



STATUS OF THE INDUSTRY

Viticulture Advisory Council

2023 Annual Report
November 14, 2023

2023 Viticulture Advisory Council Status of the Industry Report

Agricultural Advisory Council Report, Burgess.....	1
FWGGA Report, Kavouras.....	2
Fresh Fruit Report, McKinnie.....	4
Wineries Report, Cox.....	6
Processed Foods Report, Cowie.....	7
Nursery Report, Newbold.....	8
FAMU Report, Tsolova.....	11
UF Report, Sarkhosh.....	30

**AGRICULTURE ADVISORY COUNCIL
ANNUAL REPORT TO THE
VITICULTURE ADVISORY COUNCIL
2023**

Jeanne Burgess
Viticulture Representative to the
Florida Agriculture Advisory Council

Florida's Agriculture Advisory Council is an advisory body made up of representatives from agricultural commodity groups, university and other agriculture interests in the State. It serves to advise and make recommendations to Florida's Commissioner of Agriculture on issues affecting the State's agriculture industry as a whole. The Agriculture Advisory Council did not meet in 2023.

Viticulture Advisory Council Annual Industry Report - 2023

Area of Representation: Florida Wine and Grape Growers Association (FWGGA)

Representative: Lou Kavouras

Introduction

The Florida Wine and Grape Growers Association is a grower-based association dedicated to promoting Florida grapes, wine, and grape products through education, research, and marketing activities. Members consist of wineries, commercial and hobbyist growers, winemakers, nurseries, representatives of Florida A&M University, University of Florida, University of Central Florida, and students, along with vendor representatives.

Project Status

- Communications

Our website continues to evolve and improve. Members can be listed in the directory, post classified ads, renew memberships, and register for the annual conference online. Numerous links to educational information and virtual programs are offered.

- Membership

The FWGGA membership as of October 20th is 54, 42 of which are renewals and 12 new members. We ended last year with a total membership of 64. Memberships expire at the end of December, and we are mailing renewal reminders for 2024. Below is the membership breakdown:

- 20 Commercial (16 Renewals and 4 New)
- 26 Non-Commercial (18 Renewals and 8 New)
- 3 Associate (3 Renewals and 0 New)
- 2 Student (2 Renewals and 0 New)
- 3 Lifetime

- Newsletter

Newsletters are distributed semi-annually to current members and posted on the FWGGA website. Content varies, but may include university research highlights, industry news, membership opportunities, officer contact information, and conference materials.

- Annual Conference

The Annual Conference was held January 13-14, 2023, in Downtown Deland, with a focus on celebrating FWGGA's 100th anniversary. We brought in speakers from Nova Scotia,

Georgia, Ohio, UF, FAMU, and UCF along with winery owners, growers, and local experts. The conference was well attended.

Total Income for the conference ----- \$9610.

Total Expenses - \$9500

The next conference will be held on January 12-13, 2024, again Downtown DeLand, with a “Yellowstone” western theme. Presentations are planned from several professionals from Pennsylvania, Ohio, and Connecticut. Registration is now available on the FWGGA.org website. We requested a \$7,500 grant from the VAC to be used toward the FWGGA’s 2024 Annual Conference, speaker costs, and student participation incentives. We were awarded up to \$7,000 if matched by FWGGA.

- Wine and Juice Competition

The Florida State Fair (FSF) competition has historically been the FWGGA’s principal project. The competition provides exposure for commercial and hobbyist wine and juice makers. Due to complications from the Coronavirus and conflicts with Tampa Superbowl activities, the FSF regrettably was not able to host the wine competition in 2021, and since has determined that they are unable to partner with us in the future.

The FWGGA leadership has investigated numerous alternative partners and venues to no avail. We have identified the pathway to secure the required license to sell wine after the competition, which is the primary way a profit can be made; however, numerous other logistics are currently unresolved and FWGGA leadership ideas and resources are tapped out.

We reached out to the FSF this spring in hopes they would be interested in re-kindling our partnership for the competition. Conversations seemed promising, and consideration was given to holding the event during an RV rally, one of their largest multi-day events. Ultimately FSF requested some time to consider options and became unresponsive as the year went on. That said, the future of the wine competition is still unclear.

Industry Issues and Needs

New wineries are opening across the state, some paired with breweries and distilleries. Education about Florida grapes and wine is very important, now more than ever. One goal of the FWGGA is to continue to be the go-to resource for both new and existing wineries, vineyard managers, and winemakers – both commercial and novice. The association continues to recruit new members and leaders that will carry the FWGGA into the future with fresh, contemporary ideas and enthusiasm. Two new directors were added to the FWGGA slate of officers this year.

Fresh Fruit Sector Report
Florida Viticulture Advisory Council
November 2023

Fresh Fruit Representative
Phillip McKinnie

Introduction	
	<p>General Overview of Florida’s Fresh Fruit Market. Approximately 25 U-Pick operators within the state of Florida which is down from 2022’s 33 confirmed locations.</p>
Market Status	
	<p>Within the State of Florida, demand for fresh muscadine table grapes is relatively consistent, driven by consumption in two categories (Retail and U-Pick). Retail demand (e.g. Walmart, Publix, Winn Dixie) is dominated by established supply agreements with growers outside of the State predominantly from an emerging commercial vineyard in Florida but mostly from vineyards in Georgia and North Carolina. Independent retail chains (e.g. Piggly Wiggly, Grocery Outlet) often leverage local growers in a less formal manner to source table muscadine fruit grapes but volumes are unpredictable since these retailers often repackage under their proprietary store brand.</p> <p>The U-Pick market is a niche and seasonal opportunity dominated by vineyard owners with loyal repeat customers. As previously noted in prior reports, the market is fragmented, driven by hobbyists and low-volume producers. Pop up vendors along roads is representative of the current market which is opportunistic during the harvest period and extremely sporadic.</p> <p>As part of the market assessment, I canvassed U-Pick operators and was able to confirm 25 documented organizations offering U-Pick and fresh fruit in the State of Florida. There are more but many operate roadside and once their lugs are sold they don’t return.</p> <p>I randomly contacted over 10 of these organizations and was able to speak with 3 U-Pick and/or fresh fruit growers (i.e., located in High Springs, Grand Ridge and Graceville). These organizations continue to survive and rely on loyalists, word-of-mouth and local press releases. Note, fresh fruit continues</p>

	to be a part time opportunity where few rely on the sales of fresh fruit to make a living.
Product Status	
	Most growers reported lower than average yields for 2023 driven by a prolonged winter that resulted in greater cold days at or shortly after bud break. The fruit from these reduced yield produced intense flavor at a better quality than previous years.
Pricing	
	U-Pick vineyards are pricing product in the range of \$1.25 - \$2.00 per pound, while twenty-pound retail lugs are ranging from \$20 - \$30 per lug depending on market supply. This is consistent with prior years despite pricing pressures.
Growth Status	
	<p>The fresh fruit market has potential. Increased activity in the U-pick sector can be fueled by a push in Agritourism marketing at the local and county level.</p> <p>It's projected this sector will grow in the low single digits range. There are several New regulations favoring Agritourism which could foster further growth in this area if operators were to pool resources.</p>
Industry Needs	
	<p>Opportunity. Agritourism is a trend that seems to be growing driven by the need for more family friendly activities. The fresh fruit industry in Florida, including muscadine growers, have an opportunity to take advantage of this trend. Challenges. Fairly flat market pricing driven by seasonal availability. Lack of a robust database to aid in identifying U-Pick operators as well as no formal guidelines to establish minimum thresholds. The industry would benefit from a State-level coordinated media effort to increase public awareness.</p>
Summary	
	Florida's fresh muscadine fruit market is limited to small U-pick operators, spec sellers and local markets. To grow this segment, emphasis should be placed on establishing minimum guidelines followed by the establishment of a formal directory located on FWGGA's website as well as the Department of Agriculture. For this market to expand, more acreage will need to be planted in order to attract major retailers as well as an incentive for these retailers to source fruit from Florida.

Viticulture Advisory Council
Annual Industry Report 2023

Area of Representation – Wineries, **Representative** -- C. Gary Cox, Date --11/14/2023

Florida Farm Wineries had small increases in sales this year. With COVID worries mostly over travel that was coming to Florida in autos is now open to the world again, so tourism is down at wineries. Local sales to local customers at the wineries or in other retailers are slightly up. However, there is still a lot of concern for COVID, economic and labor issues that hinder progress back to normal. Festivals and events at the wineries are still somewhat limited and big sales or promotions dollars are needing to be spent to remind customers that wineries are open. Florida Certified Farm Wineries are down to 18. Over half of the certified Florida wineries are using fruits other than just grapes. Sufficient grapes to sustain growth are available at stable prices in Florida and lesser prices for out of state grapes. Wine retail prices seem to be holding up but not increasing enough to cover increasing cost. Labor costs are up, and many people don't seem to want to work. Most other supplies are available but predicted shortages for bottles have not materialized even though higher prices in general have.

A colder winter seemed to turn to a nice spring with vine buds and flowers opening only to be hit with a later than usual spring frost. This killed many of the buds and flowers cutting the tonnage of grapes from 20-70 % across the state. With a mostly uneven fruit set the harvest seemed headed for uneven ripening but produced fruit with nice characteristics. As usual rainfall was varied across the state some up some down but coming in waves of heavy rain then periods of dry for weeks. winemakers are looking forward to excellent wine from this year's grapes. The VAC Increased Acreage Program is still accounting for more grapes as these vineyards are mature but the slight increase in Florida domestic wine markets has stabilized the price per ton for Florida contract grapes.

There was still a reasonable market for Florida grape growers and sales prices for grapes were holding, with most fruit selling at \$500 per ton, even though Georgia grapes are still offered at \$350 per ton FOB the vineyard. It seems that most grapes in and outside of Florida found a home and were sold. The fruit wineries, although high in number of wineries, account for only about 20% of wine volume and seem to be using mostly excess or blemished fruit, so often cost is not an issue. Winery production with grapes is continuing to account for over 80% of Florida bottled wine production. Also, a good volume of grape bulk wine and juice is going out of state.

After more than thirty years of research work, on PD and other disease resistance in vinifera or hybrid grapes, as well as new red grape cultivars, we do not have positive results for cultivars other than Muscadines to grow in Florida. This seems to indicate it is time to reevaluate the benefit of this research. We need more research on growing muscadines better, the health benefits of Muscadine grapes, Muscadine wine and Muscadine byproducts. Continued funding by the VAC for these research projects is important.

Positive feedback is still being received from wineries for the VAC program with more promotional funding being directed back to the individual wineries as a reimbursement for their promotions. Two factors that are known to influence sales are price and promotion. Florida's smaller wineries have consistently far exceeded the national average price per bottle which would tend to reduce sales but hopefully the direct promotional funding will increase small winery sales. With gallons sold being flat we still need funding for promotion.

In summary, like most other business' wineries have had a tough 2022-23. But it appears that Florida wineries are getting back on track to a stable future in an increasing economy. We expect to grow with a continuing economic rebound. An increased tonnage of grapes and other fruits will allow Florida wineries, if supported by the retail market, to continue the growth.

Viticulture Advisory Council

Annual Industry Report Fall 2023

Processed Foods
R. George Cowie

Product Status of Muscadine Grape Processed Products

The number of manufacturers of processed muscadine grape products is an aggregate of some commercial and many more “cottage” producers that operate under the protection of the Cottage Food Regulation. Cottage producers can manufacture foods deemed to have a low risk of food borne illness in their own homes with no registration or inspection. Jams, Jellies and Preserves fall under this definition. These products can be offered for sale at roadside stands and farmers markets, or website direct to consumers, but not offered wholesale. Cottage producers must comply with laws for collection of taxes. Florida has few commercial manufactures using muscadines, but an increasing number of Cottage producers.

There remain opportunities for commercial producers who can market muscadine products in niche markets that favor local producers and avoid price comparison with commodity style grape products.

Muscadine Grape products are always impacted by growing conditions and market conditions. Fertilizer costs in 2023 growing season remain high compared to past growing seasons. Processors in 2023 unseasonably cold winter temps and late spring chilling injury that resulted in yields much lower than average. Producers in neighboring states report similar lower than average yields.

Fuel prices and driver shortages made freight services especially expensive during the 2023 harvesting season. Much higher freight costs continue to impact producers.

One processed food area I hope gets attention in the future is freeze dried muscadine grapes. I was fortunate to try some freeze dried muscadines produced by Dr. Sarkhosh in connection with UF IFAS publication this summer. A quick online search for freeze dried grapes showed non-muscadine products offered for sale for over \$5.00/oz for snack sizes, or \$1.80/ oz for bulk sizes.

If manufacturing challenges of seed removal can be addressed, freeze dried muscadine grapes may represent a gateway product for some consumers, and an additional product to supplement retail sales in venues like wineries and fruit stands that feature other muscadine products.

Nursery Sector Annual Report to the Florida Viticulture Advisory Council November 23, 2023

Nursery Representation

J. R. Newbold, Forest Groves, Inc.

The nursery sector of grape production in Florida consists of only handful of growers who sell primarily to retail garden centers or to the public directly, 2-3 large growers who supply big box stores in the south east and gulf coast states, and 1 tissue culture operation who sells starter liners to other growers both in and out of state. None of these nurseries primary income is based on the propagation and sale of grape vines but rather this makes up a small part of their business compared to other species they grow and sell. The larger growing operations continue to think the grape industry is stable while the smaller growers feel that the market and industry is slowly decreasing. Several contacts commented that the industry needs to increase the marketing and development of “Florida grown hybrid bunch grapes and Muscadine”.

Below is a summary of discussions with several of Florida’s growers.

Hopkins Nursery in Immokalee, FL is a wholesale plant nursery growing between 1,000 and 2,500 1 gallon pots per year. They started with plants sourced from Agri-Starts and still provide a limited selection of the patented plants. They have started to propagate non patented varieties as well. They do not specialize in any specific variety, but always have the goal of keeping several in stock. Bill Hopkins reports that demand is steady. Their primary customers are large chain garden centers. His clients do continue to request hybrid bunch grapes.

Bob Wallace at Chestnut Hill Tree Farm located in Alachua, FL is growing around 1,500 1g Muscadine vines per year. Grapes make up less that .5% of their 150 acre farm’s product line however they enjoy growing and selling them and plan to continue. Chestnut Hill primarily sales to garden centers and walk in customers in FL and they use the grape product line to help sell other berry and fruit trees that they grow. Bob mentioned that there just isn’t much market demand for Muscadine vines due to people not liking the sweet taste. With the end user being home owners and weekend gardeners as opposed to commercial landscape applications it makes it very difficult to sell. Bob feels as though more marketing is needed to promote Florida grown Muscadine to help increase awareness that Muscadine is a great tasting grape.

Southern Tree Source of Monticello FL reports that they produce around 500- 2 gallon pots of primarily Southern Home and Southern Jewel annually. Their primary sales are to retail garden centers. They source their material from Agri-Starts. Muscadines are part of a “small fruit” mix that they offer. Buster feels like the market for muscadines is steady and possibly growing. His clients frequently ask for thin skinned varieties. He has worked with Blanc du Bois but had difficulties and has discontinued that plant.

Agri Starts is a large tissue culture liner operation in Apopka Florida. They have historically grown tissue culture grape liners for sales to other growers who end up selling to retail garden centers. Over the past two years Argi

Starts has narrowed their spectrum of varieties and decreased their overall production volume. Ty Strode, Vice President, said that they will continue with Noble, Carlos and Southern Home (for the Door Yard market). In the recent past, they had produced as many as 9 different varieties. The Door-yard product seems to have the most predictable sales volume at this point. They do still work on a contract basis with clients for their specific needs, and are looking into the idea of producing a larger plug at an increased price to justify the cost of handling the low volume.

AgriStarts is continuing to work with the University of Georgia and Paulk Vineyards of GA, on new license varieties. They also intend to work with the USDA's National Clean Plant Network on muscadine projects.

Mr. Strode stated that muscadine sales make up less than 1% of their annual revenue. They believe that breeding research is extremely critical to increase the popularity of "Florida Grown Muscadine". The future of the Muscadine as an edible fruit weighs heavily on breeding to produce a much more pleasant experience for the consumer. The potential for more vineyards and boutiques in Florida is growing and a breakthrough in new and improved Muscadine cultivars could make all the difference.

Dewars Nurseries Inc. is a 300acre farm located in Apopka Florida that specializes in potted plants, roses, and ornamental edibles. Dewars currently produces around 6 different varieties of grapes primarily Muscadine and sells them in 1 gallon, 2 gallon, and 3 gallon containers. Dewars grows grapes strictly on contract primarily for the large box stores such as Walmart and Lowes along the gulf coast states from Florida to Texas. Dewar's production manager, Terrell, said that last year grape sales generated 1.5% of Dewars overall revenue. They have been very happy with their grape product line and plan to continue with it. They believe the market is stable for now but could see improvement with increased promotion.

Simpsons Nurseries located in Monticello Florida is another large operation that supplies a wide range of plant product to retail nurseries, landscapers, and mass merchandisers as far north as VA and west to TX. Simpsons Nursery produces a mix of Ornamental trees, shrubs, fruit trees and ornamental edibles. Bunch Grape and Muscadine sales make up less than 1% of their total revenue however on a farm their size that is pretty significant. Simpson's primary customer base for grapes is Lowes, Home Depot, and Walmart. In recent years the annual sales volume seems to be settled around 35,000 - 1 gallon Bunch grapes and around 29,000- 1 gallon Muscadine grapes. They contribute their recent modest growth in sales to simply having better stock plants and quantities available for them to sell. They buy in tissue culture liners from AgriStarts which Simpsons believes gives them a much better starter plant thus increasing the amount of quality finished goods that they can sell. Simpsons plans to continue growing and selling Bunch grapes and Muscadine and monitor the market closely to adjust their numbers accordingly.

Currently, most Florida commercial wine grape producers are sourcing their stock plants for expansion or vineyard maintenance from either AgriStarts, of Apopka Florida or from several commercial nurseries in Georgia who provide bare root starter plants.

Presently the primary market segment for Florida grown grapes consist of large wholesale growers who supply the big box stores and garden centers. The market demand for these producers seems to be stable and growing slightly. The market for sales to wineries and vineyards continues to be modest as there is only minor growth in that sector. Florida researchers and breeders must continue to work on new cultivars that can improve the taste and experience for the end user and the Viticulture industry needs to continue to increase marketing the benefits of Florida Grown Hybrid Bunch-Grapes and Muscadines. New cultivars for the Fresh Market are needed for Florida, to include seedless fruit.

In conclusion, little has changed in the Florida nursery sector in the past twelve months. Most of the same Florida nursery stock providers still have muscadine starter plants in their product mix and are focused on “big-box” retail outlets. Based on continued conversations with these producers, until progress is made with new cultivars, they will continue offering the current set of muscadine varieties at the current, modest production levels.

**VITICULTURE ADVISORY COUNCIL
ANNUAL INDUSTRY REPORT- FY 2023**

Area of Representation: Florida A&M University/ Center for Viticulture
(www.famu.edu/Viticulture)

Representative: Professor Violeta Tsoleva, Ph.D., Director

Introduction: *The Center’s mission is to conduct basic and applied research and provide service that will promote the development of a viable viticulture industry in Florida (Florida Viticulture Policy Act, 1978, Florida Statute 599.003c)*

GOALS:

1. Develop new and improved grape cultivars for wine processing and fresh fruit market in Florida.
2. Improve the biotic and abiotic resistance of Florida grapes through classical and molecular breeding.
3. Promote the marketability of Florida grapes and value-added products through research and extension.
4. Develop best management practices for Florida grapes and selected small fruits.
5. Promote a strong graduate and undergraduate student experiential learning program that will encourage and attract outstanding scholars.
6. Develop a strong working relationship with Florida growers and private industry through extension and outreach activities.

Product Status: total of 1009 lbs. / 458 kg grape was harvested and processed into experimental research wines.

Table 1. Harvest data for the 2023 harvest season. Compared to previous seasons, there was less grapes harvested for winemaking and shorter duration.

Variety	Date of Harvest	Harvest Weight (lbs.)	Harvest Weight (kg)
Blanc Du Bois	June 27 th	15.5	7.0
Stover	July 6 th	100.0	45.4
Blanc Du Soleil	July 11 th	12.0	5.4
FAMU 99	July 21 st	4.5	2.0
Conquistador	July 21 st	21.0	4.5
Black Spanish	July 21 st	75.0	34.0
Floriana	August 9 th	235.0	106.7

Noble	August 16 th	203.0	92.0
Carlos	August 22 nd	323.0	146.0
A27-10-10	September 11 th	20.0	9.0
Total		1009.0 lbs.	458.0 kg

The juice characteristics from the 2023 harvest were analyzed and recorded (Table 2)

Table 2. Juice characteristics and yeast for 2023 vinification

Variety	pH	Titrateable Acidity	Soluble Solids (Brix)	Yeast
Blanc Du Bois	3.10	8.25	16.1	VL1
Stover	3.47	5.40	20.9	VL1
Blanc Du Soleil	3.03	12.15	19.1	VL1
Black Spanish, Conquistador, & FAMU 99 Blend	3.00	17.0	14.2	RX60
Floriana	3.47	2.78	15.0	RX60
Noble	3.39	2.9	15.6	RX60
Carlos	3.29	4.2	14.3	Xarom
A27-10-10	3.51	2.85	14.0	Xarom

Industry Issues and Needs:

Disease/insect pressure:

Potential threat of the new invasive pest: citrus root weevil (*Diaprepes abbreviatus*) can pose potential threat for bunch grapes vineyards in FL. *Diaprepes abbreviatus* has a wide host attacking about 270 different plants including citrus, blueberries, sugarcane, vegetables, potatoes, strawberries, woody field-grown ornamentals, containerized ornamentals, and non-cultivated wild plants.

In the state, it was first reported in 1964, but recently the threat has been growing and the host range vastly expanding. Currently the pest costs close to 70 million in crop losses in FL.

Summary



Research Productivity Report: October 1, 2022–September 30, 2023

www.famu.edu/Viticulture

- **Implementing annual and long - range plans and priorities for the Center that addressed the expressed needs of stakeholders or clientele groups**

Research & Innovation:

1. Breeding High-Quality Southern Grape Cultivars for Meeting Industry Demands in Florida:

We are evaluating 4 advanced selections that can be promoted into new cultivars, supporting the Florida grape industry. This includes three new muscadine selections suitable for red and white wine production and one new bunch grape selections, Blanc de Leon, suitable for white wine production.

US Patent 17/300,669 -09/20/2022: New premium white bunch grape ‘Blanc du Soleil’, “US Patent Application 2436.67, PL”.

Identify one bunch-grape and six muscadine advanced selections.



Fig.1: Newly patented/released bunch grape cultivar “Blanc de Soliel” (licensed to “Double A Vineyards”, Fredonia, NY) and two muscadine advanced selections A27-10-10 and O19-1-1 suitable for wine production.

2. Bioactivity-guided Discovery of Effective Anticancer and Antioxidant Compounds in Muscadine Grapes (*Muscadinia rotundifolia*).

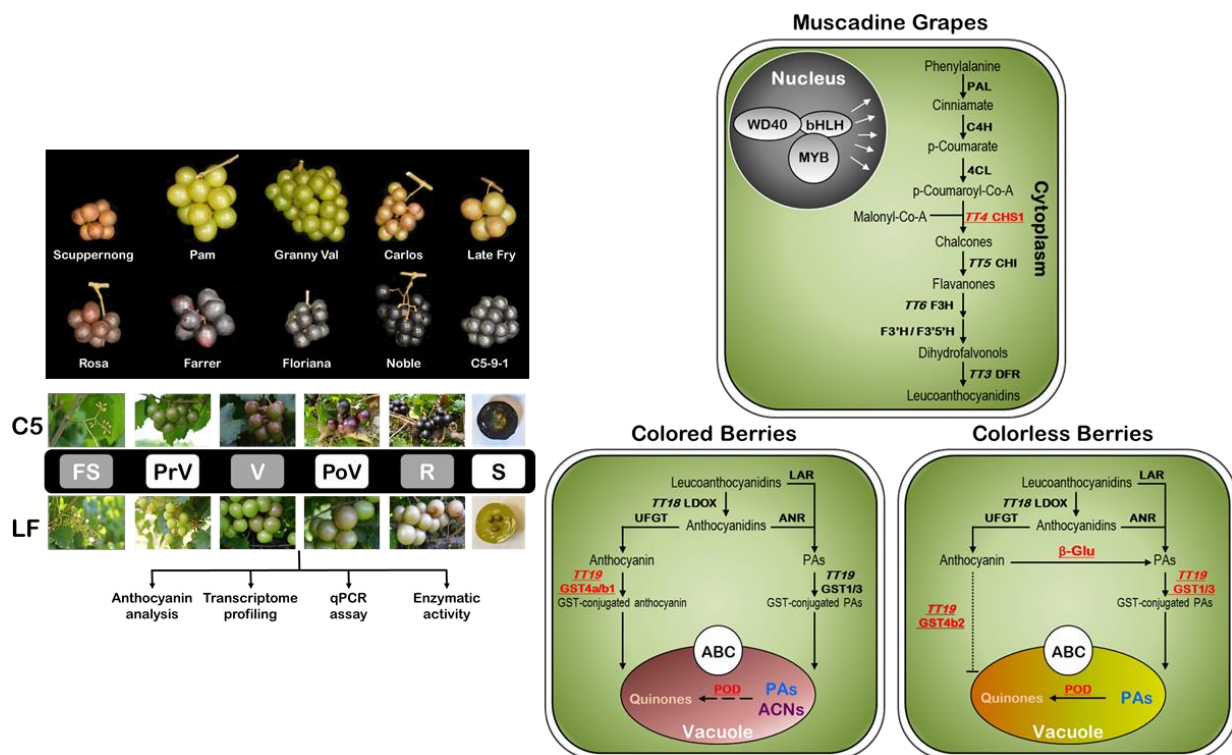


Fig. 2: A representative image for muscadine genotypes used to determine berry color characteristics. Color changes during muscadine berry development of Late Fry and C5-9-1 (C5—“Ison × Fry”) genotypes. Diagram of the anthocyanin pathway assigned with different anthocyanin-related genes in colored and bronze berries (Ismail et al., 2023; Nature-Communications Biology).

Determined phytochemicals spectrum in selected muscadine genotypes exhibiting elevated bioactivities; Evaluated the changes in transcriptome profile among muscadine genotypes exhibiting differential bioactivity performance; Developed socioeconomic evaluation of the factors influencing market capacity and consumer preferences; and Engaged consumers and stakeholder groups to muscadine grapes health benefit and transfer technology on emerging a more efficient cultivar development system.

3. **Next-Generation Grape Breeding:** Evaluated the function of genes associated with stenospermocarpy fruit-set and using CRISPR/Cas9-gRNA ribonucleoproteins strategy to develop new muscadine grape cultivars exhibiting superior fruit qualities of seedlessness.

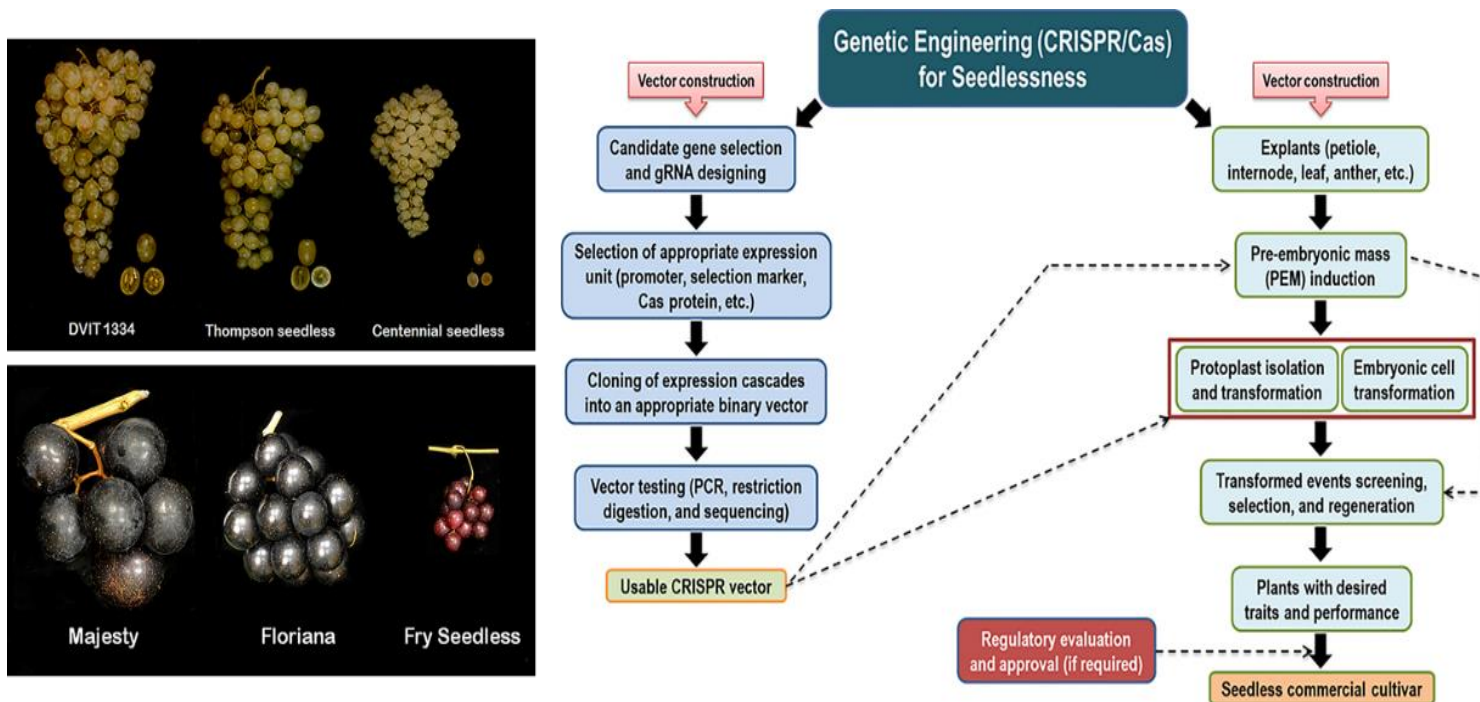


Fig.3: Close-up cluster views of Thompson seeded mutant (DVIT 1334), Thompson seedless, and Centennial seedless grape genotypes exhibiting seeded, stenospermocarpy, and parthenocarpy fruitset programs, respectively. Close-up cluster view of muscadine cultivars ‘Majesty’ (female flower, seeded), ‘Floriana’ (perfect flower, seeded), and ‘Fry’ seedless (perfect flower, parthenocarpy seedless). Visual scheme of gaining the seedlessness trait using genetic engineering (CRISPR/Cas) strategy (Moniruzzaman et al. 2023; International Journal of Molecular Sciences).

4. Determining the Effective Phytochemicals Content and Composition of Muscadine Grape to Modulate Cytokines/Interleukins Activity for Abrogating Apoptosis and Cancer Progression

This research has evaluated diverse muscadine grape genotypes and found significant differences in their stilbenes content including resveratrol, viniferin, and pterostilbene (Figure1).

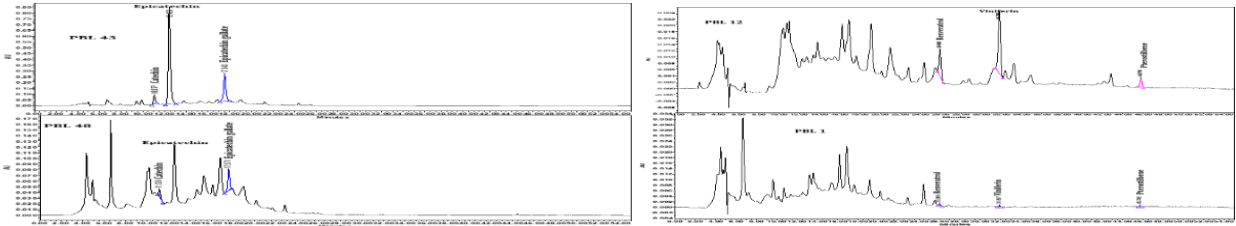


Fig 1: Genetic differences in polyphenolics content and composition among selected muscadine cultivars.

Further, our investigation with the polyphenolic catechin showed that muscadine cv. PBL43 with a value of 3646.48 $\mu\text{g/g}$ FW had the highest content of total catechin, followed by cvs. PBL5 with a value of 2859.74 $\mu\text{g/g}$ FW and PBL16 with a value of 2596.59 $\mu\text{g/g}$ FW. Other muscadine varieties with high levels of total catechin were PBL28 (1434.03 $\mu\text{g/g}$ FW), PBL2 (1430.77 $\mu\text{g/g}$ FW), and PBL 33 (1783.62 $\mu\text{g/g}$ FW). With regards to individual flavan-3-ol compounds, cv. PBL 16 had the highest content of catechin with a value of 274.61 $\mu\text{g/g}$ FW followed by cvs. PBL 5 (246.06 $\mu\text{g/g}$ FW) and PBL 43 (238.29 $\mu\text{g/g}$ FW). Further, cvs. PBL33 (221.44 $\mu\text{g/g}$ FW), PBL28 (134.74 $\mu\text{g/g}$ FW) and PBL36 (123.49 $\mu\text{g/g}$ FW) also had high levels of catechin. Based on their diverse polyphenolic content and composition muscadine grapes are shown to have potential therapeutic application for treating cancers. The anticancer activity of different Muscadine cultivars was determined against human lung cancer A549, prostate carcinoma LNCaP, and colon cancer Caco2 cell lines (Figs.1-3).

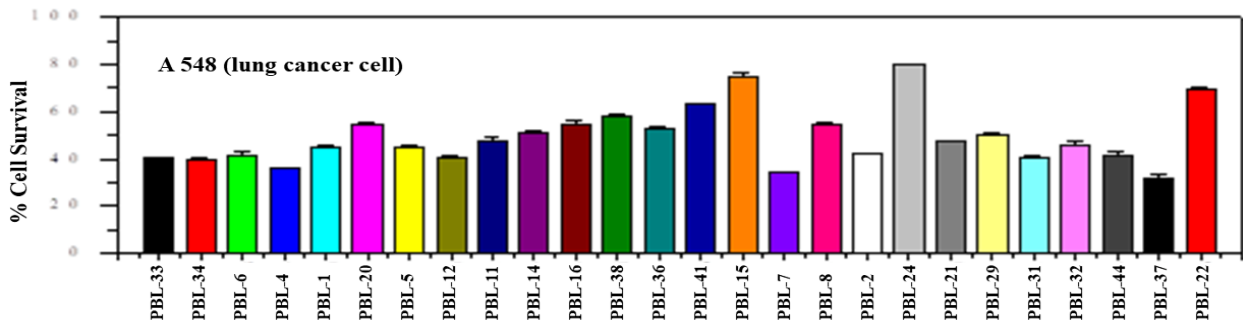


Fig. 2 Survival percentage (%) of A549 lung cancer cell growth in presence of muscadine berry extracts

The data revealed that muscadine berry extracts exhibited potential efficacy to inhibit all three types of cancers. In addition, the results also showed that >50% (on average) cell growth inhibition was achieved at 500 µg/mL concentration within 24hrs of incubation. The cytotoxicity data revealed that certain genotypes exhibited highest anticancer potential While the others showed limited cytotoxic activity. The lowest and highest IC₅₀ dose was concluded as 298 and 410 µg/mL against lung cancer cells A549, 310 and 456 µg/mL against prostate cancer cells LNCaP, and 301 and 465 ng/mL against colon cancer cell Caco2 population, respectively (Fig. 4).

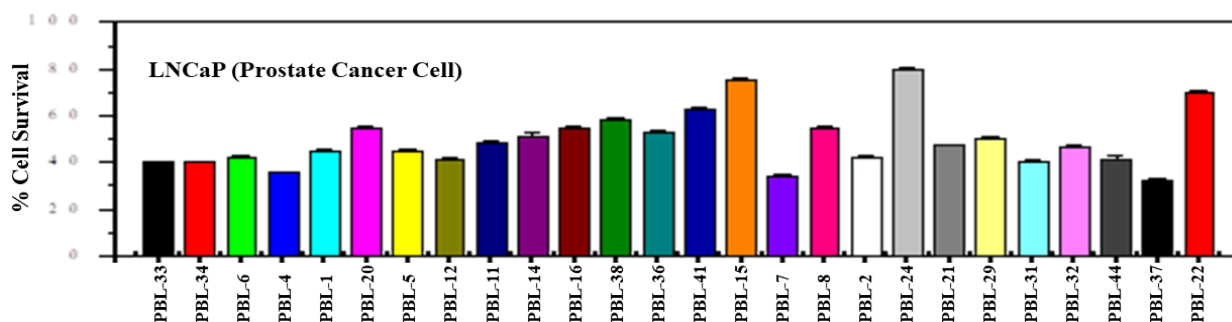


Fig. 3 Survival of LNCaP prostate cancer cell growth in presence of different muscadine genotypes

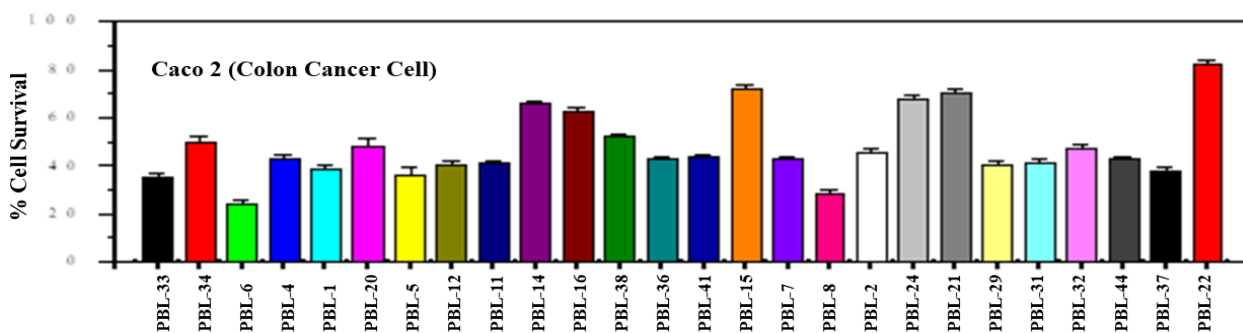


Fig. 4 Survival of the Caco2 colon cancer cells in presence of different muscadine berry extracts

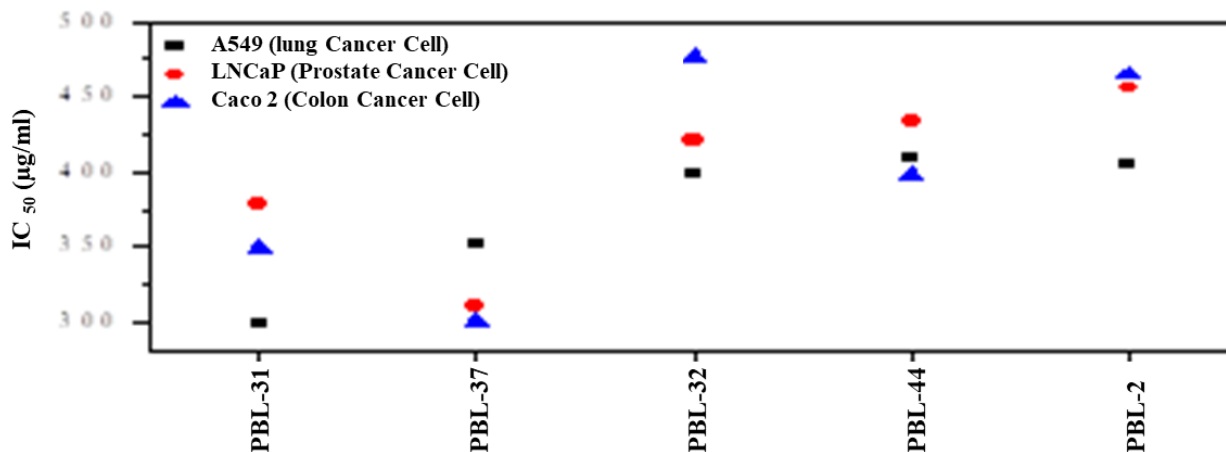


Fig. 5. IC₅₀ values of selected muscadine cultivars for A549, LNCaP, and Caco2 cancer cells

5. Bio-Prospecting Muscadine Grape Phytochemicals for Regulating Adiposity to Control Obesity

We have successfully established and grown the pre-adipose cells as a monolayer under a controlled environment (Figure 1A, B). The optimized culture protocol was then used to measure the effect of muscadine grape berry extracts on viability of 3T3-L1 cells at the pre-adipose phase. Ripe berries from muscadine cultivars were harvested, powdered and extract used in the bioactivity studies. The results showed a ~10% reduction in cell viability at the berry extract concentration of 0.6 mg/ml, ~15% reduction at a berry extract concentration of 1.2 mg/ml to 4.7 mg/ml, 30% reduction at 9.4 to 18.8 mg/ml, ~40 % reduction at 37.5 mg/ml and ~50 % reduction at a concentration of 75 mg/ml (Figure 1C, D).

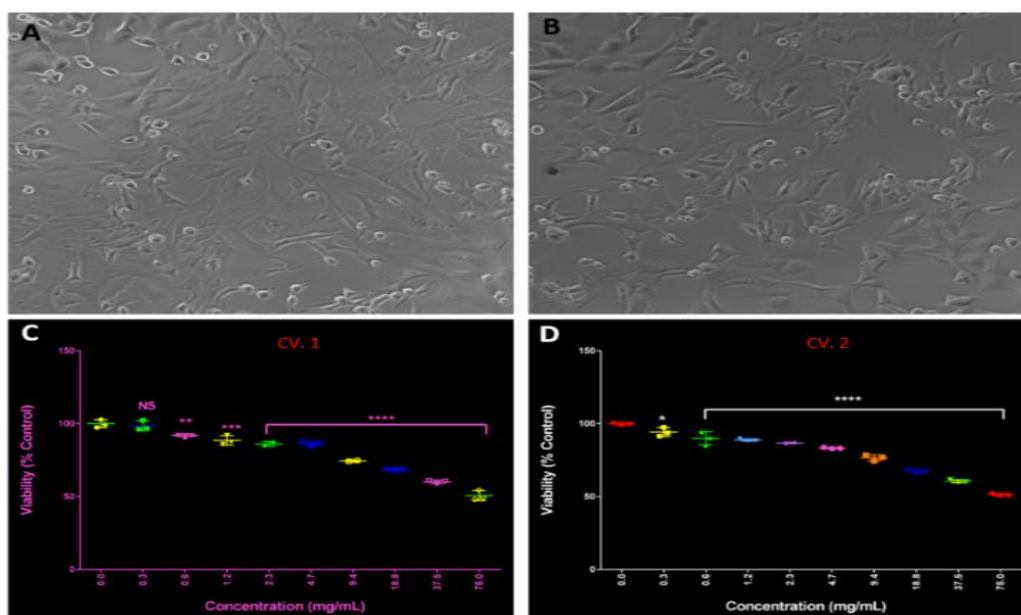


Figure 1: Microscopic image of the monolayer culture of 3T3-L1 cell line (A-B) and determination of cell viability upon treatment with grape extract (C-D).

Berry extracts from muscadine cultivars are found to show similar effect on 3T3-L1 pre-adipose cell viability. The results revealed that treatment of pre-adipose cells with berry extract from muscadine grape cv. PBL1 showed upregulation of *Atrn* and *Ramp3* genes by a factor of 2 and 150, respectively while the expression of genes *Nr3c1*, *Npy1r*, *Agrp*, *B2m*, *Bdnf*, *Cpd*, *Cpe*, *Ghr*, *Hprt*, and *Ppargc1a* was downregulated in the range of 0.1 and 0.5 in the treated cells compared to untreated cells. Further, the gene expression studies with berry extracts from another cv. PBL2 showed that expression of *Agrp*, *Atrn*, *Npy1r*, and *Sigmar1* genes was elevated by 1.5-fold in treated cells while expression of *Ramp3* gene increased by 150-fold compared to the control cells which is known to encode ‘Receptor Activity Modifying Protein 3’. Our result also showed downregulation of genes *B2m*, *Bdnf*, *Cpd*, *Cpe*, *Ghr*, *Gusb*, *Hprt*, *Hsp90ab1*, *Il1r1*, *Nr3c1*, *Sort1*, and *Zfp91* (Figure 2).

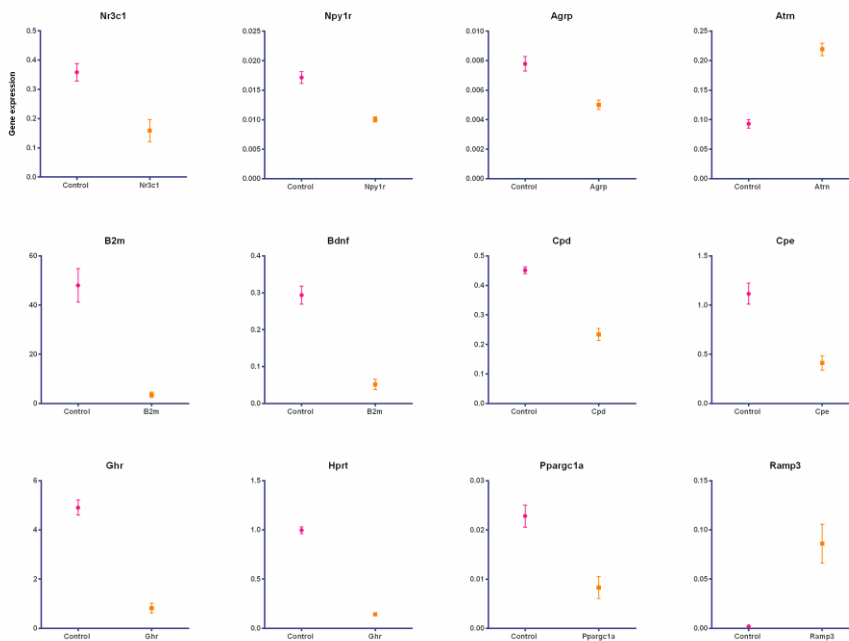


Figure 2: Gene expression analysis of obesity associated genes upon treatment with muscadine grape extract.

6. Effectiveness of Muscadine Grape Phytochemicals to Modulate Ageing Disorders and Preventing Excessive Bone Degradation to Avert Rheumatoid Autoimmune Arthritis/Osteoarthritis:

Many biological processes associated with the ageing are identical in both yeast and human. Hence, the yeast (*S. cerevisiae*) is widely used as a model organism for ageing research. Our studies have shown no significant decline in Colony Forming Units (CFUs) in the muscadine grape extract treated samples compared to non-treated samples, suggesting that the grape extract treatment enhanced cells viability. Additionally, when mouse macrophage cells were treated with grape extract from different muscadine cultivars, they demonstrated distinct cytotoxic effects. Furthermore, phytochemical components such as total stilbenes and catechins differed between cultivars and exhibited variable effects on cell growth.

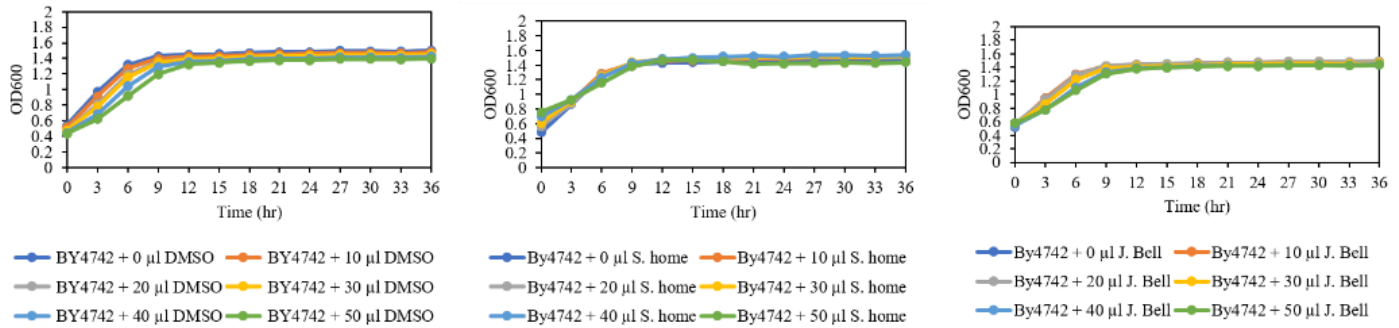


Figure 1: Growth curve of yeast cells along with various concentrations of grape berry extract (0% to 5%) prepared from different muscadine grape cultivars

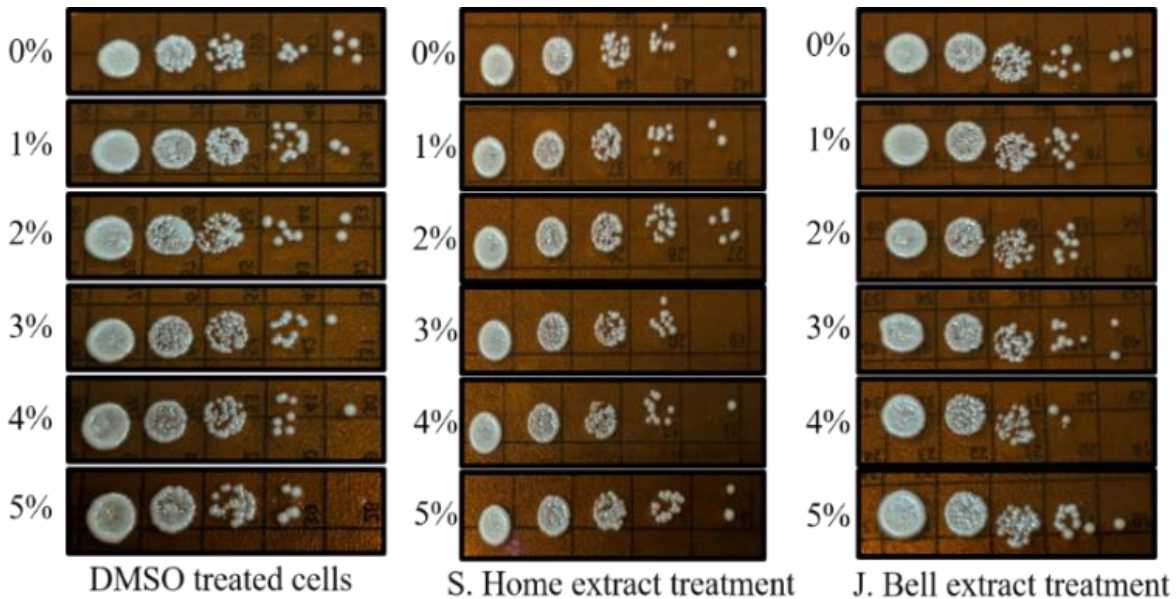


Figure 2: Chronological life span of yeast cell upon treatment with grape berry extracts.

7. Efficacy of Muscadine Grape Phytochemicals to Modulate Iron Metabolism for Regulating Prostate Cancer Growth

The HPLC analysis revealed notable variations in the phytochemicals' content and compositions between the evaluated muscadine cultivars. The observed total stilbenes content was significantly highest in the cv. PBL-37 as compared to the cv. PBL-5. Figure 1 reveals that cv.PBL-37 also exhibited a 25-fold higher amount of t-piceid and a >1500-fold increase in ϵ -Viniferin.

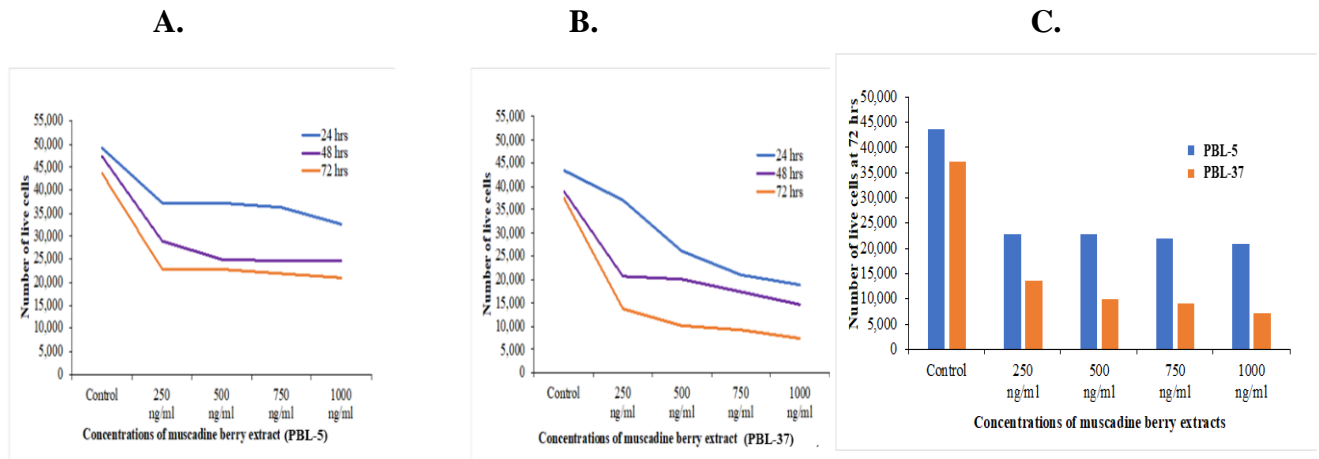
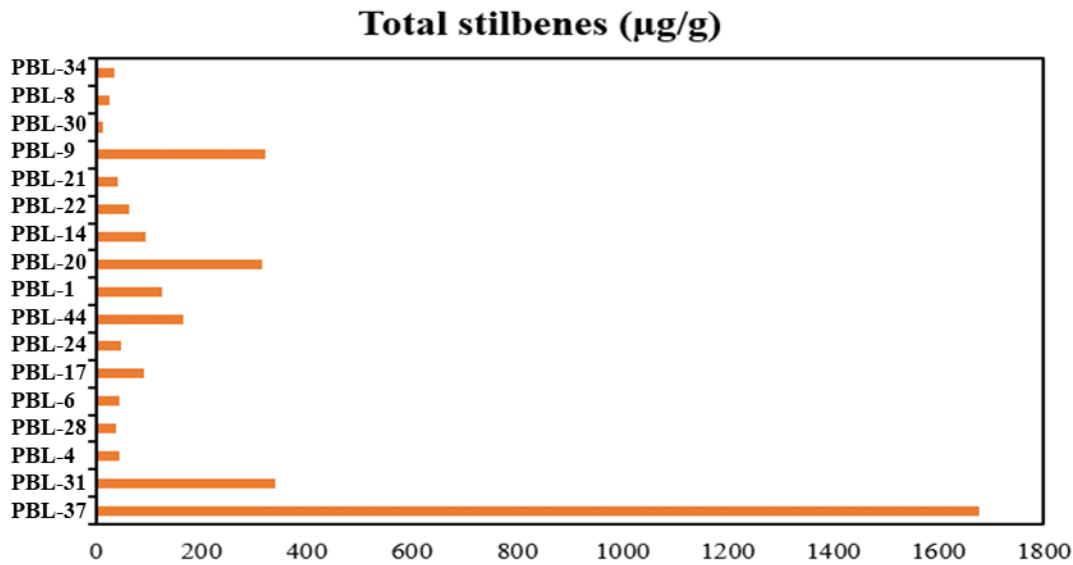


Figure 2. Effect of muscadine grape extracts on cytotoxic activity against prostate cancer cells at different exposure periods; PBL-5 (A) and PBL-37 (B) cultivars. Cells were treated

with various amounts (0–1000 ng/mL) of berry extracts. A comparison of the cytotoxicity impact of grape extract (PBL-5 and PBL-37) treatments on prostate cancer cells after 72 hours (C).

The relative gene expression studies indicated that cv. PBL-37 exhibited a significant reduction in the expression of tumor promoting gene *Bcl2* by nearly 10-fold, as depicted in Figure 3. In contrast, cv. PBL-5 berry extract did not induce any significant changes in the expression levels of the oncogenic gene, *Bcl2*.

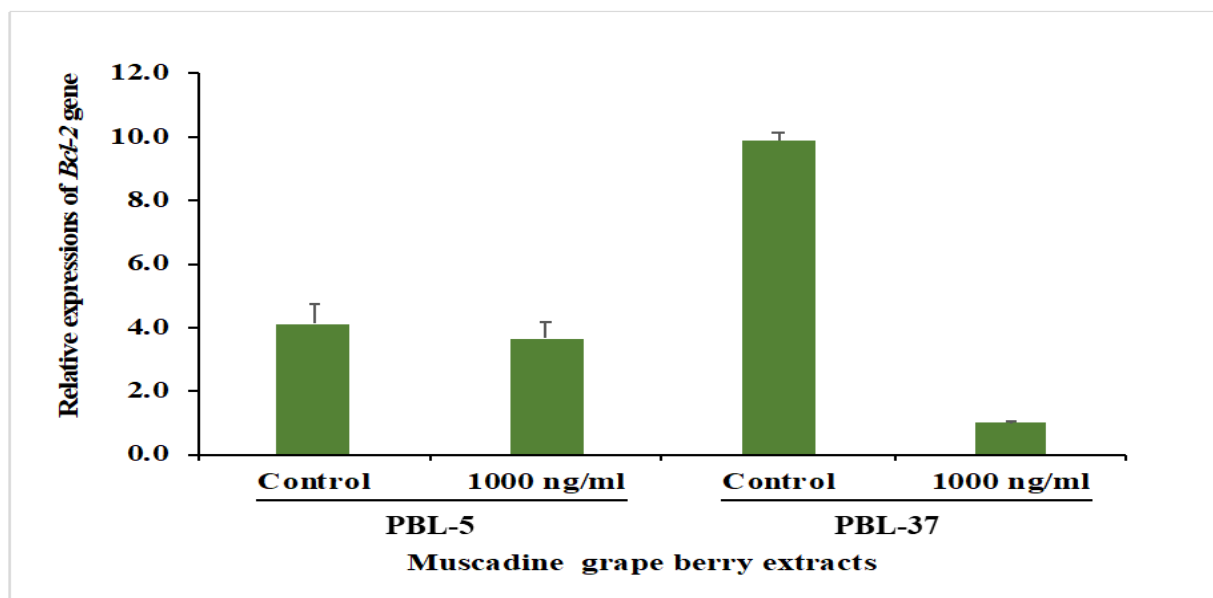


Figure 3. Effect of muscadine grape extracts on the expression of tumor-promoting gene, *Bcl2* in LNCaP prostate cancer cells.

Research Publications

Refereed Articles

1. Ismail, A., Parvez, T., Comstock, S., Bodaghi, S., Rezk, A., Vidalakis, G., El-Sharkawy, I., Obenland, D. & El-kereamy, A. (2023) Unraveling the occasional occurrence of berry astringency in table grape cv. Scarlet Royal: A physiological and transcriptomic analysis. *Frontiers in Plant Science*. In Press.
2. Gajjar, P., Ismail, A., Islam, T., Darwish, A.G., Moniruzzaman, M., Abuslima, E., Dawood, A.S., El-Saady, A.M., Tsoleva, V., El-Kereamy, A., Nick, P., Sherif, S.M., Abazinge, M.D. & El-Sharkawy, I. (2023) Physiological comparison of two salt-excluder hybrid grapevine rootstocks under salinity reveals different adaptation qualities. *Plants*, 12: 3247.
3. Darwish, A.G., El-Sharkawy, I., Tang, C., Rao, Q. & Tan, J. (2023) Investigation of antioxidant and cytotoxicity activities of chocolate fortified with muscadine grape pomace. *Foods*, 12: 3315.

4. Scheiner, J., El-Sharkawy, I., Humphries, A.F., Ren, Z., Pontasch, F., Labay, A., Kamas J & Tsoolova V. (2023). ‘Blanc Du Soleil’: A wine grape for the southeast United States. *HortScience*, 58: 610 – 613.
5. Moniruzzaman, M., Darwish, A.G., Ismail, A., El-Kereamy, A., Tsoolova, V. & El-Sharkawy, I. (2023) Seedlessness trait and genome editing – a review. *International Journal of Molecular Sciences*, 24: 5660.
6. Darwish, A.G., Moniruzzaman, M., Tsoolova, V. & El-Sharkawy I. (2023) Integrating metabolomics and gene expression underlying potential biomarkers compounds associated with antioxidant activity in southern grape seeds. *Metabolites*, 13: 210.
7. Moniruzzaman, M., Yaakob, Z., Anuar, N., Al-Khayri, J.M. & El-Sharkawy, I. (2023) Climate change impacts and adaptation strategies of Fig (*Ficus carica* L.) cultivation. *Cultivation for Climate Change Resilience*, Vol. 2, 1st ed., CRC Press, P. 94–110.
8. Yang, Y., Darwish, A.G., El-Sharkawy, I., Zhu, Q., Sun, S. & Tan, J. (2022) Rapid determination of the roasting degree of cocoa beans by extreme learning machine (ELM)-based imaging analysis. *Journal of Agriculture and Food Research*, 10: 100437.
9. Ismail, A., Gajjar, P., Park, M., Mahboob, M., Tsoolova, V., Jayasankar, S., Darwish, A.G. & El-Sharkawy, I. (2022) A recessive mutation in muscadine grapes causes berry color-loss without influencing anthocyanin pathway. *Nature – Communications Biology*, 5: 1012.
10. Ban, S., El-Sharkawy, I., Zhao, J., Fei, Z., Xu, K. (2022) An apple somatic mutation of delayed fruit maturation date is primarily caused by a retrotransposon insertion associated large deletion. *The Plant Journal*, 111: 1609 – 1625.
11. Park, M., Darwish, A.G., Elhag, R.I., Tsoolova, V., Soliman, K.F.A. & El-Sharkawy, I. (2022) A multi-locus genome-wide association study reveals the genetics underlying muscadine antioxidant in berry skin. *Frontiers in Plant Science*, 13: 969301.
12. Ismail, A., Darwish, A.G., Park, M., Gajjar, P., Tsoolova, V., Soliman, K.F.A. & El-Sharkawy, I. (2022) Transcriptome profiling during muscadine berry development reveals the dynamic of polyphenols metabolism. *Frontiers in Plant Science*, 12: 818071.
13. Park, M., Vera, D., Kambiranda, D., Gajjar, P., Cadle-Davidson, L., Tsoolova, V. & El-Sharkawy, I. (2022) Chromosome-level genome sequence assembly and genome-wide association study of *Muscadinia rotundifolia* reveal the genetics of 12 berry-related traits. *Horticulture Research*, 9: uhab011.
14. Das, P.R., Darwish, A.G., Ismail, A., Haikal, A.M., Gajjar, P., Balasubramani, S.P., Sheikh, M.B., Tsoolova, V., Soliman, K.F.A., Sherif, S.M. & El-Sharkawy, I. (2022) Diversity in blueberry genotypes and developmental stages enables discrepancy in the bioactive compounds, metabolites, and cytotoxicity. *Food Chemistry*, 374: 131632.

Professional meetings/presentations – local, state, regional, national, and international.

1. **El-Sharkawy, I.** “Updates in Grape Breeding Program at Florida A&M University”. The 2023 North American Grape Breeders & Vitis-Muscadinia Alliance Conference, University of Arkansas System Division of Agriculture (UA System), Don Tyson Center for Agricultural Sciences, Fayetteville, AR, October 3 – 5, 2023.

2. **El-Sharkawy, I.** & Tsolova, V. “A Mutation Causes Loss of Color without Affecting Anthocyanin Pathway in Muscadine Grape”. 2023 American Society of Horticultural Science, Orlando, FL, July 31 – August 4, 2023.
3. **El-Sharkawy, I.** “Grape Breeding Program at Florida A&M University”. The UF 2023 Grape Field Day May 18, 2023.
4. Olaoye, E., Darwish, A.G., Tsolova, V. & **El Shakarwy, I.** (2023) Determination of the fruit volatile profiles of muscadine grape cultivars (*Muscadinia Rotundifolia*) using HS-SPME-GC/MS. Annual FWGGA Meeting, Deland, FL, January 12 – 14, 2023.
5. **El-Sharkawy, I.** & Park, M. “Genome-wide association study of muscadine grapes reveal the genetics of 12 berry-related traits”. The 20th Biannual Research Symposium – Association of 1890 Research Directors (ARD), Atlanta, GA, April 2 – 5, 2022.
6. Ren, Z., Tsolova, V. & **El-Sharkawy, I.** “FAMU Early – A new early ripening table muscadine grape cultivar”. The 20th Biannual Research Symposium – Association of 1890 Research Directors (ARD), Atlanta, GA, April 2 – 5, 2022.
7. Darwish, A.G., Tsolova, V. & **El-Sharkawy, I.** “Bioactive compounds, metabolites, and cytotoxicity for eight blueberry genotypes cultivated in Florida”. The 20th Biannual Research Symposium – Association of 1890 Research Directors (ARD), Atlanta, GA, April 2 – 5, 2022.
8. Gajjar, P., Tsolova, V. & **El-Sharkawy, I.** “Evaluation of fertility traits in ninety muscadine grape genotypes”. The 20th Biannual Research Symposium – Association of 1890 Research Directors (ARD), Atlanta, GA, April 2 – 5, 2022.
9. F. Humphries 2023: “Winemaking Bootcamp”, 2023 Florida Wine and Grape Growers Annual Conference, Deland FL, January 12th-14th, 2023
10. F. Humphries 2023: “Post-Fermentation Techniques for Improved Wine Quality”, 2023 Vineyard and Wine Best Management Practices Workshop, Center for Viticulture and Small Fruit Research, February 15th, 2023.
11. F. Humphries 2023: “Winemaking Workshop”, 2023 FAMU Grape Harvest Festival, CVSFR, August 26th, 2023.

12. Extension and Outreach:

13. Jan 12th-14th Florida Wine and Grape Growers-Winemaking Bootcamp
14. Jan 24th E&J Gallo Visit- Andrew Sutton- Tour and Wine Sampling
15. Jan 25th FDACS Plant Industry Gainesville
16. Jan 27th Resora/Sherrod Institute Site Visit-Recommendation for Vineyard Establishment
17. Feb 1st Hummingbird Wine Bar Visit
18. Feb 2nd Island Grove Winery Site Visit
19. Feb 8th Undersecretary CAFS Tour
20. Feb 15th Vineyard and Winemaking Best Management Practices Workshop
21. Feb 21st Wakulla Environmental Institute Site Visit- Pruning Demonstration
22. March 6th, Camille Lewis, FAMU Agroecology Center/ FAMU Preschool, ERCCD, Vine management consultation
23. March 23rd Ecology Society of America Viticulture Visit and Tour
24. March 31st Freshman Group Viticulture Visit and Tour

25. March 31st St. Petersburg Community College Viticulture Visit and Tour
26. April 1st FAMU Stem Day- “Do-it yourself DNA extraction” educational exercise with 2 groups of 16 middle- & high- school students
27. April 8th FAMU Earth Day- Viticulture exhibit setup at FAMU amphitheater
28. April 10th Viticulture Tour- Mr. Lanard Pope- Hobbyist Grower/ Winemaker (met at FAMU Earth Day)
29. April 12th FDACS Agriscience Educator Leadership Program (AELP) Visit & Tour
30. April 13th Email Correspondence- Rashad Reed, Vineyard Establishment/Fertilizer Consultation- Resora/Sherrod Institute
31. April 14th Undergraduate Research Symposium- Served as a judge for poster competition.
32. April 20th Annual Farm Field Day Resora/Sherrod Institute- Viticulture exhibit setup
33. April 25th Email and Phone Correspondence with Mr. John Desrosiers, Quincy Nursery
34. April 28th Viticulture Tour- Keith Padgett- Grower Wakulla County
35. May 3rd, Congressman Neil Dunn Visit to CAFS- Viticulture Exhibit
36. May 4th, Email Consultation for Fungal Pesticide Management- Grower Keith Padgett
37. May 4th, Emerging Farmers Symposium- Viticulture Tour
38. May 8th, Professor Marcus Ramogale, Vice-Chancellor, and Principle of Mangosuthu University of Technology, South Africa- Viticulture Introduction/Tour and Discussion
39. May 16th, Extension Article “Protecting your Muscadine Grapes from Fungal Diseases” submitted.
40. May 21st, Hobbyist Grower, John Kovach, MTA for growing new patented varieties, “Blanc Du Soleil” and “Floriana.”
41. May 22nd, Extension Article “Destination: Florida Grapes and Wine” submitted.
42. May 22nd, Hobbyist Fig Grower, Jerry Chance, In-person consultation on pesticide safety
43. May 31st, Hobbyist Winemaker, Joe Moya, Email Consultation for Port Style Winemaking with FAMU 99 cultivar.
44. June 5th Email- Joe Moya- Harvest and Processing Question
45. July 3rd- Email Consultation- Joe Moya
46. July 19th- Terrell Beard Viticulture Visit- Questions about Plant Diseases
47. July 25th- AMikids Viticulture Visit and Tour -Gadsden County
48. July 26th- Amikids Viticulture Visit and Tour- Leon County
49. August 14th- Harvest Festival Info Session, Capital City Alumni Chapter.
50. August 26th - 21st Annual FAMU Grape Harvest Festival
51. August 26th – In-person consultation, J.R. Newbold III, Grape Grower
52. September 8th- Innovation Showcase
53. September 19th- Hobbyist grape grower, Tony Carrano, Email Correspondence
54. September 20th- E&J Gallo Viticulture Center Visit

Extension Publications:

- 1. F. Humphries, V. Tsolova 2023: “Destination: Florida Grapes and Wines”, Submitted May 22nd, 2023**
- 2. F. Humphries, J. Campbell 2023: “Protecting your Muscadine Grapes from Fungal Diseases”, Submitted May 17th, 2023.**

3. F. Humphries, V. Tsolova 2023: “FAMU’s 21st Annual Grape Harvest Festival- Showcase of Excellence in Warm Climate Grape Research”, Submitted October 12th, 2023

Workforce Development:

Graduate students research training:

1. Eniola Olaoye (MS, CAFS, FAMU), Title: “Determination of volatile organic compounds of muscadine (*Muscadinia rotundifolia* Michx.) flowers and ripe berries using HS-SPME-GC-MS”, 2022 – Present.
2. Victor Cup (MS, CAFS, FAMU), Title: “Identification and characterization of phage endolysins from *Streptomyces* spp: Combating common scab and soft rot diseases in potato”, 2021 – Present.
3. Pranavkumar Gajjar (Ph.D., School of Environment, FAMU), Title: “Identification of physiological and molecular events associated with salt tolerance in grapevine rootstocks”, 2021 – Present.
4. Dupe Stella Ogundipe (MS, CAFS, FAMU), Title: Non-targeted metabolomic approach to evaluate the bio-active profiles of distinctive FL wines fermented with autochthonous yeast strains. 2023- Present.

Undergraduate students research training:

Dylan Lenczewski-Jowers- Undergraduate Research Assistant- Project: “Ripper Titration Demonstration Video”, presented at 2021 FWGGA annual conference, and to be posted on the Center’s website after completion.

Camden Kruijs- Undergraduate Research Assistant- Project Title: “Bio-Conversion Study of Muscadine Grape Healthy Compounds from Fruit, Juice, Pomace, and Wine for Added Value and Increased Industry Revenue”.

Eryse White- Undergraduate Research Assistant- Project Title: “Evaluation of Florida Autochthonous Yeast Species using E-nose”.

Brittney Jean- Undergraduate Research Assistant- Project Title: “Identification and Cryo-Preservation of Florida Autochthonous Yeast Species”.

Awards and recognition:

F. Humphries and V.Tsolova - Certificate of Appreciation- FAMU Earth Day
2023 FWGGA ANNUAL CONFERENCE – WINE COMPETITION- 5 AWARDS

1. SWEET RED – 2021 FLORIANA
2. BEST IN SHOW- 2019 NEW RED BLEND
3. DESSERT/PORT- 2019 SUNNY WHITE

4. SWEET ROSE/BLEND- 2017 PINK TEMPTATION

5. WINE LABEL DESIGN- 2021 BLANC DU BOIS

Awards and Scholarship awards for Ms. Eniola Olaoye (MS, CAFS, FAMU):

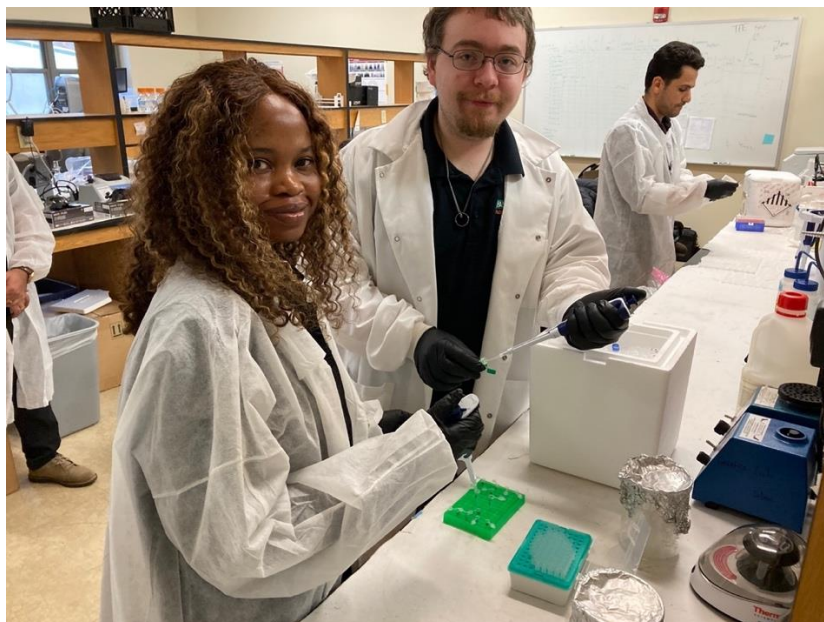
- FWGGA Golden Ticket Scholarship. January 2023
- Scholarship to attend the International Women in Wine Summit, Seattle, WA. March 23 – 27, 2023.
- Bridge Builder Initiative Scholarship: HBCU Tour to Black owned Vineyards and International Winemakers Summit, CA. August 3 – 9, 2023.
- The Black Winemakers Scholarship Fund. October, 2023.

Other Relevant Information

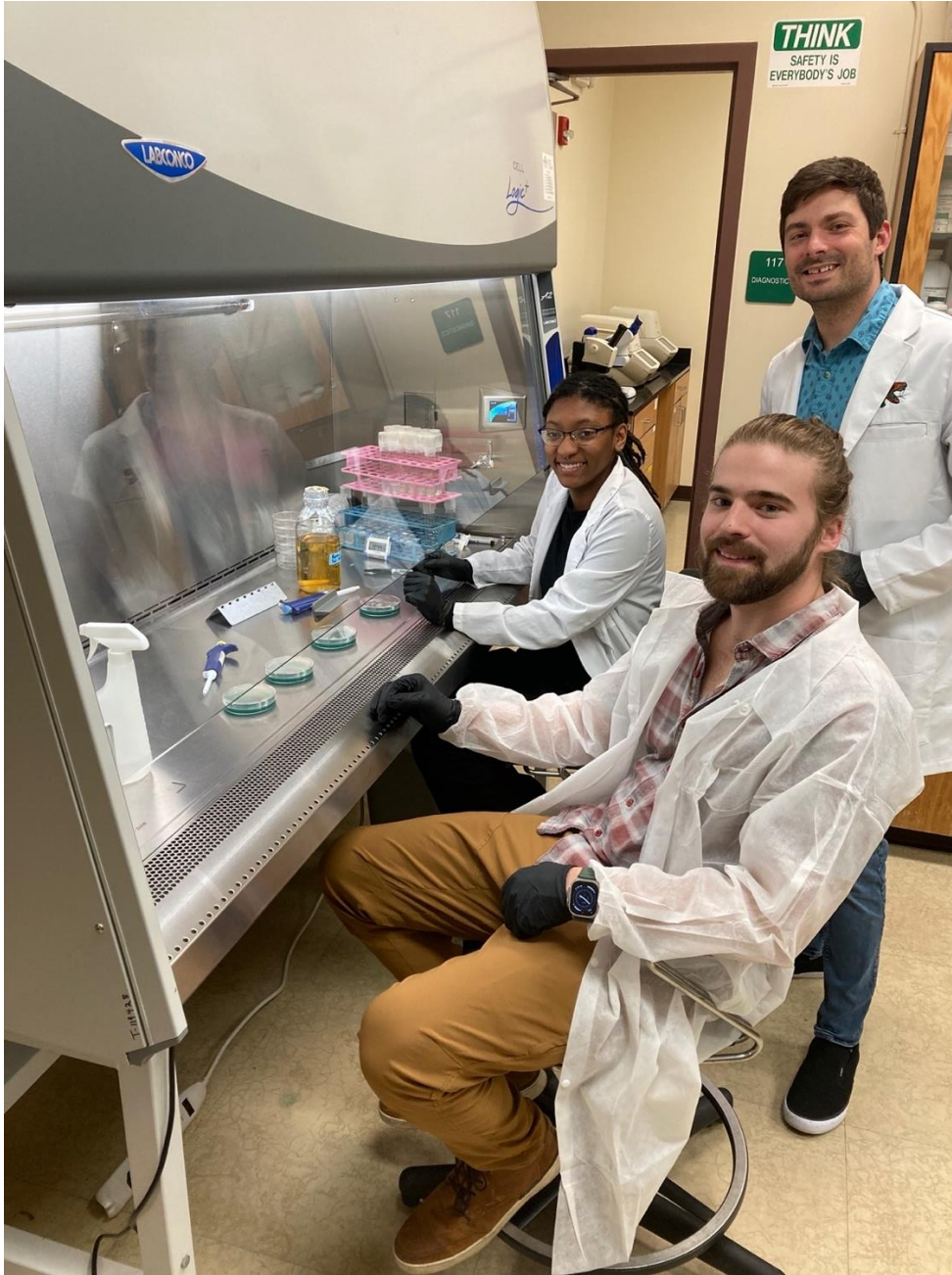
1. Ms. Anse Kaplan has developed several muscadine grape berry and juice-based products to expand its use beyond wine and juice use and promote its use as health supplements and sustain the muscadine industry. These were distributed to dignitaries and guests who visited the viticulture center on various occasions throughout the year, and they were appreciated and liked by everyone.



2. Graduate Students, Stella Dupe Ogundipe and Victor Cupp in the genetics lab



3. Undergraduate Researchers, Eryse White and Camden Kruis, working with Research Enologist, Frank Humphries, on yeast cultures under the laminar flow hood in the Tissue Culture laboratory.



Dr. Islam El_Sharkawy at the 2023 North American Grape Breeders & Vitis-Muscadinia Alliance Conference, University of Arkansas System Division of Agriculture (UA System), AR, October 3 – 5, 2023.



Report for FL VAC Meeting on November 14thDate: Oct 27th, 2023**Education****UF/IFAS 2023 Grape Field Day**

The 2023 Grape Field Day presented by UF/IFAS Extension took place at the UF Plant Science Research and Education Unit, in Citra, FL on May 18th. The day provided attendees with updates on UF and FAMU grape research, along with aspects of marketing and promoting grape products, agrotourism, and more. One highlight of the event was a research trial being conducted at the Unit by the lab of Dr. Ali Sarkhosh, Associate Professor and Extension Specialist for Viticulture and Tree crops. He is working with a product newly registered for Florida use called XylPhi-PD, which is an injectable formulation that has been shown to reduce the symptoms of Pierce's Disease. Pierce's Disease is caused by a bacteria known as *Xylella fastidiosa*, which is transmitted by leafhoppers. It causes these symptoms by clogging the Xylem (water conducting vessels) of the vine. The disease produces symptoms such as leaf scorch, marginal leaf scalding, fruit wilting, shoot stunting, and has been the main factor limiting the production of bunch grapes in Florida. Muscadine grapes are highly resistant to Pierce's Disease.

The XylPhi-PD product contains a bacteriophage (a virus that infects the bacteria) specific to *Xylella fastidiosa*, and can prevent and treat the disease. The field tour portion of the event included a demonstration of how to inject the product into the vines. The injection equipment includes the injector device, which is a robust syringe tool with a needle that is pushed into the vine, and a trigger function coupled with a compressed CO2 tank delivers the product into the vine.

The UF research trial with the product just began this year on a 4-year-old block of Chenin Blanc vines, so conclusive results will be available upon completion of the trial. Another experiment injecting the product from the year of planting onward is being planned. The product is also OMRI-listed for organic production systems.

Other presenters for the field day and their topics included:

Dr. Jean Rodriguez (A&P Inphatec)-Pierce's Disease management using XylPhi-PD Bactericides
Melissa Hunt (FDACS)-Marketing and promoting FL grape products.

Dr. Kevin Athearn (UF/IFAS)-Regulations, Markets, and Agritourism for Vineyards and Farm Wineries

Dr. Islam El-Sharkawy (FAMU)- Grape breeding at FAMU

David Jarnagin (Hyldemoer + Co)-The Englishman's Grape

For access to these presentations, past field day presentations, and a wealth of information on grape production in Florida, please visit our UF Grape website: <https://hos.ifas.ufl.edu/grape/>. Feel free to contact us through the site, and we hope to see you at our next Grape Field Day!

Promoting research findings to the general public:

- 1) **Muscadine wine shows promise in improving aging skin published at the American Society for Nutrition** <https://nutrition.org/muscadine-wine-shows-promise-in-improving-aging-skin/>
- 2) **Are Muscadine Grapes the Next Big Superfood?**
<https://www.clickorlando.com/news/local/2023/09/25/your-florida-daily-florida-researchers-transform-leathery-grapes-into-crunchy-fruit-snack/>

- 3) **Muscadines, Florida's native grape, considered a superfood**
<https://www.heraldtribune.com/story/news/2023/10/05/muscadine-superfood-florida-native-grape-scuppernongs-freeze-drying-improve-taste-antioxidants/71042852007/>
- 4) **Freeze drying Florida's native grape makes the muscadine more palatable**
<https://www.palmbeachpost.com/picture-gallery/news/state/2023/10/03/florida-native-grape-muscadine-superfood-used-wine-nutritious-freeze-drying-peel-edible/71042849007/>
- 5) **Muscadine Grapes Get New Recipe for Success from Specialists**
<https://specialtycropindustry.com/uf-ifas-research-muscadine-grapes-get-new-recipe-for-success-from-specialists/>
- 6) **Florida researchers transform leathery grapes into crunchy fruit snack**
<https://www.clickorlando.com/news/local/2023/09/25/your-florida-daily-florida-researchers-transform-leathery-grapes-into-crunchy-fruit-snack/>
- 7) **UF/IFAS researchers make muscadine grapes more palatable by freeze-drying them**
<https://www.freshplaza.com/north-america/article/9564316/uf-ifas-researchers-make-muscadine-grapes-more-palatable-by-freeze-drying-them/>

Muscadine wine shows promise in improving aging skin

Credits: <https://nutrition.org/>



UF/IFAS Research Project Progress update:

(1) Use Muscadine Wine Nutraceuticals to Improve Brain and Mental Health

PI: Liwei Gu, Food Science and Human Nutrition Department

This funded research is to explore how muscadine wine polyphenols affect cognition, memory, and mood in healthy adults over 50 years old. We have obtained IRB approval for the trial. This trial has been registered on clinicaltrials.gov. Muscadine wine polyphenols and a placebo have been formulated. The trial is ongoing with 15 participants. We will continue to add more participants while the trial is going on.

(2) Furthering the management of Grape Root Borer and Using Mitigation Strategies to Reduce its Development and Spread

PI: Oscar Liburd, Entomology and Nematology Department

The cultivation of muscadine grapes has become popular in recent years due to their extraordinary ability to thrive in varied climatic conditions, high resistance to diseases, use in a wide variety of delicious food products, and excellent shady landscaping property they provide (Jean, UF/IFAS 2023). Grapes are the highest fruits produced by volume in the United States. In 2019, grape production was estimated to be 6.9 million tons, and a revenue of 5.93 billion USD was generated in 2022

(USDA/Statistica 2023). Despite this massive production volume in the United States, muscadine grape production in Florida was estimated to occupy only about 1,600 acres of farmland in 2017 and continues to increase yearly (UF/IFAS/Hos/Grape 2023).

The favorable climatic conditions in Florida are expected to boost grape production. However, grapevine growth is confronted with the incidence of the grape root borer (GRB), *Vitacea polistiformis* (Figure 1a); the larvae of grape root borer inhabit and continuously feed on the roots of grapevines, depriving the plants of root support, essential nutrients and water required for growth and fruit production.

Recommended integrated management of grape root borer requires accurate monitoring regimes to determine when they are present so that adequate management tactics can be implemented. In this study, we continued to monitor the presence of GRB in selected grape vineyards to understand pest status in relation to previous years and refine management programs.

(3) Methodology

Monitoring for GRB has been implemented in 5 grape vineyards; 3 privately owned vineyards located in Central Florida, and the other two located at the University of Florida, Institute of Food and Agriculture research centers in North Florida. One female GRB pheromone (99% (E,Z)- 2,13 octadecadienyl acetate, 1% (Z,Z)- 3,13 octadecadienyl acetate) rubber septum with 1 mg of the pheromone was used in each of the green bucket traps deployed at each vineyard. Four of these traps were carefully hanged on the top trellis wire, about 1.5 m above the ground near the vine trunk of each grape vine. A vaportape (Hercon Environmental, Emigsville, PA) treated with 2,2-dichlorovinyl dimethyl phosphate was partially held to the inner base (bottom) of the green bucket traps (Great Lakes IPM, Vestaburg, MI) to serve as the toxicant for the trapped male GRBs (Figure 1b). The traps were distributed at an approximate distance of 40 m apart. The pheromones and vaportapes were replaced with fresh ones after 6 weeks of field exposure. Captured male GRBs were collected weekly into labeled 50 ml centrifuge tubes with caps and kept in plastic resealable bags. The captured GRBs in each trap were identified for confirmation, counted, and recorded weekly.

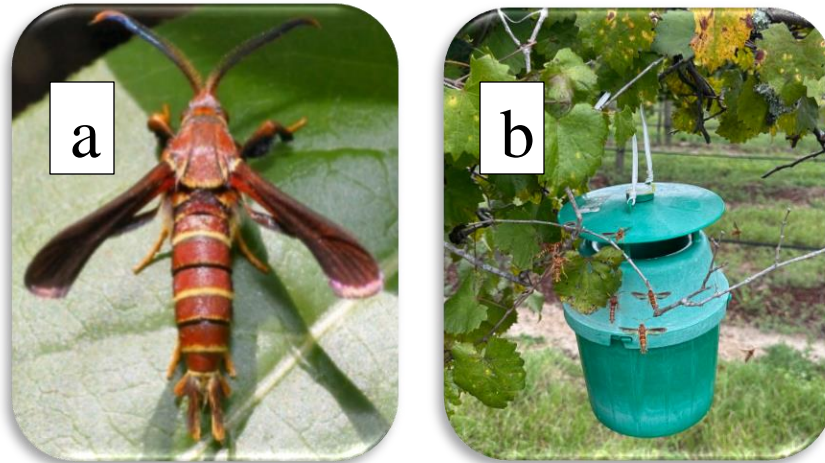


Figure 1. Male GRBs attracted by the female GRB pheromone placed inside the green bucket trap.

Preliminary Results

Captures of GRB males in the Clermont area in Central Florida has been relatively high compared to other areas including Sorrento, Eustis, Live Oak and Citra.

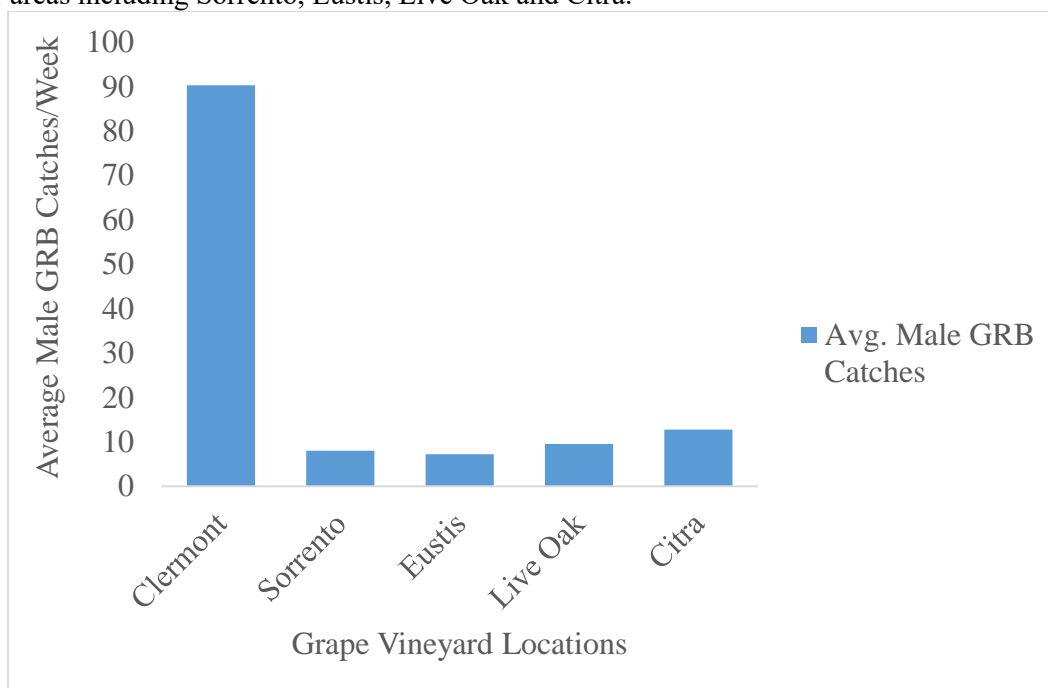


Figure 2. Average male GRB trap catches/week at each of the five different locations.

Discussion

The high male GRB catches at the Clermont grape vineyard far exceeds the numbers captured at the same location in the previous year. This difference may be due to lack of routine pest management practices on the farm in question. Grape cultivation practices that are being carried out in the vineyards located at Sorrento, Eustis, Live Oak, and Citra should be studied and those practices can be adopted in the Clermont area.

Conclusion

The monitoring of male GRBs using the green bucket trap with female pheromone and vaportape insecticide strip, has proven to be quite effective. This monitoring program should be encouraged throughout the state.

Recommendation

This monitoring studies should start early in March/April and continue until the end of the grape production season in October. Also, Further studies on the management of immature stages of GRB should be conducted in future research.

(3) Assessment of Florida Fruit wines packaged in glass bottles and cans throughout accelerated shelf-life testing

PI: Katherine Thompson-Witrick, Food Science and Human Nutrition Department

In this stage of the project, we are preparing for experiments to analyze the impact that aluminum beverage cans have on the physiochemical properties of fruit wines. Sufficient quantities of blueberry wine grown in Florida (donated from Island Grove Wineries) has been selected for use for the duration of this project. The wine has been collected and is currently being chilled in preparation to be packaged in the coming weeks. A dedicated graduate student was hired (Aug 16th) and is currently being trained in the experimental design phase and is also assembling the necessary supplies, while honing his techniques for the successful execution of this project. In preparation for the upcoming experiments, the graduate student has also been checking and validating the canning equipment in preparation for packaging. At this point in the project we are on schedule and have not experienced any significant problems or delays. Now that the substrate has been identified and collected, the labor secured, experiments detailed, and equipment checked – the data collection phase will begin soon.

(4) Field Evaluation of Newly Labeled Bactericide, XylPhi-PD, to control Pierce's Disease of *Vitis vinifera* Grapevines in Florida

PI: Ali Sarkhosh, Horticultural Sciences Department

Two hundred vines of Chenin Blanc white wine variety were ordered from a California nursery that will be planted in the ground in February 2024. PD is the most significant limiting factor in the cultivation of this variety in FL. Vines will be treated with the Bactericide, XylPhi-PD from the year 1, 3 months after the planting.

(5) Improving and Diversifying Grape Production in Florida

PI: Ali Sarkhosh, Horticultural Sciences Department

The performance of ten new selections of fresh-market muscadine grapes is under progress, 2023 season yield and fruit quality data have been collected and are ready for analysis. An experiment on the postharvest of commercial fresh-market muscadine just ended, and data will be analyzed soon. Performance of Pierce's Disease (PD) resistant wine grape cultivars under Florida growing conditions are in progress. We expect to harvest the first yield next year.

(6) Evaluation of Florida adapted bunch grape and muscadine germplasm

PI: Manjul Dutt, Assistant Professor, Citrus Research and Education Center

This project has two objectives: to develop Florida specific muscadine cultivars including fresh market and wine grapes with high malvidin 3,5-diglucoside content and secondly to utilize existing UF germplasm to develop fungal (and PD) resistant bunch grape hybrids that are well adapted productive in the hot and humid Florida environment. The Project team is currently ordering materials to establish the research plot.

(7) Understanding the mechanism of fungal disease tolerance in some southern grapes

PI: Manjul Dutt, Assistant Professor, Citrus Research and Education Center

This one year study proposes to rapidly identify the genetic factors underlying some of the disease resistant traits in the UF bunch grape germplasm through RNA sequencing and the subsequent comparison of transcripts that are differentially expressed in both disease susceptible and resistant accessions. The Project team is currently ordering materials to start the research.