

NGWB Grant Final Report

Contract #18-13-122, Board of Regents of the University of Nebraska
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Issue of Interest

Nebraska's grape and wine industry has been developing rapidly in recent years. This rapid development parallels an ever-increasing demand for science-based information in support of this exciting value-added industry. Establishment of grape and wine industries has been shown to have an economic "multiplier" effect on both rural and urban areas, with Nebraska's grape and wine industry providing an excellent example of agritourism's impact on local economies. The University of Nebraska Viticulture Program (UNVP) has pursued research aimed at benefitting this growing industry by focusing on the following topics: cultivar ("variety") and germplasm evaluation; cold-hardiness and bud-break delay; disease and insect management research; trellis construction and new cultivar performance on different trellis configurations; vineyard floor and weed management; fertilizers and nutrition; soil pH effects; pesticide crop locator (for reducing errant spray damage); reduced input, sustainable and potentially organic, production systems.

Approach to Problems

Collaboration with the NE-1020 program has enabled the UNVP to leverage funds from the NGWB by combining cultivar and germplasm studies, especially evaluation of candidate new cultivars that have potential to be of value to the Nebraska grape and wine industry. This collaboration provided both financial and advisory input from the NE-1020 participants. All plantings have been made in standardized replicated plots, usually 3 or 4 replications of 6 vines per replication. All data acquisition was based upon consultation with statisticians. Cold-hardiness was based upon survival ratings and bud-break delay on dates of 50% bud emergence (reaching Eichorn-Lorenz Stage 5), disease and herbicide damage was based upon a rating scale of 1 to 5, with 5 being extreme damage and 1 = no damage. Other focus areas were evaluated based upon pruning weights; fruit yield and harvest parameters, including degrees Brix (sugar content), juice pH and titratable acidity. A follow-up of an earlier mulch study has been initiated in order to determine another aspect of potential organic/reduced-pesticide viticulture. Research tests have taken place on UNVP research vineyards and on cooperating commercial vineyards. In the latter case, the general maintenance of the vines being studied has been contributed by the vineyard owner(s), which makes the funds have more impact.

Goals, Achievement of Goals, Results, Conclusions and Lessons Learned

The goal of determining the most suitable cultivars, although an ongoing process, has enabled the UNVP to provide listings of cultivars exhibiting promise for different regions of Nebraska. Cold-hardiness and stress tolerance, along with tolerance to diseases, herbicide drift and insects has been reported on the UNVP web site <http://agronomy/unl.edu/viticulture>. A termination report for the research program at the Panhandle Research and Extension Center (PREC) describes the challenges and successes of the cultivar trials that took place at the PREC over a

10-year period (copies of this report were provided to NGWB members at a previous meeting of the NGWB). Results demonstrate that the limited number of cultivars showing promise in western Nebraska e. g. Frontenac, Marechal Foch, Valiant, Leon Millot, Elvira and deChaunac) are fewer than those suitable for eastern and central Nebraska (see web site for detailed listing). Cultivars susceptible to high pH-induced micronutrient deficiencies were shown to be primarily those with *Vitis labrusca* in their heritage. Insects such as the grape flea beetle and the apple twig borer presented minor, controllable problems, but the most severe challenge was late spring frost damage.

Additional disease evaluations demonstrated that most cultivars exhibit varying degrees of susceptibility to Black Rot (*Guignardia bidwellii*) with Lacrosse and Valiant the most severely affected. Marechal Foch and Frontenac had modest Black Rot symptoms, but Downy Mildew (*Plasmopara viticola*) was of no consequence for Frontenac and Saint Croix. Moderate Downy Mildew symptoms were exhibited by Valiant and Prairie Star, with debilitating infections appearing on Marechal Foch and Lacrosse. Phomopsis (*Phomopsis viticola*) has been of lesser importance for most cultivars tested, but Powdery Mildew (*Uncinula necator*) caused moderate to severe problems on Saint Croix, Valiant, Prairie Star, Lacrosse, Marechal Foch, Riesling and Lemberger (Table 1). A general observation regarding *Vitis vinifera* cultivars is that they routinely are more susceptible to the afore-mentioned diseases, as well as herbicide drift. Results from commercial vineyards in western Nebraska strongly suggest that it is possible to produce Frontenac, Saint Croix, Prairie Star, Marechal Foch and possibly Lacrosse with few to no fungicide sprays. Although minimal disease pressure seems to occur in western Nebraska, a vigilant spray program at this point is dictated for grape growers in eastern and central Nebraska.

Table 1. Eastern Nebraska Grape Disease Severity – 2011

<u>Cultivar</u>	<u>Black Rot</u>	<u>Downy Mildew</u>	
	<u>Powdery Mildew</u>		
Frontenac	X	0	0
Saint Croix	X	0	X
Valiant X	XX	X	
Prairie Star	X	X	X
Marechal Foch X	X	XX	
Lacrosse X	XX	XX	

Rating Scale: XX = severe; X = moderate; 0 = absent or of no commercial concern. Phomopsis (*Phomopsis viticola*) was not a problem in the 2011 growing season.

Performance by cultivars such as Frontenac on a variety of trellis configurations illustrated that the Geneva Double Curtain (GDC) and High Cordon (HC) were superior to Vertical Shoot Position (VSP), Smart-Dyson (SD) and Scott Henry (SH). For vigorous cultivars such as Frontenac, it was difficult to manage the vines on systems requiring downward training (e.g. SD, SH). Christina Bavougian, M.S. student in the UNVP presented this information at the 14th Annual Nebraska Winery and Grape Growers Forum in March, 2011. These results have led growers to employ GDC or HC for new plantings of Frontenac and Frontenac Gris, while additional growers have chosen to convert VSP systems to GDC for these cultivars.

Progress Achieved According to Outcome Measures

This project has had significant impact on Nebraska's grape and wine industry. Several accomplishments have been noted in previous sections of this report. In addition, results have been reported at the Annual Forum, field days and grower workshops, frequently in consultation and collaboration with the Nebraska Winery and Grape Growers Association (NWGGA). The number of wineries licensed and vineyards established in Nebraska has continued to grow in a gradual and sustainable fashion. Some Nebraska grape growers have modified spray programs to achieve reduced-input and more sustainable vineyards, with a small number approaching true organic systems. UNVP personnel have been invited to participate in educational programs in other states to report results based upon UNVP research results, including cultivar selection, cold hardiness, bud break delay and trellis systems. Several numbered selections provided by breeders have been grown in UNVP vineyards for over 12 years and following their naming as cultivars, UNVP recommendations have been available to growers based upon the "track record" from such cultivar evaluation (see data presented in the UNVP web site <http://agronomy.unl.edu/viticulture>). Examples include La Crescent (MN1166), Marquette (MN 1211), Prairie Star (ES 3-24-7), Brianna (ES 7-4-76), Sabrevois (ES 2-1-9) and New York introductions (Noiret, Corot Noir and Valvin Muscat).

New and existing growers have been advised on topics ranging from cultivar and site selection to winery establishment. Nebraska wineries have been especially successful when entering their wines in international competitions. In the past three years, several Nebraska wines have been selected as the best white wine in the entire competition. As is often said in the grape and wine industry, "the wine is made in the vineyard", so UNVP assistance has been instrumental in helping the continued development of this vibrant and value-added industry.

Financial Report

The most important part of this budget was providing approximately one-half of the salary and benefits for the Viticulture Technologist (Stephen Gamet). His work in the vineyards, greenhouse and labs has been instrumental in the UNVP program development. Mr. Gamet's assistance to the graduate and undergraduate students involved in this project has been exemplary. His assistance in preparation and presentation of lectures to the industry and classes taught by Dr. Read has enabled this project to be highly successful and to present a positive image of the University, the Nebraska grape and wine industry and the UNVP. He has also been instrumental in facilitating collaboration with growers, winery personnel and the NWGGA.

Funds spent on Operating, Supplies and Travel can be documented in more detail if the NGWB should so desire. It should be noted that a significant part of the Travel budget was expended for visits to more than 60 growers and winery enterprises, in addition to travel to the UNVP research vineyards. Attendance at the American Society of Enology and Viticulture was also an opportunity to present these research results to the grape and wine scientific community..

Budget Summary for Project #18-13-122:

Salary and Benefits	\$28,891
Operating	\$399
Supplies	\$4,417
Travel	\$7,636
Indirect F&A	\$4,134
Total	\$45,477

The funding provided by the Nebraska Grape and Wine Board was of great assistance to enabling the University of Nebraska Viticulture Program to accomplish its objectives on behalf of the Nebraska grape and wine industry. The assistance is greatly appreciated by the UNVP personnel and by the ultimate beneficiaries, Nebraska's grape growers and winery entrepreneurs.

Respectfully submitted,

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