Oklahoma Department of Agriculture, Food, and Forestry

(ODAFF)

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Final Report

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OKLAHOMA VINEYARD QUALITY PROJECT

Project Summary:

The Oklahoma Grape Industry Council (OGIC) a non-profit, professional organization which represents 90% of Oklahoma's commercial vineyards and wineries undertook a project to assess vineyard quality throughout the state of Oklahoma. A previous Oklahoma Department of Commerce Grant program was used to assess the quality of wine made from Oklahoma grapes. It was determined during this project that the quality of Oklahoma grapes could be vastly improved. As the grape and wine industry in Oklahoma is still in its "infant" stage, this project could have a profound effect on future vineyard management practices. The purpose of this Specialty Crop Block Grant was to identify a comprehensive listing of vineyards in Oklahoma and using standardized assessment forms, identify correctable conditions in each vineyard and vineyard variety block, and determine if variety selection plays a role in vineyard success.

Project Approach:

Standardized Oklahoma Vineyard Assessment Forms (attached) were used to record vineyard assessments on mature vineyards (over three years old) at two times during the year – immediately following bud break in the vineyard and following veraison but prior to harvest. A contract to perform and analyze vineyard assessments was made with Eric T. Stafne, Ph.D., Project Director -- National Grape Community of Practice. Technical assistance was provided by Becky Carroll from Oklahoma State University's Horticulture and Landscape Architecture Department. Vouchers for soil sample evaluation and petiole analysis at Oklahoma State University were provided to each vineyard in the state. All data was analyzed by Dr. Stafne into a final report. The recommendations in the final report are being used by OGIC, Oklahoma State University, and Redlands Community College to develop results oriented vineyard education programs to positively benefit current and future Oklahoma vineyard operators.

The state was broken into six sections: Northeast, Northwest, Central, Lincoln County, Southeast, and Southwest. Vineyard owners were contacted to determine if they are still in business, the vineyard location, and what varieties and numbers of grapes are being grown. This information was obtained and refined by OGIC member volunteers calling and e-mailing identified vineyards. New vineyards identified through regional OGIC members were added to the vineyard lists. In all 115 commercial vineyards were identified with 305 total acres consisting of about equal numbers of vinifera and hybrids grape varieties. Vineyards no longer in business were removed from the regional lists.

A mailing was made in mid-February to all 115 identified vineyards providing information on the Oklahoma Vineyard Quality Project, the assessment forms that would be used for the survey of Oklahoma Vineyards in April at bud break and again after veriasion but before harvest.

By March 31, 2014, most lists had been refined to contain only commercial vineyards and their regional locations as well as the varieties being grown. These lists were forwarded to Dr. Eric Stafne for review and determination as to which regional vineyards and locations would be

selected for visit after bud break in mid-April. As an added benefit of this project, the revised Oklahoma Vineyard lists were provided to Don Molnar for update of the Oklahoma Sensitive Crop Viewer database maintained by the Oklahoma Department of Agriculture.

During the week of April 21, 2014, Dr. Eric Stafne visited 5 regions, 5 to 6 vineyards in each region:

- On April 21, 2014 accompanied by OGIC member Diane Stowers in the Northeast Region,going to: Lakeside Vineyard, Blue Coyote Vineyard, Hiesterberg Vineyard, Roberdes Vineyard, Osage Hills Vineyard, and Ganderway Vineyard.
- On April 22, 2914, Dr. Stafne was accompanied by OGIC member Dennis Flaming in the Northwest Region going to: Indian Creek Village Vineyard, Plymouth Valley Vineyard, Hostemark Vineyard, Whirl Wind Vineyard, Johnester Vineyard, and Brio Cellars Vineyard.
- On Wednesday, April 23, 2014 Dr. Stafne was accompanied by OGIC member Gene Clifton in the Central Region going to: Clauren Ridge Vineyard, Ingles Vineyard, Redbud Winery Vineyard, Whispering Pines Vineyard, Willow Pond Vineyard, and Canadian River Winery Vineyard. This day was followed by an OGIC reception at Ingles Vineyard in Norman, OK.
- On April 24, 2014, Dr. Stafne was accompanied by OGIC member Jill Stichler in the Southwest Region going to: Redbud Farm Vineyard, The Range Winery Vineyard, Piedmontese Vineyard, Sunset Ridge Vineyard, and Milson Vineyard.
- On April 25, 2014, Dr. Stafne was accompanied by OGIC member Richard Hale in the Lincoln County Region going to: Cedar Briar Vineyard, Spalvieri Hills Vineyard, Sparks Vineyard, Arlington Vineyard, and Tatanka Ranch Vineyard.
- The Southeastern region had very few vineyards. Largest vineyards in the SE Region were included with Lincoln County (Seminole) and Frontier County (Ada).

In early July, Oklahoma State University, Becky Carroll, assembled grape petiole and soil sampling kits and mailed these to all 115 identified vineyards. Each vineyard was offered one free petiole and one free soil sample which were mailed with postage return envelopes. Sample results were provided to each participant during August by Ms. Carroll.

During the week of July 16, 2014, Dr. Eric Stafne visited 5 regions, 5 to 6 vineyards in each region:

- On July 16, 2014 accompanied by OGIC member Diane Stowers in the Northeast Region, going to: Lakeside Vineyard, Blue Coyote Vineyard, Hiesterberg Vineyard, Roberdes Vineyard, Osage Hills Vineyard, and Ganderway Vineyard.
- On July 17, 2014, Dr. Stafne was accompanied byOGIC member Richard Hale in the Lincoln County Region going to: Cedar Briar Vineyard, Spalvieri Hills Vineyard, Sparks Vineyard, Arlington Vineyard, and Tatanka Ranch Vineyard.
- On July 18, 2914, Dr. Stafne went to the Northwest Region going to: Indian Creek Village Vineyard, Plymouth Valley Vineyard, Hostemark Vineyard, Whirl Wind Vineyard, Johnester Vineyard, and Brio Cellars Vineyard.
- On July 19, 2014 Dr. Stafne was accompanied by OGIC member Gene Clifton in the Central Region going to: Clauren Ridge Vineyard, Ingles Vineyard, Redbud Winery Vineyard, Whispering Pines Vineyard, Willow Pond Vineyard, and Canadian River Winery Vineyard.

- On July 20, 2014, Dr. Stafne was accompanied by JOGIC member Jill Stichler in the Southwest Region going to: Redbud Farm Vineyard, The Range Winery Vineyard, Piedmontese Vineyard, Sunset Ridge Vineyard, and Milson Vineyard.

OGIC members collected data from the August 2014 harvest including: where grapes were sold, quantity in pounds for each variety of harvested grape, and pH and sugar at harvest. This information was provided to Dr. Eric Stafne for evaluation.

Oklahoma State University, Becky Carroll accompanied and assisted Dr. Eric Stafne on Oklahoma Vineyard visitations and data analysis. OSU continued to perform soil and petiole analysis, and provide results to Oklahoma vineyard owners.

In December 2015, Dr. Stafne provided a preliminary report of findings which was reviewed by several OGIC members. Dr. Stafne came to the OGIC annual meeting at Tatanka Ranch Vineyard in Stroud, OK and presented the final results of the Oklahoma Vineyard Quality Project.

Goals & Outcomes Achieved:

The final Vineyard Quality Project report was forwarded to Dr. George Ray McEachern of Texas A&M University. He reviewed the report and concurred with the findings. Dr. McEachern agreed to conduct an Oklahoma Vineyard Field day at Canadian River Winery in Lexington, OK to discuss the findings and recommend additional vineyard education needed based on the report.

The purposes of this project were to:

-Identify quality improvements needed in Oklahoma vineyards and pathways to implementing them through educational programs.

> Vineyard quality has many interacting factors that go into whether or not quality fruit will be produced. Quality in fruit can also vary by the end product as well – fruit suitable for fresh consumption may not be suitable for wine and vice versa. Therefore, in this project, measures were put in place to attempt to estimate vineyard quality in different parts of Oklahoma. Since most vineyards in the state are geared toward fruit for wine production, vineyard quality for fresh fruit was not the focus of this project. The four primary elements that promote high fruit quality in the vineyard are selecting the proper **Genotype** (cultivar), having a suitable **Environment** for growing grapes (climate), dedicated and observant **Management** (viticulture), and choosing a proper **Site** for the crop (site selection). These four **GEMS** can be used in combination to enhance fruit quality throughout Oklahoma. Embedded within this is the overall question of sustainability. Sustainability is a term that encompasses more than one factor. It has three primary constituents as it relates to viticulture. Ohmart (2011) defines them this way: viticultural growing practices that are environmentally sound, socially equitable practices that fulfill the needs of society as a whole, and maintenance of economic feasibility. Much of vineyard quality is tied to sustainability, as all three

components are necessary, and often interrelated, for success in the vineyard and in the winery.

-Identify geographically the grape varieties grown throughout Oklahoma's 7 ecoregions.

Oklahoma has at least 7 ecoregions where meteorological conditions vary greatly. Surveys performed as part of this project showed remarkable, measurable differences in vineyard quality throughout the state. Those regions with strong regional grape grower organizations such as the central region Frontier Wine Growers Association who meet monthly and share information as well as conduct educational programs seem to be the most successful vineyard operators with the highest quality grapes. Those who choose to "go it alone" with little education or support were observed to be the least successful vineyard operators.

Report recommendations for **GENTOPYE** (cultivar) selection:

- Limit vinifera production north of I-40 (east-west midline of the state, except on very good sites/soils and choose cold hardy cultivars. Use a rootstock.
- South of I-40 only plant vinifera on very good sites/soils. This region has more options in terms of cultivars to choose from, but quality and quantity of fruit is still a concern.
- Use rootstocks on vinifera and some high-percentage vinifera hybrids.
- Look to incorporate high quality hybrids as a hedge against disastrous years.
- Wineries must further integrate hybrids into their plans if vineyards are to survive. Prices paid for the fruit must be competitive and reflect the value and quality of the fruit.
- Three to four tons/per acre should be the minimum for production of vinifera. Hybrids should range from 4-8 tons per acre.

-Grow high quality grapes which can be made into high quality juices and/or wines.

Again it was observed that the vineyard operators who had consistent vineyard practices and good records were most successful in terms of quality and quantity. The vineyard operators who participated regularly in strong grower groups were observed to be the most successful.

Report recommendations for **MANAGEMENT** to improve fruit quality:

- Soils in Oklahoma may limit productivity due to low organic matter, high Boron, heavy clay textures, salinity, and other factors. Amend prior to planting and monitor thereafter to improve soil quality.
- Water is a critical element in the vineyard. Increase irrigation to reduce stress during the summer and improve cold hardiness.
- Strive for a well-balanced canopy. Canopy management not only helps to produce higher quality fruit in the year it is done, but also in the future. Balancing vegetative growth and crop load is important for overall vine health.

- Pest control is critical, especially control of fungal diseases, grape berry moth, and weeds in young vineyards.
- These pests rob vines of critical nutrients, water, sunlight, and other elements, thus weakening the vine.
- Determine if mechanized harvest and pruning is something that can be done in the future. A well-trained and competent labor force is lacking now and will continue into the future.
- Keep detailed records and adjust management strategies from year-to-year as necessary.

<u>-Provide additional subject matter for incorporation into educational and extension programming.</u>

In assessing regional vineyards in Oklahoma, it appeared that many vineyards had been planted and are managed with no education whatsoever. Strong regional groups seem to be most successful in participating in educational programs and in supporting and encouraging their members in learning more about planting and managing their vineyards.

Report recommendations for **EDUCATIONAL** programs to improve vineyard quality:

- Encourage growers to incorporate the Oklahoma Vineyard Workbook into practice. Workshops that explain the book and allocate time for completing the ratings are necessary for better participation.
- More educational programs on plant and soil nutrition, irrigation and water allocation, and pest management (including disease, insects, weeds, and animal) are needed.
- Refreshers on proper pruning practices, including balanced pruning methods.
- Specific Workshops on pest management, pruning, plant and soil nutrition, canopy management (including crop load management, shoot and leaf thinning, and crop load estimation), and irrigation are needed to get current growers up-to-speed on the latest strategies for improving overall vineyard and fruit quality.

  - **Pest management** – During the course of this project the evaluators saw too much disease, insect damage, and poor weed control. Some vineyards were good, but most were poor. It seems there is a lack of understanding about the prevalent pests, timing of control, and products used for control. This is an area that, with a little diligence, can really help vine health and fruit quality.

  - **Pruning** – One outstanding problem among so many vineyards was poor pruning practices. Some obviously had no idea how to prune. It is a skill that takes practice and a keen eye, but it is not a difficult thing. Some untrained vineyard managers are scared to make a cut because they don't want to remove too much. This is a common mistake. Along with proper pruning is estimation of bud and cane winter injury. Of course it may not be necessary every year, but in years

where temps drop very low it is important to do this in order to ensure vine balance.

- **Plant and soil nutrition** – Nutritional status of the plant and soil may be the area that is least understood in Oklahoma vineyards. It is important to deal with the health of the vine and the soil. Petiole and soil tests cost money and are often considered "optional". They should not be. They are a mandatory part of any good management program; however, the manager must be educated in methods to improve nutritional problems.

- **Canopy Management** – Canopy management is a labor intensive endeavor if leaf-pulling, shoot removal, and crop load dropping is done. This is a definite area that needs improvement in Oklahoma. However, this topic is secondary to the three above because those have so much bearing on vine longevity. Canopy management also affects that, but not as critically as the others.

- **Irrigation** – Irrigation is not being used to its full potential in Oklahoma viticulture. The vines can survive without irrigation, but they will be better off with a good irrigation management program. Tools exist within the Mesonet that along with good soil moisture monitoring would reduce vine stress and improve overall vine longevity.

Beneficiaries:

All Oklahoma grape growers and winemakers numbering approximately 175 have been provided copies of the final report on Oklahoma Vineyard Quality. This report along with the Oklahoma Vineyard Workbook provides information to 115 identified Oklahoma vineyards which they can use to improve grape quality.

Oklahoma State University and Redlands Community College are beneficiaries as well. Both of these higher education institutions have information on variety selection which has been verified by this project, and the largest problems facing Oklahoma vineyard operators which they can incorporate into recurring classes such as the annual Grape Management Class for potential grape growers and in special classes set up to address specific areas discovered to be deficient during this project. As an example, weed control in Oklahoma Vineyards was found to be a large problem which can be lessened through good training programs on site in existing vineyards.

Lessons Learned:

Since much of Oklahoma viticulture is predicated on wine grape production, the end product must be considered. What makes Oklahoma wine different from its competitors? What makes Oklahoma wine special? Is it, or can it be, integrated into the social fabric of Oklahoma's citizens? If the products and industry as a whole are embraced by the public as a critical component of the state's heritage, then long-term sustainability will be achieved. This requires an understanding of the state's history as well as an acute perception of its future. All wineries and vineyard owners must work together as a team. It is essential to recognize that

one in-state winery is not in competition with another. The competition is out-of-state wine. This leads back to the point of making Oklahoma wine special. How can it be made an essential point of pride for Oklahomans?

- The Oklahoma commercial grape and wine industry must support Redland Community College and Oklahoma State University viticulture and enology efforts if we intend to have a successful future.
- Individual vineyard and winery owners must contribute their voices to an industry organization and keep abreast of what is happening in the industry now.
- Growers and wineries need to stick together and display a unified front to legislators and media in order to create a sustainable grape and wine industry.
- Oklahoma is a difficult place to grow grapes, but it can be done (with proper variety selection, site selection, management, and education). Setbacks will happen, but Oklahoma has a terroir different from anywhere else, so it is exciting to be able to taste that in the wine made from Oklahoma grown grapes. "Taste Native Oklahoma" is something to strive for.
- Continue a life-long education in viticulture.

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Additional Information:

Attached in Appendix A is a copy of the Vineyard Quality Assessment forms used.
Attached in Appendix B is a copy of the Final Report of the Oklahoma Vineyard Quality Project submitted by Dr. Eric Stafne

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PROMOTION OF OKLAHOMA PECAN GROWERS ASSOCIATION AND OKLAHOMA PECANS

Project Summary:

The purpose of this project was to increase exposure of the Oklahoma Pecan Growers' Association (OPGA) throughout Oklahoma. This was to be done with increased exposure to potential growers at trade shows, farm shows, county fairs and other industry events across Oklahoma. Another area of interest was increased exposure of Oklahoma native pecans to international markets through the collaboration with the US Pecan Team. The hopes were to increase membership therefore interest the knowledge of pecan management for growers across Oklahoma and to increase exports of Oklahoma natives.

Project Approach:

The approach was to purchase display booths that could be set up at various events to educate growers about pecan management and the benefits of OPGA. Also provide Oklahoma native pecan samples to US Pecan Team for international trade shows to increase the awareness of native pecans. Members of OPGA were to request the display booth and educational material to display at events and OGPA board members and OPGA members would be present to discuss management practices with growers.

However, there was not agreement from the Oklahoma Pecan Growers' Board on how to spend the money. Some of the board members wanted to spend the money on marketing within the state and when it was discussed at the meetings there was no approval given on spending the grant money. During 2016 a new president was elected and plans were made to spend the money as written in the grant, but with the money to be used for the international efforts there were concerns that it would favor certain growers more than others therefore it was recommended to not spend the money from the grant.

Goals & Outcomes Achieved:

The goals were to increase membership of the Oklahoma Pecan Growers' Association and increase pecan production through increased education. Also to increase interest in Oklahoma native pecans worldwide through the US Pecan efforts.

At the end of the grant period the project fell short of the OPGA's goal of a 25% increase in membership/educational programs and 25% increase in production. The Oklahoma Pecan Growers' Association saw an increase of 15% of their membership taking part in educational activities sponsored by OPGA during this time period. Over the past three years the membership has increased, mainly due to the increased interest in pecan production in Oklahoma. Oklahoma pecan production was lower than normal during this time because of weather conditions (coming out of drought conditions followed by record rainfalls). Because of the weather conditions production throughout the state was hindered and we also seen an increase in disease pressure resulting in lower production and lower quality of pecans.

Oklahoma growers participated in two different US Pecan international trade trips to China. During this trade trips Oklahoma native pecans were distributed to potential buyers. Also there were four containers (200,000 pounds) of pecans shipped from Oklahoma to China during this period.

Beneficiaries:

The Oklahoma pecan producer benefited from this project. The last census reports that Oklahoma has 2,482 pecan farms with 104,307 acres in production. It is estimated that only about 35-40% of pecan trees are harvested and of that only about 25% are managed. As growers become more aware of the Oklahoma Pecan Growers Association they will be provided with educational materials and field days that will help them better manage their orchards; thus increasing the production of pecans.

Lessons Learned:

When writing a grant on behalf of a growers association that is governed by a board, ensure that the entire board agrees to the objectives of the grant and that it would not change when there is a change in leadership. This grant was written and submitted during one president but was not granted until another president was elected who had different thoughts on the state pecan industry. Therefore, there was no money spent from the grant for activities that were approved through the grant.

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N/A

IMPACT OF PLASTICULTURE ON WATER DYNAMICS AND PRODUCTION OF TOMATOES

Project Summary:

Water is rapidly becoming a valuable resource that must be managed for optimum use. Technology (mulching) has been developed to decrease the amount of water lost from soil evaporation. The type of soil and the type of tomatoes (determinate and indeterminate) may impact water requirement and amount and timing of production. Six rows of tomatoes were established with all rows being mulched. Three rows were mulched with wheat straw (straw) at a depth of at least 10 cm and three rows were mulched with a plastic sheet (plasticulture). Soil moisture and the amount of fruit produced each week was determined. The Plasticulture method is more expensive than the Straw method, but straw is a renewable resource and adds organic matter to the soil. Producers must balance economics with environmental stewardship.

Project Approach:

Six rows (100 feet in length and 8 feet on center) were established on Canadian soils at the Darlington Applied Agriculture Research Center. Odd number rows were mulched with plastic (plasticulture) and even number rows were mulched with straw. All 6 rows were on raised furrows with drip irrigation. Each row contained the same number of tomato plants (n = 20) and the same varieties (n = 8). Rows were oriented on a north–south axis. The south half of the rows were populated with 10 indeterminate plants (4 varieties) and the north half was populated with

10 determinate plants (4 varieties). Tomato plants were planted on April 24, 2014 on 5 foot centers. Indeterminate varieties were staked and tied to keep plants within the row. Determinate varieties were not staked. Plants were fertilized once on May 05. Soil moisture probe was used to determine if irrigation was needed. Irrigation was used to keep all rows at a similar level of moisture.

First fruits were harvested on June 18, 2014. Harvesting was conducted each Monday and Thursday thereafter, if weather allowed. The number and total weight of fruit harvested from the indeterminate (south half of row) and determinate (north half of row) varieties within a row was record at each harvest. Data presented below represents observations made from June 13 through July 24 (41 days) and 12 harvest. Data were analyzed as a two factor experiment with replication. Factor one was type of mulch (plastic vs. straw) and factor two was type of tomato (determinate vs. indeterminate).

During Period 1 (June 18 through July 24) of the experiment. The type of mulch, plastic or straw, did not significantly affect the amount of fruit harvested ($P = 0.27$) or the number of pieces of fruit harvested from each plant ($P = 0.40$). However, plastic mulch produced heavier ($P = 0.07$) fruit than straw mulch. Determinate plants produced more fruit ($P = 0.005$) and in greater numbers ($P = 0.001$) than indeterminate plants, but the fruit from determinate plants weighed less ($P < 0.001$). No significant ($P > 0.65$) interactions between type of mulch and type of tomato plant were observed.

During Period 2 (July 28 through September 02), plastic mulch resulted in greater ($P = 0.001$) amounts (kg/plant) of fruit being harvested and tended ($P = 0.12$) to produce heavier fruit than straw mulched plants. There was no differences ($P = 0.54$) in the number of pieces produced. In Period 2, indeterminate plants produced more ($P = 0.05$) fruit (kg/plant) and fruit weighed more ($P = 0.001$) than fruit produced by determinate plants. Determinate plants did produce greater ($P = 0.11$) numbers of fruit as compared to indeterminate plants.

When the data from both periods were combined to evaluate the total production of indeterminate and determinate plants with plastic and straw mulch, we observed that mulch had no impact on production parameters, but type of plant did. Mulch type did not significant effect the amount of fruit harvested (9.9 kg/plant; $P = 0.20$), the number of pieces of fruit produced (173.1/ plant; $P =0.85$), or fruit weight (65.3 g; $P = 0.97$). Indeterminate plants produced more fruit (11.2 kg vs 8.6 kg/plant; $P = 0.03$) and fewer pieces of fruit (131.6 vs 214.7/plant; $P = 0.03$) than determinate plants. Fruit from indeterminate plants were heavier (88.4 vs 42.2 g/piece; $P < 0.001$) than fruit from determinate plants. Differences in fruit weight could not compensate for number of pieces produced.

There appeared to be an interaction between type of mulch, plant type, and period. Data was analyzed within type of mulch to determine the interaction. Within the plastic mulch treatment, both types of plants had greater ($P< 0.001$) amounts of fruit harvested during Period 2 as compared to Period 1. However, the magnitude of the increase was greater ($P < 0.01$) for indeterminate plants as compared to determinate plants (3.7X vs. 1.6X). The number of pieces of fruit harvested per plant increased ($P < 0.001$) during Period 2 as compared to Period 1, but fruit weight decreased ($P < 0.01$) by 26% for indeterminate and 34% for determinate plants. The

magnitude of the increase in number of pieces compensated for the decrease in fruit weight, resulting in increased production.

Within the straw mulch treatment, type of plant and period interaction was significant ($P < 0.01$) for the amount harvested (kg/plant). Indeterminate plants increased production by 260% in Period 2, while determinate plants did not increase production. The number of pieces of fruit harvested per plant increased ($P = 0.05$) and fruit weight (g/plant) decreased ($P < 0.01$) from Period 1 to Period 2 as observed for plastic mulched plants

In conclusion, determinate varieties produced more pieces of fruit that weighed less than fruit produced by indeterminate varieties. Determinate varieties produced more fruit (kg/ha) in Period 1 than determine varieties. Plastic mulch increased production during Period 2 as compared to Period 1 for all types of tomatoes, but straw increased production only in indeterminate varieties. Producers must balance cost of material, labor inputs, and seasonality of production to determine which mulch to use.

Goals & Outcomes Achieved:

The primary goal was to determine input (water, labor, and material) and output (development of canopy and fruit production) using different types of mulch. We were unable to make periodic canopy measure, the plants became too large. Additional methodology will have to be developed to measure canopy of large tomato plants. However, we can infer from production data that we did increase canopy size, which would increase the capture of photosynthetic radiation and fruit production.

Water usage was similar between treatments and confounded with type of tomato. We did determine output very accurately and climatic conditions dictated that determinate types produced tomatoes all season long, which is unusual.

Beneficiaries:

Students involved in collection of data hands on experience in conducting research. One student took the data and wrote a research paper and submitted it to the Oklahoma Journal of Undergraduate Research, a peer reviewed journal. The objective and plot lay out of the project were described to tour groups that came to Darlington for meetings or on Ag tours.

Lessons Learned:

We base supplemental water needs on weekly soil moisture probe readings, but the meter we used did not calculate the amount of water needed. We used experience to build a knowledge base of how long to run the irrigation system to keep the soil moist. The Oklahoma MESONET web site (http://www.mesonst.org) has a program (Irrigation Planner) that calculates the amount of water lost to ET at each weather station site. Producers can then decide to replace all or a portion of the water lost. A retrospective analysis of supplemental water needs during this experiment using the MESONET Irrigation Planner calculated that we should have irrigated for 100 hrs. as compared to 103.5 hrs. recorded. We over irrigated by 20.9 l/plant, which is probable

within the margin of error. Additional research is needed to determine how much of the ET needs to be replaced to maintain production and maximize water efficiency.

We had to make a slight modification to the original plan. We used straw as the conventional management rather than no mulch. Otherwise type of mulch and mulching would have been confounded.

We were able to collect canopy size measurements only once. The plants became too big for the Ceptometer we have and we decided to use production as an indirect measurement of canopy development. All problems were in the realm of methodology. Given the labor available (labor was hard to recruit), we outlined more data collection than we could do. We theorized that the production data would give us enough quality information to draw strong conclusions about the use of plastic mulch. There were no other delays other than working outside under Oklahoma's variable weather. Rain did delay scheduled harvest, but not for more than one day.

Rodent control is essential. Rodents could become a pest by destroying fruit just before harvest. Bait stations are recommended.

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N/A

ESTABLISHING VINEYARD GROUND COVER

Project Summary:

Growing grapes for personnel and commercial use (wine making, producing preserves, and for direct consumption) is a rapidly growing activity in Oklahoma. Grapes are grown on a trellis system in rows spaced 8 to 10 feet apart. The area under the vines is kept clear of vegetation to reduce competition for nutrients and water, but some form of ground cover is established in the middle of the rows, which represents 70% of the surface of the vineyard. Ground cover reduces erosion (wind and water), allows for pedestrian traffic (workers and visitors) through the vineyard and helps control weeds. Viticulturists have several options for ground cover, perennial (established only once) or annual (established each year) and cool-season (green and growing under cool temperatures) or warm-season (green and growing during warm temperatures). Desirable characteristics for vineyard ground cover are; short growing height (less frequent mowing), drought tolerant, persistent, competitive with weeds and low establishment cost. Therefore, the objective of this research was to evaluate options for establishing vineyard ground cover. Ground cover will be evaluated on the basis of quickness to cover the ground, season of

growth (competition with vines for moisture and nutrients), amount of ground cover, maintenance cost, and tendency to spread

Project Approach:

This research project was conducted at the Redlands Community College Darlington Applied Agricultural Research Center, north of El Reno, OK. Student workers were employed to do field work, and collect data. Redlands Community College provided professional supervision of the students in the field through an experienced Research technician. Consulting research scientist participated in developing the experimental design, initiation of the research, and collection and analysis of the data.

Eight aisles were used in a single factor with replication designed experiment. Aisles were assigned to one of two treatments. Treatments were; 1) turf Fescue (cool-season) and 2) Buffalograss (warm-season, native grass) seeded or plugged. The assignments of aisles (i.e. aisle between rows 6 and 7 is denoted as Row 6-7) to treatments are as follows: Row 6 -7 Buffalograss (plugged), Row 7 - 8 Fescue, Row 8 – 9 Buffalograss (seeded), Row 9 – 10 Fescue, Row 10 – 11 Undisturbed, Row 11 – 12 Undisturbed, Row 12 -13 Buffalograss (plugged), Row 13 -14 Fescue, Row 14 -15 Buffalograss (seeded), and Row 15 (east side) Fescue.

Two of the aisles assigned to Buffalograss (*Buchloe dactyloides*) were seeded (variety 'Texoka') and two of the aisles were planted with plugs (trade name 'Turffalo'). Aisles assigned to Buffalograss seeded were sown with 3.2 kg (7.0 lbs.) aisle between row 8 and 9 or 2.27 kg (5.0 lbs.) aisles between rows 14 and 15. The average seeding rate was 2.1 kg/100m^2 (4.3 lbs./1,000 ft^2). Plugs were used in aisles between rows 6 and 7 and rows 12 and 13. Plugs were planted at 0.5 m (1.5 ft.) intervals in three lines (one line in the center of the aisle and one line 0.6 m (2 ft.) on each side of the center line). The target was to have plug density of 1 plug / 0.2 m^2 (1.5 ft^2) to reduce the number and total cost of plugs. Buffalograss aisles were seeded or plugged in June of 2014.

Four aisles were assigned to the cool-season treatment and seeded with 'Survivor' turf grass (a blend of three tall fescue varieties purchased from Johnston Seed Company, Enid, OK) in the spring of 2014 at a seeding rate of 3.3 lbs/1,000 ft^2. Fescue was seeded in the spring of 2014, but the stand was very thin and did not survive the summer. The aisles assigned to this treatment were tilled regularly during the summer to control warn season grasses. The aisles were reseeded in the fall of 2014 and good germination was observed. Ground cover was estimated to be 55%.

All aisles in the vineyard were mowed regularly during the summer of 2014 to limit competition from warm season annuals and perennials. Weed competition was observed to be equal among the aisle assigned to either, Fescue, Buffalograss, or undisturbed.

We were able to establish good stands of annual cool-season grass (oats) in another vineyard. Oats were seeded in late winter, allowed to develop seed heads then rolled to reduce height and growth. This technique created a green aisle cover during late winter when warm-season grasses were brown and a straw mat in the spring for protection of the soil from compaction by traffic in the vineyard and erosion. Warm-season grasses (Bermudagrass) used in other aisles was green

by the time the oats matured and were pressed down. We theorized that at the hollow stem stage, oats would be easily press down with a roller, but that was not always true. We had to eventually mow the oats.
Seed cost for Fescue, Buffalograss seed, and Buffalograss plugs were \$0.05/m^2 (\$0.005/ft^2), \$0.54/m^2 (\$0.05/ft^2), and \$5.00/m^2 (\$0.46/ft^2), respectively. Native grass seed are more expensive than introduced or improved grasses due to production cost. Price of Buffalograss plugs can be reduced if orders are at least 1,080 plugs to cover 150m^2 (1620 ft^2).

Buffalograss was a very minor species in the aisles assigned to that treatment regardless of whether seed or plugs were used. We had attempted to establish Buffalograss at other locations on the Darlington campus without success. Bermudagrass and other warm season grasses were very competitive with Buffalograss and Fescue. We observed a diverse mix of cool-season and warm season grasses, with warm season being more dominate in most areas. All aisles were mowed at similar intervals and heights, because regardless of the species planted or sown. The mix of species required mowing to control height of the canopy and to have a managed appearance.

The significant results from this experiment are; 1) Buffalograss is hard to establish, 2) Fescue is easier to establish in the fall than in the spring, 3) Pugs of Buffalograss were no more effective in establishment than seed, 4) Fescue stand weakens with time and will need to be reestablished at 3 to 4 year intervals and 5) the local environment (soil, climate and plant diversity) will determine the climax vegetation that populate the aisle. By experiencing the failures to establish and maintain specific species within the aisle, we have demonstrated that vineyard operators must use the specie that fits their environment for a sustainable ground cover. In conclusion, the most efficient and cost effective ground cover is a natural mix that is mowed frequent to maintain the proper height and appearance.

Our recommendation is that annual cool seasons can be used in production vineyards, but cool-season perennials like Fescue are not sustainable

Goals & Outcomes Achieved:

We determined the cost of establishment of different ground cover. Yearly mowing frequency was not different among treatments, as a result maintenance cost was not different. Digital photos were taken the appearance of each option for consumers to judge which ground cover fits their situation the best.

The outcomes were anticipated to be long term, but failure to establish robust stands of Fescue and Buffalograss turned the project into a short term project. We could not accomplish any of the quantifying measurements described in the project plan, because there was no Fescue or Buffalograss to measure. We did discover that the point quadrat system of determining ground cover, which is used extensively in native range landscapes was not very efficient in our setting. We developed another method of measuring ground cover using a PVC frame and a digital camera. A digital photograph of the frame in the middle of the aisle (repeat at 11 to 15 locations) can be transferred to a computer screen. A grid sheet made of 1 cm^2, is applied over the screen. The total numbers of grids within the frame is recorded and then divided into desired categories.

We used bare ground, weeds, and grass as three categories. Using the frame as a reference, standardizes all photos with adjusting of magnification or distance from ground to camera.

We were unsuccessful in recruiting a student to participate in the interpretation and presentation of this data. The goals, objectives, and funding source of this project was part of any presentations made to groups or visitors to the Darlington Campus. We were unable to complete any goals that dealt with OSU County Educators

Beneficiaries:

Oklahoma grass seed producers can supply native grasses, such as Blue Grama and Buffalograss, to establish low maintenance ground cover in vineyards. These grasses are adapted to Oklahoma's arid climate and offer a low growing sod that has a lower water requirement than improved grasses, such as Bermuda. Seed for these native grasses are expensive ($30 to $17/lb. of seed; 3 lbs. seed/1000 square feet) to establish. Bermuda (warm-season perennial grass) and fescue (cool-season perennial grass) offer more inexpensive options, but fescue may not survive a long droughty summer and Bermuda may be too aggressive and may migrate from the middle of the row to under the vines.

Commercial vineyards are also event centers (wedding, reunions, etc.) and the ground cover must be appealing in appearance. Vineyard managers must balance the cost of ground cover establishment, maintenance cost, longevity, use, and appearance.

County Educators can offer options for grape producers. By reducing the number of times the vineyard is mowed, green-house-gas emissions will be reduced and air quality improved

Lessons Learned:

1. The biggest lesson we learned was that Buffalograss is difficult to establish under our conditions. We were surprised at the difficulty we had in establishing Buffalograss not only for the project, but in other areas on the Darlington Campus. We followed the instruction provided by the seed producers, but were not successful. We used plugs planted in a grid pattern, which was labor intensive, but even that did not yield a stand. We were unfortunate to try establishment just before heavy rainfall events that floated the seed to the top on the soil or out of the planted area. We had experienced technical expertise with years of experience in establishing grass research plots and in plot management. We had no problem in establishing Fescue, an introduced grass, but could not establish Buffalograss, a native grass.

2. Before selecting a grass for ground cover in vineyard aisle, look around the immediate area and select cultivars that are in the same family as those found in the area.

3. If a native ground cover looks good then let it establish naturally to lower ground cover establishment cost, look at over seeding if green aisle are need during early spring or late fall. We had good luck using oats, wheat, and annual ryegrass as temporary ground cover

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N/A

OKLAHOMA GROWN FARMERS MARKET PROMOTION

Project Summary:

In 2014, the Oklahoma Department of Agriculture awarded twenty Oklahoma Grown Farmers Markets with grants. Funding levels were determined by the number of vendors participating at the market on a weekly basis. The markets were selected by an application process with a panel of judges that scored the applicants. The grants were utilized to solely promote the consumption, purchase and production of specialty crops through billboards, print and radio advertising and chef demonstrations. Out of the 20, all of the farmers markets awarded consist of small producers who rely on direct marketing to sell their products. Farmers Markets continue to be a major outlet for growers to sale their fruits and vegetables and the grants help impact growers and the sale of specialty crops across the state.

As this project builds on previous work of the specialty crop grant program, reports show that markets across the state have seen an increase in consumer demand and specialty crop production. Over $2,600,000.00 was reported in specialty crop sales from the 20 Oklahoma Grown Markets that received grants and 94 new vendors selling specialty crops within those markets. One market reported a 22% increase from the previous year. By offering grants to these Oklahoma Grown Farmers Markets, we have increased the demand and competitiveness for Oklahoma Grown specialty crops and attracted new customers and vendors to our markets.

Project Approach:

The Oklahoma Department of Agriculture awarded 20 Oklahoma Grown Farmers Markets with specialty crop grants. Grants were made available on a competitive basis to existing and start up 100% Oklahoma Grown Markets. Funding levels were determined by the number of vendors participating at the market on a weekly basis. Those markets with an average of 6-10 vendors weekly were eligible for up to $500, markets with 11-20 vendors could receive up to $1,500 and those markets with over 21 vendors weekly qualified for a maximum of $3,500 to promote specialty crops within their markets. The applications were reviewed by ODAFF staff and evaluated by an outside committee. Grants were distributed in two advancements with the market receiving their first advancement in advance and their second advancement after a progress report and receipts were turned in to ODAFF staff documenting how the first advancement was spent. After the grant was completely spent, the market sent a final report along with all receipts and examples of how the money was spent to promote specialty crops.

Markets that were awarded used the grant funding on advertisements, newsletter publishing, signage and promotional ads to draw consumers to the market to purchase specialty crops. Staff also visited a number of markets that were awarded the grant to ensure the funds were used properly.

400,000 produce bags were purchased by ODAFF and distributed to all 100% Oklahoma Grown Farmers Markets in the state. ODAFF felt that by offering produce bags to Oklahoma Grown markets that it would encourage non-registered markets to become 100% Oklahoma Grown while also encouraging consumers to buy specialty crops.

Goals & Outcomes Achieved:

The main goal with this project was to enhance the competitiveness of specialty crops while building consumer confidence in locally grown produce. Reports show there are more than 700 growers that participate in Oklahoma Grown Farmers Markets with 109 new growers selling at these markets this year. The grant funds raised customer awareness and demand with over $2,792,151.00 in sales this year at Oklahoma Grown Farmers markets. With consumer demand and vendor participation continuing to grow, ODAFF feels that specialty crop advertising, signage, marketing promotion and newsletter publishing continue to be a good avenue to reach consumers in city and rural areas.

Here is a testimonial from one market about the impact of the grant at their market:

"We absolutely felt an increase in customers at our 2014 markets. One easy way to track that increase is that our SNAP dollars spent increased over 50%! Our total so far this year is just over $32K, of which we have been able to match with our Double Up Food Bucks program. So that's over $60K in dollars that have been spent with local farmers who are growing OK Specialty Crops! We think all the additional marketing, signage and promotions, along with very nice weather on market days all added to the very successful market in 2014!"

Beneficiaries:

The beneficiaries of these programs were current 100% Oklahoma Grown Farmers Markets, vendors, market managers, city officials and the buying customer. Markets that receive grant funds continue to show an increase in sales and vendor participation at their market along with giving the consumer more options of fresh, locally grown produce.

Lessons Learned:

Splitting the grant into two installments has tremendously helped make sure the grant funds are spent properly ahead of time instead of having to try and get grant funds returned to ODAFF for purchases not approved. Also, moving the application and selection process up allowed markets to be selected and have contracts in place before the season began. This allowed the market managers to get their promotions started before the market season started.

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Additional Information

N/A

OKLAHOMA SPECIALTY CROP CURRICULUM DEVELOPMENT

Project Summary:

This grant was written to allow Ag in the Classroom to create and print magazines to educate the youth of Oklahoma about the importance of eating fruits and vegetables that are grown in Oklahoma and the nutritional benefit to eating these foods. The health of Oklahoma's children concerned the AITC staff. Childhood obesity in Oklahoma had increased to 148% since 1990 and Oklahoma continued to rank towards the bottom in fruit and vegetable consumption.

Additionally, education budgets had been reduced and the replacement and utilization of text books was on the decline. AITC staff wanted to create magazines for students PreK-8th grade that would have current information about eating healthy. These magazines could then be used by teachers across the state to educate students about "My Plate" and specialty crops grown in Oklahoma.

This project built on previous SCBG projects that AITC has received funding for. These projects include "Harvest of the Month" Posters which teachers across the state are using to educate their students about the specialty crops. However, the new magazines were a student resource. They took the information from the posters and added cross curricular age appropriate activities for students to complete to reinforce their knowledge of specialty crops.

Another project that this built on was the "Specialty Crop Smart Board" lessons that were created by teachers and are available on the AITC website. Teachers created the lessons to educate students about specialty crops while reinforcing skills they were already addressing. The magazines used activities from the smart board lessons and incorporated them into an activity that students could take home with them and share with their families.

AITC had also received funding to create "Oklahoma's Bountiful Harvest." This teacher resource is full of recipes and activities to complete in the classroom with students to increase their knowledge and consumption of specialty crops. Teachers can now create a full learning experience for their students. They can use the magazines to teach the students about the fruits and vegetables, and then create recipes using those same fruits and vegetables. All of these resources go hand in hand to ensure that students in Oklahoma are exposed to healthy food choices and correct nutritional information.

Project Approach:

Oklahoma Ag in the Classroom developed, printed and distributed to classrooms the Specialty Crop Ag M(AG)azine for kindergarten through 2nd grade students as well as the Specialty Crop Ag Mag Activity Book for 3rd-8th grade students.

15,000 copies of the lower level Ag Mag were originally printed and distributed during the first year of the grant. During the second year of this grant, 15,000 copies were reprinted and over 225 classroom sets of the second printing have been distributed to classrooms across Oklahoma, as well. The average class set requested is 25 magazines so over 5,625 of the reprinted magazines have been distributed to date. This magazine has been very popular and is still being requested on a regular basis.

The upper level Ag Mag Activity Book was completed during the second year of this grant and 30,000 copies were ordered. To date, over 200 classroom sets have been distributed to classrooms across Oklahoma. Again, the average class set requested is 25 magazines, so over 5,000 magazines have been distributed as classroom sets. This magazine is also very popular and is also being requested regularly.

Both magazines have been distributed on individual basis to teachers and preservice teachers at school and university workshops to make them aware of the resource. Ag in the Classroom staff rented booth space at the State Department of Education EngageOK Summer conference and at the State Encyclomedia Conference. At both of these booths, both individual magazines and classroom sets were distributed, depending on the educator's preference. This is the main reason the magazines are still being requested. Teachers were able to catalog the resource and when they are ready to use it, they request it be sent to them. Additionally, both magazines are available in PDF format on the AITC website.
http://www.clover.okstate.edu/fourh/aitc/lessons/extras/activitybooks/activity.html

Goals & Outcomes Achieved:

AITC often gets emails or calls from teachers stating that their students have enjoyed the magazines. However, it is important for AITC to be able to document the student's use of the magazines. Therefore, each picture in both magazines has been linked to Aurasma. Auras were created for each picture. These allow users to scan the pictures with an iPhone, iPod, iPad, or android device. When the picture is scanned using the app Aurasma, it triggers a video for students to watch. Not only did this allow AITC to show the magazines are being used, it also allowed for more content to be shared with students. The Oklahoma AITC Aurasma channel has 142 likes and 572 total views of the specialty crop auras.

Additionally, AITC staff also created Kahoot Educational games for students to use after completing the magazines. These Kahoot's can be accessed using any device that can access the internet. This technology has just recently been discovered by AITC, but staff has already

created seven Kahoot games to compliment the Ag Magazines. These games have already had over 19 plays and 93 players.

These magazines are a very popular resource and will continue to be distributed to classrooms. Additional Kahoot's will be created to be used with the magazines. The AITC staff also plan to share the magazines with the National AITC Conference attendees in the hope that other states will create similar resources to educate their consumers

Beneficiaries:

Oklahoma producers who sell their crops at Farmers Markets benefited from these magazines. The magazines were provided to several Farmers Markets and they were able to distribute them to children whose parents were shopping. This resulted in children who were asking parents to purchase fruits and vegetables featured in the magazines. Additionally, students who received the magazines at school hopefully shared their new knowledge of fruits and vegetables with their parents and encouraged them to purchase these fruits and vegetables for them to eat at home. Therefore, producers of specialty crops across Oklahoma have seen an increase in their sales of specialty crops.

Lessons Learned:

After the magazine printing was completed, the only problem was with the surveys. When the grant was originally written, state testing was not as rigorous or time consuming with younger students. However, since this time, teachers are required to give more test and they have not been interested in completing any testing that is not mandated by their district or the state. A survey was created and placed on the AITC website. Teachers were offered an incentive to complete the survey with their students; however this did not entice them enough.

While Aurasma and Kahoot do not allow AITC staff to assess students' knowledge to determine if they have increased their recognition of specialty crops by 10%, which was the original goal of the grant, they do allow AITC staff to see that students are interacting with the magazines on an individual basis. This interaction is important because the more times students interact with the magazines and technology, the more likely their recognition of the specialty crops will increase. AITC staff is confident that student's knowledge and recognition of the crops has increased based also on interaction with students and teachers.

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Additional Information

Specialty Crop Ag M(AG)azine for kindergarten through 2nd grade
http://www.clover.okstate.edu/fourh/aitc/lessons/extras/activitybooks/AgMagColorBook2015.pdf

Specialty Crop Ag Mag Activity Book for 3rd-8th grade

http://www.clover.okstate.edu/fourh/aitc/lessons/extras/activitybooks/Ag%20MagActivityBook2015.pdf

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PLASTICULTURE GARDEN GRANTS

Project Summary:

The plasticulture garden grants are a continuation of a program partially funded by previous specialty crop grants. ODAFF utilizes the grants to encourage limited resource farmers who have the knowledge but not necessarily the land to grow specialty crops to sell in the community and farmers markets. Due to the advancements by growing in plastic, producers are able to be profitable along with providing Oklahoman's greater access to locally produced fruits and vegetables. Participants are selected on a competitive basis for three consecutive years and this grant covers the cost of installing the plastic, drip irrigation and supplies for a maximum of one acre. This grant also allows us to contract with four growers to assist ODAFF's program coordinator in installing the gardens in a timely manner which is imperative to maximize the growing season.

Project Approach:

Grants are awarded on a competitive basis to participants based on their marketing and experience level. Press releases are sent statewide to news publications to notify growers that applications were being accepted for the plasticulture grant program. Individuals must qualify based on Langston University's definition of a limited resource farmer being defined as a person with a direct or indirect gross farm income of no more than $100,000 in each of the two previous years and has received little or no assistance from the government. Participants must also own forty acres or less. A committee including ODAFF staff, horticulturists, cooperative extension staff and past plasticulture participants review and score the applications. There are a set number of new applicants that can be taken each year depending on how many have rolled off from the previous year and contracts are awarded to those participants.

Specialty crop grant funds are utilized by ODAFF to contract with four individuals to assist with the installation of gardens and to purchase irrigation supplies and plastic mulch. Participants may install ¼ acre up to one acre of plastic. Participants are required to have all the ground preparation and soil ready for the raised bed process. Contractors will then lay the raised beds as the drip irrigation is being laid in the ground while covering the bed with a sheet of plastic. Participants will also receive technical support from ODAFF during the growing season of specialty crops.

Fifty one applicants were approved to receive a plasticulture garden but only forty received a garden due to the other 11 canceling for unforeseen circumstances. Participants are required to submit a production report by December 31 of each year.

Goals & Outcomes Achieved:

The plasticulture program was designed to help limited resource farmers with their production of specialty crops by using more efficient growing methods. Due to a lower than normal submission of applications from new participants and a few individuals that dropped out after being selected, ODAFF fell short of our goal of installing 24 new gardens this year. Fifteen new gardens were installed along with four demonstration gardens in addition to the 25 gardens for those in year 2 and 3 of the program. ODAFF was able to install the gardens in a timelier manner by utilizing the grant to hire contractors. Timing is key in laying plastic and by getting the gardens installed sooner; growers were able to have better success. The addition of the contractors helped lighten the workload of traveling all over the state for the program coordinator and allowed him to provide more technical assistance to participants along with being able to administer the program more efficiently. The year-end production reports that are due to ODAFF by December 31st showed the forty participants sold $79,800.00 worth of specialty crops to Oklahoma consumers. Participants are also allowed to consume a portion of what they grow in an effort to increase healthy eating and better nutrition. The producers estimated that $10,500.00 of specialty crops were consumed by them and their families. The $79,800.00 of sales is slightly down from last year and did not meet our goal of increasing revenue from the previous year. We feel the cause of that is due to the high number of first time growers as there is a learning curve associated with this new growing method. It generally takes producers at least one year of trial and error to understand how it all works. In an effort to mitigate these issues, ODAFF holds an annual conference each year that is mandatory for participants to attend. This year the annual Plasticulture Conference, Extreme Gardening, was held in Okmulgee. The featured speaker was Itzak Esquira, a Horticulture specialist from Israel. Steve Upson, Noble Foundation, reported the results of shade cloth research funded through the ODAFF Specialty Crop Block grant. There were 65 attendees and a pre-conference "Hands-on-Field Day" was held the day before the conference and featured a short plasticulture demonstration, a Walk-Behind tractor demonstration and a hoop house demonstration.

Beneficiaries:

The plasticulture program had 40 individual farmers who participated in the program that directly benefited through increased revenue from the production of specialty crops. Consumers who live around the participants also benefit from the plasticulture program due to living in rural areas of the state that could be classified as "food deserts" where there is not ample access to fresh fruits and vegetables. By selling either directly from the farm or through one of the many OK Grown Farmers Markets, this provides those consumers with produce that is fresh and healthy.

Lessons Learned:

Over the years, we have learned the Georgia Jet Sweet potatoes are a very productive sweet potato but have a tendency to crack when grown with conventional methods of growing and less than a third of the potatoes are marketable. After the second year of growing the Georgia Jet in plasticulture, the program coordinator has learned there is no cracking of the potatoes and over two thirds are marketable due to consistent watering and the plastic is able to hold the water in the bed.

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FARM TO SCHOOL FOOD SAFETY WORKSHOPS

Project Summary:

Shortly after being approved and before any planning for this project took place; the ODAFF Farm to School coordinator resigned to pursue employment elsewhere. It took a while to fill the position and once it was filled the coordinator did not have the background to conduct the workshops. Knowing this and the fact that staff at the Food & Agricultural Product Center at OSU conducted similar training; ODAFF decided to not move forward with this project

Project Approach:

N/A

Goals & Outcomes Achieved:

N/A

Beneficiaries:

N/A

Lessons Learned:

N/A

Contact Information:

N/A

OKLAHOMA GROWN RECIPE OF THE WEEK

Project Summary:

As the demand for specialty crops in Oklahoma continues to grow and consumers look for new, healthy recipes ideas, ODAFF staff thought it was important to showcase certain specialty crops grown in the state each week at the farmers market. The recipe cards were mailed to the market managers before the season started and distributed at the market as certain produce was in season. This was a great way to get consumers interested in vegetables they might not normally have purchased as well as talking with the vendors about the Oklahoma grown produce and different cooking methods. Cooking demonstrations at some markets, allowed the consumer to taste the produce before purchasing it therefore increasing sales at Oklahoma farmers markets.

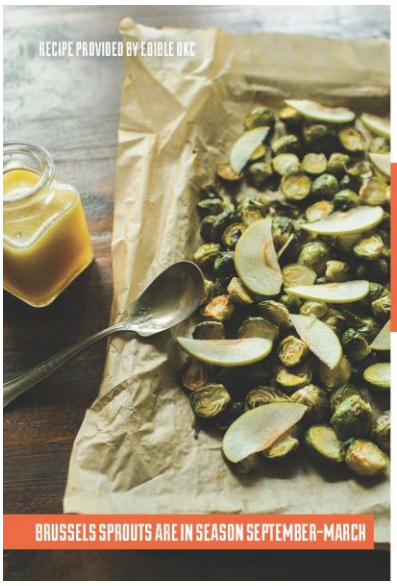
Project Approach:

The first year ODAFF staff held a recipe contest with farmers market vendors and market managers to submit recipes for the 16 week project. Once the recipes were selected a food stylist and photographer created the recipes that were distributed to the markets before the season started. The recipes distributed that year included:

Cantaloupe Salsa
Summer Squash Stir Fry
Vegetable Quesadilla
Fresh Corn and Rice Salad
Macaroni and Broccoli Salad
Baked Herbed Potatoes
Fresh Asparagus with Rigatoni Pasta
Three Sisters Stew
Spaghetti Sauce
Fresh Peppers
Lemon Pepper Chicken and Veggies
Blueberry Pudding
Blueberry Pudding
Peach Pecan Ice Cream
Zucchini Boats
Maple Roasted Pecans

The next year ODAFF staff partnered with Edible OKC, a local magazine, to create eight new recipe cards to be distributed to all 77 Oklahoma farmers markets. A produce seasonality chart was added to the back of one of the recipe cards to educate consumers when certain specialty crops were in season in Oklahoma. The recipes distributed included:

Strawberry Smoothie
Cauliflower Pizza Crust
Heirloom Tomato-Kale Salad
Fake-Fried Squash
Spaghetti Squash Fritters
Roasted Brussels Sprouts with Maple Vinaigrette
Autumn Squash Quinoa
Sugared Peaches



ROASTED BRUSSELS SPROUTS WITH MAPLE VINAIGRETTE

RECIPE BY LINDSEY RIDDLE CONWAY | PHOTOS BY MICHELLE LEACH

INGREDIENTS

ROASTED BRUSSELS SPROUTS
- 2 lbs. of Brussels sprouts, trimmed and halved
- 2-3 tbsp. olive oil
- 1 tsp. of sea salt
- 1 tsp. of ground black pepper
- 1 small apple, cut into sticks

DRESSING
- 1/4 cup of apple cider vinegar
- 3 tbsp. of maple syrup
- 2 tbsp. of olive oil
- 1 clove of garlic, finely minced or pressed
- 1 tsp. of salt

METHOD

Preheat oven to 375 F and line a baking sheet with parchment paper. Cut stems from Brussels sprouts, then halve each sprout lengthwise. Cut apple into small sticks and set aside. In a large bowl, toss sprouts with olive oil, sea salt and black pepper. Spread sprouts in a single layer on the baking sheet, then roast 30 minutes until they begin to crisp and caramelize around the edges. During the last 5 minutes of cooking, add the apple to the top of the sheet of Brussels sprouts.

RECIPE CONTINUED ON BACK

HEIRLOOM TOMATO-KALE SALAD

RECIPE BY JAMIE AND LINDSEY CONWAY | PHOTO BY AARON SNOW

INGREDIENTS

SALAD
- 1/2 large bunch green kale, washed, dried and torn into small pieces
- 1 avocado, sliced into wedges
- 1/2 small cucumber, chopped into thick cubes
- 1 small heirloom tomato, thinly sliced
- 1/4 small red onion, diced
- 8-9 fresh basil leaves, sliced into a chiffonade
- Sea salt

DRESSING
- 5 tbsp. good-tasting olive oil
- 3 tbsp. red wine vinegar
- 1 tbsp. Dijon mustard
- 1/8 tsp. sea salt

METHOD

Prepare the kale by removing the leaves from the stems, washing and drying. Bunch or stack a few kale leaves at a time and chop them into small pieces. In a large bowl, add the kale, a pinch of salt and 1/4 of the avocado. With clean hands, massage the avocado into the kale by

CONTINUED ON BACK

<u>Goals & Outcomes Achieved:</u>

The main goal with this project was to increase the sales of specialty crops at farmers markets while introducing new produce and cooking methods that consumers might be unfamiliar with. Reports show there are more than 700 growers that participate in Oklahoma Grown Farmers Markets with 109 new growers selling at these markets this year. The recipe cards raised customer awareness and demand with over $2,792,151.00 in sales this year at Oklahoma Grown Farmers markets.

The recipe cards were also given to teachers who attended one of the two Ag in the Classroom specialty crop bus tours. Teachers utilized them in their classroom while teaching students about specialty crops as well as having the students make and taste the recipe. The cards were also distributed at the Tulsa State Fair to the thousands of people in attendance to increase their awareness of specialty crops as well as directing them to a farmers market in their area.

Beneficiaries:

The beneficiaries of these recipe cards were the 77 registered farmers markets in the state, farmers market vendors and the buying consumer statewide. By having recipe cards available and cooking demonstrations at some markets the customers purchased specialty crops they might not have normally purchased therefore increasing the sale of specialty crops in the state and supporting their local farmers market vendors

Lessons Learned:

The recipes had to be practical and not too complex with multiple ingredients for the consumer.

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