

## 2021 SR SFC Final Project Report

Proposal Category:  Research  Outreach

Proposal Status:  New (Extended) Proposal  Previously funded by SRSFC

Title:

**Investigating the Potential of Disease Resistant *Vitis vinifera* (European Grape) Progeny for the Southeast**

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**Objectives:**

The purpose of this applied research project is to investigate the production potential of newly developed Pierce's Disease (PD) resistant 94% *Vitis vinifera* grape selection in Alabama where the PD pressure is high. Studies are focused to evaluate vine performance at three planting densities of 605, 519 and 454 vines/acre (corresponding to planting distance of 6' X 12', 7' X 12', and 8' X 12' respectively), where phenological, cropping and vegetative responses are

measured and fruit quality and vine field PD resistance is assessed. Vines are trained to the relatively new, high-cordon divided canopy Watson training system utilized for improved vineyard management practices, improved canopy environment, and enhanced fruit quality. The UC Davis developed PD resistant, predominantly *Vitis vinifera* selection '502-20' is being tested at the Chilton Research and Extension Center (CREC), Clanton, Alabama. The outcomes of this research can serve to promote viticultural diversification and sustainability in Alabama, aid in the development of technology for *V. vinifera* production in Alabama and the southeastern region and can support the development of In-service agent training modules in sustainable viticultural production practices in the region.

## **Activities**

To determine the feasibility of sustainable production of newly developed PD resistant 94% *Vitis vinifera* selection '502-20', an experimental site was utilized at the Chilton Research and Extension Center near Clanton, Alabama. The effect of three planting densities of 605, 519, 454 vine/acre corresponding to 6' X 12'; 7' X 12', and 8' X 12' planting distances on vine growth, development, productivity, crop efficiency, and fruit quality were evaluated. The experimental design is a CRD with 3 replications and 3 vines per block. Vines were planted in 2017 and trained to a divided canopy Watson trellis system.

During the early spring of 2020-2021, vines were dormant pruned to 12 spurs per vine (6 spurs/cordon) with two buds per spur retained for a total number of 24 buds retained per vine. The dormant pruning weights were recorded for each individual plant and vine flowering progression was observed. Young shoots were trained and tied to the support wires as soon as they reached the proper length. Shoot thinning was conducted in early spring to maintain the desirable shoot number in the canopy. Cluster flowering progression was recorded for each vine in 2021. A 30-leaves per vine sample was collected to determine treatment effect on Leaf Area Index. Petiole samples were submitted to the Plant Diagnostic Lab where Dr. Conner conducted a PCR test to establish the presence of *Xf* infection in the experimental vines.

The final stages of berry veraison and fruit maturity were documented during the summer. Fruit was harvested on August 7, 2020 and on August 13, 2021. Each season, the total yield per vine and the total cluster number per vine were measured and recorded. A five cluster per vine sample was collected to determine mean cluster weight. Other fruit quality attributes such as mean berry weight was determined on a sub-sample of 50 berries per vine. To record berry soluble solids content, the juice from 10 berries was extracted.

## RESULTS:

Our data on dormant pruning weight per vine suggests planting distance did not significantly affect the vigor of 502-20 vines, which was very uniform for all treatments in 2020, while in 2021 season the 7' X 12' planting distance resulted in slightly reduced vine vigor based on the results for plant dormant pruning weight (Figure 1).

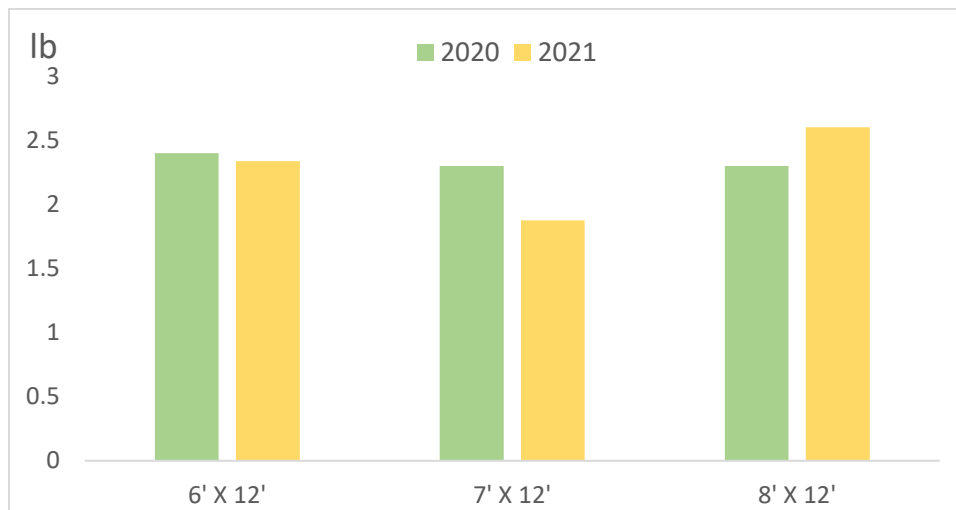


Figure 1. Effect of planting distance on dormant pruning weight (lb) of predominantly *V. vinifera* selection 502-20 grown at the CREC, Clanton, AL, 2020-2021.

Results for total yield per vine (Table 1) suggest similar cropping level (between 8.5 and 8.8 kg/vine) regardless of planting distances during 2020. During the next season, the 6' X 12' and 7' X 12' treatments yielded between 8.0 and 8.6 kg/vine respectively, while the 8' X 12' planting distance resulted in significantly higher crop of 12.6 kg/vine.

**Table 1. Effect of planting distance on yield of 502-20 grape selection, 2020-2021.**

	Total Yield, kg	
	2020	2021
6' X 12'	8.5	8.0 b
7' X 12'	8.8	8.6 b
8' X 12'	8.8	12.6 a

Average number of clusters/vine was not statistically different during the reported period, and varied between 27.7 and 31.6 during 2020 and between 35 and 54 in 2021 with the 8' X 12' treatment producing the highest number of clusters (31.6 and 54.0 respectively) in both seasons (Table 2). Mean cluster weight varied between 367.2 g for vines planted at 6' X 12' to 394.3 g for vines planted at 7' X 12' during the 2020 season, and was between 569.0 and 621.2 g in 2021. The 7' X 12' planting distance resulted in the largest cluster size in both study years, although no statistical difference between the treatments was found.

**Table 2. Effect of planting distance on number of clusters and mean cluster weight of 502-20 grape selection, 2020-2021.**

Planting density	Average No. of clusters/vine		Mean cluster weight, g	
	2020	2021	2020	2021
	6' X 12'	28.0	35.0	367.2
7' X 12'	27.7	35.0	394.3	621.2
8' X 12'	31.6	54.0	377.0	597.9

No statistical difference was found to affect the mean individual berry weight between planting distance treatments. In general, mean berry size was larger in 2021, likely due to the rainier season with above average rain events and rain water accumulation (Table 3). Berry soluble solids content was similar for all planting distances in 2020, and was highest for the 8' X 12' distance in 2021, while the 7' X 12' planted grapes had the lowest sugar content of 16.3%.

Table 3. Effect of planting distance on individual berry weight and SSC of '502-20' grape, 2020-2021.				
Planting distance	Mean berry weight, g		Brix, %	
	2020	2021	2020	2021
6' X 12'	2.0	2.8	18.7	17.1 ab
7' X 12'	2.1	2.9	18.5	16.3 b
8' X 12'	2.2	2.8	18.4	18.1 a

Planting distance of 6' X 12' resulted in the largest leaf area index of 78.5 cm<sup>2</sup>, while vines planted at 7' X 12' produced the smallest leaves with LAI of 61.9 cm<sup>2</sup> (Figure 2).

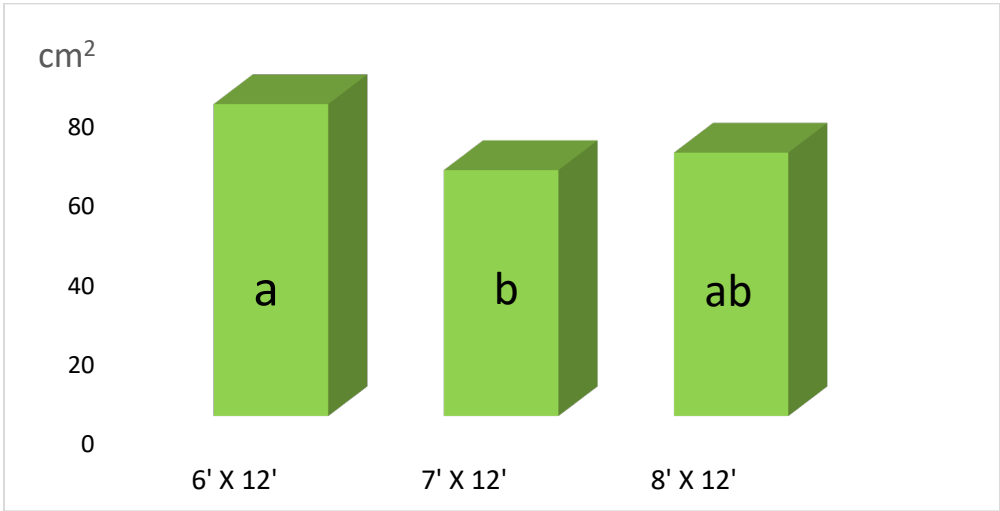


Figure 2. Effect of planting distance on 502-20 leaf area index, cm<sup>2</sup>, 2021.

Petiole samples were collected from each individual vine after harvest in mid-October, 2021 to test for the presence of *Xylella fastidiosa* infection. The conducted PCR analysis returned negative results. No Pierce’s disease infected vines were found from the PD resistant predominantly *V. vinifera* selection 502-20 after five years of cultivation in the high PD risk zone of central Alabama, while the adjacent PD tolerant American and French-American hybrid bunch grapevines were showing 37% infected plants in 2021.