

2015 FINAL PERFORMANCE REPORT

GRANT INFORMATION

AGREEMENT

AMS Agreement Number:	15-SCBGP-GA-0008		
Period of Performance:	Start Date: 9/30/2015	End Date: 9/29/2018	
Award Amount:	\$1,161,511.95		

RECIPIENT

Recipient Organization Name:	Georgia Department of Agriculture
Recipient's Point of Contact	
Name:	Jen Erdmann
Phone:	
Email:	Jen.erdmann@agr.georgia.gov

REPORT

Report Type:	FINAL REPORT
Date Report is Submitted:	12/30/2018
Final Revisions Submitted	03/15/2019

GRANT ADMINISTRATION

If funds were used for grant administration, indicate the amount of funding expended from the beginning of the grant to the end of the reporting period covered by this report. Also, indicate the amount charged as indirect expenses versus the amount charged as direct expenses.

Amount Requested	Direct and/or Indirect Expended to Date
Direct: \$1,068,817.95	Direct: \$1,068,801.92
Indirect: \$92,694.00	Indirect: \$92,694.00
Total: \$1,161,511.95	Total: \$1,161,495.92

FINAL PROJECT REPORT TEMPLATE

Final Performance Reports must illustrate the completion of each project within the grant agreement. Each project shall be outlined as separate project profiles. You will report on projects in the same order they were submitted in the approved application and subsequent amendments.

PROJECT INFORMATION (#1)

Project Title	Georgia Specialty Crop Organized Promotional Effort (SCOPE)		
Recipient Organization Name:	Georgia Agricultural Commodity Commission for Georgia Grown		
Recipient's Project Contact			
Name:	Matthew Kulinski		
Phone:	Enter the Project Contact's Phone Number.		
Email:	Matthew.Kulinski@agr.Georgia.Gov		

PROJECT REPORT

Report Type:	Final Performance Report			
Reporting Period:	Start Date:	9/30/2015	End Date:	9/29/2018

PERFORMANCE NARRATIVE

PROJECT SUMMARY

This project started as an unprecedented collaboration between multiple Georgia specialty crop organizations to promote the sale of specialty crops in Georgia and in other states. This promotional strategy was a pilot to test the efficacy of multiple product promotions in Georgia and outside the state. This effort included traditional advertising, digital advertising, and public relations in at least two targeted markets. At least one of those markets would be located outside of Georgia. The Georgia Grown Commission implemented the grant on behalf of several major Georgia specialty crop associations and commissions including: the Georgia Blueberry Commission, the Georgia Blueberry Growers Association, the Georgia Fruit and Vegetable Growers Association, the Georgia Peach Commission, the Georgia Pecan Commission, the Georgia Sweet Corn Association, the Vidalia Onion Committee, the Georgia Vegetable Commission, and the Georgia Watermelon Association.

Until now, the promotion of Georgia specialty crops has been limited to specific commodity groups or organizations. Individual commodities competed with each other for promotional funding and public awareness. For example, a single commodity would purchase a billboard that would remain up throughout the year even through the product was not in season. Until now, there had never been a comprehensive advertising and promotional effort for Georgia's commodities. The SCOPE project sought to change the incongruous nature of Georgia specialty crop promotion by working with several specialty crops and promoting their products in a coordinated and strategic fashion.

Furthermore, there had never been a collaborative effort to promote Georgia specialty crops outside the state of Georgia. Currently, Georgia exports over 90% of the specialty crops it produces outside the state. In order to really see significant returns on specialty crop promotion, Georgia needed to promote its products outside the state. This effort looked to develop and implement a strategic promotional program to gauge the efficacy of such out-of-state promotions.

At the time of this grant’s application submission, Georgia’s agriculture industry had recently met a critical threshold in the production of specialty crops. Georgia was (and still is) the top state producer of blueberries, pecans, and spring onions. The state remains in the top five in production in several other categories. As mentioned above, 90% of specialty crops grown in Georgia are sold outside the state.

A major component of this project was to promote Georgia specialty crops that are sold outside the state of Georgia. Therefore, SCOPE was designed to specifically promote targeted specialty crops including:

- Blueberries
- Peaches
- Pecans
- Sweet Corn
- Sweet Potatoes
- Vidalia Onions
- Watermelons
- Assorted Greens

A note on previous projects

SCOPE built off previous Specialty Crop programs by utilizing the relationships, databases, and retail partners already created by the Georgia Grown program. The Georgia Grown program was designed to be implemented in three phases: 1) Identify Georgia specialty crop farmers and a farmer database; 2) develop a supply chain network with producers and suppliers; and 3) promote the products to Georgia consumers. After creating the ground work of promotional asset development and retail partner collaborations with Georgia Grown, SCOPE was the next logical step to increase the sales of Georgia grown specialty crops.

PROJECT APPROACH

This project’s main goal was to promote specialty crops in three markets; Atlanta, Cincinnati and Richmond. After this project launched in 2015, this project had difficulty securing a design/advertising company through the state government’s procurement process. After roughly 18 months of delays, we were able to contract with a design firm, Blue Sky.

Design Phase

In the winter of 2017, Blue Sky held several meetings with the Georgia Grown team and other specialty crop stakeholders. The purpose of these meetings was to design a new campaign that would promote Georgia Grown specialty crops outside of Georgia. This campaign needed to be uniquely different because all previous Georgia Grown campaigns were organized around a “buy local” message. This campaign would need to shed the “buy local” message and create a campaign centered around the unique benefits of Georgia Grown Specialty Crops.

The final campaign was entitled “Nature’s Favorite State” (see specific copy and assets below). This campaign was chosen because it was able to uniquely highlight and promote a range of Georgia Grown specialty crops while promoting the benefits of Georgia Agriculture. In addition, it was designed to reach or target demographic of upper-middle class mothers and millennials. Blue Sky developed a range of design assets for this campaign that could be easily implemented by other design firms and used easily by our internal design company.

Benchmarks and Performance Measures

To evaluate this project, we created two levels of benchmarks and performance measures. The first performance indicator was measuring consumer awareness of Georgia Grown specialty crops. We contracted with Marketing Workshop to create a two-wave survey of grocery store consumers to gauge their awareness of Georgia Grown and Georgia’s specialty crops. The first wave was conducted in the fall of 2017, prior to the implementation phase. Marketing Workshop surveyed 500 consumers, who regularly shop for “fresh items” at grocery stores. A key question of the survey was the consumers awareness of Georgia grown specialty crops. The second wave of the survey was conducted in the fall of 2018, after the advertising campaign.

The second performance indicator was measuring actual sales of Georgia Grown specialty crops. IRI provided syndicated data of specific specialty crops in our three target markets. There was no way for us to isolate purely Georgia grown products at the point of sale. Our solution was to track sales during the peak of the Georgia specialty crop seasons, which also corresponded with the advertising campaign. We identified those weeks for peak production and advertising and only collected data during those periods.

Implementation

With the design and campaign assets in hand, we started the advertising phase of the advertising plan. Point of sale design materials were printed and distributed to participating retailers and farms. We used the network of producers and retailers that were already part of the Georgia grown program. This greatly improved the distribution process. Over 25 retailers used or point-of-sale signage.

For the advertising campaign, we chose to work with Cox Media Group/WSB to manage the advertising campaign. Their role was to use the assets created by Blue Sky to create a traditional television and digital campaign for Georgia Grown Specialty Crops. These ads ran in our target markets of Atlanta, Richmond and Cincinnati, with some variation.

The fall crops (pecans, greens, and sweet potatoes) were not marketed outside the state of Georgia. Pecans and greens are less seasonal, so there was no way to trace track their source for a Georgia Grown promotion. Furthermore, Georgia Grown sweet potatoes could not be

marketed outside the state of Georgia due to a USDA quarantine. The results of this project will not include any marketing or promotion figures for those fall crops.

The campaign followed a seasonality calendar based on peak production of Georgia Grown specialty crops:

Pecans November – December 2017

Sweet potatoes November – December 2017

Greens – December 2017- January 2018

Vidalia Onions – April 20 – June 1st 2018

Blueberries -May 1 -June 1st 2018

Peaches - June 1 – July 1st 2018

Sweet Corn - June 1 – July 1st 2018

Watermelon - June 15 – July 15th 2018

GOALS AND OUTCOMES ACHIEVED

Media Delivery –

The on-air television advertising was produced and aired for every specialty crop in the project. However, on-air media was only used in the Atlanta market. Social media and digital promotions were used in the Atlanta, Richmond and Cincinnati markets. The fall crops (Pecans, Greens, Sweet potatoes) were only promoted in the Atlanta market.

Below are a few highlights:

1. The Specialty Crop campaign was a success in engagement on social platforms, views of TV ads, and inventive creative design that stood out amongst the competition.
 - a. The social engagement with the different Facebook crop ads shared **2,007** times by Facebook users to their friends, over the course of the campaign in the Atlanta DMA.
 - b. The television ads **over** delivered on the projected impressions in the Atlanta DMA by **1,820,100** for the Women 25-54 demographic, and **314,600** more for the 18-34 millennial demographic.
 - c. The creative produced for this campaign includes recipe videos that live on YouTube and have reached **300,000** views across the country.
2. The Specialty Crop digital campaign was a significant success due to the volume of ads delivered, the evergreen content that was created, and the increased Google search traffic for specific Georgia grown foods in the Atlanta DMA.
 - a. The digital campaign delivered the Specialty crop ads to **8,855,280** impressions in the Atlanta DMA across WSBTV.com, Facebook, other publishers, and YouTube.

- b. The digital campaign included sponsored content articles for the different crops for a total of **20** articles that can be shared in the future on social platforms, in blogs on the Georgia Grown website, and more. The content helps the Specialty crops organic search results grow toward the top of Google searches the longer they live online.
- c. In a Google Trends search for 3 of the crops, there is a significant spike in searches on the dates each Specialty crop campaign was launched on-air on WBS-TV and online across WSBTV.com, Facebook, other publishers, and YouTube. A view of the spikes on Google trends can be seen at this [link](#).

WSB-TV On-Air Campaign

- Total impressions reached
 - Women 25-54 6,990,000 delivered (+1,820,100)
 - Adults 18-34 2,524,400 delivered (+314,600)
- Total market reach
 - Women 25-54 94%
 - Adults 18-34 79%
- Minimum Digital Impressions: 7,890,000
- Delivered Digital Atlanta Impressions: 8,855,280 (+965,280)
- Studio 2 production for 7x :30s, 7x :15s, 7x recipe videos for digital use.

Media Delivery – Social Media

Social Media and Digital Advertising Outcome Measures			
Commodity	Impressions	Link Clicks	Click Through Rate
Blueberries	2,444,332	15,444	0.63%
Onions	2,853,432	25,344	0.89%
Peaches	2,626,028	21,373	0.81%
Sweet Corn	1,704,932	23,357	1.37%
Watermelon	2,254,694	13,069	0.58%
Fall Crops	3,212,832	22,907	0.71%
Total	15,096,250	121,494	0.80%

Awareness of Georgia Grown Specialty Crops

The results of the awareness campaign of Georgia Grown specialty crops was not very decisive. This may be because the wave surveys were only a year apart and we had only

run one year of advertising. However, there were some key results and takeaways. As shown in the chart below, there was a significant increase in awareness of peaches, pecans, and blueberries. Watermelons, on the other hand, decreased in awareness.

	Georgia is (one of) the leading states producing this crop		A major crop in Georgia		Grown in Georgia, but not a leading crop		Not commercially grown in state	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Peaches	59%	65%	32%	29%	7%	5%	2%	0%
Vidalia Onions	52%	55%	31%	29%	12%	12%	6%	4%
Peanuts	42%	49%	37%	33%	15%	11%	6%	6%
Pecans	36%	42%	45%	38%	15%	16%	4%	3%
Cotton	28%	30%	43%	39%	22%	23%	7%	7%
Watermelon	17%	14%	37%	37%	38%	44%	8%	5%
Sweet Corn	15%	16%	34%	36%	42%	41%	9%	7%
Sweet Potatoes	14%	10%	32%	30%	45%	50%	9%	9%
Kale, Turnip Greens, Other Greens	13%	11%	29%	28%	45%	51%	12%	10%
Blueberries	11%	12%	24%	29%	49%	46%	16%	13%
Soybeans	11%	11%	25%	26%	39%	44%	26%	19%
Strawberries	9%	10%	31%	32%	48%	49%	12%	9%

Increasing the Sale of Specialty Crops

The main goal of this project was to increase the sale of specialty crops in the target markets by 5%. The data we received from IRI for the spring crops showed an increase well in excess of 10% (See chart below).

Berries, Corn, Watermelon, Onions and Peaches Production in Season by Year (in dollars)						Percent Change
Region	2015	2016	2017	2018	2015-2018	

ATLANTA	18,462,598	20,076,935	19,137,777	21,423,315	16.04%
CINCINNATI/DAYTON	7,531,048	9,910,693	10,230,160	10,080,503	33.85%
RICHMOND/NORFOLK	9,668,492	10,617,106	10,561,462	10,977,190	13.54%
Total	35,662,138	40,604,734	39,929,399	42,481,008	19.12%

Below is the specific commodity data that we received. We did not include the fall crops (pecans, sweet potatoes, and greens) because we did not conduct out of state advertising for those crops and we were unable to select a key season to track.

		Specialty Crop Sales				
		Commodity Sales in Season by Year (in dollars)				Percent Change
Geography	Segment	2015	2016	2017	2018	2015 -2018
ATLANTA	BERRIES	4,014,080	4,059,817	4,369,388	5,482,025	36.57%
ATLANTA	CORN	1,321,348	1,772,963	1,750,591	1,526,689	15.54%
ATLANTA	GREENS	2,064,181	3,009,723	3,647,905	649,401	-68.54%
ATLANTA	MELONS	9,473,260	10,202,792	9,019,673	10,049,086	6.08%
ATLANTA	ONIONS	895,401	775,829	901,661	803,588	-10.25%
ATLANTA	PECANS	56,054	73,538	68,066		21.43%
ATLANTA	PEACHES	2,758,509	3,265,534	3,096,464	3,561,927	29.13%
ATLANTA	SWEET POTATO/YAM	2,651,086	3,731,759	3,921,715	924,723	-65.12%
CINCINNATI/DAYTON	BERRIES	2,312,316	2,676,923	2,600,072	3,410,752	47.50%
CINCINNATI/DAYTON	CORN	319,128	402,048	1,778,868	968,195	203.39%
CINCINNATI/DAYTON	GREENS	488,599	698,121	759,405	160,660	-67.12%
CINCINNATI/DAYTON	MELONS	3,627,817	5,065,824	4,053,108	4,264,734	17.56%
CINCINNATI/DAYTON	ONIONS	288,830	377,799	385,943	391,107	35.41%
CINCINNATI/DAYTON	PECANS	17,379	29,352	34,820		100.36%
CINCINNATI/DAYTON	PEACHES	982,957	1,388,099	1,412,169	1,045,715	6.38%
CINCINNATI/DAYTON	SWEET POTATO/YAM	1,265,930	1,840,258	2,130,580	475,756	-62.42%
RICHMOND/NORFOLK	BERRIES	2,330,446	2,621,046	2,869,818	3,290,764	41.21%
RICHMOND/NORFOLK	CORN	759,747	979,172	1,074,165	982,133	29.27%
RICHMOND/NORFOLK	GREENS	1,003,091	1,417,385	1,489,359	262,087	-73.87%
RICHMOND/NORFOLK	MELONS	4,307,538	4,690,608	4,333,754	4,517,844	4.88%
RICHMOND/NORFOLK	ONIONS	583,907	552,919	612,513	490,701	-15.96%
RICHMOND/NORFOLK	PECANS	10,837	25,806	31,568		191.29%
RICHMOND/NORFOLK	PEACHES	1,686,854	1,773,361	1,671,212	1,695,748	0.53%
RICHMOND/NORFOLK	SWEET POTATO/YAM	1,763,032	2,431,254	2,343,717	542,446	-69.23%

BENEFICIARIES

This project benefited specialty crop producers in Georgia. It specifically supported Georgia growers of blueberries, sweet corn, green, melons, pecans, peaches, Vidalia onions and sweet potatoes. There are an estimated 250 high production specialty crop farms in Georgia. Furthermore, we partnered with over 25 retailers for their promotion.

LESSONS LEARNED

Throughout the course of the is project, we found several issues that could use further study:

- There is not a reliable source of information to the consumption of specialty crops. While we were able to determine general sales of specialty crops, we did not know how these compared to general trends in consumption in other markets. For example, we know that the sale of blueberries increased significantly in all our target markets. We do not know how this trend compares to other cities. Furthermore, we don't have data on the regional variations for the consumption of specialty crops.
- The supply chain for specialty crops needs to be more transparent. Currently, specialty crop producers only know the first handler of their produce. Specialty crops go through multiple handlers before they are available for sale to the consumer. This Byzantine system lacks the transparency to easily monitor specialty crop sales through major retailers. Additional information on specialty crop supply chains will help evaluate future marketing projects.
- There is a strong trend towards branding specialty crop products. Commodity and bulk specialty crops sell at a lower price points than their packaged and branded counterparts. More effort should be made to market specialty crops to consumers or to assist with the branding of specialty crops.

CONTACT PERSON

Matthew Kulinski
Georgia Department of Agriculture
Marketing Division, Room 324
19 Martin Luther King, Jr. Drive, SW
Atlanta, Georgia 30334-4201

ADDITIONAL INFORMATION

Campaign Concept Statement

The “Nature’s Favorite State” campaign started with a concept statement that described the program and the benefits of buying Georgia Grown specialty crops. It set the tone for the entire promotion. The campaign concept statement is below:

“A good shirt starts with good fabric. A good movie starts with a good script. Good produce, well that starts with good soil.

We have that and the climate to match. While we’d be glad to say it’s all our doing, we have to give credit where credit is due: Mother Nature. Maybe it’s the hospitality. Maybe it’s the accent. Maybe it’s the sweet tea. Whatever it is—Georgia is Nature’s Favorite State.

Sure, you’re not supposed to pick favorites... but She obviously did. How else do you get the only onion listed on a map? The soil, a perfect blend of minerals. The climate, with just the right amount of heat and humidity. The farmers—with the love and patience to put it all to good use. Georgia was blessed with everything we need to grow the best produce in the country.

So we do.

Day in and day out the farms of Georgia Grown raise crops with an artist’s touch. What’s harvested is as colorful and distinct as any painting. The greens are greener. The blueberries, bluer. The watermelons are sweeter. The pecans, delicious however you pronounce them.

As Nature’s Favorite State, our produce stands out. We wouldn’t have it any other way.”

Campaign Assets

Below are examples of the campaign assets and design. The campaign was created to be modern, bright and clever to appeal to a younger affluent consumer.



LORD OF THE ONION RINGS



Vidalia Onions

Nature's Favorite State
GEORGIA
 grown

VIDALIA[®]
 ONIONS

georgiagrown.com

PEACH PERFECT



Georgia Peaches

Nature's Favorite State
GEORGIA
 grown

PEACHY
 KEEN

georgiagrown.com

YOUR CURE FOR THE SUMMERTIME BLUES



Georgia Blueberries

Nature's Favorite State
GEORGIA
 grown

READY
 TO JAM

georgiagrown.com

GEORGIA GROWN VIDALIA ONIONS
 IN STORE APRIL 20TH





BERRY DELICIOUS,
 BERRY NUTRITIOUS
 SWEET GEORGIA GROWN BLUEBERRIES



FIND
 YOURS
 NOW

Nature's Favorite State
GEORGIA
 grown

JUST PEACHY



Nature's Favorite State
GEORGIA
 grown

IN
 STORES
 NOW

SALT OR NO SALT?



BUY TODAY

Nature's Favorite State
GEORGIA
 grown

A-MAIZE-INGLY SWEET



FIND YOURS

Nature's Favorite State
GEORGIA
 grown



Blueberries

Atlanta O&O

Blueberry Recipes: https://www.wsbtv.com/sponsored-content?prx_t=IboDAAAAAayycPA&prx_ro=s

Georgia Blueberry History Slideshow: https://www.wsbtv.com/sponsored-content?prx_t=IroDAAAAAayycPA&prx_ro=s

History: https://www.southernkitchen.com/sponsored?prx_t=eq8DAAAAAAoUIQA

<https://www.facebook.com/1764954313762009/posts/2114969558760481>

Recipes: https://www.southernkitchen.com/sponsored?prx_t=e68DAAAAAAoUIQA

<https://www.facebook.com/1764954313762009/posts/2114965042094266>

Richmond AE

Blueberry Recipes: http://www.newspressnow.com/sponsored/?prx_t=17QDAAAAAAp0ILA&prx_ro=s

Georgia Blueberry History Slideshow: http://www.newspressnow.com/sponsored/?prx_t=2bQDAAAAAAp0ILA&prx_ro=s

Cincinnati AE

Blueberry Recipes: http://www.newspressnow.com/sponsored/?prx_t=27QDAAAAAAp0ILA&prx_ro=s

Georgia Blueberry History Slideshow: http://www.newspressnow.com/sponsored/?prx_t=3LQDAAAAAAp0ILA&prx_ro=s

Peaches

Atlanta O&O

Perfect GA Peaches: http://www.wsbtv.com/sponsored-content?prx_t=H8EDAAAAAayycPA&prx_ro=s

FB: <https://www.facebook.com/10505090694/posts/10156916191870695>

Peach Recipes Slideshow: http://www.wsbtv.com/sponsored-content?prx_t=IMEDAAAAAayycPA&prx_ro=s

FB: <https://www.facebook.com/10505090694/posts/10156916188040695>

Peach Preserves Slideshow: http://www.wsbtv.com/sponsored-content?prx_t=lcEDAAAAAayycPA&prx_ro=s

FB: <https://www.facebook.com/10505090694/posts/10156916211505695>

Cincinnati AE

Perfect GA Peaches: http://www.newspressnow.com/sponsored/?prx_t=hsMDAAAAAAp0ILA&prx_ro=s

Peach Recipes Slideshow: http://www.newspressnow.com/sponsored/?prx_t=h8MDAAAAAAp0ILA&prx_ro=s

Peach Preserves Slideshow: http://www.newspressnow.com/sponsored/?prx_t=iMMDAAAAAAp0ILA&prx_ro=s

Richmond AE

Perfect GA Peaches: https://www.foodbeast.com/sponsored/?prx_t=g8MDAAAAAAGrMLA&prx_ro=s

Peach Recipes Slideshow: https://www.foodbeast.com/sponsored/?prx_t=hMMDAAAAAAGrMLA&prx_ro=s

Peach Preserves Slideshow: https://www.foodbeast.com/sponsored/?prx_t=hcMDAAAAAAGrMLA&prx_ro=s

Onions

Atlanta O&O

Buying Vidalia Onions: http://www.wsbtv.com/sponsored-content?prx_t=Mp4DAAAAAayycPA&prx_ro=s

Georgia Soil: http://www.wsbtv.com/sponsored-content?prx_t=M54DAAAAAayycPA&prx_ro=s

Vidalia Recipes: http://www.wsbtv.com/sponsored-content?prx_t=Np4DAAAAAayycPA&prx_ro=s

Vidalia Premiere: http://www.wsbtv.com/sponsored-content?prx_t=Oj4DAAAAAayycPA&prx_ro=s Richmond AE

Atlanta Southern Kitchen:

Buying Vidalia: https://www.southernkitchen.com/sponsored?prx_t=sqEDAAAAAAoUIQA

Facebook: <https://www.facebook.com/1764954313762009/posts/2099133867010717>

Georgia Soil: https://www.southernkitchen.com/sponsored?prx_t=rqEDAAAAAAoUIQA

Facebook: <https://www.facebook.com/1764954313762009/posts/2099118720345565>

Premiere: https://www.southernkitchen.com/sponsored?prx_t=saEDAAAAAAoUIQA
Facebook: <https://www.facebook.com/1764954313762009/posts/2099128547011249>
Vidalia Recipes: https://www.southernkitchen.com/sponsored?prx_t=sKEDAAAAAAoUIQA
Facebook: <https://www.facebook.com/1764954313762009/posts/2099124413678329>

GA Grown Richmond & Cincinnati Aud. Ext.

Buying Vidalia Onions: http://www.nydailynews.com/sponsor?prx_t=mqUDAAAAAATFoLA&prx_ro=s
Georgia Soil: http://www.nydailynews.com/sponsor?prx_t=nKUDAAAAAATFoLA&prx_ro=s
Vidalia Recipes: http://www.nydailynews.com/sponsor?prx_t=naUDAAAAAATFoLA&prx_ro=s
Vidalia Premiere: http://www.nydailynews.com/sponsor?prx_t=n6UDAAAAAATFoLA&prx_ro=s

Sweet Corn

Atlanta O&O

Corn Silk: http://www.wsbtv.com/sponsored-content?prx_t=VdADAAAAAAyycPA&prx_ro=s
FB Corn Silk: <https://www.facebook.com/10505090694/posts/10156960161160695>
Summer Vegetable Slideshow: http://www.wsbtv.com/sponsored-content?prx_t=VtADAAAAAAyycPA&prx_ro=s
FB Summer Vegetable Slideshow: <https://www.facebook.com/10505090694/posts/10156960220475695>
Sweet Corn Recipes Slideshow: http://www.wsbtv.com/sponsored-content?prx_t=ZtADAAAAAAyycPA&prx_ro=s
FB Sweet Corn Recipes Slideshow: <https://www.facebook.com/10505090694/posts/10156960176905695>

Richmond AE

Corn Silk: http://www.foodbeast.com/sponsored/?prx_t=a9ADAAAAAAGrMLA&prx_ro=s
Summer Vegetable Slideshow: http://www.foodbeast.com/sponsored/?prx_t=bNADAAAAAAGrMLA&prx_ro=s
Sweet Corn Recipes Slideshow: http://www.foodbeast.com/sponsored/?prx_t=bdADAAAAAAGrMLA&prx_ro=s

Cincinnati AE

Corn Silk: http://www.foodbeast.com/sponsored/?prx_t=btADAAAAAAGrMLA&prx_ro=s
Summer Vegetable Slideshow: http://www.foodbeast.com/sponsored/?prx_t=b9ADAAAAAAGrMLA&prx_ro=s
Sweet Corn Recipes Slideshow: http://www.foodbeast.com/sponsored/?prx_t=cdADAAAAAAGrMLA&prx_ro=s

Watermelon

Atlanta O&O

Watermelon Benefits Slideshow: http://www.wsbtv.com/sponsored-content?prx_t=DNUDAAAAAAyycPA&prx_ro=s
FB: <https://www.facebook.com/10505090694/posts/10156977283960695>
Watermelon Recipes: http://www.wsbtv.com/sponsored-content?prx_t=DdUDAAAAAAyycPA&prx_ro=s
FB: <https://www.facebook.com/10505090694/posts/10156966247480695>
Serving Watermelon Slideshow: http://www.wsbtv.com/sponsored-content?prx_t=ztUDAAAAAAyycPA&prx_ro=s
FB: <https://www.facebook.com/10505090694/posts/10156966251320695>

Richmond AE

Watermelon Benefits Slideshow: http://www.todaybuzz.com/sponsored/?prx_t=1tUDAAAAAAvsYMA&prx_ro=s
Watermelon Recipes: http://www.todaybuzz.com/sponsored/?prx_t=19UDAAAAAAvsYMA&prx_ro=s
Serving Watermelon Slideshow: http://www.todaybuzz.com/sponsored/?prx_t=2NUDAAAAAAvsYMA&prx_ro=s

Cincinnati AE

Watermelon Benefits Slideshow: http://www.workingmother.com/promoted?prx_t=09UDAAAAAATg4EA&prx_ro=s
Watermelon Recipes: http://www.workingmother.com/promoted?prx_t=1NUDAAAAAATg4EA&prx_ro=s

PROJECT INFORMATION (#2)

Project Title	Education and Marketing are Key to Increasing Market Demand for Georgia's Specialty Crop Agritourism Operations		
Recipient Organization Name:	Georgia Agritourism Association/ Georgia Grown		
Recipient's Project Contact			
Name:	Matthew Kulinski		
Phone:			
Email:	Matthew.Kulinski@agr.Georgia.gov		

PROJECT REPORT

Report Type:	Final Performance Report			
Reporting Period:	Start Date:	9/30/2015	End Date:	9/29/2018

PERFORMANCE NARRATIVE

PROJECT SUMMARY

The two largest economic industries in Georgia are agriculture and tourism. The general nature of farmers, traditionally one of hospitality and education, provides a natural invitation to consumers to visit working farms to experience, learn, and consume locally grown specialty crops of all types. This is agritourism.

But just like any venture, challenges arise. Specialty crop agritourism operators seemingly have additional risks to manage than traditional producers as the demand, sale and consumption of their products is mainly based upon individual consumers visiting their farm operations, not sales through mainstream distribution channels. Keys to the continued development of specialty crop agritourism are: educating specialty crop agritourism operators with knowledge about risk management issues, marketing mechanisms and research; how to meet the needs of their consumer demands; and how to help market Georgia's specialty crop agritourism industry to consumers and consumer groups which will lead to the increased demand for and consumption of specialty crops.

This project provided specialty crop producers in the agritourism industry educational opportunities at a three-day Georgia agritourism conference as well as providing opportunities to market Georgia's specialty crop agritourism industry to consumers and consumer groups.

Activity #1: Educational Programs for Specialty Crop Agritourism Operators: The Georgia Agritourism Annual Conference

The Georgia Agritourism Annual Conference was held February 23-24, 2016 in Rome, Georgia at Berry College. The Conference had approximately 12 hours of educational sessions (See attachment, 2016 GAA Conference Educational Program) and another 8 hours of on-farm education during the Agritourism Farm Tour. Through the Georgia Agritourism Annual Conference, specialty crop agritourism operators had the opportunity to network with other agritourism owners and operators and visit specialty crop agritourism operations to gain ideas to enhance and grow their operations, what they grow, how they grow it, and their educational modules and tools. These operators also engaged in one and a half (1 ½) days of educational sessions. The 2016 Conference also included specialty-crop-specific seminars educating specialty crop agritourism producers in the most recent risk management methods for their operations, educational experiences regarding business practices, marketing and regulatory changes, as well as networking opportunities to learn from other specialty crop agritourism producers and supporting industry businesses during the trade show. Compared to the 2015 Conference, the 2016 Conference was held in a completely different part of Georgia, offering a widely varied array of specialty crop agritourism farms for attendees to tour as well as a completely different educational program.

Activity #2: Increase Sales and Drive Demand through Marketing

The Georgia Agritourism Association online destination planning center was complete in late fall 2016 (<https://georgia-agritourism.org/>). It has been an integral part of the GAA website, all communications, and used as the go-to agritourism planning site with several marketing promotions outside of this block grant. GAA has also been working with other state organizations to continue to build cross promotional opportunities to get this new online destination planning center in front of as many consumers as possible.

Consumer Marketing at Official State Visitor Information Centers: A Committee of GAA Board members, staff and tourism professionals from across the state of Georgia was formed to oversee this project. GAA created and sent out a Request for Proposals for the project that included a wide array of examples and possible marketing vehicles to engage consumers and increase consumption of specialty crop agritourism products. Three strong (3) proposals have been received and follow up conversations have been had will all organizations. The GAA Board chose Boelte Hall to design and print agritourism guides for the 11 Visitor Information Centers.

Towards the end of this grant project, the GAA, as an organization, disbanded and passed all duties, responsibilities, and accounts onto the Georgia Agriculture Commodity Commission for Georgia Grown (Georgia Grown.). The GAA Board stayed intact and became a Georgia Agritourism Task Force (Task Force) to guide Georgia Grown through its agritourism promotions. Georgia Grown has more marketing and promotional assets at its disposal to promote agritourism facilities compared to the GAA. The Task Force and Georgia Grown decided to provide the agritourism facility coupons, described in the grant, through digital advertising and social media in addition to the VICs.

Throughout the summer spring and summer of 2018 the Task Force and Georgia Grown produced digital ads and social media posts to promote specialty crops at Agritourism facilities. In addition, an ad ran in the June 6th, 2018 Georgia Farmers and Consumers Market Bulletin, which has over 40,000 subscribers. These ads directed consumers to download or cut-out a coupon to for a “free treat” if they visit a participating specialty crop agritourism destination (<https://www.georgiagrown.com/free-treat-coupon>). These coupons were redeemed at the agritourism location’s point of sale. Participating locations kept track of how many coupons they received and reported that number back to the Task Force and Georgia Grown.

GOALS AND OUTCOMES ACHIEVED

Educational Programs for Specialty Crop Agritourism Operators

The Georgia Agritourism Annual Conference was held February 23-24, 2016 in Rome, Georgia at Berry College. The Conference had approximately 12 hours of educational sessions and another 8 hours of on-farm education during the Agritourism Farm Tour. The GOAL was to increase attendees’ knowledge and potential competitiveness of specialty crop agritourism practices. The TARGETS (85%) were exceeded by 15% as 100% of attendees indicated their knowledge of specialty crop agritourism practices and management techniques increased and exceeded by 15% as 100% of attendees also rated the amount of educational information presented as significant or moderate.

Increase Sales and Drive Demand through Marketing

Over the spring and summer of 2018, the GAA and Georgia Grown created an innovative marketing campaign to encourage consumers to visit and shop at specialty crop agritourism destinations. This campaign included 11 participating agritourism destinations and 11 VICs. The VICs received brochures, flyers and coupons highlighting the promotion. In May and June of 2018, we launched a social media campaign that included boosted posts on both Facebook and Instagram. Digital ads were also featured on the GAA, Georgia Grown, and Georgia Department of Agriculture websites. In addition, an ad with the coupon ran in the June 6th issue of the Georgia Farmers and Consumers Market Bulletin, which has over 40,000 subscribers.

The target for this activity was 200 coupon redemptions at participating specialty crop agritourism facilities. From May 2018 to September of 2018, we had 826 redemptions at the agritourism locations, exceeding our target by 626. Redemptions ranged from a low of roughly 20 at one location to over 300 at another single location. These verified visits to specialty crop agritourism facilities help to increase the sales of specialty crops directly from the farmer.

BENEFICIARIES

We estimate that over 950 southeastern growers, agribusiness professionals and consumers will benefit by directly participating in the programs provided under this grant application. There was an estimated economic impact of the agritourism coupon program of over \$41,000

- Over 125 Agritourism professionals attended the 2016 Georgia Agritourism Association Annual Conference.
- 11 Agritourism association participated in the agritourism coupon promotion
- 826 families redeemed the agritourism promotional coupon
- The average family sales at an agritourism destination is \$50. We estimate 826 redemptions multiplied by \$50 to show \$41,300 in economic impact.

LESSONS LEARNED

We were able to learn a lot about agritourism marketing programs through this grant.

- Digital advertising and social media is a more efficient form of agritourism promotion compared to brochures at visitor centers.
- Our most effective advertising technique was advertising in the Market Bulletin. We believe most of our coupon redemptions came from the June 6th ad in the paper.
- Agritourism destinations with a shopping component generate better sales than locations without stores.
- The Georgia Agritourism Conference will be continued in 2018. It will be managed by Georgia Grown. This conference continues to be an asset for the industry.

CONTACT PERSON

Matthew Kulinski
Georgia Department of Agriculture
Marketing Division, Room 324
19 Martin Luther King, Jr. Drive, SW

Atlanta, Georgia 30334-4201

Email: matthew.kulinski@agr.georgia.gov

Website: www.agr.georgia.gov

ADDITIONAL INFORMATION

publications, websites, photographs, etc. should be included here or attached and emailed to GDA

2016 GAA Conference Educational Program & Agenda-*available by request from GDA.*

PROJECT INFORMATION (#3)

Project Title	The Key to Increasing Specialty Crop Producer Profitability: Grower and Consumer Education		
Recipient Organization Name:	Georgia Fruit and Vegetable Growers Association		
Recipient's Project Contact			
Name:	Charles T. Hall, Jr.		
Phone:	Enter the Project Contact's Phone Number.		
Email:	chall@asginfo.net		

PROJECT REPORT

Report Type:	Final Performance Report			
Reporting Period:	Start Date:	9/30/2015	End Date:	9/29/2018

PERFORMANCE NARRATIVE

PROJECT SUMMARY

As noted in the title, the specific purpose of this project was EDUCATION. Education for both the specialty crop growers and consumers - young and old.

Growers need the latest, most up-to-date information to make critical decisions in their farming operations whether it is pest management, crop varieties, marketing direction, food safety procedures or other operational issues.

Consumers – parents and children want to know if the product they are purchasing or consuming is safe, where/how was it grown and is it healthy to eat. Children are naturally curious about how and where is their food grown.

To accomplish this educational project goal, GFVGA provided growers with educational opportunities at the Southeast Regional Fruit and Vegetable Conference which offers the most current research information on production practices, food safety guidelines, marketing techniques and operational procedures. In addition growers were provided with on-the-farm food safety consultation and educational programs on food safety and sustainability.

Consumer education was focused on the USDA 'farm to school' programs in which student learn where their food comes from and how it is produced. Through specific designed lesson plans student learn how produce is planted, cultivated, harvested and prepared for the table. To ensure school districts has locally grown product available to them growers were able to create profiles of their operations, the fruit or vegetable available allowing school personnel to reach out to them.

This was a tremendously successful project as outlined in the section on 'Goals and Outcomes Achieved'.

PROJECT APPROACH

The 2016 Southeast Regional Fruit and Vegetable Conference

At the 2016 Southeast Regional Fruit and Vegetable Conference, growers received the latest and most current research information on production practices, pest management techniques and food safety guidelines while also being informed on sustainability needs and regulatory issues. This Conference is known to provide up-to-date, in-depth information for production, handling, marketing and the sale of each new crop year. Every year research and specialty crop product development is introducing new, more efficient varieties, seeds, pest management, fertilization, as well as regulatory mandates and good industry practices.

The 2016 Conference was held January 7 – 10, 2016 in Savannah, Georgia hosting 3,505 attendees. This was an 8.8% increase in attendance over the 2015 Conference. There were over 107 hours of educational sessions, enhanced by two standalone conferences co-locating with the 2016 SE Regional Conference. The other conferences made their educational programs available to SE Regional Conference attendees. The TARGET for the 2016 Conference was continuing or increasing positive responses over 2015 Conference responses for the following:

- 1) The value of education (checked good or excellent) was rated by attendees at 93.4% which exceeded the 2015 Conference response of 91.1%.
- 2) The quality/usefulness of education also exceeded the 2015 Conference attendee response rating of 91.1% by almost 2% with a 2016 response evaluation of 92.7%.

Educational Programs for Food Safety Education and Sustainability for Growers

On-the-Farm Consultation for Food Safety and Food Safety Modernization Act (FSMA) Regulations. Produce Food Safety Services (PFSS) was developed from the outcry of produce growers' need for help with food safety applied to the farm. Services offered through this GFVGA member service include training, consultation, and program implementation for all current market-driven food safety standards required by the produce industry and all services follow FSMA rule compliance. The goal was accomplished to provide hands-on food safety training, consultation, informed of food safety best practices and FSMA requirements, and that take steps to acquire a food safety audit certification to 90 (TARGET was 77 farms). The additional target to provide consultation to at least 5 growers with no current food safety programs in place to help them establish a food safety program, understand food safety best practices and FSMA requirements, and take steps to acquire a food safety certification was also accomplished and exceeded with 10 growers.

Sustainability Educational Webinar & Self-Assessment/Benchmarking Guide. The webinar, Impact of Buyer Demands on Produce Operations' Sustainability Webinar, was hosted August 7th, 2018. Presenters included subject matter expert, Alison Edwards, Executive Director of the Stewardship Index for Specialty Crops (SISC), and Kevin Yue, Environmental Compliance Engineer with Lipman Family Farms. They provided understanding as to what could be in a sustainability program well as helped reduce “fear” and misconceptions of sustainability practices and programs. Alison focused on the reasons why buyer groups focus so heavily on measurements as well as how to leverage those “buyer demands” for internal improvements and ultimately ways to increase ROI. Kevin Yue came to Lipman Family Farms having different buyers requesting different “brand named” measurement schemes but they were all measuring the same things. He came to SISC knowing they were working with the industry, growers, and buyer groups to establish strong metrics that anyone could use. Kevin shared his experiences and how he has implemented a program and using it to improve the company’s bottom line. All attendees were provided access to the SISC metrics to begin internal measurements of applied water use, habitat and biodiversity, energy use, nitrogen use, etc. as well as the United Fresh Sustainability Guide and Self-Assessment Tool.

An interesting piece of information staff found was of the 15 attendees, 9 had little to no part of a sustainability program in place. Several attendees had been asked by buyers to submit measurements of various aspects.

All attendees participated in a pre-test to measure the workshop’s effectiveness. The TARGET (20% increase) was achieved as 80% of participants indicated their level of knowledge and understanding of sustainability, sustainability practices/principles, and programs increased.

Education Programs for Students and Consumers

Informational Handouts:

GFVGA began working on informational handouts for use in the classrooms in Spring of 2016. After speaking with teachers we found that an activity book that included facts, games, etc would be more appealing to students and easier for teachers to incorporate into the classroom. A designer was contracted to design the activity book in October of 2016 and printing completed in the Spring of 2017 ([LINK](#)). The 10-page activity book includes facts on production in Georgia and educational puzzles/games where students are able to apply those facts. The book includes information on peaches, strawberries, Vidalia Onions, peppers, Watermelons, cantaloupes and blueberries. GFVGA began marketing the Activity Book to teachers in the Spring of 2017 for their use in the classroom and taking requests for the activity books in the Spring and Fall of 2017.

In the summer of 2018 the GFVGA received approval to reallocate funds that were available from other areas of the grant to create teacher kits that would include the activity book for use in the classroom. The kits included activity books, crayons, pencils, erasers, and a preloaded USB drive that included a lesson plan with accompanying PowerPoint and 10 commodity informational videos.

Online database of grower members:

Beginning in the Fall of 2015 and through the Spring and Summer of 2016 GFVGA personnel developed the criteria for the software needed for this database. During that time frame staff researched, interviewed and finally identified a vendor for this project. In August 2016, GFVGA contracted with YourMembership, a membership software development company, to create an online searchable database on the GFVGA website to be available to teachers, school nutrition directors and others involved in purchasing produce for schools. The membership software has since been developed and was implemented for back-end use in the Spring of 2017. Throughout the summer of 2017 grower member profiles were updated with the most current information to ensure those using the database will be able to search by commodity, location and farm name.

The build out of front end of the directory was completed and made available to the public on the GFVGA website in 2018. The directory was promoted to teachers, farm to school alliance members and other farm to school contacts. The link was also made available to organizations with farm to school programs to share on their websites and with their contacts. The Department of Education has shown interest in the directory and will be posting the link to the directory on their Farm to School Toolkit webpages. The information on the directory will continue to be updated as we receive updated info from our growers.

GOALS AND OUTCOMES ACHIEVED

The 2016 Southeast Regional Fruit and Vegetable Conference

The GOAL for the 2016 SE Regional Conference was to continue or increase the positive responses of attendees regarding the value of their attendance and the quality of education, compared to the 2015 Conference responses. This was accomplished through the designated PERFORMANCE MEASURE which was an electronic, anonymous questionnaire emailed to all attendees at the conclusion of the 2016 Conference. The BENCHMARK was achieved (shown in the chart below) through the questionnaire from the 2015 Conference. The TARGET was to meet or exceed the positive responses of these questions for the 2016 Conference by at least 10% compared to the 2015 Conference responses. The PERFORMANCE MONITORING PLAN was achieved as staff reviewed and compared previous years' goals and targets and make adjustments for each upcoming Conference. One such adjustment applied to all future SE Regional Conferences will be to implement new method(s) for collecting attendee responses at or after Conferences including paper surveys, the use of survey's on mobile apps, etc.

The TARGET for the 2016 Conference was continuing or increasing positive responses over 2015 Conference responses. Attendees evaluated the value of education (checked good or excellent) was reached and exceeded with response rates of 93.4%, exceeding the target of 91% while the quality/usefulness of education was indicated at 89%, just below the target 94%. In another area, 80.6% of respondents indicated an increase of their knowledge of production practices and management techniques for specialty crops, under the target of 83%. As a follow up, 92.7% of respondents rated the amount of educational information presented as significant or moderate, exceeding the target of 91%.

Performance Measurement:

	Conference Yrs.		+ - REACHED TARGET/GOAL
	2015	2016	
Value of Education	91.1%**	93.4%	+exceeded goal by 2.3%
Amount of information presented as Significant or Moderate	94.1%**	89.0%	- under goal by 5.1%
Gained knowledge	83.0%**	80.6%	- under goal by 2.4%
Usefulness of Information	91.1%**	92.7%	+ exceeded goal by 1.6%

*** Percentages reported with blueberry conference ratings removed or filtered from 2015 data.*

Educational Programs for Food Safety Education and Sustainability for Growers

On-the-Farm Consultation for Food Safety and Food Safety Modernization Act (FSMA)

Regulations. Produce Food Safety Services (PFSS) food safety specialists worked with farms and packing operations to provide training, consultation, and program implementation for all current market-driven food safety standards required by the produce industry. All services provided included consultation and recommendations to FSMA rule compliance. The goal was accomplished to provide hands-on food safety training, consultation, informed of food safety best practices and FSMA requirements, and that take steps to acquire a food safety audit certification to 90 farms. This exceeded the target of 81 farms. The additional target to provide consultation to at least 5 growers with no current food safety programs in place to help them establish a food safety program, understand food safety best practices and FSMA requirements, and take steps to acquire a food safety certification was also accomplished and exceeded with 10 growers.

	2015	Benchmark	2016	+ -REACHED TARGET
Farm and Packing Operations participating in PFSS	85	77	90	+ exceeded goal by 1.2%
Consult with farms with no food safety plan		5	10	+ exceeded goal by 50%

Sustainability Educational Webinar & Self-Assessment/Benchmarking Guide. Sustainability has been quietly growing in the shadow of food safety requirements from buyers as well as the Food Safety Modernization Act and all required rules. While GFVGA efforts had to be shifted to focus on FSMA rule development, farms and packing facilities have been haphazardly giving information to buyers and creating ways to measure areas they don't understand, such as greenhouse gas emissions, without thinking why buyers are asking for this information.

The webinar, Impact of Buyer Demands on Produce Operations' Sustainability Webinar, allowed sustainability industry subject matter experts to speak to southeastern growers, packers, shippers

about the efforts being made to get the industry, buyers, and metrics organizations on the same page. While attendees indicated a continued need for more sustainability education, GFVGA is still looking for more specific education/assistance needed, as well the industry expertise to offer the education and assistance.

All attendees participated in a pre-test to measure the workshop’s effectiveness. The TARGET (20% increase) was achieved as 80% of respondents indicated their level of knowledge and understanding of sustainability, sustainability practices/principles, and programs increased.

	Attendance	Benchmark	Actual	+ -REACHED TARGET
Level of knowledge and understanding of sustainability, sustainability practices/principles, and programs	15	20%	80%	+ exceeded goal by 60%

Education Programs for Students and Consumers

Informational Handouts:

A requirement for using the activity book each teacher had to complete a pre- and post- test that measured the effectiveness of the information in the classroom; our goal was to have 25 teachers using the book in their classroom and for the pre and posttest to show an increase student knowledge of Georgia grown fruits and vegetables by 15%. Teachers across Georgia had the opportunity to request Farm to school Kits for their classrooms. To date o we have been able to distribute over 200 Kits to teachers across the state.

We asked teachers to rate their students’ knowledge of the production of Georgia Grown fruits and vegetables before implementing the activity book and after. Teachers reported before using the GFVGA Activity book that 8.47% of their students’ knowledge of the production of Georgia Grown fruits and vegetables would rate as good or excellent. After teachers utilized the GFVGA Activity book in their classrooms 56.9% of those surveyed ranked their students’ knowledge as good or excellent. Overall teachers using the activity book showed an increase of 48.43% in their students’ knowledge of Georgia Grown Fruits and Vegetables, well above our goal to increase by 15%.

Online database of grower members:

The GFVGAs goal for the online database was to facilitate the purchase of Georgia Grown fruits and vegetables by connecting schools/nutrition directors with local growers. The performance measure is the number of GFVGA grower members participating in farm to school programs in Georgia. While we did not have a benchmark the target was to have 25 GFVGA grower members selling their produce to schools.

Currently we have over 25 growers that participate in farm to school or are selling produce directly to schools or to schools through a distributor. Due to school procurement of fruits and vegetables changing on a regular basis, crop availability and other variables it has been difficult to calculate an exact number of those participating in Farm to School as it changes frequently.

BENEFICIARIES

The 2016 Southeast Regional Fruit and Vegetable Conference:

As noted earlier in this report, over 3,500 people associated with the fruit and vegetable industry in Georgia attended and benefited from this conference. Whether it was educational workshops, networking with other growers or seeing the latest production technology and practices, there were many areas in which these 3,500 individuals benefits from the conference.

Educational Programs for Food Safety Education and Sustainability for Growers

On-the-Farm Consultation for Food Safety and Food Safety Modernization Act (FSMA)

Groups and operations the benefited from this 2015 grant and it's accomplishments include growers, packers, shippers of specialty crop commodities. It is estimated the number of beneficiaries from this project are over 90. Being that these operations varying in size and economic scope would not be able to sell their produce without a food safety program and audit, it is very difficult to estimate the economic impact. However, the economic impact would be very large.

Sustainability Educational Webinar & Self-Assessment/Benchmarking Guide.

There were 15 registered attendees for this webinar, however email correspondence indicated at least one organization hosted multiple staff members in a room to participate. There is no way to tell how many attendees have downloaded or utilized the metrics provided to them. However, attendees represented multiple parts of the industry from growers, packers, shippers to non-government agencies and trade associations. While all worked or represented the specialty crop industry, it is difficult to estimate how a farm, facility, consultant, or trade association will use this information to ultimately increase the return on income.

Education Programs for Students and Consumers

Approximately 200 kits were distributed to classrooms across Georgia. We estimate that there is an average of about 30 students per classrooms, so total approximately 6,000 students have benefited from the activity book.

We estimate that at least 25 of GFVGA grower members are providing produce to schools across Georgia. However as outlined in Lessons Learned we are unable to calculate an exact number of grower members providing produce to Georgia schools.

LESSONS LEARNED

Southeast Regional Fruit and Vegetable Conference

For the SE Regional Conference, it is no longer adequate to rely on one mode of program evaluation. Staff have been watching a decline in responses through the post-conference, electronic evaluation. Since then staff have added onsite, paper evaluations in the highest attended educational sessions as well as utilized the Conference app to conduct evaluations.

Sustainability Education

Regarding sustainability, when staff wrote the 2015 grant in 2014 it was a growing need and concern. However once the FSMA rules began to roll out of FDA, sustainability took a “back seat” to food safety but did not go away. Sustainability continued to grow in the shadow of FSMA rules. There is a continued need for education and ways of measurement. GFVGA will continue to work with membership and subject matter experts on how to provide the needed and appropriate help.

Education Programs for Students and Consumers

Online database of grower members:

Due to school procurement of fruits and vegetables changing on a regular basis, crop availability and other variables it has been difficult to calculate an exact number of those participating in Farm to School. We also found that many of our growers sell through distributors, so they were not certain if they were selling through schools; in this case we tried to approach the distributors to see if we could gather a list of our member growers that had produce going to Georgia schools.

Another issue faced was growers and schools unable to coordinate the logistics of receiving the produce directly. One example is a grower that wanted to donate a couple of pallets of strawberries to a school. The school did was not able to accept the donation because they did not have a way to prepare the whole strawberries in time to get them on the lunch line.

CONTACT PERSON

Provide the name and email address of the person to be contacted if USDA has additional questions.

Charles T. Hall, Jr., Executive Director

Georgia Fruit and Vegetable Growers Association

P.O. Box 2945

LaGrange, GA 30241

chall@asginfo.net

ADDITIONAL INFORMATION

publications, websites, photographs, etc. should be included here or attached and emailed to GDA

Available on request from GDA:

2017 SE Regional Conference Program cover and workshop pictures

Food safety education and consulting

Sustainability Webinar Resources Handout

Sustainability Webinar PowerPoint Information Examples

Farm to School Activity Workbook Cover.

PROJECT INFORMATION (#4)

Project Title	Marketing Georgia Grown Products to Increase Specialty Crop Profitability (PMA Conference)		
Recipient Organization Name:	Georgia Fruit and Vegetable Growers Association		
Recipient's Project Contact			
Name:	Charles T. Hall, Jr.		
Phone:	Enter the Project Contact's Phone Number.		
Email:	chall@asginfo.net		

PROJECT REPORT

Report Type:	Final Report (SUBMITTED in Dec. 2017 & ACCEPTED BY USDA on May 4, 2018)			
Reporting Period:	Start Date:	9/30/2015	End Date:	9/29/2018

PERFORMANCE NARRATIVE

PROJECT SUMMARY

The Produce Marketing Association's annual meeting hosts more than 22,000 industry members. According to PMA, nearly 80% of buyer attendees at this annual show are directly involved in fresh market purchase decisions. This project focuses on using the largest gathering of produce buyers in North America to help expand the marketing of Georgia produce and increase the competitiveness of Georgia products.

PROJECT APPROACH

This project was designed to reach hundreds of retail and food service buyers at one conference/trade show. The GA GROWN pavilion at PMA increases the awareness of Georgia produce by direct communication with the retail chain buyers to get more produce on the grocery shelves, and with foodservice distribution companies to broaden purchases by institutional establishments and restaurants.

The Produce Marketing Association's 2015 FRESH SUMMIT was held in Atlanta, GA, on October 24-25, 2015. FRESH SUMMIT has an attendance of over 20,000 attendees from 50 countries annually. The Georgia pavilion had 8,000 sq. ft. of floor space and 29 exhibiting firms. The pavilion was coordinated by the Georgia Department of Agriculture and the Georgia Fruit and Vegetable Growers Association (GFVGA).

Companies exhibiting in the pavilion were asked to report new customer leads and increased sales. Based on the information reported, the companies that exhibited in the Georgia Grown pavilion at PMA averaged 8.4 new leads/contacts per company and over \$4.1 million in estimated new sales generated and increased current customer orders. The original performance measurement goal was three new leads per company and \$4 million in new/increased sales.

Types of companies and commodities represented in the pavilion included, Farms, Growers, Shippers, Processors, etc. Crops included - Vidalia Onions, Mixed vegetables (peppers, squash, cucumbers, etc.), watermelon, tomato, blueberry, peach, muscadines, greens, cabbage, sweet potatoes, pecans, etc.

GOALS AND OUTCOMES ACHIEVED

The PERFORMANCE MEASUREMENTS for this project were three new leads per company and \$4 million in new/increased sales. Based on the information reported, the companies that exhibited in the 2015 Georgia Grown pavilion in Atlanta, GA averaged over 8.4 new leads/contacts per company and the total pavilion increased 2016 sales by \$ 4.1 million dollars.

BENEFICIARIES

The beneficiaries of this project were the Georgia specialty crop producers that exhibited at the 2015 PMA in Atlanta and on average secured more than 8 new leads during the two day show. But those growers that did not display also received marketing benefits as the GA GROWN logo was broadly promoted to the 20,000+ attendees.

LESSONS LEARNED

PMA, *Fresh Summit*, continues to be the 'premier' United States trade show to put grower/distributors together with retail and food service buyers. There is no other venue Georgia specialty crop growers can reach this many potential new customers. We will continue to encourage Georgia growers to participate in PMA.

CONTACT PERSON

Provide the name and email address of the person to be contacted if USDA has additional questions.

Charles T. Hall, Jr., Executive Director
Georgia Fruit and Vegetable Growers Association
P.O. Box 2945
LaGrange, GA 30241
chall@asginfo.net

ADDITIONAL INFORMATION

Photos of the 2015 Georgia Grown pavilion in Atlanta are *available upon request from GDA.*

PROJECT INFORMATION (#5)

Project Title	Reading, Writing, and Arithmetic: Growing the Fundamentals for a Healthy and Sustainable Olive Industry		
Recipient Organization Name:	Georgia Olive Growers Association		
Recipient's Project Contact			
Name:	Vicki Hughes		
Phone:	Enter the Project Contact's Phone Number.		
Email:	georgiaolivegrowers@gmail.com		

PROJECT REPORT

Report Type:	Final Report			
Reporting Period:	Start Date:	9/30/2015	End Date:	9/29/2018

PERFORMANCE NARRATIVE

PROJECT SUMMARY

This project was designed to promote and enhance the production of olives, domestic olive oil and sustainable growth of the olive industry in Georgia and the Southeastern USA. The Georgia Olive

Growers Association (GOGA) partnered with the University of Georgia (UGA) Extension Services to complete the development of a Certified Oil Lab located in Athens, Georgia within UGA. This lab will offer olive and olive oil analysis for all U.S. growers and will continue to facilitate research and development of growing olives and producing olive oil in Georgia and the Southeastern United States.

Olives are unique among specialty crops in that the analysis of the olive fruit is critical to determine the appropriate harvest date. Fruit from the southeast had been shipped to California for this analysis which was costing growers time and money and delaying their response time. Furthermore, once oil was produced, the analysis for marketing and to labeling the oil as extra virgin was being outsourced to Europe and Australia. To grow the olive industry in Georgia, it was imperative for these services to be more accessible and performed in a timely manner. As this industry continues to grow it has become evident that more sophisticated laboratory analysis are required to assess the quality of Georgia olive oils which has historically fetched a premium price. The USDA Block Grant allowed the lab to develop and seek certification in several new procedures that are recognized and performed around the world, thereby solidifying the legitimacy of Georgia olive oils on the international stage. Though the long-range plan is to develop a completely certified oil Lab, the specific goal of this project was to complete Part A and B of the AOCS oil certification process. Growers in Georgia and throughout the U.S. will be able to use the Georgia olive oil lab for these services.

The Agricultural and Environmental Services Laboratories (AESL) has been working with the Georgia olive growers since 2014 and have conducted several field studies at various farms across the growing regions of Georgia. The results from these studies identified nutrient issues at several locations. To support the growing olive industry in Georgia, it was proposed that a USDA Block Grant should be initiated to expand these field surveys to include the entire Georgia olive growing region, to provide essential information about how soil characteristics and location impact plant growth, yield, and oil quality.

Also included in the USDA Block Grant was funding for the development of more rapid and cost-effective analytical methods to support this industry. Olive is a new crop in Georgia with its acreage expanding. The ideal harvest time of olives is determined by the oil content of the fruits. With progression of maturity, the oil content of olives steadily increases but eventually plateaus. Once the oil reaches this threshold, the olive should be promptly harvested before over-ripening occurs and the quality degrades. Thus, producers are required to test their olives every few days to identify the optimum time to harvest for maximum yield and quality. However, the traditional wet-chemistry techniques for determining moisture, oil, and fatty acid composition in olives is very laborious, time consuming, and costly. This block grant supported the development and validation of a Near Infrared Reflectance Spectroscopy (NIRS) method which allows for rapid and low-cost analysis of olives. The development of these rapid methods allows growers to make quick management and harvest decisions about their crop which improves the overall quality of oils produced. This technology is commonly used internationally but had yet to be developed here in

the United States, which means the development not only supports the Georgia olive industry but the entire US olive industry.

PROJECT APPROACH

Activities Performed

Objective 1 and 5: Sample olives and pollinator varieties at harvest from 6 Georgia farms producing olives and determine % oil and fatty acid profile. The analysis of these samples was conducted on olives from the 2016 crop which were harvested in September 2016. At locations containing enough olives to produce a sample, $\frac{3}{4}$ of a gallon of olives was collected for each of the three varieties (Arbequina, Arbosana, and Koroneiki) and stored in plastic bags on ice for transport back to the lab in Athens, GA. Once at the lab, the olive samples were stored at -80°C until processing. The olives were freeze dried, and oil was extracted using a bench-top seed oil press. Oil was centrifuged to remove any remaining particulates and stored in the dark in 50 mL centrifuge tubes until analysis. The olive oil was analyzed for quality by assessing the free fatty acids, peroxide value, and ultraviolet extinction coefficient. The oil purity was characterized by comparing the pyropheophytins, diacylglycerols, and fatty acid methyl esters. Collectively, these chemical parameters are used to assess the purity and quality of olive oil. Pure olive oil has a unique fatty acid profile and good quality oil will be free of oxidation. The major fatty acids like oleic, palmitic, and linoleic were all found to within range for olives. The minor fatty acids (Palmitoleic, Stearic) were also found to be within range for olives for a majority of the samples (~90%) while some of the other low concentration fatty acids (linolenic, behenic, gadoleic, lignsenoic, and arachidic) fell out of range for olive oil. This discrepancy might be due to the oil extraction process used in the laboratory. Since we are using benchtop processors, a lot more heat is introduced than in conventional systems. This might have altered the fatty acid profile, especially with those acids that are already at very low concentrations (<0.2%). Alternatively, it is possible that the discrepancy is due to the fact that the “normal” ranges for olive oil was determined by oil grown in Mediterranean climates. It is possible the sub-tropical climate in olive growing regions of Georgia and Florida simply produce a different ratio of fatty acids. The analysis was completed during November-December 2016, and a full report was developed based on the results in December-February which were presented to the Georgia Olive Growers Association in 2017 at the Southeastern Olive Conference in Lakeland, GA, completing this objective.

Objective 2: Advance the UGA labs certification to include part B of the AOCS approved chemist program. This objective includes the development of assessing the 1,2-diacylglycerol and pyropheophytins analytical methods. These methods are needed for expanding the accreditation of the UGA personnel to include part B of AOCS’s Approved Chemist program. They have been developed and will be available to olive producers by AESL. The lab is currently participating in the AOCS proficiency sampling required to expand the Approved Chemist accreditation to part B. By spring 2017 two UGA lab personnel were classified as Approved Chemist in parts A & B of AOCS’s program in the summer of 2017, at which point this objective was completed. However, those two chemists also left the program in 2017, so the crop quality lab is having to start the proficiency program over again from the beginning. A new laboratory manager was hired in January 2018 and has completed the half of the proficiency program thus far. The lab is on track to have fully certified technician by Spring of 2019. This information was shared with the GOGA association at the annual meeting in 2017.

Objective 3: Develop an NIR calibration for olive oil percent oil and fatty acid profile that would allow samples of olives and olive oils to be analyzed quickly and accurately and at a much-reduced cost to the producer.

Leading up to harvest in 2015 and 2016 olive producers from around Georgia and Florida submitted olives which were analyzed and used to develop the NIR calibration. Using these olives, we developed and validated NIRS calibration models for analysis of moisture, fresh-matter-oil (oil-FMO), dry-matter-oil (oil-DMO), and nine different fatty acids namely palmitic, palmitoleic, stearic, oleic, linoleic, linolenic, arachidic, gadoleic, and behenic acids contents of fresh olives. A total of 128 samples, 98 samples from 2015 and 30 samples from 2016 growing seasons were utilized for this work. Fresh olives were blended with a coffee grinder until homogenous and pits were minced, packed in a circular NIR cell, and scanned on a FOSS XDS NIR system covering both visible and NIR regions in the wavelength range from 400 to 2498 nm at 2 nm intervals, giving a total of 1050 data points per sample. Calibration models were developed with 83-88 randomly chosen samples for various parameters using modified partial least squares regression for internal cross validation. Of the 12 models developed, seven constituents – moisture, oil-FMO, oil-DMO, and palmitic, palmitoleic, oleic and linoleic acids (representing 88–97% of the total fatty acids) had low standard errors and high coefficients of determination ($R^2 = 0.81\text{--}0.98$; $1 - VR = 0.74\text{--}0.86$) for both calibration and cross-validation. For these seven constituents, predictions of an independent validation set yielded excellent agreement between the NIRS predicted values and the reference values with low standard error of prediction (SEP), low bias, high coefficient of determination ($r^2 = 0.80\text{--}0.93$) and high ratios of performance to deviation (RPD = SD/SEP ; 2.21–3.85). At this time the calibration has been developed and cross validated to ensure accuracy. All initial tests indicated the development can accurately assess olive pomace for oil percentage and fatty acid profiles. This new NIR technology was formally added to the AESL fee schedule by the UGA quality laboratory in Summer of 2017. The previous olive fruit moisture and oil content tests, which used to take 5-10 days to complete, costing >\$100 per sample, can now be performed in a matter of minutes for \$20 per sample. This is a substantial savings of time and money for the olive grower. To encourage the use of this new technology by over 25% of Georgia growers, the new NIR calibration and analysis was presented at the 2017 GOGA Southeastern Olive Conference in Lakeland, GA and the 2018 SE Fruit & Vegetable Conference in Savannah, GA. Furthermore, a manuscript was put together with laboratory collaborators and published in the journal of Science of Food and Agriculture. The paper, entitled “Analysis of moisture, oil, and fatty acid composition of olives by near-infrared spectroscopy: development and validation calibration models” was first published in October 2017 (DOI 10.1002/jsfa.8658).

Objective 4: Sample surface soils at 6 farms currently growing olives for production.

Thirty soil samples were taken from six different growers to assess the overall soil fertility for growing healthy olive trees and maximizing yields. The results of this study indicated several important nutrients in the olive trees around Georgia are critical insufficient and should be closely monitored by all future producers. Phosphorus and Potassium were found to be low in the soil for 40 and 53% of the sites while the pH was too acid at around 40% of the sites. Recommendations for appropriate fertilizer and liming applications were given to all the growers to alleviate these deficiencies. Olives prefer a more neutral soil acidity (~7.0), which will be difficult, but not impossible, to obtain in largely acidic Georgia soils. This study was eye opening for growers and the vigilance required by them to maintain optimal soil conditions. To follow up on these low soil

nutrients, we also took the liberty of expanding this study to look if leaf nutrient levels correlated with soil nutrient deficiencies. The largest olive leaf nutrient deficiency was calcium, manganese, and magnesium which was found in over half of the samples taken. These calcium and magnesium issues are likely tied to the acidic Georgia soils which can be remedied by adding dolomitic limestone. The remaining micronutrient deficiencies will need to be addressed as well through fertilization plans. Recommendations were all given to the growers to do this. Without doing these analyses, these issues might have been overlooked. This is especially due to the fact that growers had largely been emulating management practices utilized in California and Australia. Since growing olive trees in completely different climate that exists in the southeast United States, these results will lay the groundwork for future management practice updates. If minimum nutrient thresholds are maintained, the quality would not be expected to be impacted, but the yield might be, which has been observed to be a larger limitation. Sampling additional characteristics of site selection were identified that will benefit future producers; this information was also presented to the GOGA in the winter of 2015.

GOALS AND OUTCOMES ACHIEVED

Objective 1 and 5: Sample olives and pollinator varieties at harvest from six Georgia olive farms and determine % oil and fatty acid profile. Olives were collected and brought back to the laboratory for extraction and analysis.

Objective 2: Advance the UGA labs certification to include part B of the AOCS approved chemist program. This objective was originally achieved, but with our two lab technicians leaving the program, we are in the process of certifying the replacement technicians.

Objective 3: Develop an NIR calibration for olive oil percent oil and fatty acid profile that would allow samples of olives and olive oils to be analyzed quickly and accurately and at a much-reduced cost to the producer. The NIR calibration was developed by collecting olives from around the state of Georgia and Florida. The method was validated, and a paper was published describing the results. The UGA crop quality lab is now offering olive pomace testing for growers to help them determine the oil content and moisture of the olives so they can determine the optimal time to harvest.

Objective 4: Sample surface soils at six Georgia olive farms currently growing olives for production. Five samples were taken from each farm for a total of thirty soil samples. These soils were characterized for pH, lime buffering capacity, and plant available nutrients (P, K, Ca, Mg, Mn, Zn).

At the SE Fruit & Vegetable conferences in 2015, 2016, and 2017, we had approximately 600 attendees stop by the UGA crop quality Lab booth/display.

At the GOGA event in 2017, there was approximately 120 people in attendance that visited the UGA Lab booth as well as the approximately 200 potential growers who visited the booth, located across from the GOGA booth, at the 2018 SE Fruit and Vegetable Conference.

BENEFICIARIES

The beneficiaries of this research are primarily Georgia, Alabama, and Florida olive growers and olive oil producers, but potentially any olive oil producer in the United States will benefit from having an additional certified olive oil laboratory available to them. We worked directly with approximately twelve different growers to complete all the research objectives. They benefited immediately by getting input on their soil fertility, plant nutrition, and olive quality analysis performed for them. The added recommendations to address fertility issues will improve their overall yields and profitability. The olive oil quality results will directly enable them to optimize their harvest time. This will ensure they are optimizing their oil yields and oil quality, which could increase their overall profits by 10-20%. This will also ensure their product will be at its best and will fetch a premium price. It would be premature to offer up an estimate of how much money this research will save/earn the growers. However, I can venture that instead of spending thousands for analytical testing to measure olive oil and moisture content, the new NIR method that was developed through the support of the block grant will save the growers roughly 80% of their analytical costs.

LESSONS LEARNED

One of the issues we faced during this process was lack of fruit set which negatively impacted the sampling of olives and possibly the quality of the fruits. There are numerous factors involved with fruit set, including cold degree days, late freezes, pollinator density, and physical movement of the pollen. Many of the issues we faced during these experiments were out of control and have yet to be thoroughly researched. I believe that more emphasis should be paid to achieving stable and high yields of olive fruit before there is any concern about the olive oil quality itself.

Furthermore, if we are to continue to expand the lab to assess the quality of oil (Phase 3) from olive fruits, the laboratory would need to either invest in a high-grade oil press or only accept pre-processed oils from growers. Using small grinders and tabletop presses does in no way emulate the oil extraction process used in larger facilities and will degrade the oil. This was not initially realized in the earlier stages of the experimental design, and thus, our oil results may have been negatively impacted which was out of our control.

CONTACT PERSON

Vicki Hughes, Georgia Olive Growers Association, georgiaolivegrowers@gmail.com,

Jason Lessl, University of Georgia Agricultural and Environmental Services Lab, jlessl@uga.edu

ADDITIONAL INFORMATION

Research cited: Saha U. and Jackson D. 2017. Analysis of moisture, oil, and fatty acid composition of olives by near-infrared spectroscopy: development and validation calibration models. *Journal of the Science of Food and Agriculture*, Volume 98, Issue 5, pp1821-1831.

PROJECT INFORMATION (#6)

Project Title	Sweet Georgia Peaches... Come and Get 'Em		
Recipient Organization Name:	Georgia Peach Council		
Recipient's Project Contact			
Name:	Duke Lane III		
Phone:	Enter the Project Contact's Phone Number.		
Email:	Enter the Project Contact's Email.		

PROJECT REPORT

Report Type:	Final Report (SUBMITTED in Dec. 2017 & ACCEPTED BY USDA on May 4, 2018)			
Reporting Period:	Start Date:	9/30/2015	End Date:	9/29/2018

PERFORMANCE NARRATIVE

PROJECT SUMMARY

Georgia is the only "Peach State", but over the generations we have not taken advantage of this reputation. Georgia peach farmers have allowed their peaches to become commoditized; meaning, they are not considered to be any different than any other peach and the price to be paid for them will be no better or worse than any other peach. In this case, the price will tend to trend towards the cost of production. After all, if the product choices are the exact same, then why pay more? The answer is that they are not the same. According to consumer surveys, peaches grown in Georgia are the "best tasting peaches" and consumers are willing to pay a premium for them. GPC recognized this need differentiate between Georgia peaches and all others in order to capitalize on this market advantage. Promoting Georgia Juicys and their fabulous flavor was the way to accomplish this; by giving GPC a tool to market, differentiate, and create specific demand, we aimed to then command more money for our Georgia growers.

PROJECT APPROACH

With the help of these grant funds, we created an extensive marketing campaign for Georgia Juicys including a unique logo, packaging, and website. All of these materials served as a pathway to break-away from the pack of bulk commodity peaches currently being sold in stores. Next we targeted a group of premium retailers who had a reputation for highlighting innovative marketing strategies. We aimed to partner with a single retailer in each geographical region so that each one could have exclusivity for the first-year launch of our Georgia Juicys marketing materials. In all, we targeted seven U.S. geographical regions: Southeast, Northeast, Mid-Atlantic, Great Lakes, Texas, Midwest and Heartland.

According to a recent survey conducted by the Perishables Group Marketing Service, Georgia-grown peaches have powerful brand recognition that extends beyond Georgia and the Southeast, providing a competitive

advantage in the marketplace. Because of a competitive environment, where 20+ states are commercially producing peaches during our peak month of July and August, grocery markets have many options from which to source summer peaches. GPC recognized a need to separate from the pack or be lost in it. The question was: How do we get consumers to choose a Georgia peach over other options? Part of the solution was provided in the above survey that revealed America's passion for Georgia Peaches.

Our *primary goal* was to create a marketing campaign titled "Georgia Juicys, Peaches Bursting with Flavor!" Taken from information provided in the above survey, our Georgia Juicys marketing campaign sought to capitalize on consumer preferences, as it would help differentiate our state's peaches from other's by highlighting key attributes. This would lead us to create Georgia-peach specific demand and help us accomplish our *second goal*, to improve the profitability and sustainability of farming Georgia peaches. Increasing demand specifically for Georgia peaches would also increase the returns realized by Georgia peach farms. The long term effects of this would help us accomplish our *third goal*, to encourage market share growth for Georgia peaches.

GOALS AND OUTCOMES ACHIEVED

Describe the activities that were completed in order to achieve the performance goals and measurable outcomes identified in the approved project proposal (and subsequent amendments, if applicable). If outcome measures were long term, provide a summary of the progress made towards these achievements. Provide a comparison of actual accomplishments with the goals established for the project period. Clearly convey completion of achieved outcomes by illustrating baseline data that was gathered and showing the progress toward achieving set targets. Highlight the major successful outcomes of the project in narrative AND quantifiable terms.

In early 2016, grower representatives from Georgia's five participating commercial peach farms visited retailers to line-up partners for the *Sweet Georgia Peaches, Come And Get 'Em* marketing campaign. Several of the retailers visited throughout the U.S. included Walmart, H-E-B, Hy Vee, Winn Dixie, Loblaw, Schnucks, Coborns, Lunds and Byerlys, Food City, Roundys, Redners, Harps, Fiesta Mart, AWG, and many others. Visits took place from February to April 2016. During these visits, several retailers agreed to participate in the promotional campaign during the upcoming 2016 summer harvest season: Winn Dixie (Florida), Hy Vee (Mid-west) and Fiesta Mart (Texas) wanted to see Georgia peaches featured on prominent billboards while Coborns, Schnucks, KVAT and Redners shared interest in a social media campaign.

Goal #1: Partner directly with retailers to implement our marketing plan:

- Performance measure: Increase participating retailers peach category sales dollars over the previous year
- Benchmark: previous year's sales dollars for participating retailers
- Target: 10% sales-dollar increase

Goal #2: Use this marketing campaign to improve the profitability and sustainability of farming Georgia peaches.

- Performance Measure: The amount of "extra" dollars that selling Georgia peaches under this marketing campaign brings to the Georgia peach industry.
- Benchmark: The price of Georgia peaches sold outside of the marketing.
- Target: Sell 2,500,000 pounds of Georgia peaches under the marketing campaign at a \$0.28 per pound premium for a total of an extra \$700,000 for the Georgia peach industry.

Results: For proprietary reasons, it was not possible to get actual sales data from retailers, though each of the participating retailers communicated verbally a “significant” increase in year-over-year sales dollars as a result of the campaign. These increases were seen in numbers reported by Georgia peach growers, who cited a 112,298 unit increase in boxes sold to the six participating retailers in 2016 versus 2015. It is important to note that two of the participating retailers were new customers in 2016. Growers also reported a 50,855 box increase in sales to existing retail customers in 2016 over 2015. Growers averaged \$19.86 per box sold to retailers participating in the promotional campaign versus \$15.27 for customers not participating in the campaign. This made for a difference (increase) of \$0.18 per lb. While this difference is short of the \$0.28 per pound goal that we set, the number of pounds sold through the program totaled 4,700,000, which far surpassed the proposed 2,500,000 pound goal. The increased volume of cartons sold (112,298) to participating retailers year-over-year, multiplied by the dollar amount per carton of participating retailers (\$19.86 per carton) versus customers that did not participate in the campaign (\$15.27 per carton) resulted in a \$515,447 net increase for Georgia peach farmers. Hopefully growers now recognize the value of collaborative promotional efforts and will continue to work together closely to further these efforts.

BENEFICIARIES

The most direct beneficiaries of this program were undoubtedly the growers of peaches in Georgia. It is a very tangible benefit to recognize a \$0.18/lb increase in sales dollars with participating retailers versus non-participating retailers.

Retailers who participated also benefited from the program: Most retailers calculate profits off of a percent of cost. A \$.18/lb higher return for growers is a direct result of a higher cost for retailers. Since sales increased, the higher cost of the product generated a higher profit for the retailers as well.

While consumers may have recognized a higher retail cost, better merchandising on the part of program participants led to increased sales and overall increased consumption of Georgia peaches; Consumers throughout the nation ate more Georgia peaches and enjoyed a superior product with all the healthy benefits of this nutritious fruit.

LESSONS LEARNED

While the bottom line of the *Sweet Georgia Peaches...Come and Get Em'* campaign was exceptional, there were a few challenges along the way. The biggest disappointment was the A-frame message shouter. We quickly recognized that floor space in produce departments is highly competitive and many retailers do not allow outside signage for fear of “cluttering the department.” Those that do allow for these types of displays need notice far in advance of execution time. Going forward, marketers for Georgia peach growers will get out in front of retailers with the A-frame signs and allow plenty of time for preparation and planning, or just use other types of signage.

It was evident that we found plenty of retailers willing to partner on Georgia peach promotions. However there were many that politely declined our offers. Reasons such as “corporate will not allow” to “let’s talk next summer” were often heard during our sales meetings. Recognizing that corporate executives need to be involved in programs this large, we invited executives to attend as many meetings as possible. This advance planning will be part of future retail marketing strategies.

One of our biggest challenges in reaching our stated goal of \$0.28/lb increase was a weak peach market. The summer of 2016 revealed one of the biggest peach crops that Georgia has seen in recent memory. The abundant supply of peaches and cheap pricing from peach suppliers in neighboring states made it difficult to achieve a \$0.28/lb price increase. The success found last summer provided valuable information as we entertain sales plans going forward.

CONTACT PERSON

Provide the name and email address of the person to be contacted if USDA has additional questions.

Duke Lane III

ADDITIONAL INFORMATION



PROJECT INFORMATION (#7)

Project Title	Promoting health benefits and product versatility of Georgia Pecans: A campaign to increase competitiveness		
Recipient Organization Name:	Georgia Pecan Growers Association		
Recipient's Project Contact			
Name:	Samantha McLeod		
Phone:	Enter the Project Contact's Phone Number.		
Email:	samantha@georgiapecan.org		

PROJECT REPORT

Report Type:	Final Report			
Reporting Period:	Start Date:	9/30/2015	End Date:	9/29/2018

PERFORMANCE NARRATIVE

PROJECT SUMMARY

At the time that this grant idea was originally developed (around 2014) the Georgia Pecan Growers Association was focused on increasing domestic demand for Georgia grown pecans to meet our then-robust supply. The nutritional research over the last 20 years consistently pointed to the health benefits not only of tree nuts, but specifically identified the significant antioxidant value of pecans. GPGA wanted to capitalize on the unique nutritional value of the nut by promoting and marketing this feature.

GPGA did not have any products or services at that time that were geared for children and young consumers. Because Georgia pecans are grown in Middle and South Georgia, which are federally-recognized areas of high poverty and rural communities, the impact of increased demand for Georgia pecans had the potential for long-term positive economic effects for this region and the state. Further, the availability of pecans and their nutritional information to children and their parents could also have long-range positive effects on health, hunger, food choices and decisions for current and future consumers. Thus, the grant proposed to create an activity book to be used with school children, as well as continued exhibition at that time for the Produce Marketing Association’s Fresh Summit international event.

The grant proposal was streamlined to include two specific objectives as follows:

Objective 1: Develop a children’s activity book that showcases the nutrition and versatile uses of the pecan, emphasizes healthy food choices, and promotes positive life-long eating habits and increased exposure of the pecan.

Objective 2: Create domestic demand for Georgia-grown pecans by promoting the health benefits of the nut and nut products at the annual Produce Marketing Association’s (PMA) Fresh Summit.

PROJECT APPROACH

The Work Plan as excerpted from the approved grant application was presented as follows:

Project Activity	Project Coordinator	Timeline
1) Exhibit at the 2015 PMA Fresh Summit	GPGA Executive Director coordinates along with Educational Assistant;	The event occurred Oct. 23-25, 2015 in Atlanta, Georgia
2) Children’s Coloring Activity/Product: A coloring book featuring pecans and healthy food choices needs to be developed and printed.	GPGA Executive Director coordinates along with Educational Assistant.	Coloring book development would occur during first and second quarter of 2016 with distribution available beginning in Summer and Fall of 2016 (October begins harvesting season for Georgia pecans, so coordinating activities would be appropriate to occur then.)

To achieve the first project activity, GPGA completed an exhibit in October 2015 at PMA’s Fresh Summit on schedule with the work plan. Because the venue was in Atlanta, Georgia that year, it provided a unique opportunity for exhibiting Georgia pecans and pecan products over a three-day period. The annual PMA Fresh Summit Trade Show always draws significant attention to the Georgia Pecan Booth and 2015 was no different. GPGA logged

over 500 visits (original benchmark) to our booth that included recipe and cooking demonstrations, dissemination of nutritional and product information, along with distribution of product promotional items and purchasing information from Georgia pecan suppliers.

To achieve the second project activity, GPGA contracted with Langston Communications to create an 8-page children’s activity book with help from pecan experts. The book was additionally expanded to 12-pages in total length at no additional development cost. The book provides information through games and activities that highlight the importance and history of the pecan in Georgia, as well as its nutritional benefits, and includes healthy, kid-friendly pecan recipes. GPGA originally printed 15,000 of these books to use for distribution to school districts and at exhibits where children would be present. In 2018, nearing the end of the grant cycle, remaining budget funds were approved in order to print additional books in the amount of \$1,952.96. Distribution began on schedule with the work plan in Fall of 2016, with the most significant ‘push’ for distribution occurring in 2017 and the beginning of 2018.

GOALS AND OUTCOMES ACHIEVED

- Project Activity 1: Exhibit at the 2015 PMA Fresh Summit

Objective: Create domestic demand for Georgia-grown pecans by promoting the health benefits of the nut and nut products at the annual Produce Marketing Association’s (PMA) Fresh Summit.

Result:

GPGA logged 765 visits (*original benchmark was 500*) to our booth that included recipe and cooking demonstrations, dissemination of nutritional and product information, along with distribution of product promotional items and purchasing information from Georgia pecan suppliers.

PMA Booth Attendance		PMA Survey Completion	
2014 Benchmark	2015 Results (obtained and recorded by hand counter machine)	2014 Benchmark	2015 Results
500	765	27	56

Surveys were available to booth attendees to complete in order for much-needed feedback. Overall, the completed 2015 surveys were highly favorable for questions related to increasing knowledge and expected future use of pecans. However, as a result of the responses, we adjusted the survey questions for our exhibit at the 2017 PMA in order to try to attain more specific and useful information for GPGA’s future marketing purposes. Since

this SCBG support in 2015, GPGA has been able to continue attending PMA using grower-supportive funding and thus the 2017 and 2018 PMA events for GPGA have been self-funded.

- Project Activity 2: Children’s Coloring Activity/Product: A coloring book featuring pecans and healthy food choices needs to be developed and printed.

Objective: Develop a children’s activity book that showcases the nutrition and versatile uses of the pecan, emphasizes healthy food choices, and promotes positive life-long eating habits and increased exposure of the pecan.

Result:

Coloring book ([LINK](#)) development occurred during first and second quarter of 2016 with distribution available beginning in Fall of 2016 and continuing through the beginning of Fall 2018 before the official grant cycle ended. Books were distributed as follows:

- 1) Large-scale reach: Initial book distribution at non-school venues began as soon as the books were available at “exhibits where children are present,” as described in the grant proposal. GPGA made these books available at large agri-tourism sights (as the popularity of the agri-tourism industry continues to explode throughout Georgia - particularly in Fall and Spring seasons) as well as at our large pecan growers’ retail establishments (at no cost to consumers). GPGA distributed the books at all events where GPGA exhibited or marketed Georgia pecans. We were also able to distribute them locally, and upon request, at special events and through connections made by our state Board of Directors. We distributed approximately 3,500 (or about ¼) books through these avenues.
- 2) Targeted reach: We used social media blogs to connect with Georgia ag education teachers (GaAgShare) to reach this group of educators. We distributed approximately 5,000 (or one-third) of books through these connections, which got the books directly into the classroom and/or hands of schoolchildren. This distribution occurred in the following Georgia county school systems:

North Georgia: Elbert, Gordon, Habersham

Atlanta Metro: Fayette

Central and South Georgia: Colquitt, Harris, Houston, Lee, Liberty, Long, Tattnall, Toombs, Tift, Wilcox

Other Georgia Metro: Bibb, Albany/Lee Co/Dougherty Co.

Outside Georgia: Additional requests outside of Georgia came from Strawberry, Arkansas, McHenry, Illinois, and Midland City, Alabama, where we sent a limited number of books to ag teachers here who used them with their high school students to develop specialty crop educational curriculum for elementary education.

Special Needs: We provided books to special education classrooms at Elbert County Middle School (Elberton) and Bradwell Institute (Hinesville) whose ages exceed the

expected range of the book's activities, but whose developmental abilities are on par with the book.

- 3) Community outreach: We partnered with the Georgia Museum of Agriculture and Historic Village (located in Tifton, Georgia) to provide activity books to school systems that use the Museum for field trips through the Museum's "Destination Ag" school program. Our first distribution occurred in February 2018 during a field trip with two schools in Colquitt County in which we provided 260 books. Since then, the Museum requested 500 more books for distribution. The second Destination Ag event occurred with Tift County on April 27, 2018, where we reached approximately 300 third graders with 45 minutes of pecan activities and a presentation using the books in the classroom setting. This project coincided with April as National Pecan Month.

We partnered with Georgia Farm Bureau offices throughout the state to distribute with schools at their back to school events in 2018, as well as their 2018 spring and fall annual Ag Days or Farm Days.

BENEFICIARIES

The project was intended to solely benefit Georgia pecans as a specialty crop and our demonstrations and activity books only highlighted Georgia pecans and pecan products.

Beneficiaries of the grant activities included approximately 9,000 schoolchildren who received the activity books and more than 700 attendants to the PMA Fresh Summit who received Georgia pecan information.

LESSONS LEARNED

- 1) The grant was originally proposed and developed so that GPGA might get the activity books directly into school classrooms and be able to use the books as part of curriculum presented directly to children from GPGA staff.

Lesson Learned: Due to the stringency of state criteria curriculum, nut allergies, and individual school policies, as examples, we were unable to use this particular route for activity book distribution, with the exception of schools in Tift and Colquitt counties. This challenge led us to evaluate our distribution methods and goals and, in line with the grant, GPGA essentially developed three methods for distribution. Also, due to the age of minors using the books, we were not able to actually survey the children for evaluative feedback about the books. Instead, we had to work through the teachers or adults using the books with the children for feedback.

Adjustments/Solution: As discussed in a previously, GPGA used three different avenues for book distribution when we couldn't get directly into school curriculum. Our efforts were focused into three channels – 1) large scale reach, 2) targeted reach and 3) community outreach.

Some of the larger retail pecan establishments in the state were able to provide and distribute the activity books as part of their agri-tourism efforts and GPGA also distributed the books ourselves at multiple events (Large scale reach).

In Tift and Colquitt counties, GPGA staff was able to present pecan lessons and books for 30-45 minute increments because these school systems have “Ag in the Classroom” enrichment efforts and GPGA staff had personal contacts in the systems that were willing to work with us. Otherwise, the distribution channels that GPGA used to get the activity books directly into the classroom were through elementary, middle and high school agriculture teachers who worked with students in elementary classrooms (Targeted reach).

Additionally, the Georgia Museum of Agriculture and local Georgia farm bureau chapters were instrumental in book distribution through their established relationships and events with schools throughout the state. Farm Bureau distributed the books at their back to school events, as well as at their spring and fall annual Ag and Farm Days, and also used the books when fulfilling requests from 4-H and FFA chapters. The Georgia Museum of Agriculture, located in Tifton, Georgia, has an extensive “Destination Ag” program that hosts thousands of school children from middle and South Georgia on field trips throughout the year and this avenue was a highly successful way to present the activity books and pecan lessons. GPGA considered these avenues as the third method of distribution (Community Outreach).

- 2) The grant generated such interest among ag teachers and farm bureau, GPGA continues distributing remaining books on a weekly basis to fulfill requests for books.

Lesson Learned: Reaching out to ag teachers through social media, as well as working with farm bureau, has led to continued distribution of the activity books beyond the end of the grant cycle. In just the week leading up to the grant report, for example, GPGA received a request from Toombs county for 300 additional books and GPGA is also receiving requests from private businesses who would like to keep the books in their waiting rooms (dentist, doctor offices, insurance agencies for free distribution to their patients).

The popularity of the books has been more than anticipated and GPGA is evaluating another printing cycle for the books in order to continue our efforts serving children. We additionally purchased small packs of crayons (not charged to SCBG) to accompany each of the books, which has been a valued addition for rural distribution and in schools with limited resources.

CONTACT PERSON

Provide the name and email address of the person to be contacted if USDA has additional questions.

Samantha McLeod as listed above; samantha@georgiapecan.org

Amy Howell at amy@georgiapecan.org

ADDITIONAL INFORMATION



PROJECT INFORMATION (#8)

Project Title	Smartphone Apps for Scheduling Irrigation in Four Specialty Crops
Recipient Organization Name:	University of Georgia Research Foundation
Recipient's Project Contact	
Name:	George Vellidis
Phone:	Enter the Project Contact's Phone Number.
Email:	yiorgos@uga.edu

PROJECT REPORT

Report Type:	Final Performance Report			
Reporting Period:	Start Date:	9/30/2015	End Date:	9/29/2018

PERFORMANCE NARRATIVE

PROJECT SUMMARY

Proper irrigation scheduling provides many benefits to fruit and vegetable growers including optimal crop growth, better utilization of nutrients, higher yields, and reduced susceptibility to pathogens. However, irrigation scheduling based on crop water needs has not been widely adopted because reliable and easy-to-use scheduling tools are not available. For irrigation scheduling tools to be widely adopted, they must be easy-to-use, cheap, provide the users with actionable information when irrigation is required, and be readily accessible from mobile devices. Smartphone uses by farmers is now ubiquitous. Smartphone applications or Apps for scheduling irrigation are an emerging technology with great potential for helping growers improve water management efficiency as well as the overall profitability of the farm operation. Our project's goal was to develop and make smartphone-based irrigation scheduling Apps available to Georgia's fruit and vegetable growers to ensure that they benefit from the competitive advantage this technology offers. To achieve our goal, we pursued the following specific objectives:

1. Modify and evaluate the SmartIrrigation Vegetable App (tomato, cabbage, and watermelon) for Georgia growing conditions.
2. Develop and evaluate a SmartIrrigation Blueberry App for mature highbush blueberry.
3. Promote the Apps and train fruit and vegetable growers to use them.

The SmartIrrigation Vegetable App and SmartIrrigation Blueberry App can be downloaded from links provided at www.smartirrigationapps.org. They are available for iOS and Android operating systems and can be downloaded directly from the iOS App and Google Play stores by searching for SmartIrrigation.

PROJECT APPROACH

The project approach is described by objective.

Objective 1 – Modify and evaluate the SmartIrrigation Vegetable App for Georgia growing conditions.

Two concurrent studies were conducted during Year 1 (2016 spring growing season) and Year 2 (2017 spring growing season) at the Tifton Vegetable Park located at the University of Georgia's Tifton Campus to test the efficacy of SmartIrrigation Vegetable App (Vegetable App) in tomato and watermelon. Mr. Luke Miller, a Master's graduate student in Horticulture, conducted the studies under the supervision of Dr. Timothy Coolong and Dr. George Vellidis. Three irrigation treatments were imposed on each crop. The three treatments consisted of scheduling based on the Vegetable App, a checkbook or calendar method (control) which best represents the method used by most vegetable growers, and a soil moisture sensor-based (SMS) irrigation method that used automated tensiometers programmed to irrigate when a specified soil moisture threshold was reached. The threshold was expressed in soil matric potential in units of kPa. The effects of irrigation scheduling were measured on fruit quality, yield and water use. In 2017, frequent rainfall led to excessively wet field conditions for prolonged periods of time, which diminished the amount of irrigation that was applied over the season in both studies. This led to skewing of the water usage data for irrigation scheduling treatments compared to the previous season. Select tomato plots suffered from blossom end rot, stinkbug and spider mite damage that resulted in loss of marketable yield in these plots. The details of each experiment were described in the annual reports.

The results from the study were promising. In both tomato and watermelon the Vegetable App produced yields that were equal to or exceeded the control (checkbook method), while using less water. The results from the two-year study of watermelon indicated that the Vegetable App used 22% less water than the checkbook method and produced equal yields to the SMS method. The results from the two-year study on tomato indicated that use of the Vegetable App resulted in 21% less water use than the checkbook method. Tomato yields were maximized under the Vegetable App generating 18% greater yield than the checkbook method and 2% more than the SMS method. Tomato quality was not significantly affected in either year based on irrigation treatments. Our goal was to reduce water use by an average of 25% and are very pleased to have achieved an average reduction of 22%. The average reduction may have been higher but irrigation was suspended for two weeks during June 2107 because of heavy rains thus reducing the advantage of the Vegetable App.

An experiment to test the efficacy of the Vegetable App in cabbage was conducted at the University of Georgia's Stripling Irrigation Research Park (SIRP) during the winter of 2017-2018. In Georgia, cabbage is typically irrigated using overhead sprinkler irrigation. At SIRP, the cabbage was irrigated with a linear-move overhead sprinkler irrigation system. Irrigation was scheduled using the same methods as described for tomato and watermelon. Unfortunately high disease pressure during the growing season severely damaged the cabbage crop. Consequently, results from the study could not be used to assess the efficacy of the Vegetable App in cabbage.

Modification of the days after planting (DAP) approach the Vegetable App uses to a growing degree day (GDD) approach was not necessary because of excellent performance. Modifications to the SmartIrrigation Vegetable App user interface were made by the App's programmer based on our observations to increase usability and functionality.

Our overall conclusion was that the SmartIrrigation Vegetable App is an effective irrigation scheduling tool for tomato and watermelon in Georgia. It results in lower water use and higher yields for both crops.

Objective 2 – Develop and evaluate a SmartIrrigation Blueberry App for highbush blueberry.

The development of the Blueberry App began by evaluating the applicability of a crop coefficient (Kc) curve developed for blueberry by the University of Florida. The evaluation was conducted by Dr. Vasileios Liakos, Dr. Erick Smith, and Dr. George Vellidis at the University of Georgia's Blueberry Farm near Alapaha, Georgia, beginning March of 2016. Two blueberry varieties planted in the summer of 2014 were used for the study. The varieties were 'Suziblue' (southern highbush blueberry) and 'Vernon' (rabbiteye blueberry). Different blueberry mulching methods were also incorporated into the study. Three irrigation scheduling treatments were compared for each cultivar: a farmer-standard treatment that applied approximately 1 in of water per week in one irrigation event, a SMS method with which irrigation was triggered when soil water tension exceeded 10 kPa, and our prototype Blueberry App model that incorporated the Florida Kc curve. The SMS with the 10 kPa threshold was the benchmark against which the Blueberry App model was calibrated. The Blueberry App model used weather data from the Georgia Automated Environmental Monitoring Network (GAEMN) to calculate evapotranspiration (ET) based on the Kc curve. The model was used to develop a root zone soil moisture balance. When root zone soil moisture was depleted by approximately 20%, irrigation was triggered. Twenty percent soil moisture depletion coincides with a soil water tension of 10 kPa. The soil water balance approach requires that the soil type be accurately identified so that the soil water holding capacity can be estimated. Details of the experimental design was provided in the annual reports.

At the end of the Year 1 growing season, the irrigation treatments were compared and we found that the soil moisture history of the Blueberry App model matched the SMS method closely and that both maintained soil moisture consistently in the soil profile while the farmer standard method resulted in large fluctuations between wet and dry soils. This indicated that the Blueberry App model was robust. However, the soil

moisture data also indicated that mulching methods that incorporated bark or other materials into the soil profile made it very difficult to estimate the soil profile's water holding capacity and the decision was made to switch to an ET replacement model rather than a soil water balance model for the Blueberry App. The study was repeated during Year 2 to confirm the results. Consecutive years of frost damage prevented us from comparing yields resulting from the different irrigation methods so the study was repeated for a third year. Yield results will be available in the early summer of 2019.

In February 2018, a beta-testing version of the Blueberry App was made available on both iOS and Android smartphone platforms (Figure 1). On-farm evaluations with two Georgia blueberry growers began in the spring of 2018. On both farms, the growers dedicated one drip irrigated block that was irrigated based on Blueberry App recommendations. The effectiveness of the Blueberry App will be evaluated by comparing water use, yield, and quality of the App-irrigated block to an adjacent block irrigated by the grower's standard method. Soil moisture sensors were installed in both blocks to quantify soil moisture conditions. Irrigations were still ongoing as of the writing of this report so overall water use data during 2018 are not yet available. The comparison will continue into 2019 and yields will be compared during the 2019 harvest. Following harvest, the Blueberry App's performance will be assessed, improvements will be incorporated, and the SmartIrrigation Blueberry App will be released for public use by summer of 2019.

Objective 3 – Promote the Apps and train fruit and vegetable growers to use them.

- Two journal articles were published in HortTechnology describing the evaluation of the Vegetable App for tomato and watermelon. HortTechnology serves as the primary outreach publication of the American Society for Horticultural Science. Its mission is to provide science-based information to professional horticulturists, practitioners, and educators. The citations of the publications are given at the end of the report.
- Presentations describing the Vegetable App and the results of the study were made by Dr. Timothy Coolong at multiple University of Georgia County Extension meetings during the winter of 2018.
- Poster and oral presentations of the results of the Vegetable App study were made by Mr. Luke Miller and Dr. Timothy Coolong, at the American Society for Horticultural Science Conference in 2016, 2017, and 2018.
- A poster describing the Blueberry App was presented by Drs. Vasileios Liakos, Erick Smith, and George Vellidis at the 2018 Southeast Regional Fruit and Vegetable Growers Conference (Figure 2).
- Dr. Erick Smith will make presentations about the Blueberry App at multiple University of Georgia County Extension meetings during the winter of 2019.
- We are in the process of developing multimedia tutorials for the SmartIrrigation Vegetable and Blueberry Apps. The Vegetable App tutorial will be available by Spring 2019 while the Blueberry tutorial will be available when the Blueberry App is released in 2019.

GOALS AND OUTCOMES ACHIEVED

The Measurable Outcomes (MO) included in the approved project proposal are listed below in bulleted format. The activities which were completed in order to achieve these MOs are described below each measure.

- **MO 1** – Kc curves accurately reflect crop water use during each phenological stage of crop growth.
 - Plot studies were conducted to evaluate the Vegetable App for tomato, watermelon, and cabbage at two locations in Georgia over three years. Using the SmartIrrigation Vegetable App results in lower

water use and higher yields for both tomato and watermelon. Our goal was to document reductions in water use by an average of 25% and are very pleased to have achieved an average reduction of 22% for watermelon and 21% for tomato. The average reduction may have been higher but irrigation was suspended for two weeks during June 2107 because of heavy rains thus reducing the advantage of the Vegetable App. Nevertheless, this is a *significant* improvement over current methods used by most vegetable growers.

- High disease pressure during the growing season damaged the cabbage study. Consequently the results from the study could not be used to assess the efficacy of the Vegetable App in cabbage so no assessment is available for this crop.
- **MO 2** – Higher usability and functionality for the Vegetable App and **MO 3** – Functional Vegetable App adapted to Georgia conditions.
 - Modifications to the SmartIrrigation Vegetable App user interface were made by the App’s programmer based on our observations to increase usability and functionality. Based on our field evaluations of tomato and watermelon, the Vegetable App is fully functional and adapted to Georgia conditions. Because of problems with the cabbage study, we were not able to assess the Vegetable App’s functionality for cabbage.
 - For tomato, the Vegetable App resulted 21% less water being used and 18% greater yield than the grower-standard checkbook method *significantly improving water use efficiency*.
 - For watermelon, the Vegetable App resulted 22% less water being used and equal yields to the grower-standard checkbook method *significantly improving water use efficiency*.
 - This MO also has a long-term aspect as widespread adoption of new technologies may take as long as 10 years. We have conducted and continue to conduct a wide spectrum of outreach activities designed to develop awareness and promote adoption of the Vegetable App by Georgia growers. These activities include presentations at scientific, industry, and grower meetings as well as publications designed to reach a wide audience. In addition, we are in the process of developing an online tutorial for the Vegetable App. Adoption metrics will be downloads of the Vegetable App by users and registration of user fields in Georgia. These metrics will be provided annually by smartphone app programmer.
- **MO4** – Release of App; blueberry growers have access to low-cost, effective irrigation scheduling tool and **MO5** – Functional Blueberry App adapted to Georgia conditions
 - The Blueberry App is now under beta-testing with blueberry growers. Irrigation scheduling with Blueberry App results in more uniform daily soil moisture distribution in the soil profile when compared to most methods growers used to irrigate. The Blueberry App also provides users with actionable information on when to irrigate during periods of low ET when most growers are unsure about whether they should irrigate or not. Freeze damage to blueberry plots during the winters of 2017 and 2018 prevented comparisons of yields and thus water use efficiency assessments are not available.
- **MO 6** – Wide-spread awareness of the Apps and **MO 7** – Vegetable and blueberry growers trained to use the Apps
 - Efforts to promote adoption of the Blueberry App began in 2018 with presentations at industry meetings and will continue in 2019 with presentations at county Extension meetings. This MO also has a long-term aspect as widespread adoption of new technologies may take as long as 10 years. Adoption metrics will be downloads of the Blueberry App by users and registration of user fields in Georgia. These metrics will be provided annually by smartphone app programmer.

- Grower training activities have taken place and will continue to take place in a variety of settings including during farm visits, county Extension meetings, industry workshops, and from online tutorials.

BENEFICIARIES

Proper irrigation scheduling provides many benefits to fruit and vegetable growers including optimal crop growth, better utilization of nutrients, higher yields, and reduced susceptibility to pathogens. Potential beneficiaries of this project are ***all vegetable and blueberry growers in Georgia who adopt and use*** the SmartIrrigation Vegetable App and the SmartIrrigation Blueberry App, respectively.

The potential impact is large for Georgia vegetable growers because for tomato the Vegetable App resulted in 21% less water being used and 18% greater yield than the grower-standard checkbook method ***significantly improving water use efficiency***.

For watermelon, the Vegetable App resulted 22% less water being used and equal yields to the grower-standard checkbook method ***significantly improving water use efficiency***.

The SmartIrrigation Vegetable App has 2102 users from the date of its release through January 2019. Of those users, 1758 are using iPhones while 344 are using Android smartphones. The SmartIrrigation Blueberry App is still in beta-testing and has not yet been released to the public.

LESSONS LEARNED

Freezes in consecutive years delayed the development of the Blueberry App as we were not able to evaluate yield response of the scheduling irrigation with the App prior to on-farm testing with growers. Likewise, disease problems with cabbage prevented us from evaluating the Vegetable App for use with cabbage in Georgia. The lesson learned here was that our proposal timetable did not take into account potential problems associated with real-world production. Contingency plans were developed as problems arose. It may would have been helpful to have contingency plans included in the proposal.

CONTACT PERSON

Provide the name and email address of the person to be contacted if USDA has additional questions.

Dr. George Vellidis, Professor
Crop and Soil Sciences Department
University of Georgia
2360 Rainwater Road
Tifton, GA 31793-5766

ADDITIONAL INFORMATION

- www.smartirrigationapps.org (Figure 3) is the website from which the apps can be downloaded and where tutorials and other information are available.
- Published journal articles
 - Miller, L., G. Vellidis, Mohawesh, O, Coolong, T. 2018. Comparing a smartphone irrigation scheduling application with water balance and soil moisture-based irrigation methods: Part I—Plasticulture-grown tomato. HortTechnology 28(3):354-361. <https://doi.org/10.21273/HORTTECH04010-18>

- Miller, L., G. Vellidis, Coolong, T. 2018. Comparing a smartphone irrigation scheduling application with water balance and soil moisture-based irrigation methods: Part II—Plasticulture-grown watermelon. HortTechnology 28(3):362-369. <https://doi.org/10.21273/HORTTECH04014-18>

Figure 1. Screenshots of the Blueberry SmartIrrigation App which is currently being evaluated by blueberry growers in Georgia.

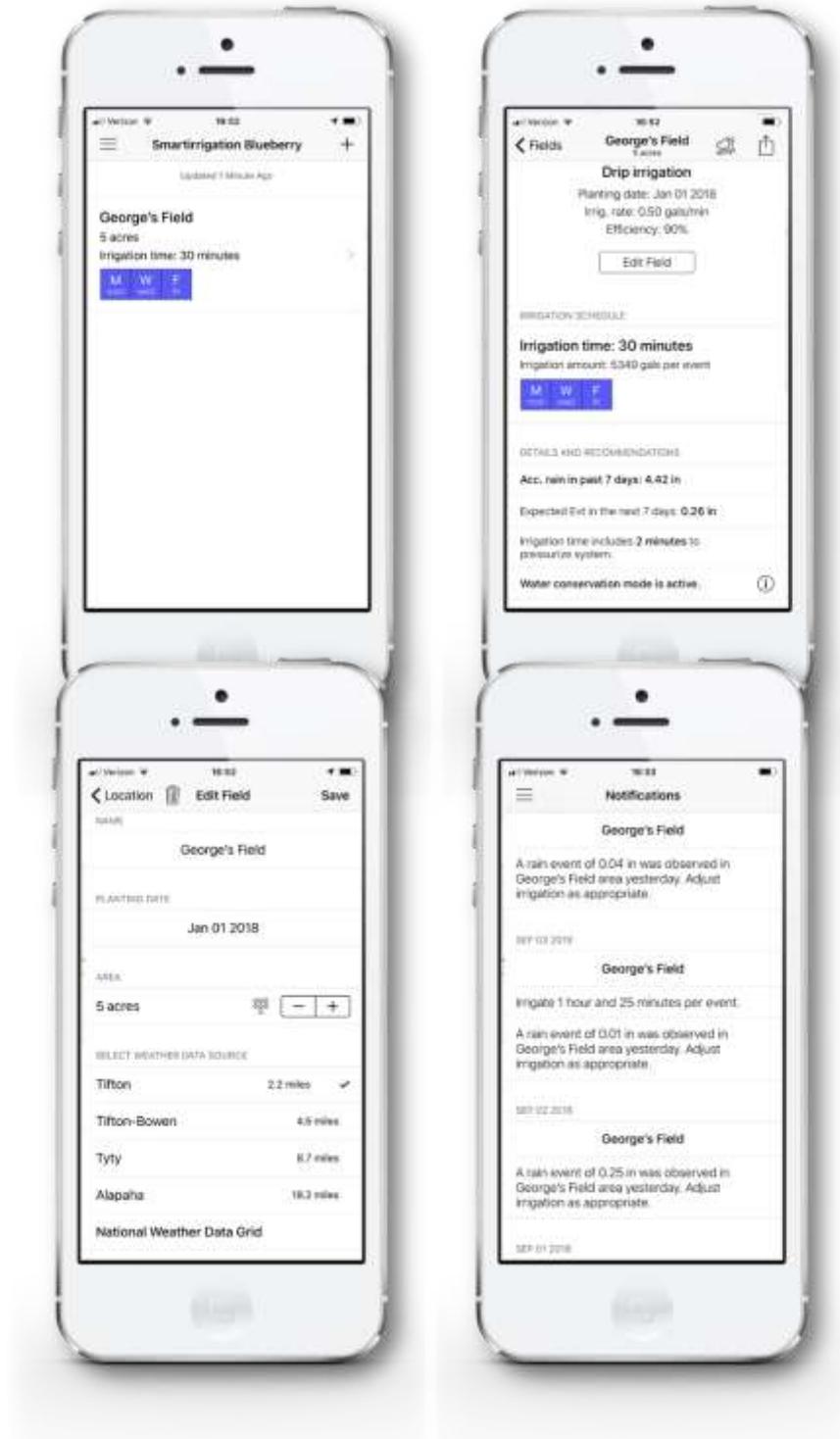


Figure 2. Poster presented at the 2018 Southeast Regional Fruit and Vegetable Growers Conference.



Development of a SmartIrrigation App for Blueberry

Vasileios Liakos¹, Erick Smith², and George Vellidis¹

¹Department of Crop and Soil Science, University of Georgia, Tifton, GA, USA
²Department of Horticulture, University of Georgia, Tifton, GA, USA



Introduction

Irrigation is one of the most important factors in growing healthy blueberry plants. Proper irrigation is essential in avoiding problems associated with water stress. Excessive irrigation can lead to root rot disease. For this reason there is a high demand for developing new irrigation practices and tools to improve Irrigation Water Use Efficiency (IWUE). The use of irrigation scheduling methods with common mobile devices will certainly improve the IWUE of irrigation (Vellidis et al. 2016). Moreover, producers will be able to access to information anytime, and anywhere, through their mobile devices.

Project Objectives

- Develop low cost and maintenance free SmartIrrigation App for blueberry.
- Compatible with iOS and Android.
- Notify users with the most accurate, viz: specific, real-time and forecast information (Figure 2, Figure 4).
- Collect soil water tension data to understand the plants' water needs.
- Evaluate IWUE of the app.

Water Balance Calculations*

- A simplified water balance model requiring minimum inputs such as: field capacity, reference evapotranspiration (ET₀), rooting depth, rainfall and irrigation system characteristics (Figure 2).
- Crop evapotranspiration (ET_c) was estimated by multiplying a crop coefficient (K_c) times the ET₀. Develop new K_c curve for blueberries (Figure 3).
- Connection of the App with the Georgia Weather Network (GWN), the Florida Automated Weather Network (FAWN) and National Oceanic and Atmospheric Administration (NOAA).

*See Figure 2.

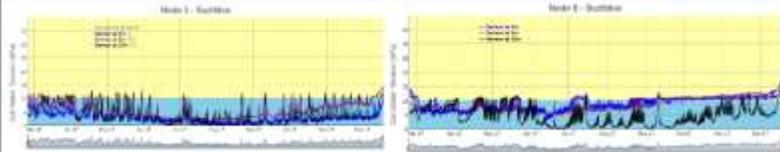


Figure 1. Soil Water Tension (SWT) graphs of two irrigation treatments. Low SWT equals greater levels of soil moisture. Node 1 was receiving irrigation based on the SmartIrrigation Blueberry App's model while node 2 was receiving 1 inch of water every week – a common irrigation strategy adopted by blueberry farmers in Georgia.

Discussion

- The SmartIrrigation Blueberry App (App) is designed for site specific irrigation through registration of each irrigation zone.
- Current input of field location is linked to continuous downloads of daily weather data from the closest weather station and/or from NOAA (Figure 4).
- The App model maintains higher soil moisture compared to the Farmer irrigation treatment (Figure 1). Both treatments used 1 inch of water per week. Only application timing was different.
- In 2016, yield in App treatment was lower, but not significantly, than the rest of the treatments (Table 1).
- In 2017, the plants irrigated with the App model had sufficient canopy volume and received PAR into the canopy. However, late spring freeze damaged the crop (Table 1).
- Soil water deficit (SWD) was noted at 20% moisture loss, which was a soil water tension (SWT) of 10 kPa.

Conclusions

- The App model is comparable to standard recommendations for irrigation (Table 1).
- Users of similar apps find them easy to use, which suggests blueberry growers can also easily adopt the tool.
- Ease of use can remove guess work for blueberry irrigation.
- The App can be used over varying environmental conditions and soil types.

Experiment with SmartIrrigation App for Blueberries

- Location: University of Georgia Blueberry Farm, Athens, GA.
- Years: 2016 and 2017.
- Objective: Compare the yield, irrigation rates and water use efficiency among: a) Farm managed at ~ 1.0 acre/inch per week, b) Blueberry App model, and c) Maintaining constant 10 kPa throughout irrigation season.
- 3 repetitions for each scheduling method.
- 2 cultivars, Suzblue (southern highbush) and Vernon (rabbiteye).
- Single line drip irrigation.
- Solenoid valves were used to control the irrigation of each bed.

References

G. Vellidis, V. Liakos, J.H. Aulrich, C.D. Perry, W.M. Porter, I.M. Barnes, K.T. Morgan, C. Frazer, K.W. Migliaccio 2016. Development and assessment of a smartphone application for irrigation scheduling in cotton. Computers and Electronics in Agriculture, 127, 249-259.

Results

Table 1. Performance of the Blueberry App compared to other irrigation scheduling treatments. Properties with the different grouping letter are significantly different at P<0.05, LSD.

Year	Scheduling Method	'Suzblue'			'Vernon'		
		Volume m ³	Active Radiation umol	Total Yield Kg	Volume m ³	Active Radiation umol	Total Yield Kg
2016	Farm Managed	1.10 ^a	-	2.05 ^a	3.17 ^{bc}	-	1.18 ^a
	App	0.83 ^b	-	1.74 ^b	2.14 ^b	-	0.96 ^b
	Constant	0.83 ^b	-	2.23 ^a	4.33 ^a	-	1.37 ^b
2017	Farm Managed	3.57 ^a	1126.8 ^a	-	6.23 ^a	1037.5 ^a	-
	App	3.73 ^a	956.3 ^a	-	6.10 ^a	1809.8 ^a	-
	Constant	3.73 ^a	362.5 ^a	-	5.68 ^a	1565 ^a	-



Figure 2. A conceptual schematic of the app's model.



Figure 3. Crop Coefficient graph at 2017.



Figure 4. Future Blueberry App's features.



UNIVERSITY OF GEORGIA
College of Agricultural & Environmental Sciences

smartirrigationapps.org

Contact Information

Name: Vasileios Liakos
Phone: 229 386 5377
Email: vliakos@uga.edu

Page | 50

Figure 3. The SmartIrrigation Apps website from which the apps can be downloaded and where tutorials and other information are available.



PROJECT INFORMATION (#9)

Project Title	V is for Vidalia		
Recipient Organization Name:	Vidalia Onion Committee		
Recipient's Project Contact			
Name:	Bob Stafford		
Phone:	NA		
Email:	bstafford@vidaliaonion.org		

PROJECT REPORT

Report Type:	Final Report (SUBMITTED in Dec. 2017 & ACCEPTED BY USDA – May 4, 2018)			
Reporting Period:	Start Date:	9/30/2015	End Date:	9/29/2018

PERFORMANCE NARRATIVE

PROJECT SUMMARY

For the 2016 season, the Vidalia Onion Committee continued the “V” campaign with the theme of “V*Inspired” which featured a more authentic voice focusing on the growers, our new spokespersons, Whitney Miller and Chef Lucas Hobbs and promotional events in targeted cities.

In keeping with this theme, the growing process was showcased on the VOC’s social media sites from field to table using video and photography to educate consumers on where and how Vidalia onions are grown. Social media fans were highly engaged with learning about the grower process and the social media posts reached 23,688 consumers.

Whitney Miller developed a series of southern recipes with a modern twist and highlighted Vidalia onions on her social media sites. During the season, she made several guest appearances on the on the Vidalia Onion Committee’s Facebook page reaching 131,355 consumer impressions. In addition, her recipes were included on a POS tear-off pad for retailers to use in-store.

The VOC partnered with 13-year old Chef Lucas Hobbs who was diagnosed with Hodgkin’s Lymphoma in January, 2015. When the Make-A-Wish Foundation asked Lucas for his wish, he requested a food truck to feed the doctors, nurses who cared for him along with the pediatric cancer patients he recovered with. His food truck events in Minneapolis garnered national attention and helped feed thousands.

Chef Lucas joined the VOC, along with the National Turkey Federation, on the road this past summer with food truck events in Minneapolis and Nashville. The food truck events were featured on local media (CBS, NBC and ABC stations) with an estimated total media reach of 1.1 Million.

PROJECT APPROACH

The VOC hosted dinner events with food bloggers and media contacts in New York, Minneapolis and Nashville. The food bloggers combined total reach was 739,697 consumers. The bloggers posted these dinners on their social media sites resulting in 44 total posts via Instagram, Twitter and Facebook with estimated reach of 118,413 consumer impressions.

We also provided new educational tools and resources for supermarket retailers based on feedback provided in a 2015 trade survey. This included a Best Practices Guide to Merchandising Vidalia Onions and a Resource Guide for Supermarket Dietitians. We received positive feedback from retailers especially supermarket dietitians who requested a field tour in 2017. In addition, we continued our seasonal crop report which was distributed to over 670 retail and foodservice contacts across the US.

GOALS AND OUTCOMES ACHIEVED

Some of our goals were to grow consumer website users with our target demographic age group (26-45) and also through social media. First we wanted to understand our audience (consumers and retailers). We surveyed 1,000 consumers from the Southeast, Mid Atlantic, Midwest and Northeast Regions. Focusing on the primary household shopper and key decision makers in grocery stores (VP of Produce, category manager, merchandiser and managers.)

What we learned is that the Vidalia brand power is starting to decline:

- Vidalia onions are the favored brand with 71% of consumers surveyed. In 2011 that percentage was 76%.
- 25% do not have a preference.
- A third of consumers would be willing to pay more for their favorite sweet onion while 37% are neutral. *In 2010, 83% would have been willing to pay more for their favorite while only 5% disagreed compared to 24% today.*

Younger millennial consumers are the reason because they are the least familiar with Vidalia onions, and they are least likely to pay more for their favorite sweet onion.

Quality is a concern:

- Sweet is the key term that comes to mind when Vidalia onions are mentioned among 63% of consumers followed by taste/flavor (51%)
- Retailers notes quality issues:
- Sometimes too mild as far as flavor. Sweet is good, but they need to taste like an onion.
- A nice large Vidalia is a great onion during the summer, but also has been difficult to achieve in the past couple of years.
- Main concern is at the beginning of the season, not starting too early and having onions that are not completely dried which results in real problems.

We also learned that Millennials want to engage with brands on social networks (*68% say that if a brand engages with them on social networks, they are more likely to become a loyal customer.*) Millennials are also more likely to review blogs before making a purchase (*33% rely mostly on blogs before they make a purchase, compared to fewer than 3% for TV news, magazines and books.*)

Whitney Miller: To accomplish our goal in reaching that younger generation we wanted to have a major emphasis on social & digital media. To do that we wanted to have a millennial spokesperson so we chose Whitney Miller. Whitney was the youngest contestant and winner of Fox's first *America's MasterChef*. Whitney is also a cookbook author and blogger. She has been featured in many TV cooking shows and in magazines. At the time Whitney's social media stats were:

- 59,300 Facebook followers
- 160,000 Pinterest followers
- 8,000 Twitter followers

While featuring Whitney Miller on our social media she did a Facebook takeover, posted recipes and gave cooking tips. Reaching over 131,355 consumer impressions.

We also posted about growing and harvesting Vidalia onions to educate our target audience. Those posts reached 23,688 consumers.

The "V for Vidalia" campaign had another partner Chef Lucas Hobbs. Chef Lucas was a 13 year old Hodgkin's Lymphoma survivor who started "Do good with Food" which is a non-profit to help serve meals to pediatric cancer patients and families. The VOC partnered with 13-year old Chef Lucas Hobbs who was diagnosed with Hodgkin's Lymphoma in January, 2015. When the Make-A-Wish Foundation asked Lucas for his wish, he requested a food truck to feed the doctors, nurses who cared for him along with the pediatric cancer patients he recovered with. His food truck events in Minneapolis garnered national attention and helped feed thousands.

Chef Lucas joined the VOC, along with the National Turkey Federation, on the road this past summer with food truck events in Minneapolis and Nashville. The food truck events were featured on local media (CBS, NBC and ABC stations) with an estimated total media reach of 1.1 Million. Chef Lucas also joined the VOC in Orlando at PMA where we put a V*Inspired wall.

Food Blogger Posts: Through social media we partnered with several food bloggers that posted several recipes with Vidalia onions. With 44 total posts via Instagram, Twitter and Facebook we were able to reach 118,413 followers.

Facebook Advertising: We spent \$3,600 in ads on Pinterest, Facebook, Instagram and Twitter. Through those ads we were able to reach over 75,000 consumers. For every \$1 spent, 20 people were reached.

Retail Marketing: We learned that retailers cited display location and high-graphic bins as key drivers for sweet onion sales. We were able to send out tool kits to 48 contacts. Giant Eagle (a major supermarket chain) included Vidalia onions as “Dietician pick” for Memorial Day week. Through this campaign we sent out monthly crop reports to over 670 retail/foodservice contacts. Included in the e-news crop reports was a link to download from the retailer sections of VidaliaOnion.org. (4,541 page views on this section.)

Ahold USA	Target	Albertsons
Delhaize	Sam’s Club	Safeway
Coscto	Walmart	Sobey’s
Aldi’s	Schnucks	Food Lion
Wegmans	Stop & Shop	Hannaford
Save Mart	Stater Bros	Whole Foods
AWG	Save a Lot	Loblaws
Sysco	Fresh Point	Brookshires
BJ’s Wholesale	Marsh	Gelson’s Market
Sprouts	Jewel Osco	Hello Fresh
Roundy’s	US Foods	Blue Apron
United Texas	Tops	Foodland

Through social media we were able to reach over 69,071 combined followers:

- Over 6,500 new followers
- 1.56 million impressions
- 3,800 clicks to website
- Over 300 mentions by bloggers, chefs, retailers and consumers

Through social media the Vidalia Onion Committee received over 6,500 new followers, 1.56 million impressions (Facebook, Twitter, Pinterest and Instagram) Over 300 mentions by chefs, bloggers and retailers. Finishing this year we learned from the information given from our growers there was a 644,682 unit increase to the year prior.

LESSONS LEARNED

The VOC finished this campaign and decided to go in a different direction with a new marketing firm and new campaign.

CONTACT PERSON

Provide the name and email address of the person to be contacted if USDA has additional questions.

Bob Stafford

bstafford@vidaliaonion.org

ADDITIONAL INFORMATION

NA

PROJECT INFORMATION (#10)

Project Title	Evaluation of Novel Disease Resistant Winegrape Varieties and Training Systems for Georgia		
Recipient Organization Name:	The Vineyard and Winery Association of West Georgia		
Recipient's Project Contact			
Name:	Paula Burke		
Phone:	Enter the Project Contact's Phone Number.		
Email:	pjburke@uga.edu		

PROJECT REPORT

Report Type:	Final Performance Report		
Reporting Period:	Start Date:	9/30/2015	End Date: 9/29/2018

PERFORMANCE NARRATIVE

PROJECT SUMMARY

Pierce's disease is a lethal bacterial disease of grapes that is native to most areas of Georgia and the southeastern US. The demand for Pierce's disease tolerant hybrid winegrape varieties in Georgia has seen significant increase in recent years. The varieties Blanc Du Bois, Lenoir, Norton and Villard Blanc have been successfully grown in the southern United States with excellent resistant to Pierce's disease and powdery mildew for more than 20 years. The success of these varieties is well established in terms of vineyard productivity and wine quality, however there is currently no information available regarding the yield, quality, and training systems best suited for growing conditions in Georgia. Although some studies from Texas, Alabama, and Florida have been conducted to evaluate suitability of these grape varieties, none of these studies formally compares their quality, yield and training systems in a controlled experiment.

The most frequently asked questions of new and prospective growers in Georgia is in respect to the potential wine quality and most suitable trellis and training system for establishing disease resistant grapes. Dozens of commercial vineyards were planted with these hybrid grapes between 2010 and the time of this report, signifying an immediate need for information to assist with choosing the best varieties and training systems for maximizing yield and quality potential for wine.

Objectives of the Research Demonstration Vineyard

1. Provide a controlled study with a multi-factorial comparison of the four most widely planted Pierce's disease and powdery mildew resistant grapevine varieties (Blanc Du Bois, Lenoir, Norton, Villard Blanc) trellised on three common training systems in the south (Vertical Shoot Positioned, Geneva Double Curtain, Watson).
2. Establish a site for providing educational outreach for new and prospective grape growers to promote exemplary grower practices for these varieties.

PROJECT APPROACH

This project was a collaborative effort involving active participation in vineyard management and data collection by the University of Georgia Cooperative Extension (Paula Burke, Dr. Rachel Itle, Dr. Cain Hickey, Jason Lessl), Trillium Vineyards (Bruce Cross – owner/operator), the Vineyard and Winery Association of West Georgia, and Westover Vineyard Advising (Fritz Westover – owner/consultant) referred to hereafter as the “investigating team.”

In 2013 a research demonstration block was established at a 2-acre commercial vineyard site in Haralson County, at Trillium Vineyards to investigate grape variety and training system interactions. This vineyard was fully established in 2015 and data was collected for four consecutive production years including yield (cluster weight, cluster number, yield per vine), growth parameters (pruning weights and cane number) and fruit chemistry (soluble solids, acid profiles, pH, sugars). The experimental plot consists of 12 vine replicates of each treatment; 3 replicates, each with 4 vine sub-replicates, established in a complete randomized block design, fully enclosed by border vines.

The vines were planted and trained to each of three training systems: Geneva Double Curtain (GDC), Vertical Shoot Positioned (VSP), and Watson (Watson) by the management team at Trillium vineyard, using standard industry practices under guidance of Westover Vineyard Advising. The investigating team conducted no less than 4 visits to the vineyard each year; one for dormant pruning in March, one for summer canopy management in June, and two or more for harvest in August. All routine weekly vineyard management activities that did not involve data collection (mowing, irrigation, pesticide application, etc.) were completed by the management team at Trillium Vineyard. The results presented below focus on significant findings for grape variety and training systems overall. The interaction of overall variety and overall training system are shown in the attached tables and will be used to assist with supporting conclusions in peer reviewed journal manuscripts.

Dormant Pruning Data

In March the team counted cane numbers and total pruning weight and total cordon length per vine. Each vine was pruned using standard 2 bud spur pruning practices. Bud density was set to industry standards of 5 buds per foot of cordon on the VSP and GDC training systems and 7 buds per foot on the Watson. The Watson training system is a horizontally divided system and therefore requires a higher spur density to fill the trellis. Pruning weights were collected per vine and will be compared to individual vine yield from the same season to determine crop load for each vine, an important parameter for comparing the unit crop level per unit of vine mass in a given season. Cordon length was recorded to provide yield data in units per linear measure of cordon, which is important to distinguish due to variability in cordon length from vine to vine within and across training systems. Dormant pruning data (Tables 7,8,9,14) shows significant differences in pruning mass and cane number each season across varieties and training systems. In general, training systems with greater cordon length (GDC) had higher cane numbers, which resulted in higher yields per vine (Tables 1,5,6) however the yield per cordon length was greatest on Watson trained vines than in VSP trained vines in all seasons, and significantly greater than GDC trained vines in all but one season (Tables 8, 9 14). The variety Blanc Du Bois was visually more vigorous in the field during the production years and this is supported by significantly higher cane weights in Blanc Du Bois in 2016 and 2017, whereas cane weights were greatest in Villard Blanc in the first production year (2015).

Yield Data

In August a harvest date was determined for each variety based on industry standards of soluble solids necessary to meet wine quality benchmarks for white grapes with the objective of harvesting white grapes (Blanc Du Bois, Villard Blanc) between 19-21 brix and red grapes (Lenoir, Norton) between 22-24 brix. Training system had a significant effect on vine yield across seasons with GDC and Watson yielding significantly higher total cluster weight per vine than VSP trained vines in all seasons (Tables 1,5, 6,13). GDC trained vines had significantly higher yields than all other training systems in 2 of the 4 years of this study (Tables 5,6). The highest yielding varieties across training systems in most seasons were Villard Blanc and Lenoir except in 2017 when Blanc Du Bois yield was higher than Villard Blanc (although there was some loss of Villard Blanc to wildlife that year). We feel that the higher yields achieved by Lenoir and Villard Blanc are directly related to the larger cluster size, as shown by average cluster weight (average cluster weight not shown for all years in attached tables). The lowest yielding variety was Norton, which also had the lowest average cluster weights in most years (Table 6) combined with lower berry weights (Tables 1, 5). In 2018 there were no differences in yield by variety across the training systems and we believe that is due to the loss of cluster weight in Lenoir caused by a late season black rot infection during very wet weather.

Fruit Chemistry

Berry samples were collected on the day of harvest (50 per vine) and tested for soluble solids (brix) total titratable acidity (TTA), pH, juice yield and berry weight (Tables 2,10). Additional analyses of acids (citric, tartaric, ascorbic, succinic, and malic) and sugars (fructose, glucose, total sugar) were included to determine if differences were found between varieties or training systems. The results varied by season and across variety and training season. Some of these differences can be explained by harvest timing based on the industry standards. For example, there were no differences in TTA or pH across variety or training system in 2015, however brix was higher in red varieties than white varieties due to the later harvest time (higher target brix). We note here that the goal brix levels were not always achieved due to the need to harvest a bit earlier to avoid rot from late season rain or pressure from wildlife. We feel the harvest timing decisions mirrored those that

would have been implemented by industry growers. In 2016 TTA was lower in white varieties than in red varieties and pH was lowest in Villard Blanc and brix differed based on the harvest timing imposed with Norton achieving higher brix than Lenoir and Blanc Du Bois achieving higher brix than Villard Blanc. Training system overall had some effect on fruit chemistry. In 2015 the Watson system had higher brix than GDC trained vines. Fruit chemistry data was recorded in 2017 and 2018 and is still in need of processing in preparation for manuscript submission to a peer reviewed journal. Sugar profiles did not differ by grape variety in 2015 but in 2016 higher levels of Fructose and Glucose were found in Norton, likely due to the higher brix of Norton that year and this effect did not carry over to training system overall (Tables 3,11). Few differences in acid profiles were recorded and red varieties tended to have higher malic acid levels (Tables 4,12).

Conclusions and Recommendations

The data sets are complete at this time with the exception of pruning weight data, which must be taken in March of 2019. We note again here that not all of the data is provided in the supporting documents, but rather a cross section that we feel is ample to serve as supporting data for our conclusions at this time. Additional statistical analysis and comparison of yield per linear measure of cordon will occur prior to submitting a manuscript for a peer reviewed journal and additional extension or trade publications. At this time there is enough supporting evidence in the included tables to show that the yield potential for the varieties tested (in terms of total yield per vine) is greatest for those varieties with larger cluster size such as Villard Blanc and Lenoir, with the exception being in 2018 when loss to fungal disease altered the data set. Furthermore, the training systems that produce the highest yield are GDC and Watson with GDC producing significantly higher yield per vine in two of the 4 years. Additional data (not shown here) was collected one season on amount of time spent pruning and training each training system. The timing data suggest that GDC requires the most man hours for management, and thus we could speculate that the Watson training system may be more efficient in terms of yield per vine per man hours in a given season. The most practical recommendation thus far is that a grower seeking maximum yield could combine a large cluster variety (Lenoir, Villard Blanc) with a high yielding training system (GDC) to maximize fruit produced per acre of land. However, if labor is not as available a grower might best choose to grow a large cluster variety on a lower maintenance but moderate to high yielding system (Watson). If a grower chooses to grow smaller cluster varieties (Blanc Du Bois, Norton) they would benefit from trellising them on one of the higher yielding training systems (GDC, Watson). Production of lower yields using the VSP training system did not result in higher quality in terms of fruit chemistry, acid or sugar profiles and thus we would discourage the VSP training system for the varieties tested in the study.

GOALS AND OUTCOMES ACHIEVED

Goals

The primary goal of this project was to determine what hybrid grape varieties are most productive and on what trellis system they are best suited. The combination of grape variety and trellis that supports the highest yield while also producing commercially desirable fruit chemistry parameters is an essential component of this work. We were able to produce fruit each year of this project and collect all of the plant and fruit measurements needed to develop recommendations to future grape growers in Georgia. The major conclusions and data collection activities are described above in the approach section. This work will also have application beyond Georgia into other regions that are seeking to plant Pierce's disease tolerant grape varieties. For example, this work has already resulted in adoption of the Watson Training System in Alabama. In addition to the goal of collecting data on yield and fruit chemistry, there have been several education and outreach objectives successfully completed during the period of this grant. A list of public outreach meetings and field days are provided below, as well as presentations at industry conferences to industry peers.

Outcomes from data

Our data shows that larger clustered varieties such as Villard Blanc and Lenoir have the greatest yield potential (Significantly greater cluster weight in 2015 and 2016 than Blanc Du Bois and Norton). If the goal of a grower is to maximize yield, our data supports that the combination of a large cluster weight and high yielding training system (Watson or Geneva Double Curtain) are the most effective combination to achieve this goal. Regardless of grape variety, Geneva Double Curtain produced significantly higher yields than Vertical Shoot Positioning and Watson training systems in 2016, however vine yield did not differ from Watson training system in 2015. If land size is limiting, Geneva Double Curtain would be the best method to maximize yield. However, if land size is not a limitation, it is possible to achieve commercially desirable yields (projected 5,505 to 6,110 kilos per acre on 12'x6' vine spacing) using the Watson system, with less labor per acre for canopy maintenance than Geneva Double Curtain (projected 6,290 to 6950 kilos per acre on 12'x6' vine spacing).

Outreach meetings and presentations

Collaborators on the project participated and presented in multiple ways to share the knowledge being gained from the research. Media outreach through articles in newspapers, UGA Southscapes, Fruit Grower magazine, and Facebook reached an estimated audience of 70,817 readers. Presentations in 2015 – 2018 at state and national conferences presented to Extension and viticulture researchers about the winegrape the research reached 130 at conferences in Florida, Pennsylvania and Arkansas. Through producer meetings, such as the Southern Winegrape Symposium, pruning workshops, Georgia Wine Producers annual meeting, and vineyard research plot tours, an estimated 408 producers were educated about what trellis system was best for hybrid winegrapes to grow in Georgia.

Supplemental to the yield and fruit chemistry data, the team collected plant tissue for nutrient analysis throughout this study to establish baselines for differences in nutrient uptake by the different grape varieties. Petioles were collected from each variety at bloom and analyzed for mineral nutrient content at the UGA Agricultural and Environmental Sciences Lab. This survey showed that of the 4 varieties in this study, Norton and Villard Blanc are more sensitive to magnesium deficiency, Blanc Du Bois is more susceptible to potassium deficiency, Lenoir is sensitive to nitrogen and phosphorous deficiency and Villard Blanc is most susceptible to calcium deficiency (data not shown). This data will be used in a future UGA extension publication to provide a more complete picture of the nutrient demands of each grape variety tested.

BENEFICIARIES

The primary group that will benefit from the results of this study are current and future grape growers in Georgia. We anticipate that the extension publications and information presented at future extension meetings will contribute to increased yields of high-quality wine grapes. The hybrid grapes introduced into Georgia by the VWAWG are fast becoming a statewide commodity, not just a West Georgia regional project. These varieties are currently being grown in 23 Georgia counties across the state, including growers in Catoosa County at the Tennessee line, to growers in Thomas County at the Florida line, as well as growers in Chatham County (Savannah) and Stephens County (Toccoa). Additionally, there are members in at least ten other counties planning on planting vineyards within the coming years. At the current rate of growth, there should be hybrid vineyards in one third of the counties in Georgia within three years. Unlike most specialty crops, such as olives or Vidalia onions, the hybrid winegrape grape varieties are not limited geographically within the state. All 159 counties can participate in this growing economic engine of agritourism. The new

growers in Georgia will have the in-state data to help them decide on vineyard site selection, soil needs and the most efficient trellising systems to use for each variety. Established growers will also benefit from this information as they will be able to modify their existing vineyards to maximize plant productivity and overall fruit quality within their vineyards.

Since the data from this study was first discussed at tailgate meetings and symposiums in 2013, 14 prospective winegrowers have now adopted the Watson Training System for their recently planted commercial vineyards totaling 41.1 acres. The table below shows the grower name, county, and number of acres planted. We believe each grower decided to use the Watson Training System as the result of the benefits shown during their attendance at tailgate meetings, symposiums and personal advising. There is currently not another resource on the Watson training system in Georgia or surrounding states outside of this project.

Georgia & Alabama Vineyards Planted to Watson Training System as of 2019

Grower Last Name	Business Name	County - State	Acres Planted
Cross	Trillium Vineyards	Haralson - GA	0.5
Fuller	Swamp Fox Vineyards	Carroll - GA	2.0
Gilbert	Qualusi Vineyards	Bartow - GA	2.7
Hughes	Rivers Bend Winery & Vineyard	Troup - GA	1.0
Moffett	Risers Mill Farms & Vineyard	Talladega - AL	3.0
Monroe	Five Points Vineyard & Winery	Chambers - AL	2.7
Moss	Farmers Daughter Vineyards	Mitchell - GA	4.0
Muller	The Vineyards at Mill Creek	Carroll - GA	4.0
Newby	Newby Family Farm & Vineyard	Floyd - GA	4.5
Parker	Big Door Vineyards	Bartow - GA	9.0
Rayworth	Rayworth Vineyards (TBD)	Carroll - GA	2.8
Sammon	Lion Hills Vineyard & Winery	Haralson - GA	2.0
Summerour	Three Strands Farms & Vineyards	Paulding - GA	1.9
Walker	Walker Vineyards (TBD)	Carroll - GA	1.0
		Total Acres:	41.1

CONTACT PERSON

Paula Burke, UGA, pjburke@uga.edu

Fritz Westover, Westover Vineyard fritzwestover@gmail.com

ADDITIONAL INFORMATION

		N	Total Cluster No.		Total Cluster Wt.(kg)		50 Berry Wt.(g)	
<i>Variety Overall³</i>			*** ⁴		***		***	
	'Blanc Du Bois'	30	66.1	A ⁵	7.6	C	166.8	B
	'Lenoir'	34	47.0	BC	10.8	B	80.2	C
	'Norton'	30	36.7	C	3.4	D	74.0	C
	'Villard Blanc'	36	53.9	BA	13.5	A	189.6	A
<i>Training System Overall⁶</i>			***		***		ns	
	Geneva Double Curtain	45	57.2	A	10.4	A	122.5	A
	Vertical Shoot Positioned	39	38.3	B	5.8	B	131.0	A
	Watson	46	57.3	A	10.1	A	129.5	A
<i>Variety x Training System⁷</i>			***		***		*	
'Blanc Du Bois'	Geneva Double Curtain	12	105.0	A	12.3	BA	148.5	B
	Vertical Shoot Positioned	7	46.1	CBD	5.2	ED	179.8	A
	Watson	11	47.1	CBD	5.3	ED	172.3	A
'Lenoir'	Geneva Double Curtain	12	42.5	CD	11.1	BAC	79.8	C
	Vertical Shoot Positioned	11	36.7	CD	6.5	EDC	81.3	C
	Watson	11	61.8	CB	14.7	A	79.5	C
'Norton'	Geneva Double Curtain	9	29.6	D	3.1	E	71.9	C

	Vertical Positioned	Shoot	9	31.8	CD	2.2	E	72.8	C
	Watson		12	48.7	CBD	4.9	ED	77.2	C
'Villard Blanc'	Geneva Double Curtain		12	51.5	CBD	15.3	A	189.8	A
	Vertical Positioned	Shoot	12	38.4	CD	9.4	BDC	189.9	A
	Watson		12	71.7	B	15.7	A	189.0	A

Table 1. Field harvest traits¹ of four winegrape varieties ('Blanc Du Bois', 'Lenoir', 'Norton', and 'Villard Blanc') grown on three training systems (Geneva Double Curtain, Vertical Shoot Positioned, and Watson) during the 2015 harvest season².

¹Field harvest include total cluster number per vine, total cluster weight (kg) per vine, and 50 berry weights (g) randomly sampled over the vine.

² Fruit was harvested from a randomized complete block design (4 varieties x 3 training systems x 3 reps/variety/training system x 4 vines per rep) at Trillium Vineyards in Bremen, GA.

³ For each variety, total possible N=36, (3 training systems x 3 reps/training system x 4 vines/rep).

⁴ Comparisons were made using the GLM procedure in SAS v.9.4. Significance levels: * $P \leq 0.05$, ** $P < 0.01$, *** $P < 0.001$.

⁵ Differences examined using Tukey HSD ($P \leq 0.05$).

⁶ For each training system, total possible N=48, (4 varieties x 3 reps/training system x 4 vines/rep).

⁷ For each variety's variety x training system, total possible N=12, (3 reps/training system x 4 vines/rep).

Table 2. General fruit chemical quality traits¹ of four winegrape varieties ('Blanc Du Bois', 'Lenoir', 'Norton', and 'Villard Blanc') grown on three training systems (Geneva Double Curtain, Vertical Shoot Positioned, and Watson) during the 2015 harvest season².

		N	ml juice / g		TTA (%)		pH		°brix	
<i>Variety Overall³</i>			*** ₄		ns		ns		**	
	'Blanc Du Bois'	8	0.47	AB ⁵	0.46	A	3.69	A	18.2	B
	'Lenoir'	9	0.40	BC	0.77	A	3.63	A	20.2	A
	'Norton'	9	0.35	C	0.87	A	3.57	A	20.3	A
	'Villard Blanc'	9	0.53	A	0.61	A	3.62	A	17.7	B
<i>Training System Overall⁶</i>			**		ns		ns		**	
		1								
	Geneva Double Curtain	2	0.41	B	0.77	A	3.57	A	18.3	B
	Vertical Shoot Positioned	1								
		1	0.48	A	0.62	A	3.70	A	19.0	AB
		1								
	Watson	2	0.42	B	0.64	A	3.62	A	20.0	A
<i>Variety x Training System⁷</i>			ns		ns		*		*	
'Blanc Du Bois'	Geneva Double Curtain	3	0.43	EBDAC	0.50	A	3.34	C	15.6	C
	Vertical Shoot Positioned	2	0.51	BAC	0.45	A	3.86	BA	18.3	BAC
	Watson	3	0.46	EBDAC	0.43	A	3.86	A	20.6	BA
'Lenoir'	Geneva Double Curtain	3	0.34	EDC	0.78	A	3.66	BAC	20.4	BA
	Vertical Shoot Positioned	3	0.45	EBDAC	0.67	A	3.66	BAC	20.7	BA
	Watson	3	0.41	EBDC	0.87	A	3.56	BAC	19.6	BA
'Norton'	Geneva Double Curtain	3	0.31	E	0.91	A	3.54	BAC	19.4	BA

	Vertical	Shoot								
	Positioned		3	0.40	EBDC	0.95	A	3.59	BAC	19.7 BA
	Watson		3	0.33	ED	0.77	A	3.59	BAC	21.8 A
'Villard Blanc'	Geneva Double Curtain		3	0.54	BA	0.90	A	3.74	BA	17.8 BC
	Vertical	Shoot								
	Positioned		3	0.57	A	0.44	A	3.67	BAC	17.3 BC
	Watson		3	0.48	BDAC	0.49	A	3.46	BC	18.0 BC

¹General fruit chemical quality harvest traits include ml of juice/g of fresh weight, percent total titratable acids (TTA), and °brix.

² Fruit was harvested from a randomized complete block design (4 varieties x 3 training systems x 3 reps/variety/training system x 4 vines per rep) at Trillium Vineyards in Bremen, GA.

³ For each variety, total possible N=9, (3 training systems x 3 reps/training system).

⁴ Comparisons were made using the GLM procedure in SAS v.9.4. Significance levels: ns nonsignificant, * $P \leq 0.05$, ** $P < 0.01$, *** $P < 0.001$.

⁵ Differences examined using Tukey HSD ($P \leq 0.05$).

⁶ For each training system, total possible N=12, (4 varieties x 3 reps/training system).

⁷ For each variety's variety x training system, total possible N=3, (3 reps/training system).

Table 3. Sugar profiles of four winegrape varieties ('Blanc Du Bois', 'Lenoir', 'Norton', and 'Villard Blanc') grown on three training systems (Geneva Double Curtain, Vertical Shoot Positioned, and Watson) during the 2015 harvest season¹.

		N	Fructose (mg/ml)		Glucose (mg/ml)		Total Sugars (mg/ml)	
<i>Variety Overall</i> ²			ns ³		ns		ns	
	'Blanc Du Bois'	8	0.80	A ⁴	0.76	A	1.57	A
	'Lenoir'	9	0.81	A	0.77	A	1.58	A
	'Norton'	9	0.80	A	0.70	A	1.50	A
	'Villard Blanc'	9	0.70	A	0.69	A	1.41	A
<i>Training System Overall</i> ⁵			ns		**		**	
	Geneva Double Curtain	12	0.83	A	0.82	A	1.66	A
	Vertical Shoot Positioned	11	0.59	A	0.51	B	1.10	B
	Watson	12	0.92	A	0.86	A	1.79	A
<i>Variety x Training System</i> ⁶			ns		ns		ns	
'Blanc Du Bois'	Geneva Double Curtain	3	0.81	A	0.76	A	1.59	A
	Vertical Shoot Positioned	2	0.67	A	0.64	A	1.31	A
	Watson	3	0.92	A	0.88	A	1.80	A
'Lenoir'	Geneva Double Curtain	3	0.92	A	0.92	A	1.85	A
	Vertical Shoot Positioned	3	0.56	A	0.46	A	1.03	A
	Watson	3	0.96	A	0.91	A	1.87	A
'Norton'	Geneva Double Curtain	3	0.86	A	0.81	A	1.67	A
	Vertical Shoot Positioned	3	0.54	A	0.44	A	0.99	A

	Watson	3	0.99	A	0.85	A	1.85	A	
'Villard Blanc'	Geneva Double Curtain	3	0.71	A	0.79	A	1.52	A	
	Vertical Positioned	Shoot	3	0.57	A	0.50	A	1.09	A
	Watson	3	0.82	A	0.78	A	1.62	A	

¹ Fruit was harvested from a randomized complete block design (4 varieties x 3 training systems x 3 reps/variety/training system x 4 vines per rep) at Trillium Vineyards in Bremen, GA.

² For each variety, total possible N=9, (3 training systems x 3 reps/training system).

³ Comparisons were made using the GLM procedure in SAS v.9.4. Significance levels: ns nonsignificant, * $P \leq 0.05$, ** $P < 0.01$, *** $P < 0.001$.

⁴ Differences examined using Tukey HSD ($P \leq 0.05$).

⁵ For each training system, total possible N=12, (4 varieties x 3 reps/training system).

⁶ For each variety's variety x training system, total possible N=3, (3 reps/training system).

Table 4. Acid profiles of four winegrape varieties ('Blanc Du Bois', 'Lenoir', 'Norton', and 'Villard Blanc') grown on three training systems (Geneva Double Curtain, Vertical Shoot Positioned, and Watson) during the 2015 harvest season¹.

		N	Citric (mg/ml)		Tartaric (mg/ml)		Ascorbic (mg/ml)		Succinic (mg/ml)		Malic (mg/ml)	
<i>Variety Overall²</i>			ns ³		ns		ns		ns		*	
	'Blanc Du Bois'	8	0.12	A ⁴	2.85	A	0.23	A	1.06	A	0.51	BA
	'Lenoir'	9	0.10	A	3.79	A	0.55	A	1.24	A	0.86	A
	'Norton'	9	0.15	A	3.60	A	0.36	A	1.61	A	0.72	BA
	'Villard Blanc'	9	0.08	A	2.77	A	0.02	A	1.56	A	0.34	B
<i>Training System Overall⁵</i>			ns		ns		ns		ns		**	
	Geneva Double Curtain	12	0.16	A	3.91	A	0.26	A	0.93	A	0.26	B
	Vertical Shoot Positioned	11	0.10	A	2.91	A	0.26	A	1.90	A	0.74	A
	Watson	12	0.08	A	2.95	A	0.35	A	1.27	A	0.83	A
<i>Variety x Training System⁶</i>			ns		ns		ns		ns		ns	
'Blanc Du Bois'	Geneva Double Curtain	3	0.22	A	3.59	A	0.13	A	0.24	A	0.22	B
	Vertical Shoot Positioned	2	0.08	A	2.19	A	0.21	A	2.08	A	0.93	BA
	Watson	3	0.07	A	2.78	A	0.34	A	0.88	A	0.37	B
'Lenoir'	Geneva Double Curtain	3	0.11	A	4.90	A	0.38	A	2.30	A	0.49	BA
	Vertical Shoot Positioned	3	0.07	A	4.25	A	0.46	A	0.87	A	0.66	BA
	Watson	3	0.13	A	2.22	A	0.82	A	0.54	A	1.43	A
'Norton'	Geneva Double Curtain	3	0.20	A	4.35	A	0.47	A	0.35	A	0.22	B
	Vertical Shoot Positioned	3	0.19	A	2.84	A	0.37	A	2.11	A	0.91	BA
	Watson	3	0.07	A	3.62	A	0.24	A	2.35	A	1.03	BA
'Villard Blanc'	Geneva Double Curtain	3	0.11	A	2.78	A	0.06	A	0.82	A	0.09	B

Vertical Shoot Positioned	3	0.07	A	2.35	A	0.01	A	2.56	A	0.45	BA
Watson	3	0.07	A	3.19	A	0.01	A	1.30	A	0.49	BA

¹ Fruit was harvested from a randomized complete block design (4 varieties x 3 training systems x 3 reps/variety/training system x 4 vines per rep) at Trillium Vineyards in Bremen, GA.

² For each variety, total possible N=9, (3 training systems x 3 reps/training system).

³ Comparisons were made using the GLM procedure in SAS v.9.4. Significance levels: ns nonsignificant, * $P \leq 0.05$, ** $P < 0.01$, *** $P < 0.001$.

⁴ Differences examined using Tukey HSD ($P \leq 0.05$).

⁵ For each training system, total possible N=12, (4 varieties x 3 reps/training system).

⁶ For each variety's variety x training system, total possible N=3, (3 reps/training system).

Table 5. Field harvest traits¹ of four winegrape varieties ('Blanc Du Bois', 'Lenoir', 'Norton', and 'Villard Blanc') grown on three training systems (Geneva Double Curtain, Vertical Shoot Positioned, and Watson) during the 2016 harvest season².

		N	Total Cluster No.		Total Cluster Wt.(kg)		Berry Wt.(g)	
<i>Variety Overall³</i>			*** ⁴		***		***	
		2						
	'Blanc Du Bois'	5	68.4	A ⁵	7.6	C	2.9	A
		3						
	'Lenoir'	3	64.7	A	13.4	A	1.3	C
		3						
	'Norton'	5	45.3	B	4.0	D	1.2	C
		3						
	'Villard Blanc'	6	56.4	BA	10.9	B	2.5	B
<i>Training System Overall⁶</i>			***		***		***	
		4						
	Geneva Double Curtain	2	81.3	A	11.5	A	1.9	B
	Vertical Shoot Positioned	4						
		3	41.7	C	6.3	C	1.9	B
		4						
	Watson	4	53.1	B	9.1	B	2.1	A
<i>Variety x Training System⁷</i>			***		***		***	
		6	116.					
	'Blanc Du Bois' Geneva Double Curtain	6	2	A	12.8	BAC	2.9	BA
		1						
	Vertical Shoot Positioned	0	32.2	C	2.7	E	2.9	BA
		9						
	Watson	9	56.8	CB	7.2	EDC	3.0	A

'Lenoir'			1							
	Geneva Double Curtain		2	95.7	A		17.7	A	1.0	G
	Vertical Positioned	Shoot	1							
			0	39.0	CB		8.9	BDC	1.5	E
			1							FE
	Watson		1	59.3	B		13.6	BA	1.3	G
'Norton'			1							FE
	Geneva Double Curtain		2	50.6	CB		4.4	ED	1.2	G
	Vertical Positioned	Shoot	1							
			1	40.2	CB		3.0	E	1.1	FG
			1							
	Watson		2	45.1	CB		4.6	ED	1.4	FE
'Villard Blanc'			1							
	Geneva Double Curtain		2	62.9	B		10.9	BC	2.4	DC
	Vertical Positioned	Shoot	1							
			2	55.3	CB		10.7	BC	2.3	D
			1							
	Watson		2	51.2	CB		11.0	BC	2.6	BC

¹Field harvest include total cluster number per vine, total cluster weight (kg) per vine, and individual berry weights from approximately 50 berries (g) randomly sampled over the vine.

² Fruit was harvested from a randomized complete block design (4 varieties x 3 training systems x 3 reps/variety/training system x 4 vines per rep) at Trillium Vineyards in Bremen, GA.

³ For each variety, total possible N=36, (3 training systems x 3 reps/training system x 4 vines/rep).

⁴ Comparisons were made using the GLM procedure in SAS v.9.4. Significance levels: * $P \leq 0.05$, ** $P < 0.01$, *** $P < 0.001$.

⁵ Differences examined using Tukey HSD ($P \leq 0.05$).

⁶ For each training system, total possible N=48, (4 varieties x 3 reps/training system x 4 vines/rep).

⁷ For each variety's variety x training system, total possible N=12, (3 reps/training system x 4 vines/rep).

Table 6. Field harvest traits¹ of four winegrape varieties ('Blanc Du Bois', 'Lenoir', 'Norton', and 'Villard Blanc') grown on three training systems (Geneva Double Curtain, Vertical Shoot Positioned, and Watson) during the 2017 harvest season².

		N	Total Cluster No.		Total Cluster Wt.(kg)	
<i>Variety Overall³</i>			*** ⁴		***	
	'Blanc Du Bois'	27	86.4	A ⁵	11.5	A
	'Lenoir'	33	58.0	B	11.0	A
	'Norton'	35	63.3	B	5.9	B
	'Villard Blanc'	36	40.1	C	7.3	B
<i>Training System Overall⁶</i>			***		***	
	Geneva Double Curtain	42	86.9	A	12.0	A
	Vertical Shoot Positioned	44	35.4	C	5.1	C
	Watson	45	63.6	B	9.7	B
<i>Variety x Training System⁷</i>			***		***	
'Blanc Du Bois'	Geneva Double Curtain	6	143.6	A	19.3	A
	Vertical Shoot Positioned	11	43.0	CED	4.9	CD
	Watson	10	72.6	CB	10.3	BC
'Lenoir'	Geneva Double Curtain	12	65.3	CBD	11.9	B
	Vertical Shoot Positioned	10	42.1	CED	9.1	BCD
	Watson	11	66.6	CBD	12.0	BA
'Norton'	Geneva Double Curtain	12	93.3	B	7.5	BCD
	Vertical Shoot Positioned	11	38.6	ED	3.3	D
	Watson	12	58.2	CD	6.9	BCD
'Villard Blanc'	Geneva Double Curtain	12	45.3	CED	9.4	BC

Vertical Shoot Positioned	12	18.0	E	3.0	D
Watson	12	56.9	CD	9.5	BC

¹Field harvest include total cluster number per vine, and total cluster weight (kg) per vine.

² Fruit was harvested from a randomized complete block design (4 varieties x 3 training systems x 3 reps/variety/training system x 4 vines per rep) at Trillium Vineyards in Bremen, GA.

³ For each variety, total possible N=36, (3 training systems x 3 reps/training system x 4 vines/rep).

⁴ Comparisons were made using the GLM procedure in SAS v.9.4. Significance levels: * $P \leq 0.05$, ** $P < 0.01$, *** $P < 0.001$.

⁵ Differences examined using Tukey HSD ($P \leq 0.05$).

⁶ For each training system, total possible N=48, (4 varieties x 3 reps/training system x 4 vines/rep).

⁷ For each variety's variety x training system, total possible N=12, (3 reps/training system x 4 vines/rep).

Table 7. Dormant pruning traits¹ of four winegrape varieties ('Blanc Du Bois', 'Lenoir', 'Norton', and 'Villard Blanc') grown on three training systems (Geneva Double Curtain, Vertical Shoot Positioned, and Watson] in 2015 after the 2014 harvest season².

		N	Cane #		Cordon Length (in)		Cane Wt (kg)	
<i>Variety Overall³</i>			***4		***		***	
	'Blanc Du Bois'	36	8.5	B ⁵	21.5	B	1.8 3	A
	'Lenoir'	35	9.4	B	22.1	B	1.3 1	BC
	'Norton'	36	4.8	C	8.6	C	1.0 0	C
	'Villard Blanc'	36	12. 2	A	30.8	A	1.5 3	BA
<i>Training System Overall⁶</i>			***		***		**	
	Geneva Double Curtain	48	10. 9	A	24.6	A	1.3 4	B
	Vertical Shoot Positioned	47	6.0	B	12.9	B	1.7 0	A
	Watson	48	9.3	A	24.7	A	1.2 2	B
<i>Variety x Training System⁷</i>			ns		*		ns	
'Blanc Du Bois'	Geneva Double Curtain	12	11. 9	BA	32.6	A	1.9 8	A
	Vertical Shoot Positioned	12	5.9	EDC	10.8	DEC	1.9 7	A
	Watson	12	7.7	BEDC	21.0	BDAC	1.5 6	BA
'Lenoir'	Geneva Double Curtain	12	12. 3	BA	25.0	BAC	1.1 4	BA

	Vertical Shoot Positioned	12	5.8	EDC	13.1	BDEC	5	1.7	BA
	Watson	12	10.2	BAC	28.2	BA	3	1.0	B
'Norton'	Geneva Double Curtain	12	4.6	ED	4.1	E	0	0.9	B
	Vertical Shoot Positioned	11	3.3	E	6.7	DE	8	1.0	BA
	Watson	12	6.6	EDC	15.2	BDEC	3	1.0	B
'Villard Blanc'	Geneva Double Curtain	12	14.8	A	36.8	A	4	1.3	BA
	Vertical Shoot Positioned	12	9.0	BDC	21.0	BDAC	0	2.0	A
	Watson	12	12.7	BA	34.6	A	5	1.2	BA

¹Dormant pruning traits include total cane number per vine, total cordon length (in) per vine, and total cane weight (kg) per vine.

² Fruit was harvested from a randomized complete block design (4 varieties x 3 training systems x 3 reps/variety/training system x 4 vines per rep) at Trillium Vineyards in Bremen, GA.

³ For each variety, total possible N=36, (3 training systems x 3 reps/training system x 4 vines/rep).

⁴ Comparisons were made using the GLM procedure in SAS v.9.4. Significance levels: * $P \leq 0.05$, ** $P < 0.01$, *** $P < 0.001$.

⁵ Differences examined using Tukey HSD ($P \leq 0.05$).

⁶ For each training system, total possible N=48, (4 varieties x 3 reps/training system x 4 vines/rep).

⁷ For each variety's variety x training system, total possible N=12, (3 reps/training system x 4 vines/rep).

Table 8. Dormant pruning traits¹ of four winegrape varieties ('Blanc Du Bois', 'Lenoir', 'Norton', and 'Villard Blanc') grown on three training systems (Geneva Double Curtain, Vertical Shoot Positioned, and Watson] in 2016 after the 2015 harvest season².

		Cane #		Cordon Length (in)		Cane Wt		Yield/ Cordon Length		Fruitfulness (Cluster no. /Cane no.)	
<i>Variety Overall</i> ³		****		***		***		ns		***	
	'Blanc Du Bois'	38.2	BA ⁵	22.9	A	10.5	C	4.37	A	2.04	A
	'Lenoir'	37.1	B	9.4	B	13.6	BA	3.88	A	1.44	B
	'Norton'	29.2	C	3.5	B	12.5	BC	1.22	A	1.33	B
	'Villard Blanc'	43.3	A	19.5	A	15.5	A	4.76	A	1.32	B
<i>Training System Overall</i> ⁶		***		***		***		***		***	
	GDC	21.3	C	37.2	A	1.9	C	0.15	B	2.50	A
	VSP	37.9	B	2.3	B	17.0	B	3.34	B	0.98	B
	Watson	51.7	A	1.9	B	20.2	A	7.18	A	1.12	B
<i>Variety x Training System</i> ⁷		ns		***		***		ns		***	
'Blanc Du Bois'	GDC	25.3	FG	63.8	A	2.4	E	0.17	A	4.01	A
	VSP	39.2	EDC	2.5	C	12.8	D	3.52	A	1.12	C
	Waston	50.1	BAC	2.3	C	16.3	DC	9.42	A	1.00	C
'Lenoir'	GDC	20.4	HG	24.3	B	1.7	E	0.34	A	2.15	B
	VSP	37.6	EFDC	2.2	C	15.3	D	3.34	A	1.02	C
	Waston	53.4	BA	1.7	C	23.9	A	7.96	A	1.15	C
'Norton'	GDC	11.3	H	6.2	CB	1.5	E	0.00	A	2.01	B
	VSP	32.8	EFDG	2.6	C	18.1	BDAC	0.98	A	0.84	C
	Waston	43.3	BDC	1.8	C	18.0	BDC	2.89	A	1.14	C
'Villard Blanc'	GDC	27.9	EFG	54.6	A	2.0	E	0.30	A	1.83	B
	VSP	42.0	BDC	1.9	C	21.8	BAC	5.53	A	0.93	C
	Waston	59.9	A	1.9	C	22.6	BA	8.44	A	1.19	C

¹Dormant pruning traits include total cane number per vine, total cordon length (in) per vine, total cane weight (kg) per vine, yield (kg) per cordon length (in), and fruitfulness (cluster number per cane number).

² Fruit was harvested from a randomized complete block design (4 varieties x 3 training systems x 3 reps/variety/training system x 4 vines per rep) at Trillium Vineyards in Bremen, GA.

³ For each variety, total possible N=36, (3 training systems x 3 reps/training system x 4 vines/rep).

⁴ Comparisons were made using the GLM procedure in SAS v.9.4. Significance levels: * $P \leq 0.05$, ** $P < 0.01$, *** $P < 0.001$.

⁵ Differences examined using Tukey HSD ($P \leq 0.05$).

⁶ For each training system, total possible N=48, (4 varieties x 3 reps/training system x 4 vines/rep).

⁷ For each variety's variety x training system, total possible N=12, (3 reps/training system x 4 vines/rep).

Table 9. Dormant pruning traits¹ of four winegrape varieties ('Blanc Du Bois', 'Lenoir', 'Norton', and 'Villard Blanc') grown on three training systems (Geneva Double Curtain, Vertical Shoot Positioned, and Watson] in 2017 after the 2016 harvest season².

		Cane #		Cordon Length (in)		Cane Wt		Yield/ Cordon Length		Fruitfulness (Cluster no. /Cane no.)	
<i>Variety Overall</i> ³		**4		***		***		***		ns	
	'Blanc Du Bois'	27.2	BA ⁵	75.4	A	2.0	A	0.09	B	2.25	A
	'Lenoir'	28.0	A	72.8	A	1.5	B	0.18	A	2.22	A
	'Norton'	23.4	B	62.3	B	1.2	CB	0.07	B	1.98	A
	'Villard Blanc'	27.2	BA	74.9	A	1.1	C	0.16	A	2.11	A
<i>Training System Overall</i> ⁶		***		***		ns		*		***	
	GDC	32.3	A	94.7	A	1.3	A	0.12	BA	2.49	A
	VSP	21.4	C	55.3	C	1.5	A	0.11	B	1.88	B
	Watson	25.6	B	64.0	B	1.5	A	0.14	A	2.04	B
<i>Variety x Training System</i> ⁷		***		***		ns		***		***	
'Blanc Du Bois'	GDC	42.5	A	115.2	A	1.9	A	0.11	BC	2.75	BA
	VSP	18.4	D	52.9	C	2.0	A	0.04	C	1.56	D
	Watson	20.8	CD	58.2	CB	1.9	A	0.11	BC	2.43	BAC
'Lenoir'	GDC	32.1	BA	92.7	A	1.1	A	0.19	BA	2.92	A
	VSP	21.7	CD	58.2	CB	1.7	A	0.15	BA	1.77	DC
	Watson	30.1	BC	67.7	CB	1.7	A	0.20	A	1.97	BDC
'Norton'	GDC	24.7	BCD	72.7	B	0.9	A	0.06	C	2.17	BDC
	VSP	21.8	CD	52.0	C	1.3	A	0.06	C	1.85	BDC
	Watson	23.8	BCD	62.1	CB	1.3	A	0.07	C	1.91	BDC
'Villard Blanc'	GDC	29.9	BC	98.4	A	1.1	A	0.11	BC	2.13	BDC
	VSP	23.9	BCD	58.1	CB	1.0	A	0.19	BA	2.34	BAC
	Watson	27.7	BC	68.3	CB	1.2	A	0.16	BA	1.86	BDC

¹Dormant pruning traits include total cane number per vine, total cordon length (in) per vine, total cane weight (kg) per vine, yield (kg) per cordon length (in), and fruitfulness (cluster number per cane number).

² Fruit was harvested from a randomized complete block design (4 varieties x 3 training systems x 3 reps/variety/training system x 4 vines per rep) at Trillium Vineyards in Bremen, GA.

³ For each variety, total possible N=36, (3 training systems x 3 reps/training system x 4 vines/rep).

⁴ Comparisons were made using the GLM procedure in SAS v.9.4. Significance levels: * $P \leq 0.05$, ** $P < 0.01$, *** $P < 0.001$.

⁵ Differences examined using Tukey HSD ($P \leq 0.05$).

⁶ For each training system, total possible N=48, (4 varieties x 3 reps/training system x 4 vines/rep).

⁷ For each variety's variety x training system, total possible N=12, (3 reps/training system x 4 vines/rep).

Table 10. General fruit chemical quality traits¹ of four winegrape varieties ('Blanc Du Bois', 'Lenoir', 'Norton', and 'Villard Blanc') grown on three training systems (Geneva Double Curtain, Vertical Shoot Positioned, and Watson) during the 2016 harvest season².

		N	ml/g	%TTA	pH	°Brix
<i>Variety Overall</i> ³			****	***	***	***
	'Blanc Du Bois'	9	0.48 A ⁵	0.44 B	3.84 A	21.0 C
	'Lenoir'	9	0.32 B	0.68 A	3.82 A	22.2 B
	'Norton'	9	0.26 C	0.63 A	3.81 A	23.4 A
	'Villard Blanc'	9	0.48 A	0.38 B	3.56 B	19.6 D
<i>Training Overall</i> ⁶	<i>System</i>		ns	ns	ns	ns
	Geneva Double Curtain	12	0.39 A	0.53 A	3.80 A	21.0 A
	Vertical Shoot Positioned	12	0.39 A	0.56 A	3.77 A	21.7 A
	Watson	12	0.38 A	0.52 A	3.71 A	22.0 A
<i>Variety x Training System</i> ⁷			ns	ns	ns	**
'Blanc Du Bois'	Geneva Double Curtain	3	0.50 A	0.46 A	3.82 A	19.90 ED
	Vertical Shoot Positioned	3	0.48 A	0.45 A	3.84 A	21.50 BDC
	Watson	3	0.47 A	0.41 A	3.86 A	21.57 BDC
'Lenoir'	Geneva Double Curtain	3	0.34 A	0.68 A	3.85 A	20.90 DC
	Vertical Shoot Positioned	3	0.30 A	0.73 A	3.87 A	22.97 BA
	Watson	3	0.31 A	0.64 A	3.74 A	22.60 BAC
'Norton'	Geneva Double Curtain	3	0.26 A	0.59 A	3.84 A	23.27 BA
	Vertical Shoot Positioned	3	0.25 A	0.67 A	3.87 A	23.43 A
	Watson	3	0.27 A	0.63 A	3.72 A	23.40 A
'Villard Blanc'	Geneva Double Curtain	3	0.47 A	0.39 A	3.68 A	19.77 ED
	Vertical Shoot Positioned	3	0.51 A	0.38 A	3.49 A	18.83 E
	Watson	3	0.47 A	0.39 A	3.51 A	20.27 ED

¹General fruit chemical quality harvest traits include ml of juice/g of fresh weight, percent total titratable acids (TTA), and °brix.

- ² Fruit was harvested from a randomized complete block design (4 varieties x 3 training systems x 3 reps/variety/training system x 4 vines per rep) at Trillium Vineyards in Bremen, GA.
- ³ For each variety, total possible N=9, (3 training systems x 3 reps/training system).
- ⁴ Comparisons were made using the GLM procedure in SAS v.9.4. Significance levels: ns nonsignificant, * $P \leq 0.05$, ** $P < 0.01$, *** $P < 0.001$.
- ⁵ Differences examined using Tukey HSD ($P \leq 0.05$).
- ⁶ For each training system, total possible N=12, (4 varieties x 3 reps/training system).
- ⁷ For each variety's variety x training system, total possible N=3, (3 reps/training system).

Table 11. Sugar profiles of four winegrape varieties ('Blanc Du Bois', 'Lenoir', 'Norton', and 'Villard Blanc') grown on three training systems (Geneva Double Curtain, Vertical Shoot Positioned, and Watson) during the 2016 harvest season¹.

		N	Fructose (mg/ml)	Glucose (mg/ml)	Total Sugars (mg/ml)
<i>Variety Overall</i> ²			*3	*	*
	'Blanc Du Bois'	9	99.6 B ⁴	96.5 B	196.1 B
	'Lenoir'	9	110.9 BA	103.6 BA	214.4 BA
	'Norton'	9	117.1 A	114.4 A	231.6 A
	'Villard Blanc'	9	108.6 BA	104.9 BA	213.5 BA
<i>Training Overall</i> ⁵	<i>System</i>		ns	ns	ns
	Geneva Double Curtain	12	107.8 A	102.9 A	210.7 A
	Vertical Shoot Positioned	12	113.9 A	108.7 A	222.6 A
	Watson	12	105.5 A	102.9 A	208.4 A
<i>Variety x Training System</i> ⁶			ns	ns	ns
'Blanc Du Bois'	Geneva Double Curtain	3	96.6 A	92.0 A	188.6 A
	Vertical Shoot Positioned	3	108.7 A	106.4 A	215.2 A
	Watson	3	93.5 A	91.0 A	184.4 A
'Lenoir'	Geneva Double Curtain	3	109.0 A	100.1 A	209.2 A
	Vertical Shoot Positioned	3	109.5 A	102.0 A	211.5 A
	Watson	3	114.1 A	108.6 A	222.7 A
'Norton'	Geneva Double Curtain	3	118.4 A	115.5 A	233.9 A
	Vertical Shoot Positioned	3	119.8 A	114.5 A	234.3 A

	Watson	3	113.2 A	113.3 A	226.5 A
'Villard Blanc'	Geneva Double Curtain	3	107.2 A	103.9 A	211.1 A
	Vertical Shoot Positioned	3	117.4 A	112.0 A	229.4 A
	Watson	3	101.2 A	98.8 A	200.0 A

¹ Fruit was harvested from a randomized complete block design (4 varieties x 3 training systems x 3 reps/variety/training system x 4 vines per rep) at Trillium Vineyards in Bremen, GA.

² For each variety, total possible N=9, (3 training systems x 3 reps/training system).

³ Comparisons were made using the GLM procedure in SAS v.9.4. Significance levels: ns nonsignificant, * $P \leq 0.05$, ** $P < 0.01$, *** $P < 0.001$.

⁴ Differences examined using Tukey HSD ($P \leq 0.05$).

⁵ For each training system, total possible N=12, (4 varieties x 3 reps/training system).

⁶ For each variety's variety x training system, total possible N=3, (3 reps/training system).

Table 12. Acid profiles of four winegrape varieties ('Blanc Du Bois', 'Lenoir', 'Norton', and 'Villard Blanc') grown on three training systems (Geneva Double Curtain, Vertical Shoot Positioned, and Watson) during the 2016 harvest season¹.

		N	Citric (mg/ml)	Tartaric (mg/ml)	Ascorbic (mg/ml)	Succinic (mg/ml)	Malic (mg/ml)
<i>Variety Overall</i> ²			ns ³	ns	ns	ns	**
	'Blanc Du Bois'	9	0.39 A ⁴	5.22 A	0.01 A	0.83 A	6.99 BA
	'Lenoir'	9	1.22 A	7.79 A	0.12 A	2.76 A	9.80 A
	'Norton'	9	0.97 A	12.86 A	0.10 A	0.26 A	9.10 A
	'Villard Blanc'	9	0.39 A	6.82 A	0.01 A	0.56 A	5.11 B
<i>Training System Overall</i> ⁵			ns	ns	ns	ns	ns
	Geneva Double Curtain	12	0.90 A	10.98 A	0.11 A	1.81 A	8.04 A
	Vertical Shoot Positioned	12	0.53 A	6.90 A	0.03 A	0.92 A	7.87 A
	Watson	12	0.79 A	6.64 A	0.03 A	0.57 A	7.34 A
<i>Variety x Training System</i> ⁶			ns	ns	ns	ns	ns
'Blanc Du Bois'	Geneva Double Curtain	3	0.56 A	6.07 A	0.01 A	1.78 A	5.04 A
	Vertical Shoot Positioned	3	0.32 A	4.90 A	0.00 A	0.45 A	8.33 A
	Watson	3	0.29 A	4.69 A	0.00 A	0.26 A	7.61 A
'Lenoir'	Geneva Double Curtain	3	0.98 A	6.73 A	0.15 A	4.22 A	10.33 A
	Vertical Shoot Positioned	3	0.71 A	6.77 A	0.08 A	2.49 A	8.96 A
	Watson	3	1.97 A	9.87 A	0.12 A	1.56 A	10.10 A
'Norton'	Geneva Double Curtain	3	1.47 A	25.21 A	0.29 A	0.34 A	11.62 A
	Vertical Shoot Positioned	3	0.83 A	8.98 A	0.01 A	0.27 A	9.40 A

	Watson	3	0.62 A	4.38 A	0.00 A	0.15 A	6.29 A
'Villard Blanc'	Geneva Double Curtain	3	0.61 A	5.92 A	0.01 A	0.88 A	5.18 A
	Vertical Shoot Positioned	3	0.27 A	6.93 A	0.01 A	0.49 A	4.77 A
	Watson	3	0.27 A	7.62 A	0.01 A	0.30 A	5.38 A

¹ Fruit was harvested from a randomized complete block design (4 varieties x 3 training systems x 3 reps/variety/training system x 4 vines per rep) at Trillium Vineyards in Bremen, GA.

² For each variety, total possible N=9, (3 training systems x 3 reps/training system).

³ Comparisons were made using the GLM procedure in SAS v.9.4. Significance levels: ns nonsignificant, * $P \leq 0.05$, ** $P < 0.01$, *** $P < 0.001$.

⁴ Differences examined using Tukey HSD ($P \leq 0.05$).

⁵ For each training system, total possible N=12, (4 varieties x 3 reps/training system).

⁶ For each variety's variety x training system, total possible N=3, (3 reps/training system).

Table 13. Field harvest traits¹ of four winegrape varieties ('Blanc Du Bois', 'Lenoir', 'Norton', and 'Villard Blanc') grown on three training systems (Geneva Double Curtain, Vertical Shoot Positioned, and Watson] during the 2018 harvest season².

		Total Cluster				
		N	No.		Total Cluster Wt.(kg)	
<i>Variety Overall³</i>			*** ⁴		ns	
	'Blanc Du Bois'	23	43.3	A ⁵	1.8	A
	'Lenoir'	34	53.0	A	2.0	A
	'Norton'	34	57.5	A	1.9	A
	'Villard Blanc'	28	33.4	B	2.0	A
<i>Training System Overall⁶</i>			***		***	
	Geneva Double Curtain	41	57.5	A	2.2	A
	Vertical Shoot Positioned	33	21.6	B	0.9	B
	Watson	46	58.2	A	2.4	A
<i>Variety x Training System⁷</i>			***		ns	
'Blanc Du Bois'	Geneva Double Curtain	6	61.8	A	3.8	A
	Vertical Shoot Positioned	8	23.3	CD	0.8	A
	Watson	10	50.0	ABC	1.2	A
'Lenoir'	Geneva Double Curtain	11	72.9	A	1.9	A
	Vertical Shoot Positioned	11	26.8	BCD	1.5	A
	Watson	12	58.8	A	2.6	A
'Norton'	Geneva Double Curtain	12	74.9	A	2.5	A
	Vertical Shoot Positioned	10	21.5	D	0.6	A
	Watson	12	70.2	A	2.3	A
'Villard Blanc'	Geneva Double Curtain	12	24.0	CD	1.4	A

Vertical Shoot Positioned	4	4.5	D	0.2	A
Watson	12	52.3	AB	3.2	A

¹Field harvest include total cluster number per vine, and total cluster weight (kg) per vine, randomly sampled over the vine.

² Fruit was harvested from a randomized complete block design (4 varieties x 3 training systems x 3 reps/variety/training system x 4 vines per rep) at Trillium Vineyards in Bremen, GA.

³ For each variety, total possible N=36, (3 training systems x 3 reps/training system x 4 vines/rep).

⁴ Comparisons were made using the GLM procedure in SAS v.9.4. Significance levels: * $P \leq 0.05$, ** $P < 0.01$, *** $P < 0.001$.

⁵ Differences examined using Tukey HSD ($P \leq 0.05$).

⁶ For each training system, total possible N=48, (4 varieties x 3 reps/training system x 4 vines/rep).

⁷ For each variety's variety x training system, total possible N=12, (3 reps/training system x 4 vines/rep).

Table 14. Dormant pruning traits¹ of four winegrape varieties ('Blanc Du Bois', 'Lenoir', 'Norton', and 'Villard Blanc') grown on three training systems (Geneva Double Curtain, Vertical Shoot Positioned, and Watson] in 2018 after the 2017 harvest season².

		Cane #		Cordon Length (in)		Cane Wt		Yield/ Cordon Length		Fruitfulness (Cluster no. /Cane no.)	
<i>Variety Overall</i> ³		ns ⁴		ns		***		***		***	
	'Blanc Du Bois'	35.2	A	80.4	A	3.2	A	0.11	A	2.1	A
	'Lenoir'	35.1	A	84.5	A	1.9	B	0.14	A	1.6	B
	'Norton'	32.3	A	83.7	A	1.8	B	0.08	B	1.9	AB
	'Villard Blanc'	34.0	A	89.2	A	1.6	B	0.09	B	1.2	C
<i>Training System Overall</i> ⁶		***		***		***		***		***	
	GDC	41.7	A	126.6	A	1.7	B	0.08	B	1.9	A
	VSP	28.1	C	63.6	B	1.7	B	0.08	B	1.3	B
	Watson	33.1	B	66.4	B	2.7	A	0.14	A	1.9	A
<i>Variety x Training System</i> ⁷		ns		ns		ns		ns		***	
'Blanc Du Bois'	GDC	51.0	A	138.7	A	2.6	A	0.13	A	2.7	A
	VSP	27.4	A	63.9	A	2.8	A	0.07	A	1.6	ABCD
	Waston	34.4	A	63.5	A	4.0	A	0.15	A	2.2	AB
'Lenoir'	GDC	43.5	A	117.9	A	1.5	A	0.10	A	1.4	BCD
	VSP	26.3	A	63.7	A	1.6	A	0.14	A	1.8	ABC
	Waston	34.9	A	67.0	A	2.6	A	0.18	A	1.8	ABC
'Norton'	GDC	35.8	A	124.2	A	1.4	A	0.06	A	2.6	A
	VSP	29.5	A	59.8	A	1.5	A	0.06	A	1.3	BCD
	Waston	31.4	A	65.3	A	2.5	A	0.11	A	1.8	ABC
'Villard Blanc'	GDC	41.1	A	131.6	A	1.7	A	0.07	A	1.1	CD
	VSP	29.1	A	66.6	A	1.1	A	0.05	A	0.6	D
	Waston	31.9	A	69.5	A	2.0	A	0.14	A	1.8	ABC

¹Dormant pruning traits include total cane number per vine, total cordon length (in) per vine, total cane weight (kg) per vine, yield (kg) per cordon length (in), and fruitfulness (cluster number per cane number).

² Fruit was harvested from a randomized complete block design (4 varieties x 3 training systems x 3 reps/variety/training system x 4 vines per rep) at Trillium Vineyards in Bremen, GA.

³ For each variety, total possible N=36, (3 training systems x 3 reps/training system x 4 vines/rep).

⁴ Comparisons were made using the GLM procedure in SAS v.9.4. Significance levels: * $P \leq 0.05$, ** $P < 0.01$, *** $P < 0.001$.

⁵ Differences examined using Tukey HSD ($P \leq 0.05$).

⁶ For each training system, total possible N=48, (4 varieties x 3 reps/training system x 4 vines/rep).

⁷ For each variety's variety x training system, total possible N=12, (3 reps/training system x 4 vines/rep).

Photographs of Grape Varieties and Vineyard Work Days – 2017 Harvest



Villard Blanc on Watson training system.



Team harvest on Geneva Double Curtain trained vines.



Lenoir grapes on Geneva Double Curtain training system.



Villard Blanc on Vertical Shoot Positioned training system.



Harvesting Blanc Du Bois on the Watson training system.



Norton grapes on the Watson Training System.



Blanc Du Bois on the Watson training system.



Lenoir on the Vertical Shoot Positioned training system

Wineries use chemical test to help pick best grapes

By Merritt Melancon
University of Georgia

Georgia wines may not have the same cachet as California Chardonnays or French Burgundies, but they're earning new accolades each year thanks to a community of dedicated grape growers and a little help from University of Georgia (UGA) Cooperative Extension.

UGA Extension agent Paula Burke in Carroll County, Georgia, is working with the Vineyard and Winery Association of West Georgia, Georgia wine growers and the UGA Agricultural and Environmental Services Laboratories (AESL) to help produce better wines by perfecting growing methods.

According to the UGA Center for Agribusiness and Economic Development, Georgia's fledgling wine industry has an impact of \$81.6 million on Georgia's economy each year.

There's been very little research into what it takes to grow wine grapes in Georgia. Most of the grape research in the state has focused on muscadine varieties, but wine growers in west Georgia are using hybrid vines that incorporate the genetics of classic vitifera or European varieties and the genetics of wild grapes to help combat disease.

"These hybrid grapes grow very vigorously," Burke said. "They seem to love poor soil, and they just seem to love this area of Georgia. The poorer the soil, it seems the faster they grow."

These are Texas-cultivated hybrids, like Blanc du Bois, Norton, Lenox and Villard Blanc. They can be treated like classic pinots and merlots in the wine barrel, but are resistant to problems like Pierce's disease, which makes wine grape cultivation very difficult in Georgia.

"When you say 'Norton' or 'Blanc du Bois,' nobody knows those varieties, but they make fantastic wines," Burke said.

"You can make sweet wines out of them, you can make dry wines out of them ... They're great wines, they're just not the merlots or pinots that you see in the store."

But even if the right variety of the right crop is planted in the right place, knowing the right growing methods for the region can greatly impact growers' success, Burke said.

Burke started working with nearby Harrison County, Georgia, winery Trillium Vineyard in 2014. She took copious soil samples to help AESL, which is best known for analyzing soil and water samples to develop soil-testing recommendations for hybrid grape wineries in Georgia. Burke also started working with owners Bruce and Karen Cross on variety testing.

The goal was to compare varieties of grapes and trellising systems to see which combination provided the best yields and the highest quality grapes.

But determining the "highest quality grapes" can be subjective, and that's where the team at the UGA Crop and Environmental Quality Laboratory, one of the labs that make up AESL, had some influence. Daniel Jackson, manager of the lab, has taken on the task of quantifying what makes a grape great for winemaking.

Building on a testing system he developed to chemically describe the sweetness of Vidalia onions, Jackson developed a battery of tests for the Trillium Vineyard grapes.

Jackson and his team measure pH and titratable acidity (measurements of the acidity of the grape juice), how quickly that acidity will mellow and meld with other flavors, and the brix and sugar profiles that characterize the potential alcohol content of the wine and the overall sweetness of the juice.

For thousands of years, winemakers have developed a knowledge base about how growing practices affect the wine made from traditional wine grapes. Tests from the UGA lab allow Georgia's wine growers to accelerate this



Carroll County UGA Cooperative Extension agent Paula Burke gathers wine grape samples at Trillium Winery. Photo: Bruce Cross

process by using modern chemistry.

They'll be able to skip the generations of trial and error and pinpoint the best uses for each variety of grape and how growing methods will improve the quality of each variety.

"This is a systematic approach to identifying how these varieties (which have not seen widespread use in this region) will perform in the vineyard and in the wine barrel," Jackson said. "It's allowing us to look at these newly adopted varieties and see how they respond to different growing conditions, how growing conditions affect quality and what kind of wines they can be used for."

This information can help growers make informed decisions about which grapes to grow and which cultivation techniques will maximize yield and quality.

Burke and Jackson's work with the Trillium Vineyard is being funded by a three-year grant from USDA and has received significant technical advice from Fritz Westover of Westover Vineyard Advising and Rachel Bile, a postdoctoral horticulture researcher on the UGA campus in Griffin, Georgia.

Separately, Jackson's lab has started accepting grapes and wines from other Georgia producers. FGN



THINK LONG TERM

THE EFFORT YOU MAKE TODAY WILL REWARD YOU IN THE FUTURE.

Seeking the great Georgia Grape

Georgia wines may not have the same reputation

as California chardonnays or French Burgundies, but they're earning accolades thanks to dedicated grape growers and help from UGA Cooperative Extension.

Carroll County UGA Extension agent Paula Burke is working with the UGA Extension Agricultural and Environmental Services Laboratories (AESL), the Vineyard and Winery Association of West Georgia and Georgia wine growers to help produce better wines by perfecting growing methods.

According to the UGA Center for Agribusiness and Economic Development, the fledgling wine industry has an impact of \$81.6 million on Georgia's economy each year, but there's been little research into growing wine grapes in Georgia until now.

Wine growers in west Georgia are using hybrid vines that incorporate the genetics of classic vinifera or European varieties and the genetics of American grapes to help combat disease.

"These hybrid grapes grow very vigorously," Burke said. "They seem to love poor soil, and they just seem to love this area of Georgia.

The poorer the soil, it seems the faster they grow."

These are Texas-developed hybrids like 'Blanc du Bois,' 'Norton,' 'Lenoir' and 'Villard Blanc,' which can be treated like classic pinots and merlots in the wine barrel but are resistant to problems like Pierce's disease, which makes vine grape cultivation very difficult in Georgia.

"When you say 'Norton' or 'Blanc du Bois,' nobody knows those varieties, but they make fantastic wines," Burke said. "You can make sweet wines out of them; you can make dry wines out of them ... They're great wines; they're just not the merlots or pinots that you see in the store."

Burke started working with a nearby Haralson County winery, Trillium Vineyard, in 2014. She took numerous soil samples to help the AESL develop soil-testing recommendations for grape wineries in Georgia, and started working with owners Bruce and Karen Cross to test varieties.

Their goal was to compare varieties of grapes and trellising systems to see which combination provided the best yields and the highest quality grapes.

Determining the "highest quality grapes" can be subjective, and that's where the team at the Crop and Environmental Quality Laboratory at the AESL came in.

Daniel Jackson, manager of the Crop and Environmental Quality Laboratory, is quantifying what makes a grape great for winemaking. Building on a testing system that he developed to chemically describe the sweetness of Vidalia onions, Jackson developed a battery of tests for the Cross' grapes.

His lab measures pH and titratable acidity, which are measures of the acidity of the grape juice, how quickly that acidity will mellow and meld with other flavors; the Brix and sugar profile, which characterize the potential alcohol content of the wine; and the overall sweetness of the juice.

"The information we're providing can help growers make informed decisions about which grapes to grow and which cultivation techniques to use to maximize yield and quality," Jackson said. "Winemakers

"When you say 'Norton' or 'Blanc du Bois,' nobody knows those varieties, but they make fantastic wines."

PAULA BURKE

should also be able to use our results to identify how to treat the grapes and the styles that would produce the best wines."

Burke and Jackson's work with Trillium Vineyard is funded by a three-year grant from the U.S. Department of Agriculture and has received technical advice from Fritz Westover of Westover Vineyard Advising and Rachel Itle, a postdoctoral horticultural researcher on the UGA campus in Griffin, Georgia. Separately, Jackson's laboratory has started accepting grapes from other Georgia growers who want to know the chemical breakdown of their grapes and how to improve their quality. • *Merritt Melancon*