

NGWB GRANT DRAFT FINAL REPORT – FY 2016-2017

Contract Number 18–13-227

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Issue of Interest: The overall goal of the University of Nebraska Viticulture Program (UNVP) is to provide science-based research information that will assist the development of the Nebraska grape and wine industry in a sustainable and profitable manner, thus enhancing the economic viability of Nebraska communities. Improving performance of grapes grown in Nebraska vineyards leading to excellent quality wine production is part of this goal. Evaluation and selection of grape cultivars and their efficient management in Nebraska vineyards, along with educational programs that add to the overall capability of grape growers and winemakers are also included in this overall goal.

Approach to the Problem: Research vineyards managed by the UNVP and those of grower-cooperators are used to pursue scientifically designed and implemented research projects. These experiments are continuing and have resulted in information useful to the Nebraska growers and wineries. The results have been communicated to the clientele by field days, workshops, seminars and the Annual Winery and Grape Growers Forum and Trade Show, in addition to via electronic communications such as the Nebraska VineLines electronic newsletter which reaches over 350 email addresses and through the UNVP web site <http://viticulture.unl.edu>

Goals/Achievement of Goals: The UNVP has continued to evaluate new genotypes, including new grape cultivars and selections provided by public and private breeders, in many cases simply numbered selections that may someday be named or discarded. Results achieved by the UNVP are valuable to the breeders in determining future release or elimination from their breeding program. Examples include numbered selections from the University of Minnesota, Cornell University and private breeders that are being tested in UNVP research and demonstration plantings. Recommendations resulting from experiments on trellising, ground covers and mulches have been adopted by

commercial Nebraska growers. Collaboration with commercial vineyards has enabled the UNVP to leverage funds provided by the NGWB by eliminating routine maintenance costs such as sprays and irrigation. For example, by working with Eric Nelson, Oak Creek Vineyards, we have implemented studies on water use efficiency and evaluation of ground covers for young vineyards. The latter research will be reported as part of a PhD dissertation in the near future (B. Loseke).

Cultivar and new genotype evaluation: Two new genotypes were planted in the spring of 2016, the University of Minnesota's new white wine grape introduction, 'Itasca', and a selection from a private breeder TP 1-12-18 (Tom Plocher, breeder). These and other new genotypes will be evaluated rigorously by similar approaches to those used for the more than 100 genotypes previously or currently evaluated in the UNVP research vineyards. Relatively recent introductions such as Petite Pearl, Noiret, Corot Noir, Aromella, Marquette and Bianca are continuing to receive emphasis, some of which are finding favor with Nebraska and Midwest clientele. Maps have been developed for delineating Nebraska regions of adaptability for many of the genotypes currently and previously tested. This information has been incorporated into two new NebGuides; one was completed in late 2016 and the second is on target to be completed by mid-2017. It is also part of information that has been provided to several prospective new growers who are intending to become part of the developing Nebraska grape and wine industry.

Northern Grapes and NE-1020 multi-state projects: Results of these projects have been shared at multi-state meetings, including the American Society for Enology and Viticulture (ASEV) and the American Society for Horticultural Science (ASHS). It now appears that the purported herbicide tolerance of such genotypes as MN1258, Vidal Blanc and Chambourcin may have been related to phenology and not to actual herbicide tolerance. As spring 2016 progressed into summer, mortality of a few vines in the NE-1020 vineyard occurred. Further monitoring is continuing and 2016-2017 winter damage is currently being assessed. Major contributions of the Northern Grapes Project have been presentation of **webinars** available to all interested growers and winery personnel, along with professionals sharing their expertise by making

presentations at symposia and workshops in participating states, sometimes on a reciprocal basis.

Stability of Frontenac Sports: Following the determination that anatomical investigations were not fruitful, PhD candidate Ben Loseke and colleagues have initiated molecular approaches to attempt to identify the genetic basis for the differences inherent in these mutations. One gene construct has been identified in Frontenac Blanc, but not in Frontenac Gris. This exciting research is ongoing and should lead to a preliminary report in late 2017 or early 2018.

Cold Hardiness and Bud Break: Further evaluation of both established and new cultivars/genotypes has continued, with data supporting the revelation that Norton is hardier than earlier supposed, that Petite Pearl is very promising, and recognition that Aromella is probably not a good candidate for Nebraska vineyards. Cultivars considered borderline in terms of cold hardiness include Bianca, Vidal Blanc, Seyval Blanc, Chambourcin, MN 1258 and MN 1220. However, because Chambourcin and Bianca have been highly successful for select wineries, they fall into a “niche” category that may relate to site-specificity. Early bud break is a serious concern for Marquette, potentially limiting its use in spring frost-prone locations. Petite Pearl’s late bud break is likely a better candidate for red wine grape production in such locations. Itasca and additional Plocher genotypes offer promise for dry white and dry red wine production, respectively. The lower acid content of juice from these genotypes may facilitate more efficient production in the winery, with less additives necessary to achieve quality wines.

Mulch and Ground Cover Studies: Mulch studies were concluded in 2015, with the recommendation that prairie hay, wheat straw, black landscape fabric, crushed glass and distillers dried grains (DDG) offer promise for non-herbicide weed management and moisture conservation. Concerns over vermin such as mice and voles was unfounded, but cost factors and limited availability of crushed glass and DDG make these materials untenable. Wood chips are only useful on flat ground; they tend to wash downhill in heavy rains. Ground cover research is ongoing and appears promising. PhD candidate Ben Loseke has collected valuable data regarding water use efficiency and weed management in relation to use of six different ground cover species or mixtures. This encouraging research will

become available as he completes his field research studies in the 2017 growing season.

Growing Degree Days (GDD) Research: Compilation of data from previous growing seasons will be instructive as this research continues. It is becoming apparent that GDD elapsing between bud break and veraison varies with cultivar, but is not consistent from year to year. This research needs to be continued for several more years in order to use GDD as a basis for estimating potential harvest timing. Use of Forcing Solution technology has led to faster bud break data acquisition, thus enabling more efficiency in these studies. Research is proposed to be continued and expanded on bud break timing for selected cultivars during ensuing dormant seasons.

Pest Management and Reduced Pesticide Input: Investigation of use of ozonated water sprays as a potential replacement for fungicide use has continued, but is limited by access to equipment. Future studies (elsewhere) of use of hot air blasts (Agrothermal, Inc.) in the vineyard will be considered for 2017. Monitoring rainfall and relative humidity is a standard practice and should be refined as a potential aid to growers in eastern Nebraska.

UNVP Educational Programs:

- Field Day – July 16, 2016 – Old Cellar Vineyards, Arapahoe, NE - Mechanization in the vineyard was the primary focal topic, with demonstrations of machine harvester, mechanical pruning and leaf removal featured. Alternative posts were presented, and sprayer technology and canopy management were also topics for demonstration and discussion. Attendance 60
- New Technologies and Herbicide Drift Workshop – Lincoln, NE – November 5, 2016. Guest discussant was Dr. Donald Weeks, Professor of Biochemistry, UNL. Dr. Weeks explained the molecular background involved in creation of herbicide-resistant soybeans and the potential impact on sensitive crops such as grapes. Nebraska growers and NWGGA representatives discussed the development of guidelines for growers when impacted by herbicide drift incidents. Attendance 45
- The 20th Annual Nebraska Winery and Grape Growers Forum and Trade Show was held for the third time at the Omaha Marriott, Omaha, NE from March 2

to 4, 2017. Highlights included presentations by G. Stanley Howell, Michigan State University Professor Emeritus, arguably the “Father of Michigan’s modern wine industry, who ably filled in for Richard Smart who couldn’t attend because of family medical problems. Ed Swanson, founder of Cuthills Vineyards and recipient of the NWGGA’s “Pioneer Award”, presented a stimulating keynote lecture chronicling the history and growth of Nebraska’s grape and wine industry. He also presented details of his program of breeding grapes for harsh Midwest climates. Drew Horton, winemaker in the University of Minnesota’s ongoing grape breeding program served as the key speaker in the enology track and provided insights into sulfur and oxygen challenges in winemaking; he also led a “hands-on” workshop on the use of the new technology “Vinmetrica”. Karen Purves, an internationally known motivational speaker enriched attendees communication skills and presented promotion and marketing skill sets that will be useful in overall marketing and in enhancing tasting room sales. Numerous additional topics included viticulture fundamentals, a 50-year retrospective on freeze injury (Stan Howell), canopy management, ground covers and foliar fertilization. Attendance 145, with nearly 100 enjoying the Awards Banquet.

- **Of Special Note:** Because the Nebraska grape and wine industry has matured over recent years and the NWGGA has now in place an effective Executive Director, the decision was made that the NWGGA will take over the presentation of the annual conference after the conclusion of the 20th Annual Nebraska Winery and Grape Growers Forum and Trade Show.
- The Nebraska VineLines was published six times electronically to over 340 email addresses, with periodic “Breaking News” items and announcements of Northern Grapes Project webinars interspersed as necessary. Feedback from recipients was extremely positive.
- Two NebGuides related to grape production have been developed. The first is for home grape production and was published in late 2016. The second focuses on commercial vineyard production in Nebraska and will be finalized in mid-2017.
- Numerous presentations as part of the UNL Speakers Bureau have been made by Paul Read, Professor of Viticulture, to promote and advertise the Nebraska wine story, along with other presentations, radio spots and programs and scientific presentations to ASHS and ASEV audiences. Support of the

Nebraska Grape and Wine Board has been helpful in these promotional efforts (and acknowledged).

Results, Conclusions and Lessons Learned: Information derived from this project has been useful to current grape growers and wineries, while benefitting new enterprises emerging during the year. A few further pertinent observations:

- Research Technologist Stephen Gamet has continued to provide exemplary service in maintaining the UNVP research and demonstration vineyards, conducting research trials, acquiring data and compiling results for potential publication and sharing with the industry. He continues to be a great teacher, helping new students, visiting scientists and graduate students to learn fundamental vineyard management tasks. He also provides technical support for professional presentations and outreach activities.
- Cultivar evaluation. New cultivars established at the beginning of the 2016 growing season are being evaluated for their growth potential, tolerance to disease and other stresses, while their 2016-2017 winter cold hardiness has only been evaluated on a preliminary basis because of the mild winter. Petite Pearl is a red wine grape cultivar that is receiving grower attention based upon results obtained in the UNVP and adjacent states' research vineyards. Bianca, Marquette, Noiret and Norton are receiving new attention or renewed interest.
- Ground covers for young vineyards. PhD student Ben Loseke is in his final year of these studies and it is anticipated that, based upon preliminary results, new recommendations will emanate from this research thrust. At present, creeping red fescue and native grasses can be recommended for between-row cover crops and in-row results will need further evaluation, but appear promising.
- Canopy management. UNVP research has demonstrated that grape cultivars with procumbent (trailing) growth habit, such as Frontenac, Marquette and the Frontenac sports are best trained to a high cordon type of trellis system such as the Geneva Double Curtain (GDC) or a High Bilateral Cordon (HBC) system. The latter system is conducive to machine harvest and has led to vineyard owners retrofitting their existing trellis systems from VSP to HBC in anticipation of machine purchase. Other grape cultivars with a vigorous or pendulous growth habit will also benefit from such training systems.

- Cold hardiness and growing degree days (GDD). As noted earlier, dormant bud break studies were initiated at the conclusion of the 2016 growing season, while analysis of GDD ensuing during the periods from bud break to veraison and from bud break to harvest for different cultivars will continue and will be summarized in subsequent reports.
- NE-1020 and Northern Grapes Project. In spite of the herbicide drift problems, good information has been accumulated regarding tolerance to 2,4-D drift and the overall results of these projects have been shared among the participants from the more than a dozen states involved in these projects. Results from Minnesota, South Dakota, Iowa, New York and Vermont have provided insights into management of Marquette, Brianna and Frontenac, both in the vineyard and the winery.

Progress Achieved According to Outcome Measures: This project funding has enabled the UNVP to provide educational programming and research results that have provided clear benefits to the Nebraska grape and wine industry. When one evaluates the growth of the industry (one winery and perhaps 15 acres of commercial vineyards in 1994, now over 30 wineries and over 125 growers producing grapes on an estimated 400+ acres), it is clear that considerable progress has been made. The collaboration of independent growers and the Nebraska Winery and Grape Growers Association and its leadership with the UNVP has provided a synergy that has contributed to this growth. The increasing respect that Nebraska wines are receiving nationally and internationally strongly suggests that progress in quality is concomitant with the physical growth of the industry.

Financial Report

The budget submitted in the request for funding and included on the contract has been followed, with minimal changes. Support for the Viticulture Technologist's half salary and benefits has enabled delivery of exceptional educational programs and excellent maintenance of the UNVP research and demonstration vineyards. Expenditures for supplies, fuel and vehicle rental were as noted in the contract. Removal of non-performing genotypes has made room for new ones to be evaluated in the UNVP research vineyards, resulting in expenses for further trellis

modifications and repair. Donated materials have enabled greater leverage of the funding from the NGWB board.

The usual 10% overhead charge mandated by the University of Nebraska and per agreement with the Nebraska Department of Agriculture was included in the contract.

Note: Additional funding and support has been provided by the Northern Grapes Project (a multi-state SCRI grant-funded project) and the University of Nebraska's Agricultural Research Division. In-kind contributions of land, equipment, irrigation and supplies have been provided by grower-cooperators, which also helps make for more efficient use of the NGWB funding, for which the UNVP is grateful.

Further specific details can be provided if desired, along with a list of presentations and publications emanating from this Nebraska Grape and Wine Board supported project.