2024 Progress Report R-26

Title:
Evaluating Cold Hardiness of Muscadine Cultivars

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Objective:

The objective of this study is to evaluate cold hardiness of various Muscadine cultivars (*Vitis rotundifolia* Michx.). Determining the cold tolerance for each cultivar will provide growers and breeders the ability to expand the geographical range where muscadine grapes can be cultivated, increasing the potential for market expansion. This knowledge also helps reduce the risk of crop loss due to winter damage, ensuring a more reliable and sustainable muscadine production industry.

Justification and Description:

In the face of ongoing climate change, understanding the effect of cold hardiness in muscadine vines is important when selecting cultivars. Muscadines, *Vitis rotundifolia* Michx., are native to the southeastern United States. They thrive in regions characterized by high temps and high humidity and have demonstrated resilience against pests and diseases that can harm other *Vitis* species. Muscadine vines are deciduous and bear their

fruit in small, round, loosely arranged clusters. These round fruits boast thick skins, can contain up to five seeds and have fruit color that can range from bronze to deep purple. Through breeding programs, cultivars have been developed to now be produced on a commercial scale. Muscadine fruit can be purchased and/or sold as fresh fruit, or in products, such as wine, juice, jam, jelly, and similar items.

While they thrive in hot, humid regions, they are particularly sensitive to frost and cold temperatures falling below 10°F. They can suffer damage when exposed to minimum winter temperatures as low as 0ºF. As global temperatures continue to fluctuate, extreme weather events, including sudden cold snaps, become more frequent and unpredictable. This poses a significant risk to the cultivation of muscadine grapes. Research into the cold hardiness of these vines is essential for vineyard managers and growers, as it enables them to adapt and implement cultivars that stand up better in the cold weather.

Materials and Methods:

The study will take place at the Mississippi State University, MAFES South Branch Experiment Station in Poplarville, MS. Nine varieties of muscadine will include, (dependent on availability) but are not limited to, ‘Carlos’, ‘Lane’, ‘Doreen’, ‘Noble’, ‘Darlene’, ‘Fry’, ‘Summit’, ‘Black Beauty’, and selection H17-66.

Buds will be collected from healthy, vigorous canes. The bud will be shaved off the canes with the use of a single edge razor blade. Buds will be cut by beginning approximately 1/2 to 3/4 inch below the bud's base and making a clean, upward cut that reaches 1/2 to 3/4 inch beyond the bud. Buds will be collected once a month beginning at the start of dormancy and ending at bud swell (5 collection times: November-March).

Bud low-temperature exotherms (LTEs) will be identified by means of differential thermal analysis with a Keithley Multimeter Data Acquisition System (model 2700-DAQ-40; Keithley Instruments, Cleveland, OH, USA) involving a programmable freezer (Tenney Environmental Test Chamber, model T2C, Thermal Product Solutions, Williamsport, PA, USA) and thermoelectric modules (TEM). The temperature protocol will involve a one-hour period at 4°C, followed by a gradual decline of 4°C per hour until reaching -40°C. The LTEs that signify the temperature at which buds are fatally affected, will be determined for each individual cultivar.

Each TEM will consist of ten buds from each cultivar, with six replicates per cultivar per collection date (60 buds per cultivar per collection; 300 buds per cultivar in total for study; 2,700 buds in total).

Results and Discussion:

Due to recent temperatures, data has yet to be collected. Project is expected to being in December.