifically Board Chairman Charles Knight and Board Attorney Robby H. Richardson. The discussions centered the closely-guarded terms of compensation for SCRTC's board of trustees and other board officials. Cooperative members complained of a long-standing feeling of

distrust combined with a lack of communication as well as disclosure on the subject.

Initially, Richardson indicated that all a member needed to do was complete the proper form detailing the questions one might have and they would be answered at the next regularly scheduled board meeting. This was done and in phone conversations with both Knight and Richardson, they confirmed the board would be sending details shortly.

A few weeks passed following the July 28, 2011 board meeting when Knight responded, "Your request was voted on in the July 28 meeting and it was unanimous." Yet, he could not remember specifics or the outcome of the vote. He said

See CAMPAIGN PROMISE, 11



**MINDY McCULLLEY**, left, County Extension Agent for Family and Consumer Sciences, showed dozens of area residents at the Bounty of The Barrens Market on the courthouse lawn last Saturday. Held in cooperation with the Tour de Farm bicycle ride, the spring market was officially opened by Kentucky Commissioner of Agriculture James Comer who lauded the market's recognition as the Best Medium-sized Farmers Market in Kentucky in 2012. The market will continue each Saturday through the summer growing season.

## Bounty of the Barrens Market

**KEN PUNTEL OF GLASGOW** demonstrated chair caring at the Bounty of The Barrens Market on the courthouse lawn on Saturday. Puntel restores a variety of chair seat types, a skill he learned from a friend several years ago, and turned it into a small business operation. He and his wife, Sally, an artist, can be found at the market many Saturdays during the year.



## Barren County Fiscal Court Tug-of-War

By **SAN TERRY**  
IPINews/Barren County Progress

The dysfunctional nature of Barren County Fiscal Court was displayed once again during last week's April meeting as elected county officials clashed on a variety of topics. The scolding tug-of-war between County Judge/Executive Dave Greer and

magistrates took center stage as more than 25 minutes was spent discussing the transparency of the court's meetings. For several years, Fiscal Court has met twice each month. Last month, Greer issued an executive order changing the meetings to once per month, a practice employed by 59 other Kentucky counties. Kentucky Revised Statute allows the County

Judge/Executive to determine the number of meetings per month. When Greer made the announcement in March, she noted that she felt one meeting per month was sufficient to conduct the county's business. At the time, some magistrates hesitated at the notion, citing the tradition of bi-weekly meetings and claims that the citizens wanted two meetings per month.

At last week's court session, magistrates quickly got the matter to the table to express their disapproval of the new schedule. Magistrates Chris Steward and Gary Gilton teamed on a motion to have meetings twice each month. County Attorney Jeff Sharp explained that by Kentucky law, the magis-

See TUG-OF-WAR, A3

**Learn with Us!**



## **Plate it Up: Kentucky Fruits & Vegetables**

This class will feature Kentucky Proud fruits and vegetables. Topics will include; selection, storage information, recipes, and demonstrations. Learn some new ways to prepare some favorite garden vegetables and why they are so important to your health.

**Taught by: Rosie Allen,**

**Gallatin County FCS Agent**

For more information or to pre-register for this class, call the Pendleton County Extension Office at (859) 654-3395. Every one attending will receive a free cookbook!



*Pendleton Co. Extension Service  
45 David Pribble Drive  
Falmouth, KY 41040*

Phone: (859) 654-3395  
FAX: (859) 654-3397

**Date:** Monday, September, 17th  
**Time:** 7:00 PM  
**Location:** Pendleton Co. Extension Office  
**Presenter:** Rosie Allen,  
Gallatin Co. FCS Agent  
**Reservations:** Call (859) 654-3395  
**Register online:** [www.ca.uky.edu/pendleton](http://www.ca.uky.edu/pendleton)



Educational programs of the Kentucky Cooperative Extension Service serve all people regardless of race, color, age, sex, religion, disability, or national origin. University of Kentucky, Kentucky State University, U.S. Department of Agriculture, and Kentucky Counties, cooperating. Disabilities accommodated with prior notification.





### **Lessoned Learned**

1. The demand for the recipe card grows with each year of the project. The consumers and producers recognize the value of the cards and want more copies. Due to the budget constraints of printing more cards the committee has been creative in the use of social media and other forms of outreach to share the information and recipes.
2. Engaging producers in evaluation has proven to be very hard. To increase the likelihood of response the university partners are relying on Agriculture and Horticulture agents, KDA and Farm Bureau professionals who have credibility with the producers to encourage future involvement in evaluation phases of the project.
3. Producers have indicated that recipe cards that feature unique commodities such as kohlrabi would be helpful to encourage consumers purchase and preparation.

## Contact Person

Tammy J. Stephenson, PhD  
Faculty and Director of Undergraduate Studies  
Department of Dietetics & Human Nutrition  
University of Kentucky  
Office: 121 Funkhouser Building  
Mailing Address: 203 Funkhouser Building, Lexington Kentucky 40506-0054  
Office - (859) 257-2353  
Mobile - (859) 351-3881  
[Tammy.Stephenson@uky.edu](mailto:Tammy.Stephenson@uky.edu)

## Final Financial Report

<b>GRANT FUNDS RECEIVED</b>	<b>\$50,815.00</b>
<b>GRANT FUND EXPENDED</b>	<b>\$50,815.00</b>
<b>TOTAL REMAINING</b>	<b>\$0</b>
<b>LINE ITEMS</b>	
<b>SALARIES/ WAGES</b>	\$11,147.41
<b>BENEFITS</b>	\$1,213.34
<b>TRAVEL</b>	\$1,355.02
<b>EQUIPMENT</b>	\$0
<b>SUPPLIES</b>	\$33,132.23
<b>CONTRACTUAL</b>	\$0
<b>OTHER</b>	\$3,967.00 (indirect expenses)
<b>TOTAL</b>	<b>\$50,815.00</b>

## **Project 3 Title - Optimizing Orchard Management Strategies for Yield, Plant Health, and Fruit Quality in Organic Apple Production**

Principal Investigator      Douglas Archbold, Professor  
Co-PIs                              Mark Williams, Associate Professor  
    John Strang, Professor  
    Ricardo Bessin, Professor

### **Project Summary**

There is a growing market for organically-grown apples. However, the specific challenges for organic apple production in Kentucky and the mid-South have not been clearly established, and solutions to any problems have yet to be studied so that appropriate recommendations can be developed. The high start-up costs and delayed economic returns of apple production have hindered interested Kentucky apple growers from trying organic production. Thus, the purpose of this project was to assess the effectiveness of organically-approved techniques and materials to manage identified challenges in organic apple production and to determine their impact on tree health, yield, and postharvest cold storage and post-storage quality of the fruit over a 3 year period.

### **Project Approach**

The orchard was planted in 2007 in a design to allow statistical comparison of treatments which can be imposed upon blocks of trees of 3 disease-resistant apple cultivars ('Redfree', 'Enterprise', and 'Crimson Crisp'). There are a total of 215 trees on about 0.5 acre.

There were five primary objectives of this project:

Objective 1, comparing shallow, under-tree tillage to selected annual ground covers on tree growth and yield, was not pursued due to fear of tree damage from voles and dogwood borers, significant problems each year that were not evident when the project started. Voles in particular use under-tree vegetation for protective cover. Cumulatively, 20% of the trees died from these problems between 2010 and 2013. A problem of under-tree tillage knocking fruit from lower limbs was solved. Trellis wires were established at 0.9 and 1.7 m height, and low limbs were pulled up and away from the zone within which the tractor/tiller operated.

Objective 2 was to evaluate a liquid lime sulfur/fish oil mixture for fruit thinning applied at petal fall, and assess effects on current-year fruit size and yield. Fruit number was reduced each year with lime sulfur, though subsequent hand-thinning was needed. The reduction in fruit number did not increase size of remaining fruit as usually occurs in conventional production.

Objective 3 was to assess the effectiveness of sulfur-bearing and non-sulfur compounds for management of apple diseases. Significant seasonal variation in disease incidence was observed, and disease problems increased at the later harvest dates. Across all cultivars, and the orchard generally, powdery mildew was the primary fruit disease. Surprisingly, cedar apple rust incidence was generally very low.

Objective 4 was to compare physical techniques to chemicals for control of codling moth, plum curculio and other pests. Individual 'Redfree' fruit were covered with bags when > 20 mm in

diameter. Across years, 21% of the unbagged fruit showed plum cucurlio injury and 15% showed codling moth injury. The physical barriers effectively prevented fruit losses to insects. Objective 5 was to assess fruit quality at harvest and after 4 and 8 weeks of cold storage to determine the storability of organically-grown fruit, and if the field treatments, especially for insect and disease control, impacted postharvest disease incidence. No significant storage disease problems were observed, although a small proportion of 'Enterprise' fruit exhibited cork spot and/or bitter pit (calcium deficiency-related disorders).

## Goals and Outcomes Achieved

All of the primary objectives were addressed as noted above. The data gathered from the project has provided a wealth of information on which to base future research (Tables 1-3). The orchard will be maintained for at least 6 more years with modifications in disease and insect control strategies to increase the marketable percentage of the fruit crop. A cumulative summary of the results was presented at the 2014 Kentucky Fruit and Vegetable Conference by the PI. Approximately 150 people were in attendance. A summary of the results was also published in the 2013 Fruit and Vegetable Crops Research Report. When the data set and statistical analyses are complete, the results will be written for submission to an appropriate journal and the results presented at a national scientific conference.

Table 1. Average yield per tree and fruit size of organically-grown apples at the Horticultural Research Farm, Lexington, Kentucky, 2011-2013.

Cultivar	Year	Yield (kg/tree)		Fruit size (g)	
		Total	Marketable (% of total)	All	Marketable
Redfree	2011	2.2 ± 0.5	1.6 ± 0.3 (73)	117 ± 2	123 ± 2
	2012	1.4 ± 0.2	0.9 ± 0.2 (67)	187 ± 8	201 ± 10
	2013	6.1 ± 0.7	4.5 ± 0.5 (74)	121 ± 3	124 ± 3
Crimson Crisp	2011	2.1 ± 0.4	0.9 ± 0.2 (40)	123 ± 7	155 ± 7
	2012	3.2 ± 0.4	1.5 ± 0.2 (46)	135 ± 6	154 ± 6
	2013	3.6 ± 0.3	2.0 ± 0.2 (55)	148 ± 2	155 ± 2
Enterprise	2011	4.1 ± 0.4	2.0 ± 0.3 (48)	195 ± 5	204 ± 5
	2012	3.7 ± 0.5	1.6 ± 0.3 (43)	251 ± 11	265 ± 12
	2013	8.4 ± 0.6	3.5 ± 0.4 (42)	216 ± 9	219 ± 5

Table 2. Percent of organically-grown apple fruit with injury from key insect pests at the Horticultural Research Farm, Lexington, Kentucky, 2011-2013.

<b>Cultivar</b>	<b>Year</b>	<b>Plum Curculio</b>	<b>Codling Moth</b>	<b>Stink Bug</b>
<b>Redfree</b>	<b>2011</b>	24.9 ± 2.7	14.5 ± 2.1	2.7 ± 0.7
	<b>2012</b>	32.2 ± 4.9	14.2 ± 5.2	6.5 ± 2.8
	<b>2013</b>	11.4 ± 2.0	2.3 ± 0.4	3.4 ± 0.5
	<b>Mean</b>	27.6 ± 4.0	10.5 ± 1.7	4.4 ± 1.1
<b>Crimson Crisp</b>	<b>2011</b>	19.4 ± 6.0	9.7 ± 4.2	1.7 ± 0.5
	<b>2012</b>	9.0 ± 3.8	12.1 ± 1.9	0.9 ± 0.4
	<b>2013</b>	26.6 ± 3.6	12.1 ± 1.7	3.8 ± 1.0
	<b>Mean</b>	19.0 ± 2.7	11.7 ± 1.5	2.2 ± 0.4
<b>Enterprise</b>	<b>2011</b>	30.7 ± 4.3	12.5 ± 2.7	1.8 ± 0.7
	<b>2012</b>	20.6 ± 3.9	21.8 ± 3.6	12.2 ± 2.7
	<b>2013</b>	15.8 ± 3.3	37.8 ± 3.1	2.7 ± 0.6
	<b>Mean</b>	22.7 ± 7.7	25.0 ± 7.1	5.9 ± 1.2

Table 3. Percent of organically-grown apple fruit with injury from key diseases at the Horticultural Research Farm, Lexington, Kentucky, 2011-2013.

<b>Cultivar</b>	<b>Year</b>	<b>Cedar Apple Rust</b>	<b>Powdery Mildew</b>	<b>Apple Scab</b>	<b>Sooty Blotch Flayspeck</b>
<b>Redfree</b>	<b>2011</b>	10.7 ± 2.0	1.5 ± 0.3	0.2 ± 0.1	0.3 ± 0.6
	<b>2012</b>	0 ± 0	12.6 ± 3.2	2.3 ± 1.4	0 ± 0
	<b>2013</b>	0.2 ± 0.1	1.6 ± 0.3	1.1 ± 0.3	2.7 ± 0.7
	<b>Mean</b>	3.7 ± 1.2	4.9 ± 1.0	1.4 ± 0.5	1.2 ± 0.7
<b>Crimson Crisp</b>	<b>2011</b>	42.1 ± 6.0	24.4 ± 6.6	0.0 ± 0	8.0 ± 4.1
	<b>2012</b>	0 ± 0	0.1 ± 0.1	0 ± 0	0 ± 0
	<b>2013</b>	36.5 ± 2.8	19.3 ± 1.3	0.8 ± 0.4	4.0 ± 0.9
	<b>Mean</b>	26.3 ± 3.4	14.8 ± 3.4	0.3 ± 0.1	3.9 ± 1.3
<b>Enterprise</b>	<b>2011</b>	8.2 ± 1.9	19.2 ± 3.2	5.5 ± 1.7	25.7 ± 3.8
	<b>2012</b>	0 ± 0	3.2 ± 1.2	2.7 ± 1.2	0.2 ± 0.2
	<b>2013</b>	1.3 ± 0.7	28.2 ± 2.3	2.0 ± 0.6	33.8 ± 5.7
	<b>Mean</b>	5.1 ± 1.6	17.2 ± 2.7	3.8 ± 1.0	19.7 ± 4.3

## **Beneficiaries**

There are two primary groups of beneficiaries of this project. One group is the current and prospective tree fruit growers interested in **possibly trying organic apple production (>65 fruit growers)**. Given the level of the problems we observed, and the reduction in marketable fruit as a result of these problems, organic apple production is not economically viable at this time. Hopefully, our results would dissuade growers from attempting organic apple production until marketable yields can be increased. The other beneficiary of this work is the tree fruit research community (**>200 people**) who can target the problems we have identified, and that they likely share, for research to solve the problems.

## **Lessoned Learned**

The original goals of the project were achieved. The limitations to organic apple production in Kentucky were clearly established, though they did vary year to year. Though it was not anticipated, a window of opportunity was revealed. The highest marketable yields as a proportion of the total crop were found with the earliest harvested cultivar ('Redfree' on ~August 1). Other disease-resistant cultivars with early harvest dates (no later than mid-August) can now be sought and tested for their use in an organic production system. Unless effective organically-approved tools for management of the disease and insect problems can be developed, organic production of early ripening apple cultivars may be the only feasible approach.

## **Contact Person**

**Douglas D. Archbold**

**859-257-3352**

[darchbol@yky.edu](mailto:darchbol@yky.edu)

## **Additional Information**

None

## Final Financial Report

<b>GRANT FUNDS RECEIVED</b>	<b>\$ 73,590.00</b>
<b>GRANT FUND EXPENDED</b>	<b>\$ 73,517.95</b>
<b>TOTAL REMAINING</b>	<b>\$ 72.05</b>
<b>LINE ITEMS</b>	
<b>SALARIES/ WAGES</b>	\$ 34,059.65
<b>BENEFITS</b>	\$ 2,570.95
<b>TRAVEL</b>	\$ 213.12
<b>EQUIPMENT</b>	\$ 0
<b>SUPPLIES</b>	\$ 29,815.65
<b>CONTRACTUAL</b>	\$ 0
<b>OTHER</b>	\$ 6,858.58
<b>TOTAL</b>	<b>\$ 73,517.95</b>

## **Project 4 Title Asparagus: A Nutritious, High-Value, Early Crop for Market Gardeners**

### **Project Summary**

Asparagus is a nutrient-dense food, high in folic acid, and a good source of potassium, fiber, vitamin B6, vitamins A and C, and thiamin. Also, according to Pick-Your-Own Farming (Wampler and Motes, 1985), a practical handbook on truck farming and direct marketing, asparagus has been among the top ten moneymakers for producers. Because it comes on early in the season and is high-value it can aid a diversified vegetable producer's cash flow when little else is available. It is well suited for both conventional production, and growers that wish to use organic practices can do so with proper management because of the limited insect and disease pressure. Organic weed control would be more difficult because of the perennial nature of the crop but is possible. The perennial nature of the crop, a well maintained planting can continue to produce for 15 years or more, can be attractive to the small market gardener or homeowner who doesn't have the ability or desire to prepare garden beds yearly. These characteristics make asparagus a win-win crop for the producer and the consumer who is concerned about eating better, however there has not been a replicated variety trial in Kentucky for many years. We need to have researched based results to make the best recommendations to our growers.

While not a large crop in Kentucky there is incredible potential. The UK CES New Crops Opportunities Center developed an enterprise budget in 2005 that estimated returns to growers around \$1,500 per acre and the rule of thumb from the Michigan Asparagus Board is one acre of asparagus for every 10,000 residents. Using 2009 census estimates of 4.3 million people in Kentucky we could support 430 acres of asparagus for in state consumption alone with a crop value of \$645,000.

### **Project Approach**

Two randomized complete block plantings were established with 8 varieties, one in Breathitt County and one in Fayette County. The varieties selected were Apollo, Grande, Guelph Millennium, Atlas, Jersey Knight, Purple Passion, UC-157, and Jersey Supreme.

Routine plot maintenance following commercial production recommendations was done throughout the year to maintain the plantings in Breathitt and Fayette Counties and fertility was maintained as required by soil testing.

### **Beneficiaries**

Over 500. current growers, potential growers, County Extension Agents, and youth all benefitted from this project through participation in site visits, field days, and Extension programming. Growers and Extension Agents are obtaining in-state research results rather than having to rely on other states' information. Youth had the opportunity to taste the asparagus as part of a field day program. This introduced them to a new food product that they were unfamiliar with.

Kentucky has approximately 80 acres of asparagus in production now in small plots and as part of diversified farm operations for direct marketing. Based on population and estimates of consumption Kentucky could support another 350 acres of asparagus. With average yield of 1500 pounds per acre and average direct market price of \$1/pound this would result in another \$525,000 of income to new and current growers in Kentucky.

### **Lessons Learned**

This project is still in its infancy and much will be learned in the future. Site selection is critical. We did all we could to limit potential difficulties, but *Fusarium* is now established in the Breathitt County

planting. Growers need to be aware that as with any other agricultural enterprise there is the potential for failure.

Depending on the results of experimental fungicide treatments we have the potential to develop a protocol for treating Fusarium infected plantings.

### Goals and Outcomes Achieved

The planting in Breathitt County was diagnosed with Fusarium Wilt in 2012 and became a test location for non-labelled fungicide treatments in 2013. None of the treatments were successful though a new management strategy will be tried in 2014. If successful the treatment can be evaluated and submitted for registration as fusarium is a significant disease problem for asparagus growers.

A presentation on asparagus production was given in Lexington during the annual meeting of the Kentucky Vegetable Growers Association in 2013. Attendance in the session was approximately 75 individuals. Of those that completed surveys (16 individuals) 12 had never grown asparagus before, one had limited experience, and 3 considered themselves experienced growers. The presentation was made available to county agents after the meeting and two agents requested copies and presented them in their counties.

Both plantings have been visited regularly by visitor/tours to the Robinson Station and the Horticulture South Farm throughout the term of the grant.

A typical asparagus planting can be expected to last for 20 years prior to any noticeable decline in productivity. While it is too early in the study to document impact, this study will be maintained as long as feasible with the resources available. Over that time Kentucky growers will see the development of the planting and have access to current and cumulative yields.

Harvest data for the eight asparagus varieties can be found in Table 1. There were no significant differences in spear width among varieties. Jersey Supreme, Grande and Atlas were the top performers for the first harvest year. Purple Passion yielded the least amount of marketable spears, nevertheless its unique coloration may allow for increased marketability. Overall, yields for all varieties were lower than expected, but crown productivity should increase over the next few growing seasons.

**Table 1.** Asparagus yield results, 2013, Fayette County.

Variety	Yield per plant <sup>1</sup> (lb.)	Yield per acre <sup>2</sup> (lb.)	Weight per spear <sup>3</sup> (oz.)	No. Spears per plant <sup>4</sup>	Spear width <sup>3</sup> (in.)
Jersey Supreme	0.54 a <sup>5</sup>	3136	0.39	22.2	0.39
Grande	0.53 a	3078	0.42	20.1	0.39
Atlas	0.50 ab	2904	0.43	18.6	0.41
Jersey Giant	0.43 abc	2497	0.36	20.3	0.36
Apollo	0.38 bcd	2207	0.38	15.9	0.38
UC-157	0.34 cd	1975	0.35	15.7	0.36
Jersey Knight	0.32 cd	1859	0.36	14.2	0.36
Purple Passion	0.24 d	1394	0.43	8.9	0.37

<sup>1</sup> Average yield per plant for the entire season

<sup>2</sup> Season-long average yield per plant x 5808 plants per acre

<sup>3</sup> Average wt. per spear for the entire season

<sup>4</sup> Average season-long wt. per plant divided by average season-long weight per spear

<sup>5</sup>Means in column followed by same letter are not significantly different (Waller-Duncan Multiple-Range Test ( $P \leq 0.05$ ))

**Contact Person**

Shawn Wright, Ph.D  
Department of Horticulture  
University of Kentucky  
Phone 606-272-3500'  
Shawn.wright@uky.edu

<b>GRANT FUNDS RECEIVED</b>	<b>\$8277</b>
<b>GRANT FUND EXPENDED</b>	<b>\$8029.72</b>
<b>TOTAL REMAINING</b>	<b>\$(376.57)</b>
<b>LINE ITEMS</b>	
<b>SALARIES/ WAGES</b>	\$2607.20
<b>BENEFITS</b>	\$1126.36
<b>TRAVEL</b>	\$344.50
<b>EQUIPMENT</b>	\$0
<b>SUPPLIES</b>	\$3221.64
<b>CONTRACTUAL</b>	\$0
<b>OTHER</b>	\$730.02
<b>TOTAL</b>	<b>\$8029.72</b>

## **Project 5 Title: Marketing Kentucky Grown Nursery Plants and Industry Education**

### **Project Summary**

The active membership of the Kentucky Nursery & Landscape Association is comprised of growers, garden center operators and landscapers in the state of Kentucky. KNLA **had** a winter trade show along with The Tennessee Nursery & Landscape Association in January and **offered** booths to its members at a reduced cost (name of trade show is Mid-States Horticultural Expo or MSHE). KNLA **used** the funding to promote the MSHE show in industry magazines and by direct mail. **2011 was a turning point for the MSHE show** due to the challenging economic times our industry **faced** the last couple years. **In** 2011, the MSHE trade show **was** held in conjunction with American Nursery & Landscape Association's Management Clinic. The ANLA Management Clinic **had** about 700 garden center and landscaping owners and managers in attendance from our surrounding region and across the United States. Exposing our Kentucky growers to this national audience **afforded** Kentucky growers **the** opportunity to showcase their plant material not only to local retailers and landscapers but to retailers and landscapers throughout the region and across the U.S.

Second, KNLA would **used** funding for KNLA's annual education conference called the Kentucky Landscape Industries Winter Conference or KLI Winter Conference. The KLI Winter Conference is co-sponsored by two other industry groups – Kentucky Arborists' Association and Kentuckiana Greenhouse Association. The education conference's purpose is to increase the knowledge of our growers, retail operators, landscapers, and others involved in the green industry in Kentucky from topics such as nursery and greenhouse production, business management, pest management, garden center/landscape maintenance, landscape installation and design, business management, and personnel training. **The 2011** KLI Winter Conference **was** held January 27-28, 2011 in Louisville, Kentucky. KNLA **used** the funding for advertising (including direct mailings, design, postage & printing), speaker fees (including travel and hotel costs), and audio-visual equipment rental. The other half of the grant (at KDA's direction) was used for the 2012 Mid-States Horticultural Expo and 2012 Kentucky Landscape Industries Winter (education) Conference.

### **Project Approach**

#### **2011**

**MSHE** - The first part of the grant was used for marketing the Mid-States Horticultural Expo with advertising in local, regional and national print publications and on a local nursery association's (Louisville Nursery Association or LNA) website. Our target was to market to as many garden centers, landscapers and professionals in the nursery industry in our state and out-of-state in order for Kentucky growers to have access to as many buyers as possible. We specifically advertised in 16 local, regional and national magazines and the LNA website. We were able to add an extra month of advertising in January just before our show and advertise in a landscape magazine with a high subscriber list that we previously were not able to advertise due to budgetary constraints.

**KLI Winter Conference** - The second part of the grant was used for our education conference (Kentucky Landscape Industries Winter Conference) for speakers and marketing of the education conference. With this grant, we were able to secure high-caliber speakers and plan a

cutting-edge program and design and produce the printed education registration/program. The brochure was targeted to our members and to other segments of the green industry (i.e. landscape architects, arborists, education professionals). We were also able to sustain our attendance from the previous years and receive an array of nursery professionals including nursery and greenhouse growers, landscape maintenance/contractors, government/municipal staff, university personnel, arborists, and landscape architects. Feedback during the conference and on the surveys indicated this year's education conference was the best education program due to the quality of speakers and timeliness of the sessions – especially the Sustainability track.

## **2012**

**MSHE** - The third part of the grant was used for marketing the Mid-States Horticultural Expo with advertising in local, regional and national print publications. Our target was to market to as many garden centers, landscapers and professionals in the nursery industry in our state and out-of-state in order for our Kentucky growers to have access to as many buyers as possible. We specifically advertised in 16 local, regional and national magazines. One of KNLA's ultimate goals is to increase the production & marketing of Kentucky grown nursery stock and it is of the opinion of our Board of Directors that we have satisfied this goal with attracting quality buyers to the trade show for our Kentucky growers. From the survey of Kentucky growers after the trade show, all of the growers indicated that that they have made over 10 new business contacts and anticipate an increase in sales of 5%-10%.

**KLI Winter Conference** - The fourth part of the grant was used for our education conference (Kentucky Landscape Industries Winter Conference) for speakers and marketing of the education conference. With this grant, we were able to secure high-caliber speakers and plan a cutting-edge program and design and produce the printed education registration/program. The brochure was targeted to our members and to other segments of the green industry (i.e. landscape architects, arborists, education professionals).

Our Board of Directors feel we have fulfilled the education conference's purpose - to increase the knowledge of our growers, retail operators, landscapers, and others involved in the green industry in Kentucky from topics such as nursery and greenhouse production, business management, pest management, garden center/landscape maintenance, landscape installation and design, business management, and personnel training.

## **Goals and Outcomes Achieved**

### **2011**

**MSHE** - The grant monies afforded our expo attendee registration levels to maintain the same attendees as 2010 – which is a success in itself due to the downturn of our industry due to weather related conditions and an even tougher economy. **Specifically, we were able to attract attendees from 30 states with 62% of attendees being an end decision maker or “quality buyer” in categories such as president/owner, manager/foreman, corporate officer/general manager and buyer.** One of KNLA's ultimate goals is to increase the production & marketing of Kentucky grown nursery stock and it is of the opinion of our Board of Directors that we have satisfied this goal with attracting quality buyers to the trade show for our Kentucky growers. From the survey of Kentucky growers after the trade show, all of the growers indicated that that they have made over 10 new business contacts and anticipate an increase in sales of 5%-10%.

**KLI Winter Conference** - We saw an increase in the number of landscape architects who attended programming due to continuing education credit approval from the Kentucky Landscape Architect Board. We were also able to increase our attendance 7% from the 2010 education conference and received an array of nursery professionals including nursery and greenhouse growers, landscape maintenance/contractors, government/municipal staff, university personnel, arborists, and landscape architects.

## **2012**

MSHE - The grant monies afforded our registration levels to **maintain the same attendees as 2011** – which is a success in itself due to the downturn of our industry due to weather related conditions and an even tougher economy. **Specifically, we were able to attract attendees from 23 states plus 2 Canadian Provinces with 71% of attendees (9% increase from 2011) being an end decision maker or “quality buyer” in categories such as president/owner, manager/foreman, corporate officer/general manager and buyer.** From the survey of Kentucky growers after the trade show, all of the growers indicated that that they have made over 10 new business contacts and anticipate an increase in sales of 5%-10%.

**KLI Winter Conference** - We were also able to increase our attendance 8% from the 2011 education conference and received an array of nursery professionals including nursery and greenhouse growers, landscape maintenance/contractors, government/municipal staff, university personnel, arborists, and landscape architects. Feedback during the conference and on the surveys indicated this year’s education conference was excellent due to the quality of speakers and timeliness of the sessions.

## **Beneficiaries**

Beneficiaries of the Mid-States Horticultural Expo were **green industry professionals including** our Kentucky specialty crop producers by providing them a venue to market and sell their product(s) to “quality” buyers.

Beneficiaries of the Kentucky Landscape Industries Winter Conference were **green industry professionals** including specialty crop producers, garden center and landscape operators, landscape architects, government/municipal staff, arborists, university employees and educators. **The number of green industry professionals including members benefiting from the project for both MSHE and KLI for 2011 and 2012 combined is 2,496.**

## **Lessons Learned**

The entire project went smoothly except receiving data for surveys. We had to rely mostly on one-on-one emails and personal phone calls (which was more time consuming) to gather post expo/conference follow up. A creative incentive for them to respond survey questions would be something we would suggest in the future to have participation in the surveys.

## **Contact Person**

Betsie A. Taylor  
502.320.3733  
mail.knla@gmail.com

## **Additional Information**

Marketing Publications from both the KLI Winter Conference and Expos – Images available on request.

<b>GRANT FUNDS RECEIVED</b>	<b>\$45,000</b>
<b>GRANT FUND EXPENDED</b>	<b>\$45,000</b>
<b>TOTAL REMAINING</b>	<b>\$0</b>
<b>LINE ITEMS</b>	
<b>SALARIES/ WAGES</b>	\$
<b>BENEFITS</b>	\$
<b>TRAVEL – KLI WINTER CONFERENCE SPEAKER TRAVEL (SEE ATTACHED SPREADSHEET)</b>	\$1,777.09
<b>EQUIPMENT</b>	\$
<b>SUPPLIES</b>	\$
<b>CONTRACTUAL – MSHE ADVERTISING (SEE ATTACHED SPREADSHEET)</b>	\$30,000.00
<b>CONTRACTUAL – KLI WINTER CONFERENCE</b>	\$8,250.00

**Final Financial Report**

<b>SPEAKER HONORARIUMS (SEE ATTACHED SPREADSHEET)</b>	
<b>CONTRACTUAL – KLI WINTER CONFERENCE AUDIO VISUAL (SEE ATTACHED SPREADSHEET)</b>	\$934.05
<b>CONTRACTUAL – PRINTING AND REPRODUCTION (SEE ATTACHED SPREADSHEET)</b>	\$4,038.86
<b>OTHER</b>	\$
<b>TOTAL</b>	<b>\$45,000.00</b>
<b>GRANT FUNDS RECEIVED</b>	<b>\$45,000.00</b>
<b>GRANT FUND EXPENDED</b>	<b>\$45,000.00</b>
<b>TOTAL REMAINING</b>	<b>\$0</b>

## **Project 6 Title: Persimmon Evaluation for Eastern Kentucky**

### **Project Summary**

Growers across Kentucky are looking for high-value specialty crops to help diversify their farming enterprises and persimmons are a fruit that may fit for growers. The American persimmon is a native crop in eastern Kentucky and is harvested and utilized from the wild by the residents. The Asian persimmon is a high-value crop in areas where it is available, but it is rarely available in any quantity in most of Kentucky because of winter hardiness concerns. Advertised price ranges from \$1-\$2 a pound for Asian persimmon. With the expansion of direct marketing opportunities and the interest in local food, good markets should exist for the crop. It is relatively free of serious pests so it doesn't require spraying and in fact there are few sprays registered for use on them. They have the market advantage of being considered "Appalachian" which increases their market appeal. Unfortunately there haven't been any replicated trials comparing cultivars that are available for growth, yield, winter hardiness, and consumer preference. We proposed looking at American, Asian, and hybrid persimmon varieties..

### **Project Approach**

Persimmon (Dollywood, Izu, Hokaido, Yates, Steinmark, Great Wall, Sugar Daddy, Valene Beauty, and several numbered selections) were obtained and planted in a randomized block design replicated three times at the UK Robinson Center for Appalachian Sustainability (RCARS) in Jackson, KY. The numbered selections were grafted trees donated by Garden's Alive to support this project. The site at RCARS was selected for increased visibility and for protection from theft that could have been a problem at the site we initially proposed, Robinson Forest.

We also distributed information on persimmon through print media and grower meetings to increase consumer and grower interest.

### **Goals and Outcomes Achieved**

An article on persimmon was published in the Kentucky Woodlands Magazine, 12,500 copies of each issue are printed and 10,500 are mailed. The remaining issues are distributed through various Extension and Department of Forestry outlets. The publication is also available online. [http://www2.ca.uky.edu/kywoodlandsmagazine/Vol\\_6\\_No\\_2/KWM%206.2.pdf](http://www2.ca.uky.edu/kywoodlandsmagazine/Vol_6_No_2/KWM%206.2.pdf). A talk on persimmon will also be given at the 2014 KY Fruit and Vegetable Growers Congress. Average attendance at this meeting ranges from 400-600. Persimmon information has also been distributed to the county Agricultural Agents and growers that have visited RCARS.

Persimmons were highlighted at the 2012 Northern Nut Growers Association Meeting that was hosted by the University of Kentucky in Lexington.

### **Beneficiaries**

Residents, woodland owners, market-gardeners, agri-tourism operations and others have all benefitted from this project.

## **Lessons Learned**

Our planting did not survive as a replicated planting. We experienced challenges obtaining quality planting stock, weather conditions were particularly difficult in 2011 resulting in the loss of many trees, and deer populations have increased substantially resulting in the loss of most of the other trees through browse and rubbing.

One of the biggest challenges to establishing persimmon as a viable crop in Kentucky is the lack of affordable quality planting stock. While quality trees are available the cost of them relative to other tree fruits is substantially higher. Suppliers view them as landscape specimens rather than as orchard trees and the economic sustainability is suspect if a grower was planning on establishing their orchard with this type nursery material. There is low-cost planting stock available but the quality is poor and viability and trueness-to-type is suspect. Growers will probably have their greatest probability of success by obtaining persimmon seedling, planting them, and then grafting desired varieties on to the rootstock when it is available and compatible. Provision should be made for irrigation if containerized or b&b nursery stock is used. Even though these trees are native to the area they do not respond well to transplanting even under ideal circumstances, thus the recommendation for planting seedlings and grafting desired scion wood.

Woven polytape is not sufficient to keep deer from entering a planting. A more substantial fence is required and needs to be maintained year round. Theft of solar chargers and batteries can be a problem which is why we recommend a physical barrier. Tree guards to protect from rodent girdling should also be considered until the trees are well established.

We hope to pursue this project further using the lessons we have learned. We hope to obtain persimmon seedlings through donations and have a new potential location at the Morgan County Cooperative Extension Farm. Graft wood is available to us through Mr. Lehman.

## **Contact Person**

Shawn Wright, Ph.D  
Department of Horticulture  
University of Kentucky  
Phone 606-272-3500  
Shawn.wright@uky.edu

## Final Financial Report

<b>GRANT FUNDS RECEIVED</b>	<b>\$5002</b>
<b>GRANT FUND EXPENDED</b>	<b>\$4819.97</b>
<b>TOTAL REMAINING</b>	<b>\$(182.03)</b>
<b>LINE ITEMS</b>	
<b>SALARIES/ WAGES</b>	\$
<b>BENEFITS</b>	\$
<b>TRAVEL</b>	\$
<b>EQUIPMENT</b>	\$
<b>SUPPLIES</b>	\$4381.74
<b>CONTRACTUAL</b>	\$
<b>OTHER</b>	\$438.23
<b>TOTAL</b>	<b>\$4819.97</b>