

2022 SR SFC Project Progress Report

Proposal Category: ___Research _X_Outreach

Proposal Status: _X_ New Proposal ___Previously funded by SRSFC

Title: *Extension Education on Newly Released Blueberry Cultivars with Improved Fruit Quality Characteristics*

Name, Mailing and Email Address of Principal Investigator:

Elina Coneva, Ph.D.
W.A. Jr. & C. Dozier Endowed Professor
Extension Specialist, Pomologist
101 Funchess Hall
Auburn University
Auburn, AL 36849
Edc0001@auburn.edu

Co-PIs:

Ebrahiem Babiker, Ph.D.
Research Geneticist, USDA-ARS
810 Hwy 26 West
Poplarville, MS 394700287
Phone: (601) 403-8769
ebrahiem.babiker@usda.gov

Sushan Ru, Ph.D.
Assistant Professor
Small Fruit Breeding and Genetics
287 CASIC Building
Auburn University, AL 36849
Phone: 509-942-9811
szr0099@auburn.edu

Eric Stafne, Ph.D.
Extension/Research Professor
810 Hwy 26 West
Poplarville, MS 39470
Ph.: 601-403-8939
eric.stafne@msstate.edu

Melba Salazar-Gutierrez, Ph.D.
Assistant Professor, Plant Physiology
101 Funchess Hall
Auburn University, AL 36849
Ph.: 334-844-4862
Mrs0146@auburn.edu

Camila Rodrigues, Ph.D.
Assistant Extension Professor, Food Safety
275 CASIC Building
Auburn University, AL 36849
Ph.: (334) 758-1107
crodrigues@auburn.edu

Edgar Vinson, Ph.D.
Assistant Extension Professor
Chilton Res. & Extension Center
Co. Rd. 756
Clanton, AL 35045
Ph.: 205-646-3610
vinsoed@auburn.edu

Harli Willis
Program Assistant-Virtual Events Coordinator
Alabama Cooperative Extension System
Ph.: 334-733-2697
Hbw0014@auburn.edu

Objectives:

This project seeks to evaluate the performance of newly released blueberry cultivars with enhanced fruit quality and biological characteristics that have not been previously tested in central Alabama conditions. The purpose is to develop educational curriculum on new cultivars production practices and post-harvest handling techniques and provide training to growers and Extension personnel. The outcomes will directly benefit a large number of specialty crop family farms growing this high-value berry crop, praised for providing sought after valuable health benefits.

Specific Objectives:

- 1). To establish and maintain demonstration planting of newly released blueberry cultivars in central Alabama;
- 2). To evaluate cultivar phenology, vegetative development, and stress responses;
- 3). To assess cultivar yield potential and fruit quality characteristics including berry size, taste, appearance, flavor, pH, total phenolic, total sugar, Glucose, Fructose, and total acids;
- 4). To organize a blueberry production training event for growers and Extension personnel and offer education on production, food safety, and post-harvest handling practices;
- 5). To record a video presenting information on the new blueberry cultivars and their performance
- 6). To present the newly gained knowledge at grower meetings in Alabama (Alabama Fruit and Vegetable Growers Association Annual Conference), and the Southeast Regional Fruit and Vegetable Conference, Savannah, GA.
- 7). To develop an article for the SR SFC Newsletter.

Activities:

Two new blueberry cultivar releases from the UGA breeding program are reported to produce large size berries. ‘Titan’ and ‘Krewer’ berry size is reported to be twice as large as the berry size of most rabbiteye blueberry cultivars. ‘Pink Lemonade’ (recommended as a backyard cultivar) possesses unique pink fruit color and ripens late. ‘Pink Lemonade’ has a very attractive and unusual appearance and draws consumers curiosity and attention at the marketplace. ‘Alapaha’ is known for its very early ripening, surpassing ‘Climax’, while its blooming season is about 7 to 10 days after that of ‘Climax’, which reduces the risk of late spring frost and freeze damage to the crop. ‘Vernon’ is another early season cultivar that has not been evaluated for production in Alabama conditions. ‘Ochlockonee’ is reported to mature about a week after ‘Tifblue’ and can extend the harvest season.

Since these improved blueberry cultivars have not been previously tested for their agricultural performance in Alabama environment, an experimental plot was established to evaluate their vegetative growth, production potential and fruit quality characteristics in order to develop cultivar recommendations to specialty crop producers in the Southeast. Traditionally

grown cultivars such as the early season ‘Climax’, ‘Premier’, and the late ripening ‘Powderblue’ and ‘Tifblue’ were included as controls.

RESULTS:

The above mentioned newly released and established blueberry cultivars were planted as a RCBD experiment with 4 single plant replications at the Chilton REC, Clanton in central Alabama. Each cultivar had a single plant on each of the four rows in the experiment. Data to determine each cultivar bud break and flowering phenology were collected periodically starting in January 2022 until mid-March. A late spring freeze event occurred on March 12-13 when temperatures fall to 24 degrees F. Row covers (Figure 1) were used to protect the experimental bushes every time critically low temperatures were expected starting as early as January 2022 until last freeze in mid-March. The early row cover application was due to the fact that low chill cultivars such as ‘Krewer’ and ‘Pink Lemonade’ had fulfilled their chill requirements at the end of December and had some open flowers in early January (Figure 2).



Figure 1. Row covers used to protect the blueberry cultivar experiment at the CREC, AL during January-March, 2022.

Application of row covers increased the temperature under the cover by as much as 8 degrees F and successfully protected the plants through mid-March when the strong winds of over 35 miles/hr. blew away the row covers from two of the experimental rows (half of the experiment) and exposed the plants to the freezing temperatures. At this time the blueberry cultivars had between 20% (‘Tifblue’), and 100% (‘Krewer’) open flowers due to the warming trend in the beginning of March. Since blueberry plants can tolerate temperature of 23-24⁰F during the early pink bud stage, but are susceptible to cold injury at 28⁰F at the full bloom stage, all cultivars sustained cold injury and the most advanced blueberries had a complete crop lost, especially on the two rows where the wind damage caused the row covers to be removed from the plants (Figures 3, 4, and 5).



A



B

Figure 2. 'Krewer' (A) and 'Climax' (B) rabbiteye bushes flowering stage on January 11, 2022, CREC, AL.

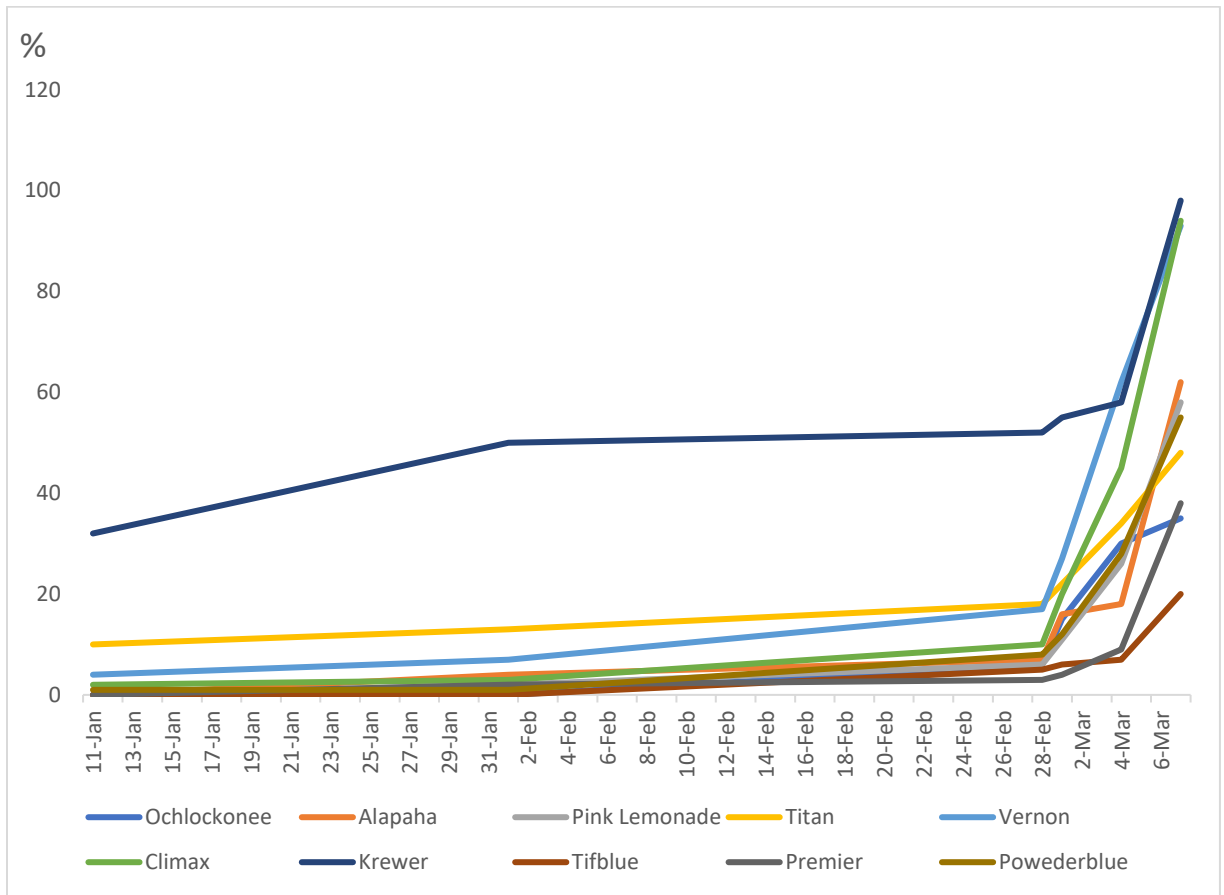


Figure 3. Phenogram of flowering (percent open flowers) of selected rabbiteye blueberry cultivars grown at the CREC, AL, 2022.



Figure 4. Cold damage to uncovered (A) and row covered (B) 'Krewer' rabbiteye blueberry plants after the freeze event on the evening of March 12, 2022.

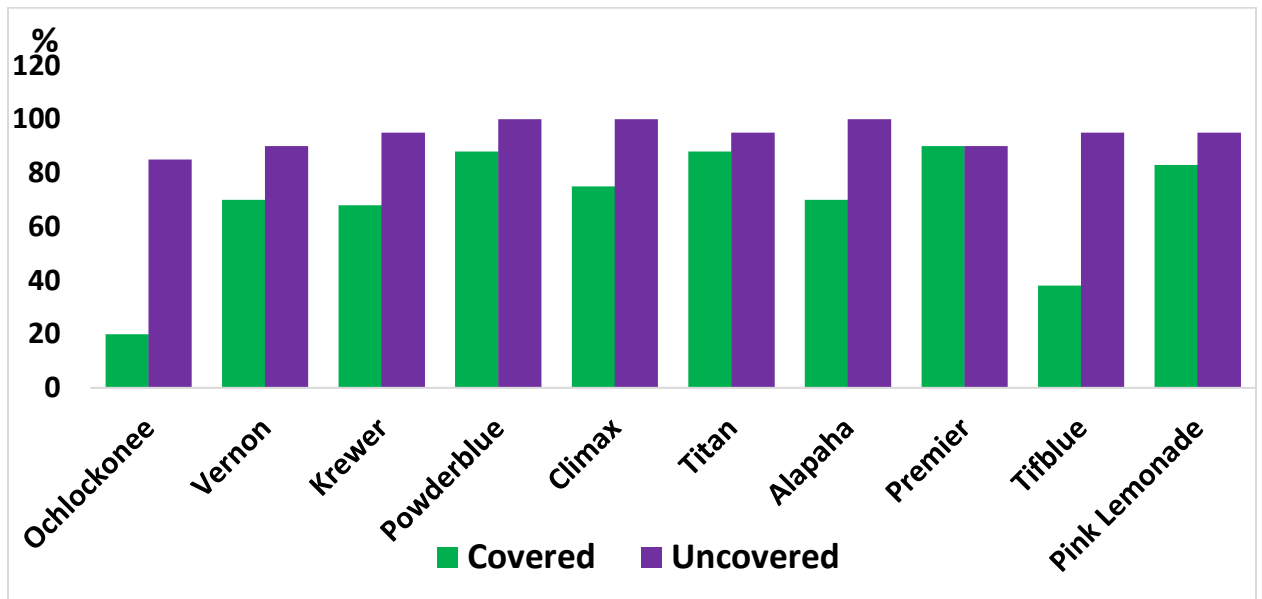


Figure 5. Percent cold damaged flowers for selected blueberry cultivars based on row cover protection after the March 12 freeze event, 2022.

Visual rating of the degree of cold injury was conducted for each blueberry plant shortly after the freeze event on March 12. The results (Figure 5) suggest the two covered rows had between 20 and 90% damaged flowers, while the damage on uncovered/unprotected rows representing the other half of the experimental plants varied between 85 and 100%.

Table 1. Yield and fruit quality attributes at each harvest period of selected rabbiteye blueberry cultivars grown in central Alabama CREC, 2022.

Cultivar	Yield, g/plant			Berry wt, g			SSC		
	7-Jun	14-Jun	23-Jun	7-Jun	14-Jun	23-Jun	7-Jun	14-Jun	23-Jun
Alapaha	92.0	123.0	12.0	2.2	1.6	1.2	14.9	15.5	14.4
Climax	33.5	68.0	32.0	2.3	2.1	1.8	16.1	16.1	18.7
Krewer	133.0	156.0	37.0	4.0	3.3	2.3	14.8	15.1	16.4
Vernon	427.3	143.3	129.0	3.0	1.9	2.4	14.9	14.4	15.5
Titan	110.3	116.0	–	4.5	3.5	–	12.1	16.6	–
Tifblue	–	194.0	226.0	–	1.4	1.7	–	13.5	16.1
Ochlockonee	–	139.0	188.0	–	2.3	2.3	–	13.2	15.9
Powderblue	–	83.0	95.5	–	1.4	1.8	–	14.3	15.5
Premier	–	56.0	–	–	1.6	–	–	15.5	–

Season of ripening and the number of harvests were recorded on bushes with some fruit produced. First blueberry harvest occurred on June 7, followed by harvesting on June 14 and 23rd, 2022. Individual harvest yield was measured for each bush (Table 1). To determine fruit quality characteristics, a 10-berry sample was collected at each harvest event when berry size and SSC were measured. Due to the spring freeze crop loss, no sufficient berry samples were available to measure berry pH, total phenolic, total sugar, Glucose, Fructose, and total acids.

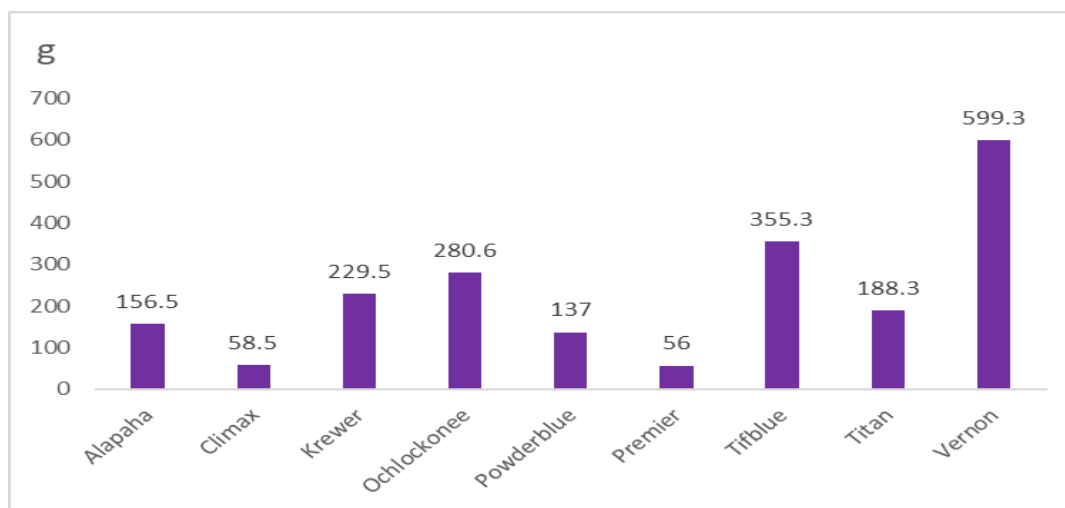


Figure 6. Total yield/plant (g) of selected blueberry cultivars grown at the CREC, AL, 2022.

Our results for total yield/plant (Figure 6) suggest ‘Vernon’ produced the highest yield of 599.3 g/plant (mainly the protected bush produced fruit), while no crop was harvested from any of the ‘Pink Lemonade’ plants.

Table 2. Fruit quality attributes of selected rabbiteye blueberry cultivars grown in central Alabama CREC, 2022.

	Mean berry weight, g	SSC
Alapaha	2.0	15.5
Climax	2.1	16.5
Krewer	3.5	15.2
Ochlockonee	2.3	15.0
Powderblue	1.7	15.3
Premier	1.6	15.5
Tifblue	1.6	15.3
Titan	4.0	14.4
Vernon	2.5	15.0

Due to the significant freeze crop loss fruit quality attributes were determined on a small berry sample (10 fruit) and should be considered with caution. The results on seasonal mean berry weight and SSC are presented in Table 2. ‘Titan’ berries were the largest (4.0g) among all cultivars tested and were followed by ‘Krewer’ fruit with an average size of 3.5g. ‘Climax’ berries were the sweetest during 2022 season, but all blueberry cultivars produced crop with relatively higher SSC, likely an effect of the low crop load.

Results on cultivar phenology, cold damage and berry size and appearance were discussed at growers meetings and educational events. The blueberry cultivar evaluation study was presented at the Southeast Regional Fruit and Vegetable Conference in Savannah, GA, at the Professional Agricultural Workers Conference in Montgomery, AL. Results were also presented in a webinar on Blueberry Cultivar Selection as part of the ACES Commercial Horticulture Team lead Fruit School Project focused on Blueberry production and consisted of six one hour seminars where 12 Extension professionals, including out of the state invited speakers presented information on different aspects of blueberry production including food safety and postharvest handling practices. The Blueberry School curriculum was developed as an In-service train-the-trainer event offered to the Extension personnel and broadcasted via Facebook Live event to wider grower and general public audience. Two field day and demonstration events were conducted pre-and post- Blueberry Production Fruit School to complement the knowledge gained on sustainable blueberry production with practical hands-on experience in orchard management. On March 1st we conducted a Blueberry Production Workshop with New Blueberry Cultivars Showcase and pruning demonstration. Blueberry harvest and safety handling workshop was offered on June 10, 2022 where participants had an opportunity to taste the new cultivars and familiarize with their fruit quality.