

ARKANSAS AGRICULTURE DEPARTMENT

SCBGP-FB FINAL REPORT

Agreement Number 12-25-B-0909

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Project 1: Produce Marketing Association Fresh Summit Show

Project Summary

The only action performed on this project was the reimbursement of travel expenses and the payment of PMA dues as all other costs for the 2010 PMA Fresh Summit were covered under the Agreement 12-25-G-0603. A scope change was submitted on September 12, 2011 requesting that \$13,000 of the remaining funds be used towards the 2011 PMA Fresh Summit. The change was granted and the new scope change became project 7 in the agreement.

The remaining \$23,992.90 in funds on this project were budgeted and a scope changed submitted to route the funds to 4 new projects.

On February 2, 2010 a request was made to commit funds from this project for the Fresh Summit International Convention and Exposition to be held October 15-18, 2010 in Orlando, Florida. The convention was attended by 4 Arkansas Producers and 2 AAD representatives. Sales contracts in an amount totaling 3 times the cost of the project were booked by the producers.

Project Approach

The majority of this project was covered under Agreement 12-25-G-0603.

Goals and Outcomes Achieved

The goals and outcomes achieved on this project were covered under agreement 0603.

The convention was attended by 4 Arkansas Producers and 2 AAD representatives. Sales contracts in an amount totaling 3 times the cost of the project were booked by the producers.

Beneficiaries

The beneficiaries of this project on the produces that attended this show as part of the project and they are highlighted in the final report for 0603.

Lessons Learned

Proper fiscal planning is a must to keep the financials of the project in right order. AAD now tries to fund the PMA show out of only one agreement.

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Project 3: Determining Needs of Arkansas Pecan Growers to Increase the Industry's Competitiveness and Economic and Environmental Sustainability.

PROJECT SUMMARY

Pecans are regarded as the most important commercial nut crop grown in the eastern United States. Arkansas ranks 10th in pecan production in the United States. In 2010, the United States exported 40,622 metric tons (MT) of unshelled, or in-shell, pecans valued at \$143 million and 12,948 MT of shelled pecans valued at nearly \$109 million. The top buyer of U.S. in-shell pecans was Hong Kong. In the past 10 years, exports of pecan have grown, on average, 9% yearly.

Currently, Arkansas pecan production is among the least efficient in the United States. This inefficiency can be attributed both to the lack of knowledge about efficient production practices and to the lack of knowledge growers have about recommended practices in the areas of pest management, orchard management, and food safety. For the past two years, the Arkansas Pecan Growers Association has subcontracted the UA Division of Agriculture to conduct a needs assessment for the industry and provide educational opportunities to growers and industry representatives. To accomplish this, 12 commercial pecan growers (16 sites) geographically located in the various production areas of the state were selected to be monitored to gather information about horticultural and pest management practices. In addition, we continue to deliver information to growers and industry representatives to equip them with the ability and skills to make more effective management decisions. To gain more detailed information from a broader demographic, an Arkansas pecan industry survey was conducted. Based on the survey results, we propose to continue monitoring for important pests such as pecan nut casebearer; and we propose to begin monitoring for stink bug and for the nutritional status of trees. We also propose to offer pecan growers educational opportunities focused on improving production practices, minimizing inputs and increasing economic sustainability. Pecan is a perennial crop requiring multiple years of research to build a baseline to work from in developing recommendation guidelines concerning the complex issues facing the industry. This project is a continuation of efforts of previous funding for which the results have been incorporated into oral and written recommendations for growers.

PROJECT APPROACH

An assessment was conducted to determine the current status and needs of the Arkansas pecan industry. This assessment was conducted by two methods. The first method is a written, comprehensive survey which was sent to members of the Arkansas Pecan Growers Association, other commercial growers, and county extension agents. The survey results provided a clearer understanding of the cultural and pest management practices and economics of the pecan industry. For the second method, we continued to monitor (15 farms selected for Year 1 of this project) for pests to determine incidence and biology of major pests such as the pecan nut casebearer, pecan weevil, and scab. Soil and foliar samples have been collected to determine soil biotic and abiotic conditions and to determine nutritional status of the orchards. In addition, shelling and packing facilities were visited and direct interviews with three pecan brokers were conducted. Interviews were designed to determine the movement of Arkansas pecans, to ascertain if GAP 'Good Agricultural Practices' are being implemented in these facilities, and to discuss industry expectations and how Arkansas growers measure up to industry expectations.

Proposed project activities

1. A survey will be conducted to determine the status and needs of the Arkansas pecan industry.
2. Grower workshops will be presented to educate growers on horticulture and pest management practices, GAP and food safety, risk management, and marketing to increase their knowledge and skills to improve production practices, minimize input and make the industry more economically sustainable.
3. Four workshops to train growers in setting and monitoring insect pest traps will be presented throughout the state.
4. To continue monitoring for important pests such as pecan nut casebearer, start monitoring for stink bug (conducted by Donn Johnson, Professor in Entomology and his Ph.D. student, Brian Cowell)
5. Three fact sheets will be generated in which information obtained through this grant will be summarized to improve horticultural and pest management practices in pecan orchards.
6. A follow-up evaluation form will be mailed to growers to ascertain the implementation of practices.

GOALS AND OUTCOMES ACHIEVED

Written grower surveys and results:

Eighty surveys were mailed to growers and other pecan industry associated people and 38 responses were returned. The information gained from these responses has allowed us to determine the educational needs of the industry. It has also shown us the current status of the industry. For example, 41% of respondents have planted new trees in the last five years and 31% plan to plant new trees in the future. Most of the pecan orchards are small, with 64% of the orchards being less than 15 acres and 19% larger than 100 acres. Average farmer age is 65 years with 27.5 years of experience in farming, and 19 years of experience in growing pecans. The survey also indicates that most growers are not following basic horticultural or pest management practices. The majority of farmers do not prune yearly

(only 18% of respondents), most growers do not thin their crop, and many growers have not conducted a soil or foliar test in the last ten years. Soil problems associated with the lack of soil testing are evident with pH ranging from 4.9 to 8.0 and low base saturation for Ca, high base saturation for Mg, and extreme compaction. The foliar analyses indicate deficiencies and toxicity for some of the minerals tested. Low or deficient nutrient levels were found for: P, K, S, Fe, Cu, and Ni and high or excessive nutrient levels were found for Ca, Zn, Mn, and B. These results indicate current and potential future problems with productivity and nut quality in Arkansas pecan orchards.

Respondents indicated pecan nut casebearer (PNC) and stink bug are the major insect problems facing the industry. To help growers to better manage these problems, we continued to monitor for PNC and results were sent to The Belt Wide *ipm*PIPE project (<http://pecan.ipmpipe.org/map/pnc/>) to be included in the Southeast pecan IPM monitoring system. In addition, the information was posted on our own Extension site (<http://comp.uark.edu/~dtjohnso/>), an interactive web page created to provide pecan producers and consultants with up-to-date temperature information and particular degree day accumulations for the current year, the previous year, and for the 30-year norm.

Stink bug monitoring:

To begin our understanding of the impact of stink bug damage to the pecan industry, in 2012, Donn Johnson advised Brian Cowell to develop sampling and decision-making protocols for implementing management practices against stink bugs in order to minimize damage to pecan nuts. Toews (2011) reported that stink bugs were commonly captured: in field margins of row crops early in the year; feeding on non-cultivated and cultivated plant hosts during spring and early summer; throughout the entire year in a pecan grove that was not mowed; in row crops like cotton and peanuts during the summer; and in late planted soybean and grain sorghum from mid-September through mid-October. We hypothesize that the potential risk for stink bug damage increases in a pecan grove given a history of stink bug nut damage and/or increasing percentage of the grove perimeter that is adjacent to farmscapes of crops supporting stink bugs that mature between pecan water stage to shuck split. This will require development of sampling methods for estimating: density of stink bugs in the pecan grove understory; density of stink bugs in the pecan canopy; and a way for growers to quickly assess and make informed decisions about pest management of stink bugs.

Brian monitored for stink bugs and talked to each of six participating growers about recorded numbers of stink bugs per pyramid trap and percentage damage to pecan nuts in pecan groves with different adjacent farmscapes (fallow, hay for animal fodder, corn, rice, early or late maturing soybean, pecan, river, woodlot, etc.). Pyramid traps were constructed of yellow coroplast corrugated polypropylene plastic (4mm x 48" x 24") (Pack and Seal, Avenel, NJ) that act as a supernormal plant that attracts plant feeding insects, especially stink bugs. Each trap had both sheets of yellow plastic wired securely to a 4' rebar (3/8" diameter) set 1' into the ground which resisted winds of hurricane Isaac on August 30. A capture screen cage was wired to the top of the pyramid trap and rebaited biweekly with a rubber septum

charged with 30 ul *Euschistus* spp. aggregation pheromone, methyl (E, Z)-2,4-decadienoate (Fig. 2 A-B). Three pyramid traps were set on the ground in each grove perimeter quadrant (north, east, south, west) and in the grove center of seven pecan groves: Fayetteville (University of Arkansas Agricultural Research and Extension Center); Blackwell (2 groves); Mayflower; Humphrey; Garland City; and Hope (University of Arkansas Southwest Research and Extension Center). Biweekly from 13 June to 25 October, insect specimens were removed from each trap, bagged, transported to the lab and specimens identified to species and counts tabulated. Once nuts reached water stage in early August, biweekly collections were made of two randomly selected nuts per tree from each of five trees at each trap site, bagged each 10 nut sample and transported bagged nuts to the lab. Later, each damage spot on nuts was sliced open to the kernel: if the kernel or nut meat was darkened it was recorded as stink bug feeding; whereas we tried to identify presence of frass or tunneling or a larvae as damage caused by pecan weevil (legless larva), or an internal Lepidoptera caterpillar of either hickory shuckworm or pecan nut casebearer. Once these data are analyzed, we hope to quantify the effect of each adjacent farmscape crop over time on temporal changes in stink bug densities in each quadrant versus the density in the center of each pecan grove.

We demonstrated that baited, yellow pyramid traps (Fig. 2 A-B) captured significant numbers of brown and dusky stink bugs (Fig. 2 C) but very few green stink bugs or leaf-footed bugs that may also damage pecan nuts (Fig. 1). As we collected nuts for the damage assessments, we often observed stink bugs on pecan nuts. We quickly learned to identify a stink bug puncture on the shuck (Fig. 3 A), to slice under the puncture to confirm the puncture penetrated to the kernel and meat (brown stain) (Fig. 3 B) and count damage as stink bug. It was apparent that stink bug damage began in early August when the earliest nut cultivars were entering the water stage and that hickory shuckworm damage was occurring after late-August (Table 1).

We also took pictures of an adult male and female pecan weevil (Fig. 4 A-B), a pecan weevil Circle trap on a tree (Fig. 4 C), shuck damage by pecan weevil female that consisted of a hole with a circle of track marks (Fig. 5 A) with a tunnel penetrated through the kernel and often a legless larva inside (Fig. 5 B). We also noted damage by pecan nut casebearer and hickory shuckworm that left frass on the base of the shuck or inside the shuck, respectively.

Industry visits and interviews to determine market expectations:

This survey also included visiting shellers and packers to determine market expectations for this industry and how Arkansas growers measure up to these expectations.

December 2011- Visited Hauani Creek Pecan Company, Hauani Creek Ranch and Savage Equipment Company, Inc. Madill, Oklahoma.

Interviewed owners and key employees concerning pecan quality standards and aspects of food safety that are of concern to pecan buyers/brokers/processors. Specific focus on pecans received from Arkansas
U of A representative received a tour of the cleaning facility and pecan equipment manufacturing plant.
Visited with Dr. Charles Rohla, from the Noble Foundation in Ardmore, Oklahoma to discuss research and general pecan issues.

April 2011- Visited with Nolan Branton, owner of Delta Pecan in Greenville, Mississippi, concerning pecan quality, food safety, economics and general management procedures that growers might implement to their benefit. Delta Pecan buys many pecans grown in Arkansas.

Upon request by University of Arkansas Extension personnel, the owner of Delta Pecan accepted an invitation to speak at the 2012 Arkansas Pecan Grower's Association meeting concerning "What Buyers Want" in relation to pecan management, type, quality and food safety.

State-wide workshop:

Results from the survey have helped us design and deliver science-based information to growers during educational meetings. A state-wide workshop was conducted on May 5th. The workshop content was driven by the survey results with a program focusing on areas of need for growers such as cultivar selection, nutrition, and pest management. This workshop was very well received by growers. Growers rated the workshop and provided feedback by completing an evaluation form. Aspects of the workshop were rated on a scale from 1 (lowest rating) to 5 (highest rating) with 3 being a "no opinion." Of particular note from the workshop evaluations is the mean rating of 4.82/5.00 on the question "Overall, how would you rate this workshop in terms of usefulness" and 4.76/5/00 on the question "Overall, how would you rate the quality of this workshop." Even more importantly, growers the statement "I have gained much useful information from this presentation" with a rating of 4.80/5.0 and the statement "the information presented has convinced me to change and/or adapt my practices" received a rating of 4.60/5.0. From these high ratings it is clear that the workshop and survey that informed the content of the workshop provided useful information for the growers. This project has convinced growers to adapt their practices and incorporate more effective and sustainable management practices in their pecan orchards. See evaluation results in Table 2.

Growers were pre and post tested at the workshop and it was determined that more than a 50 percent increase in knowledge gain occurred.

Comments that were included on the evaluation forms were the following:

- I would like to see more information on marketing of the pecan grower.
- Good job.

- Some should have used microphone and repeat the question before they answered.
- It was a very informative conference – great facility – friendly staff.
- Interesting and informative

The follow-up survey has been moved to the total end of the project since this project has been extended in grant 1054 and 1214.

Tailgate Meetings

Three tailgate meetings were conducted in late summer, 2012 to train growers to set and monitor insect traps. The locations for these meetings were: Humphrey, Morrilton, and Texarkana. Information on how to identify various signs of insect damage, severity of damage, and management practices to minimize damage was given at these meetings. A total of 27 people attended.

Web Site

A web site was launched by the Arkansas Pecan Growers Association (<http://arkpecangrowers.org/>) to serve as a repository for timely and pertinent information for this group. The U of A Faculty have contributed information for posting to the site.

List of completed activities:

Date	Activity	Completed
Oct-Nov	Develop surveys	Yes
Oct-Dec	Assess crop load and nut quality; interview shellers and brokers	Yes
Dec-Jan	Conduct surveys	Yes
Jan-Feb	Compile survey results; collect soil for soil analysis	Yes
April-Sep	Set and monitor traps; assess for diseases and crop load; conduct foliar collection	Yes
April	Conduct grower demonstrations to teach use of insect traps at 4 locations	Yes

Sept	Gather data collected. Develop horticultural and pest management fact sheets Conduct grower workshop to disseminate information and knowledge gained from project Follow- up evaluation	Yes Web site Yes No
Oct	Final summary report will be submitted to the Arkansas Dept. of Agriculture	Yes

BENEFICIARIES

A total of 35 pecan growers attended the Pecan Grower Workshop on May 5 in Little Rock, AR. At that meeting, Elena Garcia summarized the pecan grower survey, Charles Rohla (Noble Foundation) talked about nutrition management and how to thin pecan trees, Donn Johnson reviewed pecan IPM, Brian Cowell presented his proposal to develop a stink bug sampling program in Arkansas, Harrison Pittman (National Agricultural Law Center) outlined liability issues facing the pecan industry and we toured a local pecan orchard where we answered grower questions.

Pecan tailgate meetings occurred in: Blackwell, AR (Faulkner Co.) on 12 September (7 attendees); Texarkana, AR (Miller Co.) on 17 September (5 attendees); and Humphrey, AR (Arkansas and Jefferson counties) on 26 September (15 attendees). We informed these 27 pecan growers and county extension agents about our project findings and recommendations from the soil and petiole nutrition samples, stink bug trap catches (Figure 1), percentage insect damage (Table 1) and answered questions. Attendees were surprised and impressed as to how well the baited yellow pyramid traps captured stink bugs. Many participants expressed their appreciation for the University of Arkansas beginning studies on management of pecan nutrition, stink bugs and other pests.

LESSONS LEARNED

Information gathered from the industry survey has given us much insight into what areas of research and education are needed by the industry to improve their production practices to become more competitive in the market place where high quality pecans bring much higher prices than low quality pecans. For example, growers now recognize that the nutritional status

of their orchards is not what it should be in order to maximize nut production and quality. Several growers have taken action to ameliorate this problem. Results also indicate that most growers get their pecan management practices information from grower meeting such as that delivered through this grant. Insect monitoring has shown us that nut damage sampling needs to be fine-tuned by cracking open each damaged nut sampled to check for stink bug staining of kernel or presence of frass or larvae of internal Lepidoptera or the pecan weevil. Biweekly percentages of stink bug damage of nuts in the trees appears to increase until shuck split and then drop as nuts mature, whereas percentage of nuts damaged by internal Lepidoptera and the pecan weevil appears to increase after mid-August. We speculate that mature nuts damaged by stink bugs fall from the tree whereas those damaged by internal Lepidoptera and the pecan weevil stay stuck in the shucks in the tree. If growers learn to scout for pests and sample soil and petioles they are expected to benefit by properly timing insecticides to prevent nut damage and create a more balanced soil nutrient complex that results in higher nut quality and yields per acre.

Baited yellow pyramid traps attracted and captured mostly brown and dusky stink bugs and not green stink bugs or leaf-footed bugs that may also be feeding on pecan nuts. Presently, we are unsure how to use stink bug counts from pyramid traps set on the ground in the pecan understory to predict the start of stink bug feeding on nuts. Therefore, we plan to evaluate several methods to assess temporal changes in densities of stink bugs within the pecan canopy including: spraying a quick knockdown insecticide (pyrethrum + PBO) into a randomly selected pecan canopy to cause all stink bugs to fall to a ground cloth to be counted; and compare stink bug captures on ground and in lower, middle and upper pecan canopy in three groves using both UV light traps (Kamminga et al. 2012 reported this trap attracts green stink bugs) and baited yellow traps.

Over all for the project, we have been very well received. Growers are more than happy that we are working on pecans again. They express their appreciation nearly every time that we talk to them telling us how much the growers affiliated with the project really appreciate what we are doing.

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ADDITIONAL INFORMATION Tables and Figures:

Table 1. Percentage damage by stink bugs (SB), pecan weevil (PW) and internal Lepidoptera (IL) (either pecan nut casebearer or hickory shuckworm) in five pecan groves in Arkansas (2012)

Date	Blackwell 1			Blackwell 2			Mayflower			Humphrey			Garland City		
	SB	PW	IL	SB	PW	IL	SB	PW	IL	SB	PW	IL	SB	PW	IL
Aug. 16	0	0	0	0	0	0	10	0	0	15	0	0	-	-	-
Aug. 30	0	0	0	0	0	0	4	0.7	0	18	0.7	0.7	-	-	-
Sept. 13	2	0	0	2	0	0	4.7	0	0.7	22	0	10.7	-	-	-
Sept. 18	-	-	-	-	-	-	-	-	-	-	-	-	4	0	12
Sept. 27	4	0	5.3	2.7	0	2	8.7	0.7	3.3	21	2.7	10	-	-	-
Oct. 10	2.7	0	3.3	2	0.7	2	7.3	0.7	4.7	21	21	11.3	5.3	0	26.7

Table 2. Summary of evaluation form responses for the annual pecan growers association educational meeting (May 5th, 2012) at Little Rock State Extension Office:

	1 Least Informativ e	2	3 No Opinion	4	5 Most Informativ e	Rating Averag e	Respon se Count
Overall, how would you rate this workshop in terms of usefulness?	(0)	(0)	(0)	(3)	(14)	4.82	17
Overall, how would you rate the quality of this workshop?	(0)	(0)	(0)	(4)	(13)	4.76	17
The time allotted for the workshop was appropriate – not too short or too long.	(0)	(0)	(0)	(2)	(15)	4.88	17
I have gained much useful information from this presentation	(0)	(0)	(0)	(2)	(14)	4.80	16
The information presented has convinced me to change and/or adapt my practices	(0)	(1)	(0)	(3)	(12)	4.60	16

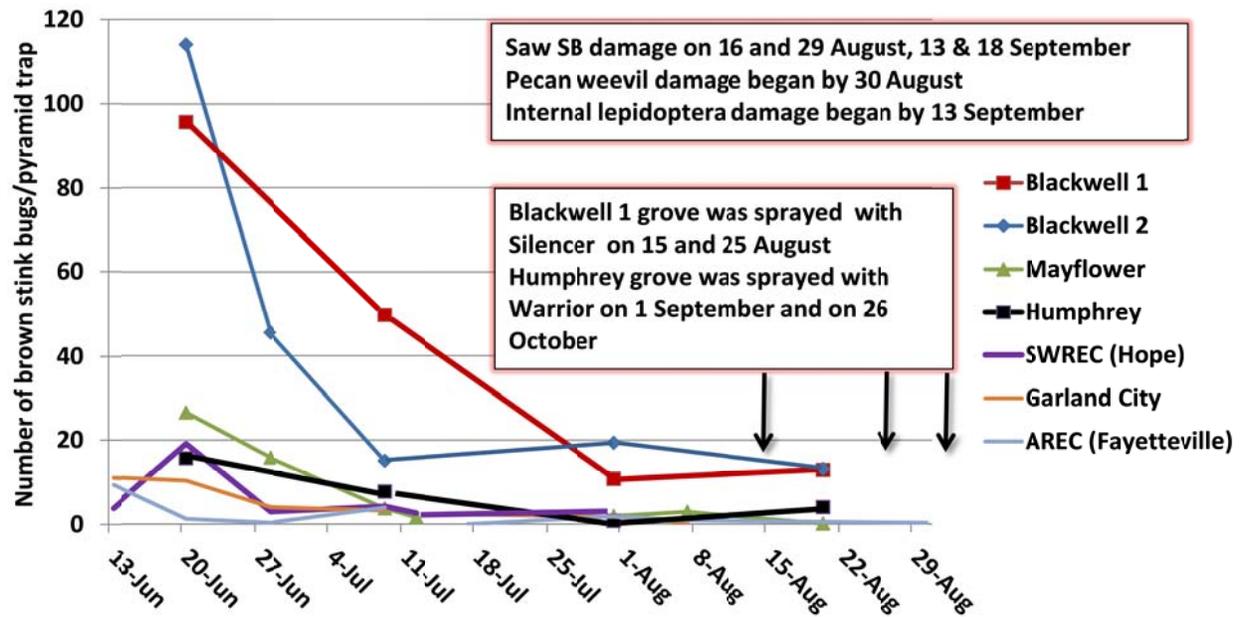


Figure 1. Mean numbers of stink bugs per pyramid trap captured in each of seven pecan groves sampled in Arkansas in 2012.



Figure 2. A) Yellow stink bug trap in a pecan orchard perimeter, B) screen cage on the top of the stink bug trap with an aggregation lure attached inside above the funnel opening, and an C) adult brown stink bug (Photos: D. Johnson).

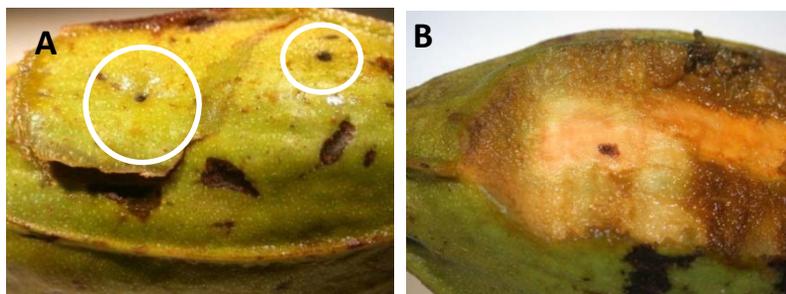


Figure 3. Pecan nuts past water stage with A) two types of stink bug damage on the shuck: circular depressions or dimples (left circle) or circular holes (right circle). When the shuck is sliced beneath the puncture to expose the kernel, you see a B) discolored spot where the stink bug fed on the kernel (Photos: D. Johnson).

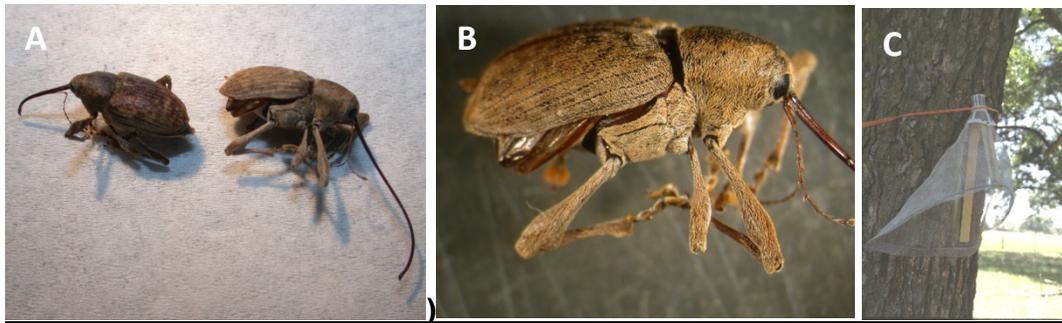


Figure 4. A) Pecan weevil male (left) and female (right), B) close up of a female pecan weevil (Photos: D. Johnson), and C) pecan weevil Circle trap on pecan trunk (Photo: Oklahoma State University EPP-7079)



Figure 5. Pecan weevil damage consists of an A) egg laying hole with a circle of tracking marks or scratches on the shuck and B) a hole in the kernel often filled with frass from the larva feeding inside on the endocarp or pecan embryo (Photos: D. Johnson)

Project 4: Classical Biological Control of the Japanese Beetle in Arkansas

Project Summary:

The Japanese beetle, *Popillia japonica* (Newman), is a serious invasive pest that recently became established in Arkansas. The larvae feed on turf roots, causing extensive damage to homeowners and turf managers. As an adult, the beetle is known to feed on foliage, flowers and fruit of over 300 species of flowers, shrubs, and trees. This beetle causes extensive harm to fruit plantings and ornamental plants in Arkansas. It is quickly spreading from Northwest Arkansas to other parts of the state. This expanding population is not known to have any natural enemies within the state. Other states have found it beneficial to introduce a highly specific pathogen of Japanese beetles that provides long-term biological control of this pest. Dr. David Smitley at Michigan State University assisted us to collect several hundred grubs and later mailed us six thousand frozen Japanese beetle adults infected with the microsporidian *Ovavesicula popilliae* (Andreadis and Hanula). The pathogen-infected Japanese beetles were released in parks, nurseries and golf courses in the region. We will continue to monitor and compare local Japanese beetle populations in both released and control sites to determine if the pathogen is established, spreading and controlling the Japanese beetle population.

Project Approach:

In April, May and September 2010, Japanese beetle larval densities were sampled at eleven sites by digging and sifting through ten square feet of soil. One site was abandoned later due to lack of larvae. Every larva found was brought back to the lab, identified and dissected. The gut, hemolymph and Malpighian tubules of each larva were mounted and examined for pathogens using phase microscopy. We were specifically concerned with the milky spore bacteria *Paenibacillus popilliae*, the microsporidian *Ovavesicula popilliae*, the Eugregarines *Stictospora* spp. and nematode infections. Pathogens were identified morphologically. Prevalence of these infections was recorded (Tables 1 and 2). This process was repeated with adult beetles in June, July and August 2010. Each week, between ten and twenty adult beetles were removed from pheromone traps at each sample site and dissected for disease. One previously undescribed protozoan pathogen was found in Japanese beetle. It is thought to be in the genus *Adelina*.

In May 2010, we traveled to Michigan to collect about four hundred infected Japanese beetle larvae and released them in Arkansas. Many of the larvae found were either of different species (killed) or healthy Japanese beetles. After dissection, larvae and soil were autoclaved and discarded. There was not enough material to make a successful release of the pathogen. In August 2010, Dr. David Smitley of Michigan State University mailed us several thousand frozen adult beetles (used PPQ Permit P526P-09-03001 to move pests). A subsample of these beetles was dissected to determine the percentage *O. popilliae* infection. The remainder was used as release material. In August 2010, approximately 6,000 adult beetles were buried across four sites. These released adult beetles had approx. a 13 percent infection rate. The four release sites consisted of two golf courses, one public park and one nursery. Approximately 50

beetles were buried every one square foot at each release area. We continue to monitor these sites for *O. popilliae* establishment and changes in local Japanese beetle populations.

Goals and Outcomes Achieved:

The prevalence of natural enemies of larval Japanese beetles in Northwest Arkansas was successfully determined through the repeated sampling of parks, golf courses and nurseries. All collected larvae and a subset of the adult Japanese beetles removed from traps at each site were dissected. We determined the prevalence of several species of natural enemies in larvae and adult Japanese beetles. We also estimated the density of Japanese beetle larvae in each site (Table 1).

Beetles infected with *O. popilliae* were successfully moved from Michigan to Arkansas. The prevalence of *O. popilliae* was determined and the pathogen was released into the wild. Whether or not the pathogen has become established or spread in the area has yet to be determined. We will continue to monitor the situation in 2011 and possibly 2012. Larvae and adults will be collected from control and release sites in the same way as they were in 2010. If it is determined that the pathogen has become established, we will continue monitoring the adult beetles in Northwest Arkansas for any decline in population.

Results of this study are currently being prepared for publication and dissemination.

Beneficiaries:

Further classical biological control programs for Japanese beetles can now more easily be started now that we have a record of the natural enemies of *P. japonica* in Northwest Arkansas. Many pathogens and parasitoids that would be useful for the state were not found, such as *P. popilliae* or the parasitoid *Tiphia vernalis*. Should researchers want to delve into further biological control releases, they now have a baseline data.

Because the establishment and spread of *O. popilliae* is still being monitored we cannot directly comment on the impact of the release of the microsporidian on the beetle population. However, should its establishment and spread be confirmed, we suspect it will permanently lower the maximum beetle population found in this region. *O. popilliae* is known to lower female fecundity by 50% as well as increase larval mortality. This would mean less damage for turf managers and homeowners dealing with damage caused by larvae feeding on turf root systems. It would also mean a decline in adult populations, translating into less foliar and fruit damage for growers and horticultural damage for homeowners and growers. This reduction in damage could be particularly important to organic growers, who have limited options when dealing with high adult populations. This control would occur year after year without any further investment.

Lessons Learned: We now have documentation of the natural enemies offering control of Japanese beetle in the area. There were no parasitoids found and very few lethal pathogens. Further biological control efforts, with multiple agents, may be needed to naturally reduce the

population of Japanese beetle to acceptable levels. However, the introduction of *O. popilliae* is expected to contribute greatly to that control over the next decade.

We do not recommend the use of larval Japanese beetles for the further dissemination of *O. popilliae* to other regions looking to import it as a biological control agent. It is easier to locate, collect and disperse thousands of frozen, infected adult beetles and significantly reduce the time needed to implement a biological control program over large areas infested with Japanese beetles. The monitoring of the spread of *O. popilliae* is on a timeline outside the scope of this grant. Continuation of this project and the judging of its success will require future funding.

Table 1. Totals and site densities of Japanese beetle larvae and pathogen prevalence in multiple sites in Northwest Arkansas in 2010

Site	# Larvae	Larvae/ sq. foot	% <i>P.</i> <i>popillia</i> <i>e</i>	% <i>O.</i> <i>popillia</i> <i>e</i>	% <i>Stictospo</i> <i>ra</i>	% <i>Adelin</i> <i>a</i>	% <i>Nematod</i> <i>es</i>
Univ. Ark. Farm	56	0.5	0	0	0	0	3.6
Razorback Golf Course	32	1.1	0	0	56.3	0	0
Lost Springs Golf Course	34	1.1	0	0	76.5	0	5.9
Valley View Golf Course	13	0.4	0	0	69.2	0	0
Wilson Park	41	1.4	0	0	65.9	0	0
Gulley Park	8	0.3	0	0	0	0	0
Lewis Park	3	0.1	0	0	0	0	0
Riverbend Gardens	20	0.7	0	0	0	0	0
Gay Orchards	0	0	0	0	0	0	0
Rom Orchards	12	0.3	0	0	33.0	0	0

XNA airport	1	0.1	0	0	0	0	0
Total	219	0.6	0	0	38.4	0	3.0

Table 2. Total numbers of adult Japanese beetles sampled and dissected and prevalence of pathogens site sampled in Northwest Arkansas in 2010

Site	# Adults	% <i>P. popilliae</i>	% <i>O. popilliae</i>	% <i>Stictospora</i>	% <i>Adelina</i>	% Nematodes
Univ. Ark. Farm	100	0	1.0	0	0	1.0
Razorback Golf Course	100	0	0	0	0	0
Lost Springs Golf Course	100	0	1.0	0	1.0	0
Valley View Golf Course	100	0	0	0	0	0
Wilson Park	90	0	0	0	1.1	0
Gulley Park	100	0	0	0	0	0
Lewis Park	100	0	0	0	0	0
Riverbend Gardens	100	0	0	0	2.0	0
Gay Orchards	90	0	0	0	0	0
Rom Orchards	98	0	0	0	0	0
Total	978	0	0.2	0	0.4	0.1

References cited:

Andreadis, T. G. and J. L. Hanula. 1987. Ultrastructure study and description of *Ovavesicula popilliae* n. g., n. sp. (Microsporidia: Pleistophoridae) from the Japanese beetle, *Popillia japonica* (Coleoptera: Scarabaeidae). J. Protozool. 34: 15-21.

Cappaert, D. L. and D. R. Smitley. 2002. Parasitoids and pathogens of Japanese beetle (Coleoptera: Scarabaeidae) in southern Michigan. Environ. Entomol. 31: 573-580.

Hanula, J. L. 1990. Epizootiological investigation of the microsporidian *Ovavesicula popilliae* and bacterium *Bacillus popilliae* in field populations of the Japanese beetle (Coleoptera: Scarabaeidae). Environ. Entomol. 19: 1552-1557.

Hanula, J. L. and T. G. Andreadis. 1988. Parasitic microorganisms of Japanese beetle (Coleoptera: Scarabaeidae) and associated scarab larvae in Connecticut soils. Environ. Entomol. 17: 709-714.

Smitley, D. 2008. Biological control of Japanese beetle in Michigan. Final Report for the Michigan Department of Agriculture Horticulture Fund.

Fiscal Data:

	Funds	Expenses
Beginning Balance	\$10,000.00	
Sal/Wages		\$6,378.98
Supplies		\$2,081.94
Travel		\$1,495.27
Other		\$43.81
Remaining Funds	\$0.00	

* This project was rebudgeted through the normal UA internal processes. Less travel was required due to further collaboration with those in Michigan who collected the Japanese Beetle adults and FedEx'd them to us as frozen specimens. These savings were utilized for additional labor used for microscopic dissections to confirm protozoan infection in the frozen adults, as well as for supplies needed for additional lures and traps for assessing the success of release of protozoan next year, along with the purchase of a netbook for easier data collection/input. The amount re budgeted was less than 20% of the total project amount.

Project 5: Enhancing the Food Safety of Direct Marketed Specialty Crops in Arkansas

Project Summary

The University of Arkansas conducted four workshops throughout the state for farmers' market growers and small farmers to increase knowledge and awareness of microbial food safety at the farm level. During these workshop information was draw upon material from the national GAP website, the UC-Davis Small Farm Program, and colleagues in other states who have previously held this type of workshop. Speakers from NC State and NC Fresh Produce Safety Task Force were invited to present information. Participants developed food safety plans for their farm during the workshop under the guidance of the project leaders and speakers from North Carolina.

Project Approach

The University of Arkansas conducted four workshops throughout the state for farmers' market growers and small farmers to increase knowledge and awareness of microbial food safety at the farm level. As demand for locally produced foods increases, the opportunity for a food-borne outbreak, from a local source, also increases. Growers must be pro-active and knowledgeable about food safety to prevent outbreaks. During these workshop information was draw upon material from the national GAP website, the UC-Davis Small Farm Program, and colleagues in other states who have previously held this type of workshop. Speakers from NC State and NC Fresh Produce Safety Task Force were invited to present information.

The workshops included information on:

- Food Safety Enhancement Act of 2009 and how the proposed Food Safety Modernization Act I affects small producers.
- Identification of potential sources of food safety problems.
- Methods to reduce the risk of a food safety contamination on the farm.
- How to conduct a food safety assessment on the farm.
- Developing of a food safety plan for the grower's farm.

Participants developed food safety plans for their farm during the workshop under the guidance of the project leaders and speakers from North Carolina.

Workshop locations and dates:

Jonesboro, AR
June 28, 2010
CES Office
Eight attendees

Pine Bluff, AR
June 29, 2010
UAPB
S.J. Parker 1890 Extension Complex Auditorium.
31 attendees

Fayetteville, AR
July 26, 2010
UA Food Science Building
27 attendees

Conway, AR
Aug 16, 2010
Natural Resource Center
Time: 1:00 - 5:00 PM
21 attendees

Workshop attendees were evaluated at the conclusion of each workshop and the results are listed in the goals and outcomes achieved.

Goals and Outcomes Achieved

- The University of Arkansas conducted four workshops throughout the state for farmers' market growers and small farmers to increase knowledge and awareness of microbial food safety at the farm level.

The workshops included information on:

- Food Safety Enhancement Act of 2009 and how the proposed Food Safety Modernization Act I affects small producers.
 - Identification of potential sources of food safety problems.
 - Methods to reduce the risk of a food safety contamination on the farm.
 - How to conduct a food safety assessment on the farm.
 - Developing of a food safety plan for the grower's farm.
- Participants developed food safety plans for their farm during the workshop under the guidance of the project leaders and speakers from North Carolina.
 - Workshop attendees were evaluated at the conclusion of each workshop and the results are as follows:

Worskhop Evaluations								
Workshop site	of Participants	Number of Evaluations	Food safety Overview	Farm Self Assessment	Farm Mapping activity	Passing along best practices	Liability	Based in info today, will you
No. responses			60	57	59	58		53
Jonesboro	8	7	5.0	4.7	4.1	5.0		6 will make changes; 1 will not
Pine Bluff	31	17	4.7	4.6	4.3	4.6		10 will make changes; 3 will consider; 1 will not make changes; 2 will pass info to growers
Fayetteville	27	19	4.3	4.5	4.1	3.9	4.3	15 will make changes; 1 will consider changes
Conway	21	17	4.5	4.5	4.1	4.4	4.5	14 will make changes
Average			4.6	4.6	4.2	4.4	4.4	45 will make changes 4 will consider making changes 2 will not make changes 2 will pass info along to growers
1(not useful) 2 3 4 5 (very useful)								
Comments:								
great and very very useful - learned lots of new info. thanks for bringing in an expert like him - even if we had to fly him he good workshop. Would like more info about legislative issues. Maybe present a "sum it up" information brochure. Come								
Great! targets us small farmers - what we need								
Suggestions for improving the workshop								
conduct during slow part of year - winter								
very good - would like to see more photos from actual farms								
very good presentation. I didn't plan on staying for the entire program but I'm glad I did because it was very education;								
fix typos & setup of workshop (schedule not followed) be more organized; very useful and enjoyable also! Would have								
find showcase farms and have farmers tell us about real practices								
➤ make it at least 6 hrs long to have enough time to cover all material								

A post-evaluation was conducted to determine if growers had begun to implement practices and knowledge learned from participating in workshop. There were 10 responses submitted.

The questions and responses are as follows:

Question 1: Your position when you attended the Food Safety on the Farm workshop (more than one answer possible)

7 growers, 3 market managers, 2 agents

Question 2: For EXTENSION AGENT, FARMERS' MARKET MANAGER OR OTHER FARM ADVISOR:

Have you used the materials from the workshop to inform growers you work with about food safety practices on their farm?

100% Yes (6)

0% No

Question 3: (for Growers) Have you implemented or changed your practices in the areas below as a result of the information presented in the "food safety on the farm" workshop?

(Table with complete results at end)

- 57% Have started harvesting in a manner that reduces the potential for contamination
- 50% Have started to document farm activities such as fertilizer applications, pest management treatments in the processing area as well as production area, meetings to inform workers/volunteers of farm procedures.
- 43% Have started to inform workers/volunteers about food safety practices on your farm, especially the importance of proper hand washing.

Practice	Yes	No	Was already doing	N/A
Testing water	2	3	1	1
Designating a ground bin for stackable harvesting bins so harvesting bins don't touch the ground.	1	2	3	0
Harvesting in a manner that reduces the potential for contamination.	4	0	3	0
Use drip irrigation where applicable	2	0	5	0
Using sanitized water when washing produce	0	1	5	1
Apply manure more than 4 months before harvesting the crop.	1	0	3	3
Taking measures to keep animals (including dogs, cats, chickens and wildlife) out of production area as much as possible	2	0	5	0
Inform workers/volunteers about food safety practices on your farm, especially the importance of proper hand washing.	3	0	2	0
Inform workers/volunteers where the bathroom is located	3	0	2	2

<i>Document farm activities such as fertilizer applications, pest management treatments in the processing area as well as production area, meetings to inform workers/volunteers of farm procedures.</i>	3	2	1	0
<i>Create a "farm food safety manual" for workers/volunteers.</i>	1	4	0	2
<i>Start a traceback/documentation system?</i>	1	5	0	1
<i>Looked into GAP certification for your farm?</i>	1	5	0	1

Attendees Comments:

Highly useful program. Would attend again if re-presented.

I made copies and shared all information with all the food growers. We put signs up at our market to inform public to only eat properly washed produce. I thought this class was extremely beneficial.

Our farm is very small but I found this workshop invaluable - it was nice to know i am doing the right thing and have proof = this workshop was excellent and should definitely be ongoing esp. as things are changing all the time in agricultural practices. thanks so much

Beneficiaries:

The beneficiaries of this project are the farmers' market growers and the small specialty crop producers of the state as they do not have the resources to bring consultants to advise them on food safety.

Lessons Learned:

A written pre-test of the participants' knowledge was not conducted. A verbal assessment was made at the beginning of the workshop, and two post-workshop surveys were conducted. The lesson learned is that the project needs to be conducted based on what is set forth in the submitted project proposal.

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Project 6: Legal and Business Guide for Specialty Crop Producers

Project Summary:

The specialty crop industry faces a wide range of legal/business opportunities and challenges, including contract laws, food safety, food labeling, labor, business organizations, and application of the Perishable Agricultural Commodities Act. In addition, the industry is confronted by other unique challenges that directly affect competitiveness, principally marketing of various types of specialty crops using different marketing systems (i.e. direct, buyers, restaurants, wholesalers, etc). Additionally, growers must navigate third party relationships and requirements that include audits and contracts.

This project addressed these opportunities and challenges in a comprehensive and long-term manner to enhance the competitiveness of the specialty crop industry in Arkansas. The project has been and will continue to leverage the institutional capacity of the National Agricultural Law Center and the University of Arkansas Division of Agriculture. The project included University contributions/collaborations from the Cooperative Extension Service, the Agricultural Economics and Agribusiness Department, and the Institute of Food Science and Engineering. Additionally, this project leveraged the eXtension Community of Practice for Agricultural Law.

Project Approach:

The project was completed over a two-year period, with the statewide meeting and the majority of the research and information development occurring during the first year. During the second year, project leaders engaged growers in statewide and regional workshops as well as completing the final resources including several of the factsheets.

In the first phase of the project, the “Legal and Business Guide for Specialty Crop Growers” was authored and published in print form and onto the National Agricultural Law Center web site. This publication consists of an Introduction and eight chapters that address specific aspects of legal and business issues. Specifically, six of the chapters focus on legal issues of the most relevance to improving the competitiveness of specialty crop growers:

- Contracts;
- Business Organizations;
- Labor;
- Food Safety (with a focus on legal aspects and liabilities rather than on obligations, parameters, and audit processes);
- Food Labeling; and
- The Perishable Agricultural Commodities Act.

The National Agricultural Law Center authored these chapters of “Legal and Business Guide for Specialty Crop Growers,” each of which are 5 to 10 pages in length. Further, the Center coordinated with Dr. Ron Rainey, and Dr. Steve Seidemann to write the chapters on marketing of specialty crops and third party audit of specialty crop operations respectively.

Once completed, the “Legal and Business Guide for Specialty Crop Growers” was published by the National Agricultural Law Center and be made available in hardcopy to growers, county extension offices and other interested stakeholders. Additionally, the resource will be made available online at http://nationalaglawcenter.org/assets/articles/center_specialty.pdf, and the Cooperative Extension Service web site (www.uaex.edu).

Next, the project partners published numerous factsheets that correspond with each of the eight chapters of the “Legal and Business Guide for Specialty Crop Growers.” The links to these factsheet can be found at the end of this report. The final component of the project was to plan and host a statewide workshop in a centralized location as well as a series of four regional workshops which were held throughout the state. The workshops provided technical and practical education to specialty crop producers and other stakeholders such as extension personnel who work with specialty crop producers.

Goals and Outcomes Achieved:

The overall stated goals of this project were achieved by accomplishing the following:

Objectives:

- Development and publication of a producer-friendly, producer reference manual titled “Legal and Business Guide for Specialty Crop Producers” that will be published and distributed in print form to specialty crops producers and stakeholders.
 - This document has been created and posted on the National Agricultural Law Center’s website, at http://nationalaglawcenter.org/assets/articles/center_specialty.pdf. Also, hundreds of print copies have been distributed at various workshops across the state.
- The print publication will also be published electronically on the National Agricultural Law Center web site, www.nationalaglawcenter.org, and the eXtension Community of Practice for Agricultural Law.
- Publication of a series of 2-page Cooperative Extension Service factsheets that correspond with each chapter of the “Legal and Business Guide For Specialty Crop Producers”. These factsheets will be used for outreach and producer engagement and also published on the National Agricultural Law Center web site. In addition, the factsheets will be published in the eXtension Community of Practice for Agricultural Law as well as any other appropriate eXtension Communities of Practice;

- The factsheets have been created and published onto the internet. They are available at <http://nationalaglawcenter.org/readingrooms/specialtycrops/>.
- Conduct one statewide workshop that provides education and training to specialty crop producers, the curriculum for which will incorporate the “Legal and Business Guide for Specialty Crop Producers” and extension factsheets;
 - This was the first workshop that we held in the central part of the state. Over 77 producers attended.
- Survey attendees of statewide conference and other stakeholders to help identify additional legal, marketing, and audit issues for specialty crop producers;
 - This was distributed at the first workshop, the statewide conference, and was used to refine the written materials and the presentations that went along with them. At least 75 producers believe they increased their knowledge. At least half believed they would make operational changes based on the material.
- Conduct four additional regional workshops, one in each region of the state that uses project resources, including in survey results from the statewide conference, and is tailored to providing hands-on training and education.
 - Using the survey results we conducted 4 separate workshops in each of the four regions in the state. Over 75 producers attended.

The expected measurable outcome was that producers and other stakeholders would have sufficient research and information available to them to allow them to make informed decisions regarding specialty crops. All of the proposed documents (the guide and the accompanying factsheets) have been created and distributed throughout the state of Arkansas. We have received several requests for further printings of the guide and the materials are still extremely useful to specialty crop producers to this day. The documents received over 425 hits on the website. Over 30 grower influencers are believed to have used the material.

Beneficiaries:

This project was designed to benefit producers, the overall growth and competitiveness of the specialty crop industry, state policymakers, community leaders, and others. In addition, the project is expected to be of benefit to the general public as well since it will enhance the overall economy of Arkansas. Over 100 producers are believed to have used the materials. They benefited from the availability of the guide materials.

Lessons Learned:

One of the primary lessons that we learned was importance of legal issues in agriculture is growing and farmers are becoming increasingly aware of the need for accurate and

understandable legal information. Farmers markets, road-side stands, and other market avenues for specialty crops are growing in popularity and it is critical that the farmers understand the potential legal consequences that can occur because this form of agriculture is substantially different than row crop farming or ranching. Understanding, and hopefully preventing, these risks is a major step that farmers need to address early in their operation so that potential issues may be identified before they become problems.

Contact Person:

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Additional Information:

Links to the materials created under this grant:

Legal and Business Guide for Specialty Crop Producers (NALC and Div. of Ag) –
http://nationalaglawcenter.org/assets/articles/center_specialty.pdf

Perishable Agricultural Commodities Act Factsheet (H. Pittman) -
http://nationalaglawcenter.org/assets/articles/pittman_paca.pdf

Food Safety and Specialty Crops Factsheet (R. Rumley) -
http://nationalaglawcenter.org/assets/articles/rrumley_foodsafety.pdf

Agricultural Contracting Factsheet (R. Rumley) -
http://nationalaglawcenter.org/assets/articles/rrumley_agcontracting.pdf

Food Labeling for Specialty Crop Producers Factsheet (E. Rumley) -
http://nationalaglawcenter.org/assets/articles/erumley_foodlabeling.pdf

Third Party Food Safety Audits for Specialty Crop Producers Factsheet (S. Seideman and R. Rainey) -
http://nationalaglawcenter.org/assets/articles/seideman_3rdparty.pdf

Project 7: Produce Marketing Association Fresh Summit Show

Project Summary

This project was also covered in agreement 1054.

Five specialty crop companies participated in the Arkansas Agricultural Department's (AAD) booth at the 2011 Produce Marketing Association (PMA) Fresh Summit International Convention and Exposition in Atlanta, GA on October 14-17th, 2011. The companies are:

- Mathews Ridgeview Farms
- Clanton Farms
- Post Familie Winery
- Old Dominion Produce
- Delta Blues

The companies were surveyed and the results are given under the goals section.

Project Approach

In January 2011, participants were recruited by a letter and email to all Arkansas producers who were GAP/GHP inspected or that AAD had knowledge of and were of a size that could benefit from the event.

Five specialty crop companies participated in the Arkansas Agricultural Department's (AAD) booth at the 2011 Produce Marketing Association (PMA) Fresh Summit International Convention and Exposition in Atlanta, GA on October 14-17th, 2011. The companies are:

- Mathews Ridgeview Farms
- Clanton Farms
- Post Familie Winery
- Old Dominion Produce
- Delta Blues

Old Dominion and Delta Blues were new participants in the AAD booth at the PMA Fresh Summit.

A survey was sent to all participants after the event and response were due by January 9, 2012. A copy of the survey is below:

2011 PMA FRESH SUMMIT

Atlanta, GA

1. WAS THIS SHOW HELPFUL?

1 2 3 4 5 6 7 8 9 10
YES  No

2. WILL YOU RETURN NEXT YEAR?

1 2 3 4 5 6 7 8 9 10
YES  No

3. DID YOU THINK ATTENDING "DID OR WILL" INCREASE YOUR SALES?

1 2 3 4 5 6 7 8 9 10
YES  No

4. ARE YOU HAPPY WITH THE BOOTH SETUP?

YES NO: _____

5. HOW MANY SALES LEADS OR POTENTIAL SALES LEADS WERE MADE?

6. HOW MANY CONTACTS WERE MADE? -

7. HOW MANY LEADS OF:

NATIONAL: _____

REGIONAL: _____

LOCAL: _____

8. HOW ELSE WAS THIS SHOW HELPFUL?

9. SUGGESTIONS: _____

Goals and Outcomes Achieved

AAD achieved its goals and outcomes by constructing a booth at the 2011 PMA show and recording 15 potential sales leads as indicated in the survey results below.

Survey Results:

1. Average Score 2.5
2. Average Score 2.0
3. Average Score 2.25
4. All attendees responded with "Yes".
5. Average sales leads were 16.75
6. Average contacts were 30
7. Averages were: NATIONAL: 10 REGIONAL: 4 LOCAL: 2
8. One of the response that was commonly reported was, "This show puts me in touch with people who are outside of the buyers in Arkansas".

Verbal reports from participants and the notable increase in the number of buyers visiting the AAD booth indicate participation in the AAD booth was successful and beneficial for the companies. The increase in the traffic at the AAD booth is a direct result of the better booth location which AAD earned by being a five year participant at the PMA Fresh Summit. All participants have indicated to AAD they want to participate in the AAD booth at the 2012 PMA Fresh Summit.

Beneficiaries

Beneficiaries were the specialty crop producers of Arkansas and especially those that attended the show with AAD. When Arkansas has a presence at these national shows all of Arkansas can benefit.

Lessons Learned

AAD has been attending this show and constructing this booth for a number of years now and thus most of the problems have been worked out.

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Project 8: Encouraging Agricultural Education through the Conway Farmer's Market.

Project Summary:

According to the Centers for Disease Control and Prevention, only 26% of American adults eat fresh fruit and vegetables three or more times a day. With a statistic like this, it is clear that action must be taken in improving this percentage, or our nation faces dire consequences, such as increased health care costs and decreased overall national health. Our project, Encouraging Agricultural Education Through The Conway Farmer's Market constructed a well-developed, agriculturally based, educational spot at the Conway Farmer's Market. This station provided visual and written information in regards to learning about specialty fruits and vegetables, and also a hands-on demonstration on how to prepare them properly and in a healthy manner.

Project Approach:

Due to the timing in which we received the funding the market was wrapping up the season. Thus we were unable to fully implement the proposed activities. However, we were able to obtain the supplies and conduct the project at a limited capacity.

The mobile Kitchen display unit was used to provide hands-on demonstrations on how to prepare fruits and vegetables properly and in a healthy manner. Through the educational and promotional activities our objective was to expand citizen's knowledge on specialty produce through visual examples, such as participating in demonstrations and through flyers, posters and brochures made available. Our methods for employment of raising awareness about the educational station included: alerts through social networking sites and email, printed flyers at local businesses and parts of town, a memo was sent out in a newsletter and newspaper, and we alerted and educated the local schools about it. It is important to note that our educational booth provided the locals with knowledge and information but also stood as a pilot program of sorts. As the sole educational booth in the state, it helped to encourage and influence other markets to do the same by providing a work model.

We will continue to use all 3 activities next year to continue on goal and hope better people's knowledge of fruits and vegetables.

Goals and Outcomes Achieved:

Due to a limited amount of time and decreasing attendance at the farmers market goals and outcomes were not fully achievable. However the following was achieved:

- Purchased supplies for mobile kitchen display unit
- Worked with Chris Meux on educational displays
- Worked with Kim Williams on promotion materials

Beneficiaries:

The beneficiaries of this project are the citizens of Faulkner county and Conway city.

Lessons Learned:

The biggest lesson learned is that AAD should not wait to the last minute to re-budget funds and that projects that are added should only be submitted if they have enough time to be completed.

Contact person:

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Project 9: Assessing and Addressing Legal Risk and Opportunities for the Arkansas Edamame Industry

Project Summary:

Edamame is the common name used to describe several specialty varieties of edible green vegetable soybeans. Centuries old, edamame has long an important crop and food source in Asian countries and other parts of the world. In the United States, consumer demand for edamame is increasing at a steady pace – as much as 12-15% annually. Edamame is a crop grown in the United States, but not yet at a commercial scale that comes even remotely close to meeting domestic consumer demand. Arkansas is poised to become the national leader in edamame production, having made significant private-public investments to reach its current stage of approximately 1,000 acres of edamame production.

This project addressed some of the legal and regulatory issues involved in developing the commercial edamame industry in Arkansas. As with any sector of the agricultural industry, commercial edamame production is confronted by unique legal issues, some of which are unique even among the issues faced by other specialty crops. This uniqueness is compounded in part by the fact that most, if not all, edamame producers have backgrounds in large-scale, non-specialty crop production (i.e., soybeans) rather than more traditional specialty crop production. The purpose of this project was to further assess and address the legal and regulatory hurdles and opportunities that impact on the long-term development of the Arkansas edamame industry.

Telephone interviews, along with an initial meeting in Crawford County, helped to identify some of the major issues surrounding the new edamame industry. One of the first issues is the lack of overall understanding for the regulatory approval process under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). A significant portion of the 900 acres contracted for in the first year of production was not able to be harvested due to weed pressure. The weed pressure exists because the growers did not have sufficient pre- and post-emergence herbicides available to them to control weed pressure. Without resolving this issue for the next crop year, it will be difficult to convince producers to contract with the processor for future production. Consequently, this issue was identified as the most critical hurdle to the future existence and potential expansion of the commercial edamame industry in Arkansas. In sum, the industry and current investments will not come to fruition unless this pesticide issue is resolved. Other issues that we observed during the initial phase of the grant were organic certification, crop insurance and non-gmo labeling.

The organic certification issue was already addressed in a previous project. By leveraging existing resources of the National Agricultural Law Center, including a project funded as part of the FY2010 Specialty Crops Block Grant Program titled, “Legal and Business Guide for Arkansas Specialty Crop Producers” this question had already been answered for specialty crop producers. The research, information, and outreach

provided under that project applies broadly to specialty crop producers (including edamame) regardless of the market avenue they have selected; however the target audience was unaware of this resource since most of the edamame producers are row crop farmers.

Project Approach:

The outcome of this part of the project was the short-term development of reliable, objective agricultural and food law research and information designed to enhance the probability of success for the edamame industry and the communities it is developing. The Center personnel developed relationships with the producers, processors, extension personnel, and policymakers in furthering the edamame industry in Arkansas.

The Center has interacted with the diverse range of stakeholders in the edamame industry to assess legal research and information needs beyond those that are currently identified through telephone interviews conducted to date, including two in-person stakeholder meetings in Crawford County. Telephone interviews indicated that there are questions on the application of the National Organic Program, crop insurance, food labeling issues, and the potential application of the Perishable Agricultural Commodities Act (PACA).

Some of these very issues have been previously addressed by another specialty crop grant that we had performed in addition to the materials that we already have on our website. There were several issues that they needed addressed that had not been researched in any depth. The Center's next task was to conduct research and publish a stakeholder-friendly publication specifically addressing the pesticide/herbicide regulatory approval process. This was one of the primary issues that stakeholders had identified early in the process. The other two issues that were important for the development of the edamame industry are crop insurance and non-gmo certification. The publications were developed by Center personnel and distributed at the final stakeholder meeting this fall in Russellville, AR. Over thirty people attended the meeting representing most of the edamame acreage currently under production, representatives from the processing plant, extension personnel, and state employees that are involved with the labeling and pesticide issue. Additionally, we have made ourselves available to answer any follow up questions that were a result of the meeting.

Goals and Outcomes Achieved:

The overall stated goals of this project were achieved by accomplishing the following:

Objectives:

- The Center will interact with the diverse range of stakeholders in the edamame industry to assess legal research and information needs beyond those that are currently identified through telephone interviews conducted to date, including at least one in-person stakeholder meeting in Crawford County.

- We identified five different issues that they were facing. Two of which had already been addressed by another project and the other three were addressed under the second objective.
- Two separate meetings were held in Crawford County. The first was to gather information on the issues that they were facing and the second was to present the results of the research and to get the stakeholders together to talk about other potential issues.
- The Center conducted research and published three stakeholder-friendly publications specifically addressing the pesticide/herbicide regulatory approval process, non-gmo labeling for edamame produced in Arkansas, and the availability of crop insurance for edamame.

The expected measurable outcome was that producers and other stakeholders would have sufficient research and information available to them to allow them to make informed decisions regarding the 2013 crop season, as well as the steps necessary to addressing the herbicide availability issues. Many of the issues surrounding the herbicide issue have been addressed and the next major issue, crop insurance, has been spotted so that industry can begin to address that issue before it rises to the level that the herbicide problem did. Currently there are no policies available for edamame and the process for creating a new policy can take up to five years.

Beneficiaries:

This project was designed to benefit producers, the overall growth and competitiveness of the edamame industry, state policymakers, community leaders, and others. In addition, the project is expected to be of benefit to the general public as well since it will enhance the overall economy of Arkansas.

Over 20 producers (i.e., those currently engaged in edamame production and new producers interested in production next year) attended the final meeting in Russellville with at least ten more people representing industry, state policymakers, and extension personnel. Long-term, however, this number could be much higher as this project should assist in laying a stronger foundation for the future success of the industry.

Lessons Learned:

One of the primary lessons that we learned was that even though edamame is an immature soybean it does not get treated as a soybean for purposes of herbicide certification or for crop insurance. The subtle difference between the varieties of beans makes a tremendous difference on the regulatory level. Once the regulatory issues were dealt with concerning the herbicide approval process we still found a stumbling block with getting a chemical company to include the use of their product on edamame even if it was allowed at both the state and federal level because of liability concerns. Another issue was crop insurance. At least one producer said that he currently had

crop insurance covering his edamame; however the RMA office in Kansas City stated that edamame did not qualify for any of the soybean policies because it was harvested early and remained in its pod. This issue is not critical at the moment because the industry is just starting, but in the future crop insurance will be necessary to help defray the risks associated with agriculture. Combined with the time requirements for getting a policy in place, this issue will need to be addressed soon because the solution may take longer to achieve than the herbicide issue.

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Additional Information:

Links to the materials created under this grant:

Approval of Pesticides (R. Rumley) -
http://nationalaglawcenter.org/assets/articles/rrumley_approval.pdf

Crop Insurance for Edamame (R. Rumley) -
http://nationalaglawcenter.org/assets/articles/rrumley_edamame.pdf

Non-GMO Labeling (E. and R. Rumley) -
http://nationalaglawcenter.org/assets/articles/rumleys_nongmo.pdf

Project Summary

According to a USDA survey Arkansas ranks 1st, tied with Mississippi, in the nation for the number of individuals who are food insecure. Also, a Feeding America report indicates Arkansas is 9th in the nation for childhood hunger. These statistics mean that over 500,000 people in Arkansas are hungry or wondering where their next meal will come from. Additionally, the Youth Risk Behavior Survey in Arkansas shows that only 13.9% of children in the state get an adequate amount of fruits and vegetables daily. The state is combating the lack of availability of nutritious foods for low income families as well as a high rate of hunger. Due to this the Arkansas Hunger Relief Alliance (AHRA) set a goal in 2008 of acquiring and dispersing more fresh fruits and vegetables through their member organizations.

Fresh fruits and vegetables are more difficult to store and transport within the hunger relief system. When they are available they must be transported immediately to local pantries and shelters and then made available quickly to clients. The transporting of fruits and vegetables from out of state sources is expensive and risky. Since they are perishable items they must be transported on refrigerated trucks and often arrive bruised and rotting.

Due to our need for more nutritious food and the complexities of delivery and storage the Alliance began looking for new and innovative ways to provide access to fresh fruits and vegetables to the families served by hunger relief organizations in our state. Through this search the Alliance became aware of the Society of St. Andrew's (SOSA) gleaning efforts and formed a partnership to develop a gleaning network in Arkansas. Gleaning is the act of following behind farmers after their harvests and picking produce left in the field. The concept is perfect for Arkansas because of the large agricultural base from which to access foods and the high rate of volunteerism in the state.

The project began in May 2008 with the development of an advisory council to help develop and link resources needed for the network. Three gleaning efforts occurred that summer. Approximately 150,000 pounds of fresh, nutritious food from Arkansas fields were gleaned during these first efforts. Unfortunately much more than that was left behind in the fields. The gleaned food was made available to pantries and shelters where it was distributed quickly and efficiently to Arkansas families.

Volunteers and farmers are the key building blocks of this system and require hours of networking to build strong and lasting commitments. Additionally, there must be transportation and distribution methods to ultimately get the food to needy Arkansans. These require staff time and funds to adequately move the product in a timely and efficient manner. The development of this network takes time and resources, but the end result will be a long standing network to provide fresh fruits and vegetables to hungry Arkansans.

Project Approach

The partnership with the Society of St. Andrew is a natural fit. SOSA has over thirty years gleaning experience and would like to develop relationships in Arkansas. The Alliance is the distribution system with almost one thousand feeding agencies in all seventy-five counties of Arkansas.

The Director of Food Sourcing for the Alliance called on farmers, producers, and packers to gain their involvement in the gleaning network. Our staff worked with SOSA to develop volunteer networks across the state to participate in gleaning activities. This included presentations to civic groups, churches, schools, state agencies, media outlets and other organizations that were interested in promoting the project. We worked to develop and track printed materials to distribute with the produce to educate Arkansans about preparation and use of the produce they were receiving. Written surveys were developed and distributed to select pantries and shelters to collect and track data regarding the increased interest in and consumption of fresh fruit and vegetables. The staff of the Alliance provided SOSA complete access to and assistance with the local network of hunger relief organizations in the state to help with volunteer staffing and distribution of gleaned products.

The Director of Food Sourcing provided logistical support with transportation and supplies for each gleaning during the 2012 season. This included:

- Boxes, bins or bags needed for storing and transporting

- Transportation costs from the field to the distribution points

- Onsite assistance at gleanings

- Coordination of local distribution points to ensure freshness of produce gleaned

The Director of Food Sourcing for the Alliance continued to work with the Governor's Office to coordinate use of State of Arkansas Regional Maintenance Crews to staff gleanings.

The Alliance staff publicized the gleaning project on its website, at any meetings or forums, and within its memberships. The staff assisted SOSA with any recruitment of volunteers as requested.

Goals and Outcomes Achieved

1. Increase partnerships with farmers by 50%. To date, the program has used fewer than 10 farmers. The goal is to add at least 5 new specialty crop producers to the list of participating farmers in Arkansas.
-The Alliance and SOSA increased outreach efforts in 2012 with great results. We have met several new producers and began forming relationships that should prove beneficial in the future. Immediate results are four new growers and a new crop. For the first time we are gleaning pecans. New farms are Old Dominion, Randy Hardin, Robert Carruthers, and Kenneth Cole. One farmer that had committed to gleaning suffered major health problems this summer and died earlier this month.

2. Glean a minimum of 1,000,000 pounds of produce in 2012. This would be an increase from the 800,000 pounds of produce gleaned in 2010 and the almost 700,000 pounds gleaned in 2011. With an increase in farmer participation by 50% and good weather, the goal of 1,000,000 pounds of gleaned produce is attainable. Gleaned produce is weighed at the point of harvest and records are kept by the AHRA staff.
-Without enough winter to speak of, the 2012 harvest season came early and was bountiful. The Arkansas Gleaning Project surpassed the goal above by acquiring 1,150,707 pounds of produce. Crops gleaned include turnips, strawberries, squash, cucumbers, tomatoes, cabbage, green beans, peaches, corn, eggplant, peppers, watermelon, honeydew, okra, pears, and pecans. There have been 53 days in the field.
3. Inform and educate 75,000 Arkansans about the nutritional value, storage and preparation of the produce they receive. The AHRA staff will develop, print, and distribute informational and educational material to the pantries and shelters for inclusion in the boxes of fruits and vegetables given to food recipients. Since the informational and educational material will only be given to Arkansans with the produce they receive, AHRA will use the amount of materials distributed to determine population reached.
-The Alliance designed, printed and distributed 25,250 informational flyers (attached) about the gleaned produce. According to the American Community Survey, the average family size in Arkansas is 3. Assuming each of these flyers reached a family, we educated 75,750 Arkansans about the produce they were given. The information included what the product history, storage instructions, a recipe, and notification that it could be bought at a local farmers market or grocery store with their EBT card.
4. Increase the interest in and consumption of Arkansas grown produce from other sources such as farmers' markets and grocery stores. This data will be obtained through a pilot project with some of the larger and more established pantries/shelters conducting written surveys of the recipients of fresh fruit and vegetables.
-Alliance staff visited three large food pantries in the central Arkansas area and interviewed 133 families about the produce and informational flyers they received through the agency and the Arkansas Gleaning Project. The questions and results are attached. As you can see, the results are overwhelmingly positive.
 - Ninety-six percent of those surveyed said our program increased the amount of fruits and vegetables in their diets.
 - Ninety percent felt the informational flyers we helpful.
 - Sixty-five percent tried new foods because of the produce they received.
 - Eighty-eight percent said they have purchased more produce because of the program 52% from the grocery store, 7% from farmers markets, and 29% have purchased from both.

Beneficiaries

The ultimate beneficiary of the Arkansas Gleaning Program is the people of Arkansas. Our clientele are typically "at risk" population, mostly made up of children and the elderly. The fresh, nutritious food the Arkansas Gleaning Project injects into their diets helps fight many health issues including obesity and diabetes. Our member food banks are also beneficiaries. Produce donated from sources outside of Arkansas cost thousands of dollars to transport and usually

arrives in poor condition. The average cost of produce for the Arkansas Gleaning Project in 2012 is 2.8 cents per pound. That product is given to the food banks and feeding agencies free of charge making it an indispensable source of valuable product.

Lessons Learned

The Arkansas Gleaning Project is having a successful year. We began gleaning in January and are still picking pecans in November. As far as we've come since 2008, there is much more work to be done. Our long term goal is 5 million pounds per year by 2020. We learn lessons everyday about the partnerships, staff, and supplies needed to obtain our goals. We are looking into ways to make the program self-sustaining and searching for the partnerships to help us get there. With our partners, we have accomplished wonderful things and have become an example and mentor to food banks across the country. The program is at a pivotal point. To accomplish more, we need more resources including staff and equipment.

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Project 11: Arkansas Wine and Grape Industry Promotional Bottle Carrier

Project Summary

This project originally appeared in the Arkansas 2011 proposal however it was re-scope to 2009.

AAD in this project designed and had printed a cardboard wine bottle carrier for Arkansas wineries/vineyards along with a brochure listing information promoting the Arkansas Wine/Grape/Juice industry.

Project Approach

AAD coordinated with the University of Arkansas extension service media office to design both the wine carrier and the brochure. The printing of the wine carrier was bid out according to Arkansas procurement standards while the brochure was printed through the University of Arkansas. The number of carriers provided to each winery was based up the gallons of wine produced by each winery in 2011. There were 80 cases, each containing 80 carriers that were ordered and distributed to in-state wineries. There were also 6,000 brochures that were also distributed with each carrier.

Wineries' were verbally surveyed in late December 2012.

Goals and Outcomes Achieved

The following goals were achieved.

1. ***Survey wineries to measure increase in sales and traffic, in addition to gathering feedback.*** Wineries were verbally surveyed in December 2012 and asked if they believed that the wine carriers and brochures helped to increase sales. The majority believed it was too soon to determine if the project helped to increase sales.
2. ***10 % increase in traffic on www.arkansasgrown.com website's wine page by September 2012 as compared to September 2010 & 2011 traffic. September 2010 traffic was 2,326 visits.*** December 2012 traffic was 2,758.6 hits which is 18.5 % increase in traffic.
3. ***Provide 6,000 promotional carriers to Arkansas Wineries.*** Actually 6,400 wine carriers were provided to the wineries during September 2012.

Beneficiaries

The beneficiaries of this project are the Arkansas small farm wineries. These wineries received a product that allows them to better market the small farm wine industry in Arkansas.

Lessons Learned

The main lesson learned on this project is that changing a project scope with only a few months remaining in the project is not an ideal situation.

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