NE-2220 Annual Meeting

Delamar Hotel Traverse City, MI

Hosted by Michigan State University Extension

11/09/2023 - 11/10/2023

In-person and virtual

Coordinators:

Esmaeil Nasrollahiazar: Viticulture Educator, MSU Extension

Paolo Sabbatini: Professor, Department of Horticulture

Micheal Reinke: Viticulture Specialist, MSU Extension

Agenda:

Thursday, November 09, 2023

9:00 Breakfast

Moderator Esmaeil Nasrollahiazar

9:00-9:10 Welcome and Opening Remarks

9:10-9:55 State reports (Colorado, Iowa, Kansas)

10:00-10:45 State reports (Maryland, Maryland 2, Massachusetts)

10:50-11:35 State reports (Michigan, Minnesota, Missouri)

11:40-1:00 Lunch break

1:05-1:55 State reports (Montana, Nebraska, New Jersey)

2:00-3:45 State reports (New York, North Dakota, South Dakota)

3:45-4:00 Coffee Break

4:00-4:35 Michigan Grape Associations and Growers: Remarks and Priorities

4:40-5:00 Discussion and Q&A

6:00 Dinner at Artisan Restaurant

Friday, November 10, 2023

9:00 Board shuttles to site visits Delamar hotel 615 E Front St, Traverse City, MI 49686

10:00 -11:00 Boathouse Vineyards Sustainable grape production with no-machines and no-eradicating pest control 5115 East amore road lake Leelanau 49653

12:00 Lunch Peninsula Grill 14091 Center Rd, Traverse City, MI 49686

1:00 -1:35 Sirena Vineyard Privately funded research projects studying new rootstock performance in Northwest Michigan 14695 Mapleton Ln, Traverse City, MI 49686

1:50 -2:15 Mari Vineyards High-tunnel grape production and cold hardiness sampling site 7768 Center Rd, Traverse City, MI 49686

Attendees:

Terence Bradshaw (VT), Paul Read (NE), Jason Londo (NY), Harlene Hatterman-Valenti (ND), Anne Fennell (SD), Soon-Li Teh (MN), Amy Birk (MI), Derrick Vogel (industry), Patrick Murat (MT), Dennis Philips (industry), Michael Reinke (MI), Matt Clark (MN), Aude Watrelot (IA), Esmaeil Nasrollahiazar (MI), Tony Jacobson (MI industry),Virtual attendees: Scott Kohl (KS), Candice Fitch-Deitz (KS), Nicole Clark (KS), Andrej Svyantek

Not Present:

CO, MD, MA

Minutes taken by Aude Watrelot

State Reports:

IA (Aude):

* General update on 2023 seasons
* Japanese beetle challenge
* Cultivar planting trial
* Trellis system trial
* Enology: cultivar comparison, foliar sprays using ProCa and Phenylalanine; extended maceration project

KS (Candice):

* KS vineyard established in 2020, 3rd year vines
* Verona 2nd year vines, new plantings => no fruit yet
* 5ft HW with Vignoles on VSP; varieties on market and some tablegrapes for public education
* Research vineyard impacted by herbicide drift in 2022
* Frontenac blanc and gris to evaluate viability in KS and industry
* Traminette: production vines, to be replaced by Petite Pearl and Crimson Pearl
* Clarion: 24 cuttings, 10 survived
* Japanese beetle and drought challenges required irrigation and spraying
* No disease issues. Fungal control sprays used.
* Evaluating herbicide drift impact on vine survival

ND (Harlene):

* Vines in nursery rows
* Clarion received with issues
* Frontenac blanc and gris to see if viable in KS and industry

MN (Matt):

* Vines in nursery rows
* Clarion received with issues

MI (Michael Reinke):

* Focus on pest/disease management, autonomous sprayers (drones, intelligent sprayers)
* Working on sub-AVA designation (zone 3)
* Research projects: cold hardiness, canopy management, leaf removal for quality (USDA grant)
* Educational events: Orchard & Vineyard Show, Hort Days, Viticulture Field Day, Dirt to Glass conference

MI (Esmaeil Nasrollahiazar):

* Conducted a survey among industry members to identify educational, extension needs, and research focus.
* Proposed the development of an app to enhance accessibility to scouting reports.
* Introduced "Grapesense," an app aimed at providing reliable information for grape growers.
* Emphasized the app's features, including articles, podcasts, webinars, and a chat for information sharing.
* The app is currently free, with a potential future option for article access through purchase.
* Shared insights into the expression of genes related to anthocyanin biosynthesis, highlighting the use of ethanol at veraison to enhance UFCT gene expression.
* Discussed a project evaluating the efficacy of robotic laser bird control to reduce bird damage, with a focus on Chardonnay experiencing the most damage.
* Introduced the Cold Hardiness Project, featuring DTA plots created using 3D printing for precise temperature control.
* Announced a new project on sap analysis for vine nutrition, which will be offered to growers.
* Engaged in a discussion about sap analysis, exploring differences between leaves and considerations for data interpretation, particularly in relation to old versus young leaves.

MT (Andrej):

* Challenging climate extremes: spring frosts, winter damage, lack of water infrastructure
* 3 research vineyards established 2015-2022, evaluating cultivars
* Future plantings of Frontenac, etc.
* Trials of enzymes, skin contact, yeast strains, hyperoxidation in winemaking
* Developed FTIR wine analysis and fermentation monitoring methods

NE (Paul):

* ~35 wineries, some closures due to labor, retirement, death
* Multi-generational wineries persist
* Fruit drop trial did not improve wine quality in Norton
* High tunnel table grapes successful for 7 years, vinifera damaged by wind
* Itasca fruit drop study, resilience observed after herbicide drift
* Edelweiss, Petite Pearl popular and on high cordon or VSP
* Winter temps -30F to -14F east to west NE

NY (Jason):

* Retirements of key personnel, new hires, vineyard removals
* Planning Objective 1&2 trials for Spring 2024 planting
* Greenhouse study with VT

ND (Harlene):

* New research complex with sensory evaluation
* Macrobin sensory trials on 8 cultivars
* Two whites and two reds of interest
* Thoughts on Objective 2 cultivar selection

SD (Anne):

* 2.5 hrs south of ND, some Canadian fronts 18F recently
* Limited disease pressure
* New white evaluation planting with Itasca, ND cultivars, 3 MN seedless
* Rabbit issues
* Marquette trunk splitting if Fall rains
* Bird control trials of netting, lasers, bags

VT (Terence):

* Stable acreage, wineries. Largest grower expanding.
* Lake Champlain moderates cold to ~30F but vine damage occurs
* Historic flooding challenging
* Former NE1020 plantings used for disease assessment research
* Received Objective 1 cuttings for 2024 planting
* Objective 2 replicated trial planned with Brianna, Crimson Pearl, Foch, etc.
* No spray, conventional spray trials done 2017-2021. Yields compared.
* Natural wine, biofungicide trials and grower survey

MI Industry (Tony Jacobson):

* Focus on research and education
* 5th in wine production, diversity of hybrids and vinifera
* >10,000 acres, mostly small growers, some juice grape acres could convert
* Interest in new varieties for diversity and sustainability
* Cool climate varieties from Canada, Europe
* Consumer pressure for organic/natural but costs are high
* Metrics needed to define sustainability and organic
* Organic vs conventional tradeoffs
* Fair grape pricing a challenge

MI Industry (Amy Birk):

* Largest fruit region, 8600 acres total, juice grape acres declining
* 42" annual rainfall, winter lows around -10F
* Early budbreak moving earlier, harvest from August to October
* Cab Franc, Lemberger top wine grape varieties
* Many large juice grape vineyards remain
* Climate change challenges: early budbreak, drought, rain
* Clean nursery stock, new cultivars, soil health, rootstocks needed
* Increasing GDD documented since 1996

General Discussion:

* Consider involving more enologists in project
* Think about breeder's rights and how to best disseminate new varieties
* Phenology data format needs standardization for multistate data
* Enology data details: yeast, nutrients, etc.
* Objective 2 sites need coordination of planting years and cultivars
* Consumer perceptions of wine labels and organic/conventional tradeoffs

**Appendix: State Reports**

**NE2220:  MULTI-STATE EVALUATION OF WINEGRAPE CULTIVARS
AND CLONES**

**2023 Report**

**State:  Colorado**

**Author(s): Horst Caspari**

**Timing of Activities: 10/1/2022 – 9/30/2023**

1. **Impact Nugget:** Identified several *Vitis vinifera* cultivars with superior fall bud cold hardiness. These cultivars had high bud survival and produced full crops after two record-breaking cold events (Oct 2019, Oct 2020) while most other *Vitis vinifera* cultivars had low (2020) or no yields (2021). The cultivars continued to produce full crops in 2022 and 2023 with no evidence of delayed effects from cold damage (e.g. damage to mature wood or late-season trunk collapse). Cultivars severely damaged by the Oct 2020 events and retrained from the ground in 2021 had excellent recovery, producing full crops in 2022 and 2023.

1. **New Facilities and Equipment: n/a**

1. **Unique Project-Related Findings:**

1. **Accomplishments Related to Each of the 3 Objectives**

1. Screen the viticulture characteristics of clones, cultivars and elite germplasm with significant potential throughout the USA.
2. Evaluate the viticultural and wine attributes of promising emerging cultivars and genotypes based on regional needs.
3. Conduct explorations of new germplasm and lesser-known cultivars that may have economic potential for the US wine industry.

**5.   Impact Statements:** Colorado growers continue to replace cold-tender grape cultivars with more cold-tolerant cultivars, many of which have been tested in the NE1020/NE1720/NE2220 project. For example, the most popular cultivar for new plantings in 2022 was Itasca, first tested in our trial under its breeding number MN1285. Since the beginning of NE1020 the percentage of the vineyard area planted to cold-tolerant cultivars has increased from less than 1% to more than 20 % in 2022. In 2023, cold-hardy, inter-specific cultivars accounted for about 30 % of new plantings, continuing the industry shift to cultivars that are better adapted to Colorado’s growing conditions.

**6.   Published Written Works (Relative to NE2220 Activities): n/a**

**7.    Scientific and Outreach Oral Presentations (Relative to NE2220 Activities)**

Caspari, H.: Viticulture research update. VinCO 2023 conference, Grand Junction, CO, 17 January 2023.

Caspari, H.: Does a warmer climate lead to more cold damage? New Mexico Wine Education Conference – Roots & Research, Santa Fe, NM, 27 Feb 2023.

**8.   Fund Leveraging (Relative to NE2220 Activities): n/a**

**9. Online resources**

Annual results can be found in our Annual Viticulture and Enology Reports - https://aes.colostate.edu/wcrc/stations/orchard-mesa/viticulture/#1550867094981-f823e4e6-c95a

Multi-year summary from the Hot-Cold site - https://webdoc.agsci.colostate.edu/aes/wcrc/techbulletins/Grand%20Valley%202008%20grape%20variety%20trial.pdf

Multi-year summary from the Warm-Cold site - https://webdoc.agsci.colostate.edu/aes/wcrc/techbulletins/Rogers%20Mesa%202008%20grape%20variety%20trial.pdf

**Iowa State University - Ag Experiment Station**

**NRS Project Results Template**

For the reporting period 10/1/2022 through 9/30/2023

**For Capacity Projects (Hatch, Hatch Multistate, Animal Health, and McIntire-Stennis)**

This template is for your convenience to develop the project results narrative off-line. When  you are satisfied with the content, log into NRS, then copy and paste the content into the results drop down menu.

*++ Pro tip - save your progress in NRS after copy/pasting into each field.*

Unlike REEport, multiple project results can be submitted for the current fiscal year, depending upon project objectives and co-PD activities.

NOTE to Hatch Multistate Project directors: Please report on the Iowa project's research that supports the multistate project, not the full multistate project.

Project Directors submit results to NIFA through NRS, **N**IFA’s **R**eporting **S**ystem <https://nrs.nifa.usda.gov>.If you have never accessed the reporting system before, visit [this eAuthentication Help Guide](http://www.iahees.iastate.edu/files/inline-files/eAuthentication%20Account%20with%20Identity%20Verification%20v1.1.pdf) for instruction to: a) create your account, and b) verify your identity (page 5)

BOTH steps must be completed. Send login support requests to aes\_research@iastate.edu.

USDA-NIFA defines **Results** as *the* ***demonstrated achievements*** *of research projects and extension programs.* They represent **significant progress toward the project or programs stated goals and objectives.** Results constitute **changes in knowledge, behavior, or condition** that benefit identified target audiences and the broader public.

**After logging into NRS, select the appropriate Reporting Year from the Fiscal Year drop-down menu.**

*The blue fields below will expand as you type in them.*

**Project Number Project Director Name**

|  |
| --- |
| IOW0 5516 |
| Suzanne Slack |

**Results title** – **a descriptive title of your results, NOT the name of the project**.

|  |  |
| --- | --- |
| Establishment of two new NE2220 vineyards and grape harvest data from previous plantings.  |  |

 Maximum 175 characters/spaces

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|  |

**Nothing Significant to Report** If this box is checked, please skip the next four fields and complete the required “Comments” field (⑤). Note that USDA expects this to be marked infrequently throughout the project lifecycle, most likely in the early years.

\*\* This should ***not*** be checked in back-to-back reporting years.

S**ignificant project results** are entered into the following four fields; instructions are provided above each field.

**If you are submitting results for the final year of the project:**

NRS now includes a notice for your project that it is closing out and shows a task list.

You will see an additional button: **ADD FINAL RESULT. Use this to enter your result(s).**

Final results should be an overview and a summary of the projects accomplishments during its lifecycle.

NIFA has requested that results are written so your neighbor, mother, or family friend could read the result and understand the impact of the project. If additional information is needed, NIFA program leaders or communications specialists will reach out to you directly.

**① Briefly describe** the issue or problem that the project addresses and its importance.

For a **final** report, begin with: ***"This is the final report for this project."***

|  |
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| Winegrape cultivar selection is among the most important components of vineyard and viticulture industry management. Prior to the turn of the 21st century, most U.S. states produced few to no winegrapes, primarily because of limitation in cold hardiness and disease resistance of the *Vitis vinifera*, the European winegrape species that comprises most commercial cultivars grown in the U.S. in traditional production regions. The introduction of new, interspecific hybrid cultivars has allowed for the development of grape industries in regions not previously considered possible. At the same time, continued evaluation of *V. vinifera* and hybrid cultivars and clones is critical to maintaining the winegrape industries in non-traditional regions. The major *V. vinifera* cultivars grown worldwide were selected over decades or even centuries for best suitability in European regions, and were then spread to California’s and other arid western U.S. states. As new winegrape industries emerge, continued growth, and the economic impact that comes with it, is dependent on improving quality and quantity of grapes and wine produced. Continued discovery, development, and evaluation of winegrape cultivars and clones is critical for maintaining growth within this emerging agricultural sector. |

 Maximum 8,000 characters/spaces

**②** In **non-technical terms, please briefly describe how you made significant progress** towards the goals and objectives described in the non-technical summary of the project initiation. (If you need a copy, please reach out to aes\_research@iastate.edu or log into NRS to view the project details).

|  |
| --- |
| 1. Screen the viticulture characteristics of clones, cultivars, and elite germplasm with significant potential throughout the USA.A new vineyard established in 2023 featuring elite germplasm from the North Dakota and Minnesota breeding programs. The vineyard contains 12 new promising elite germplasm lines and 4 standard cultivars for comparison. This vineyard is replicated in South Dakota and New York as well for gauging potential in different climates throughout the USA. 2. Evaluate the viticultural and wine attributes of promising emerging cultivars and genotypes based on regional needs.Foliar sprays were on applied on ‘Marquette’ grapevines, in both 2022 and 2023. Prohexadione Calcium (ProCa) was applied at a rate of 50 mg/L every two weeks from one-week post-bloom to one-week post-veraison, while Phenylalanine (Phe) was applied at a rate of 100 mg/L at veraison and one week post-veraison. Both ProCa and Phe were applied in combination, and a control group was sprayed with water. Berries were collected throughout development and ripening for analysis of basic chemistry and phenolic compound content in skins, seeds, juices, and wines. Findings suggested that ProCa and Phe influenced the phenolic content of ‘Marquette’ berry tissues and wines when applied separately but may have a negative interaction when applied together. Additionally, the application rates may not have been high enough to show a significant impact on tannin concentration in the finished wines.A cultivar comparison was conducted between ‘Crimson Pearl’, ‘Petite Pearl’, ‘Marquette’, and ‘Frontenac’ throughout berry development and ripening. Pinot noir from Michigan was also included. The research aimed to address issues related to the ripening of these cultivars. Basic chemistry and phenolic content were compared in skins, seeds, juices, and wines. Notably, the 2023 Petite Pearl and Crimson Pearl vines experienced significant leaf loss from Japanese beetles. Petite Pearl, which was collected on September 28th with a Brix of 12.2 and a pH of 3.01. A trial of chaptalization was conducted, resulting in a Brix of 27.2. The hybrid cultivars showed lower tannin and IRP in seeds compared to Pinot noir at each time point.Abstract of ASEV-ES 2023: “In 2022, three cold-hardy interspecific grape cultivars Marquette, Crimson Pearl, and Petite Pearl were destemmed, crushed, and fermented, using ICV D254 yeast strain, for 7 days (control) or 21 days (extended maceration EM) before pressing, cold stabilization and bottling. Basic chemistry, color parameters and phenolic compounds concentrations were analyzed by UV-Vis spectrophotometer and HPLC-DAD, respectively, throughout the process. The pH and titratable acidity of all wines were at the same level at bottling at about pH 3.3 and 8 g/L, respectively. At bottling, the hue of all EM wines was higher and the color intensity was lower than control wines. EM Marquette wines showed a higher phenolics concentration than control wines, whereas the concentration of phenolics was the same between control and EM in Crimson Pearl and Petite Pearl wines. Although tannin concentration decreased between pressing and bottling, the two treatments were not statistically different. EM has been shown in *Vitis vinifera* wines to decrease the anthocyanins concentration, and increase the extraction of tannins from seeds. However, the color intensity and tannin concentration in wines at bottling decreased after EM, which could be attributed to the adsorption of tannins to polysaccharides that are also extracted from grape and yeast cells. The effect of extended maceration on wine quality during aging will be further studied.”A new vineyard established in 2023 seeks to advise small scale growers on the best trellising system for two recently released cultivars, ‘Itasca’ and ‘Clarion.’ Vines will be trellised according to a single high wire, Watson, or Vertical shoot positioning (VSP) training system. |

 Maximum 8,000 characters/spaces

**③ Briefly describe how your target audience benefited** **from the project’s activities.**
(e.g., IMPACTS: increased knowledge, changed behavior, and or changed condition; see last page)

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| Webinars – ISU/UMN Research and Winemaking webinar series: Topics 2023: Nutritional Labels on Wines; Optimum ripeness parameters; Must adjustment; Protein Instability; Waste management (November 14th) and Wine filtration (December 12th). Direct impact on 39 growers and winemakers of US Midwest states and other states and countries per session (156 participants total for 4 sessions this year). Recordings of each webinar available on YouTube with a total of 4,607 views for 24 videos.Workshop – Topics: Sulfur dioxide management (full day) with hands on activities and presentations, provided on May 16th to 11 growers and winemakers from Iowa, and Minnesota.Field day – Topics: trellis systems and new cultivars; grape maturity, canopy management pest and disease management, grape processing, and research project presentations and wine tasting. Iowa State University, Horticulture Station, and Food Sciences building, Ames, IA.  1 August 2023; 12 participants of Iowa, Nebraska, and Minnesota as vineyard owner, hobbyist, winemaker, farmer, intern and student.  |

 Maximum 8,000 characters/spaces

**④ Briefly describe how the broader public has benefited** (or will benefit (impacts)) **from the project's activities.**
(e.g., IMPACTS: increased knowledge, changed behavior, and or changed condition; see last page)

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| The overarching goal of this multistate project is to improve cold hardy wine production in the Midwest. By completing the projects listed here at the University level, growers and wine makers will have better insight to improve the quality of their wines. This directly impacts the public long term by providing improved local and regional wines for consumers.  |

 Maximum 8,000 characters/spaces

**⑤ Comments** (optional)

This field is **required** if “Nothing Significant to Report.” has been checked above. Describe and explain any major changes or problems encountered in the research methods, and the course of action to correct these obstacles.

This field is **optional** if you reported results in one of the 4 fields above. Example of items that could be entered are: opportunities for training and professional development that were provided during the project year, how results have been disseminated to communities of interest, and new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Please list DOIs (links are preferrable) for publications and products.
Do not list the entire citation or report products that do not have a linked DOI.

|  |
| --- |
| 1. Cheng Y., Gapinski A.D., Buren L., Nonnecke G., \*Watrelot A.A. (2023) “Impact of Post-Fruit Set Leaf Removal on Marquette Phenolic Compounds During Berry Development and Ripening”. *American Journal of Enology and Viticulture*, 74: 0740027; DOI: 10.5344/ajev.2023.22054
2. Gapinski A.D., Horton A., \*Watrelot A.A (2023) “Effect of Whole Cluster Fermentation on Phenolics in Cold-Hardy Red Wines”. *Food and Bioprocess Technology*, 16, p1595–1608 DOI: 10.1007/s11947-023-03010-7
3. \*Watrelot A.A., Vavra C., Gapinski A.D., Cheng Y. (2023) “What are the challenges to producing high quality red wines from interspecific grapes?” *BIO Web of Conferences* 56, 02016. https://doi.org/10.1051/bioconf/20235602016
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 Maximum 8,000 characters/spaces



# NE1720: MULTI-STATE EVALUATION OF WINEGRAPE CULTIVARS AND CLONES

# 2023 Report

# State: Kansas

**Author(s): Scott Kohl, Candice Fitch-Deitz**

**Timing of Activities: 10/1/2022 – 9/30/2023**

1. **Impact Nugget**

Highland Community College, in Kansas expanded evaluation site to include 5 new varieties from UMN alongside unreleased varietal plantings from NDSU and Cornell. Plans to include commercial scale plantings of Frontenac Blanc, Petite Pearl, and Crimson Pearl in spring 2024. Awaiting TTB rulemaking regarding Kaw Valley AVA (American Viticultural Areas) petition (If accepted, this would be the first AVA in Kansas).

1. **New Facilities and Equipment**

None.

1. **Unique Project-Related Findings**

Trial varietal ND213 was the earliest bud break of all varietals planted in the HCC vineyards and received damage to shoots in E 5-7 stages of growth. These third-year vines were able to recover and produce clusters even though primary shoots were a complete loss.

1. **Accomplishments Related to Each of the 3 Objectives**
2. Screen the viticulture characteristics of clones, cultivars, and elite germplasm with significant potential throughout the USA.
	1. Two trial varieties from North Dakota State University were the earliest bud break varietals. ND213 reached bud break on 04/12/2023, three weeks before bud break in the prior growing season. ND054.27 reached bud break on 04/19/2023, which was two weeks before the previous season. Two consecutive nights of below freezing temperatures occurred on 04/22/23-04/23/23. ND213 vines had growth at E 5-7 stages, which received killing temperatures. These vines recovered, flowered, produced clusters, and filled canopy of the eight-foot spacing. The three trial varieties from Cornell University; R65v83, R67v79, and Vignoles had flowers removed, and each vine filled the trellis wire.
	2. Verona, planted on 5/17/2022, was unable to reach the cordon wire in year two. These vines are susceptible to herbicide drift which appears to stunt the upward growth of the vines compared to other varietals within the trial and research vineyard.
	3. Stuck unrooted cuttings of the following varietals from the University of Minnesota on 05/26/2023 with the following planted vs alive quantities at the end of the growing season: Clarion (24 planted/19 alive), MN 1332 (21/21), MN 1369 (27/24), MN 1311 (22/20), MN 1419 (21/14).
3. Evaluate the viticultural and wine attributes of promising emerging cultivars and genotypes based on regional needs.
	1. Continued evaluation of varietals for impact of herbicide drift on the overall health and productivity of the vines.
4. Conduct explorations of new germplasm and lesser-known cultivars that may have economic potential for the US wine industry.
	1. N/A

**5. Impact Statements**

Highland Community College’s efforts to operate the 456 Wineries business incubator continues to accelerate industry growth. Two new incubator clients have moved into the incubator. Rearranging the Certificate program, combining Viticulture and Enology into a single certificate and changing course delivery methods to “hybrid” format has caused an uptick in student enrollment, nearly doubling the number of students in the “Intro” courses.

**6. Published Written Works (Relative to NE2220 Activities)**

N/A

**7. Scientific and Outreach Oral Presentations (Relative to NE2220 Activities)**

* Clark, N.; Fitch-Deitz, C.; Kohl, S. (2023) Growing practices, cultivar selection, milestones of NE2220 project in Kansas. Kansas Grape Growers & Winemakers Association conference, Lawrence, KS. January 14, 2023.
* Clark, N; Wine Faults Workshop. Wamego, KS. 6/13/2023. 18 Attendees.
* Fitch-Deitz, C; Clark, N; Kohl, S. 4th Annual HCC Viticulture and Enology Field Day. Wamego, KS. 7/18/2023. 25 Attendees.
* Kohl, S. History and Current KS Wine Industry. St. Marys, KS. 9/2/2023. 16 Attendees.
* Kohl, S. Emcee, Kansas Grape Stomp. Kansas State Fair. Hutchinson, KS. 9/9/2023. 210 Attendees.

**8. Fund Leveraging (Relative to NE2220 Activities)**

**9. Online resources**

* <https://highlandcc.edu/pages/grapes_0>
* <http://456wineries.com/literature/>

**NE2220:  MULTI-STATE EVALUATION OF WINEGRAPE CULTIVARS
AND CLONES**

**2023 Report**

**State:  Massachusetts**

**Author(s):  Elsa Petit Senior Lecturer**

**Timing of Activities: 10/1/2022 – 9/30/2023**

1. **Impact Nuggets:**
2. Pesticide reduction: Collaborating with AgZen, Dr. Petit secured an $18,000 grant, implementing real-time imaging trials to reduce grape pesticide use.
3. New plantings: Dr. Petit secured $2,500 in funding from Trustees of the UMass Cold Spring Orchard to expand the NE2220 vineyards with 15 new varieties.
4. Sustainable business Practices: Collaborating with the Isenberg School of Management, we received a $10,000 grant, to study sustainable viticulture practices in seven vineyards across New England states.
5. Educational impact: Dr. Petit involved seven undergraduate students in research projects related to NE2220.
6. Public outreach: Dr. Petit 26 Grape Notes newsletters and doubled subscribers since 2020, reaching about 200 subscribers in New England.
7. Public engagement: Dr. Petit secured a Public Engagement Project Fellowship to improve communication channels, elevating research quality and enhancing public understanding of sustainable viticulture.

1. **New Facilities and Equipment:**

We established a new vineyard testing 15 new varieties in Cold Spring Orchard, Belchertown, MA.

1. **Unique Project-Related Findings:**

We tested two sprayer types and we found out that sprayer types impacted pesticide runoff dramatically (publication in preparation).

1. **Accomplishments Related to Each of the 3 Objectives (2&3 reported together)**

1. Screening evaluations of promising emerging cultivars and advanced breeding lines (pre-commercial) to determine suitability for regional adaptation of viticulture and wine quality attributes.
2. Comprehensive grapevine cultivars and clone evaluation for viticultural, pest susceptibility, fruit and juice quality characteristics, including enological characteristics, and local adaptation for sustainable production.

Planted 15 novel varieties to assess their survival rates, cold hardiness, phenology, disease resistance, and fruit quality.

1. Explore new germplasm resources including disease resistant cultivars being released in Europe, plant introductions including Asian accessions, and less-known cultivars that may have economic potential for the US grape industry.

1. **Impact Statements:**

* **Pesticide reduction::**
* Collaborated with AgZen, using real-time imaging to cut pesticide use, securing an $18,000 grant.
* **More germplasm screening:**
	+ After surveying growers in New England, we doubled vineyard size, and planted 15 new varieties with a $2,500 grant.
* **Microbiome study:**
	+ Presented at the University of Vermont on agricultural management's impact on grape microbiomes.
* **Business sustainability:**
	+ Collaborated with the Isenberg School of Management, studying sustainable viticulture standards. Interviews with seven vineyards.
* **Hokkaido University Delegation:**
	+ Invited to present research at Cold Spring Orchard during the Hokkaido University Delegation Visit in April 2023.

1. **Published Written Works:**

E. Petit, A. Ali, S. Schoelmann, J. Ellis, M. Resnick, and Z. Robinson. Spring 2023. 2021 New England and New York Grape Production Survey.

1. **Scientific and Outreach Oral Presentations (Relative to NE2220 Activities):**

P. Ewick and E. Petit. 2023. The American Grape Terroir: Influence of agricultural management on the microbiome. ASEV Eastern Section, Austin, TX, USA, June 7-9, 2023.

P. Ewick and E. Petit. 2023. The American Grape Terroir: Influence of agricultural management on the microbiome. University of Vermont, Plant and Soil Sciences, September 22, 2023.

**8.   Fund Leveraging:**

AgZen. Sprayer and adjuvant efficiency on downy mildew. Amount awarded: $18,000.

Trustees of the UMass Cold Spring Orchard. Renewal of the cultivar trial. Amount awarded: $2,500.

**9. Online resources:**

NA

NE2220: MULTI-STATE EVALUATION OF WINEGRAPE CULTIVARS AND CLONES

2023 Report

State: Michigan

Author(s): Michael Reinke

Timing of Activities: 10/1/2022 – 9/30/2023

1. **Key Personnel Changes**
	1. Michael Reinke – Viticulture Extension specialist. Started 20 November 2023. Was previously the IPM educator for all specialty crops in the Southwest Michigan area. For MSU Extension. Michael is an entomologist with experience working with the USDA and industry before settling into MSU Extension. His area of expertise is in pest and disease management and autonomous technologies.

1. **Impact Nugget**
	1. As it relates to the NE2220 Objectives, no major impacts in the last year.

1. **New Facilities and Equipment**
	1. New hardware for the winter bud hardiness testing program
	2. 3D printers used for developing extension tools and unique materials for research projects.
	3. Autonomous sprayer equipment.

1. **Unique Project-Related Findings**

1. **Accomplishments Related to NE2220 Objectives**

1. Recently funded research projects related to NE2220 Objectives:
	1. Grapevine cold hardiness: role of ASR (VvMSA) gene in the integration of environmental cues and sugar/ABA signals. Funded Michigan Craft Beverage (2020-2022)
	2. Sustainable canopy management approaches to enhance grape specialized metabolites and fruit quality. Project GREEEN\ (2020-2022)
	3. Early leaf removal strategies enhance specialized color metabolites accumulation and grape quality. Funded NIFA-AFRI Foundational Knowledge of Agricultural Production systems (2021-2024)

**6. Impact Statements**

 As they relate to the NE2220 Objectives, the most impactful efforts have been through education at MSU Extension’s various meetings outlined below.

**7. Published Written Works** (Relative to NE2220 Activities)

None identified

**8. Oral Presentations and Outreach Activities**

 MSU Extension organizes or is a part of 4 major grape educational events each year. During 2023, we hosted the Northwest Michigan Orchard and Vineyard Show in January 2023 and the Southwest Michigan Horticulture Days in February 2023, each with 2 days of educational presentations on viticulture and enology including discussions on site and cultivar selection, pruning strategies, pest and disease management, and mitigation of climate effects. We also hosted the Viticulture Field Day in July 2023 where field presentations discussed emerging technology, new cultivars, and pest and disease management. MSU Extension also partnered with industry representatives on the second year of a new conference called Dirt 2 Glass held in August 2023 that had 2 days of education on climate impacts on viticulture and enology as well as soil nutrition and under-vine management. MSU Extension also partnered with industry organizations on around a dozen events to educate on the above topics to smaller, focused grower groups throughout the year. The MSU Extension grape team also published weekly scouting reports for the entire state of Michigan from May through August of 2023, where crop conditions and horticultural practices were discussed beside pest and disease management recommendations.

**9. Fund Leveraging** (Relative to NE2220 Activities)

* None identified

**10. Relevant Websites**

https://www.canr.msu.edu/grapes/

**NE2220:  MULTI-STATE EVALUATION OF WINEGRAPE CULTIVARS
AND CLONES**

**2024 Report**

**State:  Minnesota**

**Author(s): Matthew Clark and Soon Li Teh**

**Timing of Activities: 10/1/2022 – 9/30/2023**

1. **Impact Nugget**

Deploying new wine grape varieties requires having tested selections in multiple locations (states) so that farmers plant the right vines in the right growing conditions. This multistate project connects grape breeders with viticulture experts who use robust methods to screen plants and make recommendations back to the breeder and to growers through extension and outreach activities.

We submitted grapevine cuttings to 7 states for evaluation. We expect that the vines will be evaluated for a minimum of three years before they produce fruit for the first time. The collaborators will evaluate disease resistance, winter survival and growth habit during the establishment years. Vines were planted at these sites into the vineyards. Distribution included 6 red wine selections, a new variety released in 2022 (‘Clarion’), and three advanced cold hardy, seedless table grape selections. Each site received 4 vines of each selection when available or to meet local needs.

Grape growers benefit from having wine grape cultivars that have been tested extensively within their state or similar growing conditions. We are testing 6 potential new red wine cultivars and plan to release at least one of these over the next five years. Growers benefit from new products with improved fruit quality traits offered by these varieties. The multistate project ensures that sufficient data are collected from multiple sites to reduce risk to farmers who install new vineyards.

This project improves rural economies and communities by focusing on grape production and winemaking. Wineries are becoming centers of economic growth and community centers in rural areas in Minnesota and regionally. This project aims to improve the sustainability of grape and wine production, connects the broader public to where their food comes from, and strengthens the ties between rural and urban areas.

1. **New Facilities and Equipment**

1. **Unique Project-Related Findings**

1. **Accomplishments Related to Each of the 3 Objectives**

I. Conduct initial screening evaluations of promising emerging cultivars and advanced breeding lines (pre-commercial) to determine suitability for regional adaptation of viticulture and wine quality attributes.

We submitted grapevine cuttings to 7 states for evaluation. We expect that the vines will be evaluated for a minimum of three years before they produce fruit for the first time. The collaborators will evaluate disease resistance, winter survival and growth habit during the establishment years. The 2023 growing season would be the first year of establishment for most test sites. Sites (PI, USDA Hardiness Zone) include:

Cornell University (Londo; Zone 6a); Iowa State University (Slack; Zone 5); Highland Community College (Kohl; Zone 6a); University of Missouri (Volenberg; Zone 6a); North Dakota State University (Hatterman-Valenti; Zone 4a); South Dakota State University (Fennell; Zone 4a), Vermont (Bradshaw; Zone 5a).

II. Comprehensive grapevine cultivars and clone evaluation for viticultural, pest susceptibility, fruit and juice quality characteristics, including enological characteristics, and local adaptation for sustainable production.

NA

III. Explore new germplasm resources including disease resistant cultivars being released in Europe, plant introductions including Asian accessions, and less-known cultivars that may have economic potential for the US grape industry.

NA

**5.   Impact Statements**

**6.   Published Written Works (Relative to NE2220 Activities)**

Clark, M. D., Luby, J. J., & Atucha, A. (2023). ‘Clarion’ Grapevine: A White Wine Cultivar for Midwest United States Production. *HortScience*, *58*(2), 231-233.

Treiber, E. L., Moreira, L. S., & Clark, M. D. (2022). Postharvest Potential of Cold-hardy Table Grapes. *HortScience*, *57*(10), 1242-1248.

**7.    Scientific and Outreach Oral Presentations (Relative to NE2220 Activities)**

Clark, M. (2023) *Vitis*Gen3: Completing the grapevine powdery mildew resistance pipeline. National Association of Grape Breeders Annual Meeting. Fayetteville, AR October 3, 2023.

Clark, M. and Teh, S-L. (2023). A Minnesota Update. National Association of Grape Breeders Annual Meeting. Fayetteville, AR October 3, 2023

Clark, M. (2023) Breeding for disease resistance in cold hardy fruit crops. Plant Pathology Departmental Seminar, University of Minnesota, Saint Paul, April 3, 2023.

Clark, M. (2023) Challenges of breeding cold hardy grapes. Prince Edward County Winegrowers Association, Prince Edward County, Ontari, CA. March 14, 2023.

Clark. M. (2022) Use of wild *Vitis* in grape breeding. Northern American Native Grapes Workshop. November 2022.

**8.   Fund Leveraging (Relative to NE2220 Activities)**

**9. Online resources**

**NE2220:  MULTI-STATE EVALUATION OF WINEGRAPE CULTIVARS
AND CLONES**

**2023 Report**

**State:  Montana**

**Author(s): Andrej Svyantek, Zhuoyu Wang, Zachariah Miller**

**Timing of Activities: 10/1/2022 – 9/30/2023**

1. **Impact Nugget**
* Statewide vineyards with re-established vines experienced one of the longest growing seasons on record.
* Research on ‘Harbinger’, a locally identified noir vine, expanded in 2023 to expand characterization of wine chemistry.

1. **New Facilities and Equipment**
* A UV/Vis Microplate Reader (Spectrostar Nano Microplate Reader, BMG LabTech, Cary, NC, USA) was purchased and established at WARC for analysis of fruit and processed product chemistry via enzymatic, colorimetric, and other assays.
* An FTIR Wine Analyzer (Lyza 5000 Wine, Anton Paar GmbH, Graz, AUT) was purchased and established at WARC for analysis of must, fermentation, and wine chemistry.

1. **Unique Project-Related Findings**

1. **Accomplishments Related to Each of the 3 Objectives**

1. Screen the viticulture characteristics of clones, cultivars and elite germplasm with significant potential throughout the USA.
* Characterized fruit of three new accessions under MT conditions for the second consecutive vintage.
	+ ND.054.27 (patent pending as ‘Radiant’)
		- (Harvest Date: Sept. 25, 2023; Brix: 20.6; pH: 2.95; TA: 11.6 g/L)
		- White accession from NDSU-GGEP.
	+ ND.213 (patent pending as ‘Dakota Primus’)
		- (Harvest Date: Sept. 14, 2022; Brix: 24.8; pH: 3.55; TA: 8.2 g/L )
		- White accession from NDSU-GGEP.
	+ AP.Early (patent pending as ‘Harbinger’)
		- (Harvest Date: Sept. 26, 2023; Brix: 23.1; pH 3.15; TA:10.1 g/L)
		- Noir seedling accession found locally by Al Putnam of Corvallis, MT along his fence adjacent to small personal variety trial established in early 2000’s.
		- Patent applied for in 2023 using RC collected data.
* Continued training new accessions/ cultivars in new planting.
	+ New research vineyard for viticultural management and fermentation research composed of ‘Hasansky Sladky’, ‘Itasca’, ‘Marquette’, and ‘Somerset Seedless’ initiated in 2021.
	+ New vines for the research center: ‘Itasca’ (in study); MN1259 and TP B-4-16 (as borders)
	+ Expecting the first crop of ‘Hasansky Sladky’, ‘Itasca’, ‘Marquette’, and ‘Somerset Seedless’ research plots in 2025.
	+ Expecting the first crop of MN1259 and TP B-4-16 in 2024.
1. Evaluate the viticultural and wine attributes of promising emerging cultivars and genotypes based on regional needs.
* Completed laboratory analysis of fermentation studies with emerging red wine cultivars (‘Crimson Pearl’, ‘Frontenac’, ‘Hasansky Sladky’, and ‘Frontenac’) in conjunction with field studies on canopy management.
* Conducted chemical analysis from fermentation work with local white wine cultivars (‘Frontenac gris’, ‘La Crescent’) focused on amber wine potential based on grower interest.
* Continued screening fermentation techniques to optimize new NDSU-GGEP white wine grapes (‘Radiant’ and ‘Dakota Primus’) with potential for Montana.
* On-going chemical analysis for 2023 fermentations of all red wine cultivars at the Research Center
	+ ‘Crimson Pearl’, ‘Frontenac’, ‘Hasansky Sladky’, ‘Frontenac’, ‘Petite Pearl’, ‘Verona’, and new variety, ‘Harbinger’
	+ Purpose: To examine the enological potential of ‘Harbinger’ relative to regionally promising grapevines.
1. Conduct explorations of new germplasm and lesser-known cultivars that may have economic potential for the US wine industry.
* Initiated collection of extremely early ripening European, North American, and Asiatic germplasm for evaluation in Western MT.
	+ Multiple lines undergoing greenhouse based multiplication for future planting.
* Continued generating seed lines with a focus on early ripening parents.

**5.   Impact Statements**

**6.   Published Written Works (Relative to NE2220 Activities)**

* N/A

**7.    Scientific and Outreach Oral Presentations (Relative to NE2220 Activities)**

* Kadium, V.K., Z. Wang, Z. Miller, and A. Svyantek. 2023. Observations of a Novel Noir Grapevine with Short Season Ripening Potential for the Intermountain West. North American Grape Breeders Conference. Fayetteville, AR, USA. Poster
* Pilli, R., V.R. Kadium, A. Svyantek, J. Stenger, C. Auwarter, X. Li, and H. Hatterman-Valenti. Genome-Wide Association Study of Cold Hardiness in Interspecific Wine Grapes (Vitis spp.). American Society for Horticultural Science Annual Conference. Orlando, FL.
* Kadium, V.R., R. Pilli, A. Svyantek, J. Stenger, X. Li, C. Auwarter, and H. Hatterman-Valenti. 2023. Genome Wide Association Study of Grape Phenology in a Cold Hardy Interspecific Hybrid Grapevine Population (Vitis spp.). American Society for Horticultural Science Annual Conference. Orlando, FL.
* Kadium, V.R., R. Pilli, A. Svyantek, J. Stenger, X. Li, C. Auwarter, and H. Hatterman-Valenti. 2023. Genome-wide Association Study of Basic Fruit Chemistry in Cold Climate Winegrapes (*Vitis* spp.). American Society for Enology and Viticulture National Conference. Napa, CA.
* Pilli, R., V.R. Kadium, H. Hatterman-Valenti, A. Svyantek, and X. Li. 2023. Association Study of Cold Hardiness in Interspecific Winegrapes. American Society for Enology and Viticulture National Conference. Napa, CA.
* Kadium, V.R., Z. Wang, Z. Miller, and A. Svyantek. 2023. Evaluating Fruit Zone Leaf Removal Across Seven Interspecific Hybrid Winegrapes in Western Montana. American Society for Enology and Viticulture National Conference. Napa, CA.
* Kadium, V.R., R. Pilli, J. Stenger, C. Auwarter, X. Li, A. Svyantek, and H. Hatterman-Valenti. 2023. Genomic Prediction of Basic Fruit Chemistry in a Cold-Hardy Interspecific Hybrid Grapevine Population. American Society for Enology and Viticulture- Eastern Section Annual Conference. Austin, TX.
* Kadium, V.R., R. Pilli, J. Stenger, C. Auwarter, B. Trela, X. Li, A. Svyantek, and H. Hatterman-Valenti. 2023. Genomic Prediction of Wine Chemistry and Quality in a Cold-Hardy Interspecific Hybrid Grapevine Population. American Society for Enology and Viticulture- Eastern Section Annual Conference. Austin, TX.
* Montana Grape and Wine Association Annual Conference; Helena, MT. Mar. 2023. Wang, Z., A. Svyantek, V. Kadium, and Z.Miller. Novel Winemaking Techniques and their Application in Cold Hardy Grape and Fruit Wine Production.
* Montana Grape and Wine Association Annual Conference; Helena, MT. Mar. 2023. Thaden, B., A. Svyantek, and Z. Wang. Testing Fermentation Methods and Phenolic Extraction for Marquette Wines.

**8.   Fund Leveraging (Relative to NE2220 Activities)**

* N/A

**9. Online resources**

* <https://agresearch.montana.edu/warc/research_current/grapes/index.html>

**NE2220:  MULTI-STATE EVALUATION OF WINEGRAPE CULTIVARS
AND CLONES**

**2023 Report**

**State:  Nebraska**

**Author(s):  Paul E. Read Professor of Viticulture and Benjamin A. Loseke and Stephen J.  Gamet, Viticulture Technicians**

**Timing of Activities: 10/1/2022 – 9/30/2023**

1. **Impact Nuggets:**
2. **We still find that there is no significant impact in wine quality with fruit drop as reported in 2022 with Frontenac, Frontenac Gris, Itasca, and Marquette.**

1. **High Tunnel Vinifera Grapes project is progressing. We are expecting our first harvest in 2024 but have experienced some plant loss from a cold temperature event in March after the plants had started sap flow and slight bud.**

1. **New Facilities and Equipment:**

New High Tunnel constructed in 2021 for V. vinifera project (see 4, #3 below).  Again, we experienced some minor damage from winds to the high tunnel on Memorial weekend of 2023. We also experienced some winter losses unrelated to the wind damage. These repairs and plant replacements have been completed and the tunnel and plants are ready for the winter.

1. **Unique Project-Related Findings:**

Itasca in one of our research blocks took a significant hit from a herbicide drift event that virtually wiped out the crop in 2022 but made a complete recovery in 2023.

1. **Accomplishments Related to Each of the 3 Objectives (2&3 reported together)**

1. Screen the viticulture characteristics of clones, cultivars and elite germplasm with significant potential throughout the USA.
2. Evaluate the viticultural and wine attributes of promising emerging cultivars and genotypes based on regional needs and:
3. Conduct explorations of new germplasm and lesser-known cultivars that may have economic potential for the US wine industry.:

* Six years of evaluating ‘Itasca’ has determined that it is a highly qualified cultivar for Nebraska grape growers, especially for dry and off-dry white wine production.  Petite Pearl, Marquette, La Crescent and Brianna have also proven to be profitable additions to the grape cultivars suited for Nebraska growers and winemakers.
* High tunnel *Vitis vinifera* trials were planted in April 2021, including Cabernet Sauvignon, Petit Verdot, Riesling, Tannat and Zinfandel and a new cultivar ‘Merchette’, developed by Ed Swanson, is included as a quasi-control for this ongoing project.  Because of the loss of a few plants, we are discussing some additional ideas for future plant protection of the plants from cold events including soil mounding, temporary heating source or some other form of insulation around the plants.

1. **Impact Statements:**
* The University of Nebraska Viticulture Program (UNVP) has conducted science-based research enabling Nebraska grape growers and wineries to produce high quality grapes and wines from new and improved germplasm (cultivars and numbered selections).
* Research incorporating ground covers has confirmed that both between-row and under-row ground covers will enhance production, produce balanced vines, reduce erosion and encourage beneficial insects for established grapevine plantings.  However, newly planted grapevines cannot compete with established ground covers, thus requiring clean cultivation under the rows until the vines reach third or fourth year growth..
* Based upon the UNVP research on trellis systems, several vineyard owners have opted to transition from vertical shoot position systems to either bilateral high cordon or Geneva Double Curtain trellis systems.  This has been implemented for many cultivars, but especially Edelweiss, LaCrescent, Marquette and the Frontenac group of cultivars.

1. **Published Written Works (Relative to NE2220 Activities):**

Loseke, Benjamin A., Paul E. Read and Stephen J. Gamet. 2022. Groundcovers for Nebraska Vineyards.  Nebraska Extension NebGuide G2341, 8 pages.

1. **Scientific and Outreach Oral Presentations (Relative to NE2220 Activities):**

Read, Paul E., Benjamin A. Loseke and Stephen J. Gamet. 2022. A Wine Industry Dilemma: does crop size reduction make better wine? ASEV Eastern Section, Minneapolis, July 14, 2022.

Read, Paul E., Stephen J. Gamet and Benjamin A. Loseke. 2022. High tunnel table grapes for Nebraska and the Read, Paul Midwest.  Int. Cool Climate Wine Symposium, St. Catherines, Ontario, Canada, July 18, 2022. (Extended Abstract)

Read, Paul E., Benjamin A. Loseke and Stephen J. Gamet.  2022. Grapevine trunk disease in Nebraska and the Midwest. Int. Cool Climate Wine Symposium, St. Catherines, Ontario, Canada, July 18, 2022.  (Extended Abstract).

Read, P. E., Gamet, S. J. and Loseke, B. A. 2022. High Tunnel Table Grapes: An alternative to field production? International Society for Horticultural Science (abstract). August, 2022.

**8.   Fund Leveraging (Relative to NE2220 Activities):**

\* Nebraska Department of Agriculture Block Grants totaling in excess of $600,000 over the past 6-year period.

\* Nebraska Grape and Wine Board Grants Totaling over $425,000 over the past 6-year period.

**9. Online resources:** University of Nebraska Viticulture Program web site <http://viticultur.unl.edu>

NE2220: MULTI-STATE EVALUATION OF WINEGRAPE CULTIVARS AND CLONES

2023 Report

State: New York

Author(s): Jason P Londo

Timing of Activities: 10/1/2022 – 9/30/2023

1. **Key Personnel Changes** (List any new hires, retirements, departures, etc. that impact your program personnel.) To my knowledge, I am the only person currently at Cornell (and New York?) involved in the NE2220 project.  Dr. Maddy Oravec was hired at Cornell University to fill the retirement of our grape breeder, Dr. Bruce Reisch.  Maddy will start at Cornell officially July 1, 2024.  I am anticipating that she will join the project.  To my knowledge there is no plan to refill Dr. Tim Martinson’s position, but I am not privy to the overall plan for statewide grape extension in New York.

1. **Impact Nugget** (Provide a concise summary of a key accomplishment, finding, or project impact from the past year.)  New York does not have an established experiment in place to report on.  All previous plantings have been removed.  However, I can report that I will be planting an NE2220 experiment this coming spring, 2024.  I will be establishing field vineyards in support of Objective 1 and Objective 2 of the multistate plan.  Currently the design is to plant at least 4 breeder selections from ND, MN, and NY breeding programs as 4 vine single panel trial runs at a new vineyard at Cornell Agritech.  In addition, I am planning a 9 cultivar trial in the design of Objective 2.  Six, 4-vine panels of hybrid varieties will be planted in randomized block design.  I am planting Clarion, Itasca, Frontenac, Frontenac gris, Frontenac blanc, Crimson pearl, Verona, Marquette, and Aravelle (NY81).

1. **New Facilities and Equipment** (Describe any noteworthy results or discoveries from your program's research activities over the past year.)

1. **Unique Project-Related Findings**

1. In addition to the Obj 1 and Obj 2 plantings described above.  I will also be running a green house bases study on the same 9 hybrid varieties as they respond to simulated higher temperature and drought conditions.

1. **Accomplishments Related to NE2220 Objectives**
2. Screening evaluations of promising emerging cultivars and advanced breeding lines (pre-commercial) to determine suitability for regional adaptation of viticulture and wine quality attributes.
	1. Plan to plant 4 selections from the ND, MN, and NY breeding programs in Spring 2024.  Evaluating establishment, vine growth and performance.
3. Comprehensive grapevine cultivars and clone evaluation for viticultural, pest susceptibility, fruit and juice quality characteristics, including enological characteristics, and local adaptation for sustainable production.
	1. Plan to plant 9 cultivars in 6, 4-vine panels in a randomized design.  Monitoring establishment, vine growth and performance, cold hardiness, acclimation, deacclimation, phenology, disease response and fruit quality.
4. Explore new germplasm resources including disease resistant cultivars being released in Europe, plant introductions including Asian accessions, and less-known cultivars that may have economic potential for the US grape industry.

**6. Impact Statements** (Highlight broader impacts and significance of your program's work over the past year. How does this work benefit the region's grape and wine industry?) NA

**7. Published Written Works** (Relative to NE2220 Activities) NA

**8. Oral Presentations and Outreach Activities** (Relative to NE2220 Activities) NA

**9. Fund Leveraging** (Relative to NE2220 Activities)

* Funding Source:
* Project Title:
* Total Amount:

**10. Relevant Websites**

NE2220: MULTI-STATE EVALUATION OF WINEGRAPE CULTIVARS AND CLONES

2023 Report

State: North Dakota

Author(s): Harlene Hatterman-Valenti, Avery Shikanai, Hava Delavar, Bijaya Ghimire, Rajasekharreddy Bhoomireddy, Ozkan Kaya, and Collin Auwarter

Timing of Activities: 10/1/2022 – 9/30/2023

1. **Key Personnel Changes** None

1. **Impact Nugget** Released ND213 as ‘Dakota Primus’ and ND054.27 as ‘Radiant’

1. **New Facilities and Equipment** Will be finishing the new Peltier Complex which will house Food Science and Meat Science as well as the Northern Crop Institute with dedicated space for sensory evaluations.  Purchased a second DTA system and renovated a walk-in vernalization chamber into a large freeze chamber.

1. **Unique Project-Related Findings** Continue to explore methods to evaluate accession adaptability to cold temperatures and fluctuating temperatures.

1. **Accomplishments Related to NE2220 Objectives**
2. Screening evaluations of promising emerging cultivars and advanced breeding lines (pre-commercial) to determine suitability for regional adaptation of viticulture and wine quality attributes.

ND1.94.022 == ND\_white\_2023\_1

Averages 20 brix with 11 g/L TA.  Medium cluster weights of 60/g. This accession has relatively high yield potential, with 1.4 kg/plant on a 1m X 1m spacing.

ND1.97.104 == ND\_white\_2023\_2

11-13 g/L TA at 20-23 brix. Clusters are around 20-25 cm with an average weight of 93 grams.  1.1 kg/plant when on a 1m X 1m spacing.

ND1.97.047 == ND\_red\_2023\_1

Averages around 20 brix with 1.8 g/L TA. Clusters are slightly smaller, averaging 70 grams. This accession has a relatively high yield potential, with 1.4 kg/plant on a 1m X 1m spacing.

ND1.97.108 == ND\_red\_2023\_2

Average of 20 brix with 1.2 g/L TA. Clusters are similar in size to ND\_white\_2023\_2, averaging 90 grams. While yield is slightly lower (0.73 kg/plant), this accession was highly rated in blind tastings.

Fargo’s environmental conditions are not conducive to downy mildew. However, downy mildew severity for all accessions has been low. Additionally, there has been low severity of powdery mildew and black rot for all accessions. All accessions are tolerant to phylloxera and have survived North Dakota’s challenging winters since planting in 2017.

In 2021 and 2022 we evaluated over 500 accessions for winemaking potential. In blind tastings, each accession ranked as well or better than any of the check cultivars: ‘Marquette’, ‘Petite Pearl’, ‘Frontenac’, ‘Adalmina’, or ‘Frontenac Blanc’.

1. Comprehensive grapevine cultivars and clone evaluation for viticultural, pest susceptibility, fruit and juice quality characteristics, including enological characteristics, and local adaptation for sustainable production.

Hoping to hear how ND213 and ND054.27 did at various locations.

1. Explore new germplasm resources including disease resistant cultivars being released in Europe, plant introductions including Asian accessions, and less-known cultivars that may have economic potential for the US grape industry.

Turkey has V. vinifera cultivars on their own root system that are cold-hardy down to between -30 to -45 C!

1. **Impact Statements** (Highlight broader impacts and significance of your program's work over the past year. How does this work benefit the region's grape and wine industry?)

1. **Published Written Works** (Relative to NE2220 Activities)

Svyantek, A., Wang, Z., & Hatterman-Valenti, H. (2023). Impact of Steam Extraction and Maceration Duration on Wines from Frozen ‘Frontenac’ Must. Fermentation, 9(4), 317.

Abd El-Khalek, Ahmed F., El-Kenawy, Mosaad A., Belal, Bassam E., Hassan, Islam F., Hatterman-Valenti, Harlene M. and Alam-Eldein, Shamel M.. "Basal defoliation, salicylic acid and cyanocobalamin to ameliorate the physiological and biochemical characteristics of flood-irrigated ‘Crimson Seedless’ grapevines in a semi-arid Mediterranean climate" Folia Horticulturae, vol.0, no.0, 2023, pp.-. <https://doi.org/10.2478/fhort-2023-0023>.

Svyantek, Andrej, Brooke, Matthew Auwarter, Collin and Hatterman-Valenti, Harlene. (2022). Influence of greenhouse maintenance treatments on growth of seedling grapevines (Vitis spp.). AgroLife Scientific Journal, 11(2). <https://doi.org/10.17930/AGL2022227>.

1. **Oral Presentations and Outreach Activities** (Relative to NE2220 Activities)

Kadium, V., R. Pilli, B. Trela, C. Auwarter, X. Li, A.  Svyantek, and H. Hatterman-Valenti. 2022. Genomic Prediction of Wine Quality in Cold-hardy Grapevines: A Glass Half Full. VitiNord. Burlington VT, USA. December 5-8, 2022.

 Delavar, H. and H. Hatterman-Valenti. Identification of Genomic Regions for Cold Hardiness in Interspecific Wine Grapes. Northern Region American Society Horticultural Science annual conference, Zoom, January 5-6, 2023.

Delavar, H. and H. Hatterman-Valenti. The Genetics of Cold Hardiness in Interspecific Wine Grapes. North Dakota Grape and Wine Association annual meeting, Dickinson, ND, February 3-4, 2023.

Delavar, H. and H. Hatterman-Valenti. The Genomic Regions associated with Cold Hardiness in Interspecific Wine Grapes. Plant Science Graduate Student Symposium, Fargo, ND, March 17-18, 2023.

Delavar, H. and H. Hatterman-Valenti. Identification of Genomic Regions for Cold Hardiness in Interspecific Wine Grapes (Vitis spp.).  114th Annual Meeting North Dakota Academy of Science, Minot, North Dakota, April 14-15, 2023.

Ghimire, B. and H. Hatterman-Valenti. Cold Hardy Wine Grapes Production Under Caterpillar Tunnel in North Dakota. NDSU Student Research Day, April 28, 2023.

Ghimire, B. and H. Hatterman-Valenti. Production of Cold Hardy Wine Grapes Under Caterpillar Tunnel in North Dakota: Assessment of Phenology, Yield and Quality. 47th ASEV-Eastern Section Annual Meeting, Austin, TX June 7-9, 2023.

Kadium, V.R., R. Pilli, J. Stenger, C. Auwarter, X. Li, A. Svyantek, and H. Hatterman-Valenti. Genomic Prediction of Basic Fruit Chemistry in a Cold-Hardy Interspecific Hybrid Grapevine Population. 47th ASEV-Eastern Section Annual Meeting, Austin, TX June 7-9, 2023.

 Kadium, V.R., R. Pilli, J. Stenger, C. Auwarter, X. Li, A. Svyantek, and H. Hatterman-Valenti. Genomic Prediction of Wine Chemistry and Quality in a Cold-Hardy Interspecific Hybrid Grapevine Population. 47th ASEV-Eastern Section Annual Meeting, Austin, TX June 7-9, 2023.

Shikanai, A.K., A.W. Svyantek, C.P. Auwarter, and H.M. Hatterman-Valenti Spray and Pray: Foliar Fertilizers Interact with Genotype to Affect Winter Acclimation but Underperform Non-Treated Controls. 47th ASEV-Eastern Section Annual Meeting, Austin, TX June 7-9, 2023.

Kadium, V.R., R. Pilli, A. Svyantek, J. Stenger, X. Li, C. Auwarter, and H. Hatterman-Valenti. 2023. Genome-wide Association Study of Basic Fruit Chemistry in Cold Climate Winegrapes (Vitis spp.). American Society for Enology and Viticulture National Conference. Napa, CA. June 26-29, 2023.

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Ghimire, B. and H. Hatterman-Valenti. Wine Grapes Production Under Caterpillar Tunnel. North Dakota Water tour. NDSU Horticulture Research Farm, August 9, 2023.

Svyantek, A., B. Köse, H. Delavar, V.R. Kadium, S. Bogenrief, Z. Wang, M. Brooke, C. Auwarter, and H. Hatterman-Valenti. 2023. Examining the Relationship Between Color, Diameter, and Cold Hardiness in One-year-old Suckers of ‘Frontenac’ and ‘Prairie Star’. XIII International Conference on Grapevine Breeding, Genetics and Management. Cappadocia, TUR. August 21-24, 2023.

Svyantek, A., J. Stenger, C. Auwarter, A. Shikanai, B. Köse, Z. Wang, V.R. Kadium, M. Brooke, H. Delavar, Z. Wang, M. Brooke, R. Pilli, S. Bogenrief, and H. Hatterman-Valenti. 2023. This Is How We Chill From '23 'Til: Breeding Cold Hardy Grapevines for Unprecedented and Unpredictable Climate Challenges. XIII International Conference on Grapevine Breeding, Genetics and Management. Cappadocia, TUR. August 21-24, 2023.

Ghimire, B. and H. Hatterman-Valenti. Wine Grapes Production Under Caterpillar Tunnel. NDSU Fruit, Hemp and Vegetable Field Day. September 7, 2023.

**9. Fund Leveraging** (Relative to NE2220 Activities)

Funding Source: ND Dept. of Ag/Specialty Crop Block Grant

Project Title: Integrated Improvement Process of Cold-Hardy Grapes: from Breeding, Production to Sensory Analysis.

Total Amount: $269,846

Funding Source: ND Dept. of Ag/Specialty Crop Block Grant

Project Title: Following the Genetic Map to Stable Color, Anthocyanins, and Phenolics in Cold-hardy Grapevines.

Total Amount: $166,277

Funding Source: ND Dept. of Ag/Grape and Wine Grant

Project Title: Using high-throughput phenotyping to improve the efficiency and speed of grapevine cultivar development.

Total Amount: $52,590

**10. Websites**

NE2220: MULTI-STATE EVALUATION OF WINEGRAPE CULTIVARS AND CLONES

2023 Report

State: South Dakota

Author(s): Anne Fennell

**Timing of Activities: 10/1/2022 – 9/30/2023**

1. **Key Personnel Changes** (List any new hires, retirements, departures, etc. that impact your program personnel.) **NA.**
2. **Impact Nugget** (Provide a concise summary of a key accomplishment, finding, or project impact from the past year.)

Robins are not deterred by laser scarecrow, in contrast to other grape foraging birds.

1. **New Facilities and Equipment** (Describe any noteworthy results or discoveries from your program's research activities over the past year.)  **NA.**

1. **Unique Project-Related Findings** Table grape selections MN1325 and MN1369 are sensitive to high pH.

**Accomplishments Related to NE2220 Objectives**

1. Screening evaluations of promising emerging cultivars and advanced breeding lines (pre-commercial) to determine suitability for regional adaptation of viticulture and wine quality attributes.
2. Cuttings of four red wine grape selections (MN1332, MN1347, MN1394, MN1421) were acquired from University of Minnesota.  Materials were rooted and grown up for planting in 2024 to determine value for moving to comprehensive evaluation.
3. Cuttings of three table grape selections (MN1296, MN1325, 1369) were acquired from University of Minnesota.  Materials were rooted and grown up for planting in 2024 to determine value for moving to comprehensive evaluation.  MN1325 and MN1369 show chlorosis and appear to have high pH sensitivity.

ii. Comprehensive grapevine cultivars and clone evaluation for viticultural, pest susceptibility, fruit and juice quality characteristics, including enological characteristics, and local adaptation for sustainable production.

1. A new evaluation trial was established in SD. MN1280, ND054, ND213, Itasca (sentinel cultivar) are replicated in randomized complete block with 1.8 x 3 m spacing. Vines are trained to high cordon and first fruit production will be in 2024.

1. In adjacent research plantings a split-plot design was used to determine whether a laser scarecrow could be used to decrease bird predation.  A split-plot design with Laser or no laser and netting and no netting was used.  The laser diminished number of bird species within the vineyard; however, robins (*Turdus migratorius*)were undeterred and rapidly stripped unnetted vines.

1. **6. Impact Statements** (Highlight broader impacts and significance of your program's work over the past year. How does this work benefit the region's grape and wine industry?)

The new trials will be used for grower field days.  Selections Netting is still the most important bird deterrent available.

**7. Published Written Works** (Relative to NE2220 Activities) **NA**

**8. Oral Presentations and Outreach Activities** (Relative to NE2220 Activities)

North American Grape Breeders Conference, Fayetteville, Arkansas 10/2023.

**9. Fund Leveraging** (Relative to NE2220 Activities)

* Funding Source: South Dakota Specialty Crop Block Grant
* Project Title: Mitigating freezing damage in emerging wine and seedless table grapes during fall acclimation and spring deacclimation.
* Total Amount: $105,057

**10. Relevant Websites: NA.**