Virginia Wine Board Enological Research Services
Final Report

7/28/2023

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	Original Award	Final Amount Spent	Amount Remining
Jan 2022 - June 2022	$183,779.00	$144,040.49	$39,738.51
July 2022 - June 2023	$298,748.00	$285,376.51	$13,371.49
Total	$482,527.00	$429,417.00	$53,110.00

Objectives and Results:

Objectives (A1) Summary

As the providers of Enological Research Services to the Virginia Wine Board, the Winemakers Research Exchange (WRE) continues to provide leadership, vision, and support in the development of science-based approaches toward quality improvement and increased efficiency in the production of Virginia wine and cider. During the contracted period (January 1, 2022 – June 30, 2023), the WRE has conducted 86 practical experiments, held 17 sensory sessions, presented at 14 conferences, held educational sessions and made numerous site visits to individual wineries and cideries around the state. We have collaborated directly with colleagues from Virginia Tech on two Wine Board funded grants, worked with local consultants and vintners on SCBI grant-funded research, and provided administrative support to the ViRV grape breeding initiative. In the following pages, details are given for completion of the items enumerated in the statement of need for the provision of enological research services.

(A2) The Winemakers Research Exchange (WRE) has recruited, trained and supervised staff with the expertise needed to provide services outlined by the statement of need. At present, WRE personnel includes a Board of Directors, a Cider Technical Committee, full time Research Enologist, full time Exchange Coordinator and part time Cider Specialist. Together, these provide the supervision and expertise needed to provide enological research services to wineries and cideries in Virginia. A list of current personnel can be found in Appendix A.

The WRE Board of Directors sets the vision for experimentation, hires and supervises staff, and facilitates interactions with the industry. This Board meets quarterly and also responds to urgent issues on an ad hoc basis via email. Each is a leader in experimentation and discussion at sensory sessions. Two of the Board members (Emily Hodson and Ben Jordan), as well as the Research Enologist, also serve on the ViRV Grape Breeding Board.

A separate Cider Technical Committee composed of cider industry leaders was established to provide content and community support for the Cider Specialist. This committee meets quarterly. Two of its members (Andy Hannas, David Timmerman) were also among the first to complete cider experiments.

The WRE employs two full time staff people:
Dr. Joy Ting acts as the Primary Project Leader as well as content specialist (Research Enologist) for wine related projects. In addition to her responsibilities as Research Enologist, she was responsible for hiring and training the Exchange Coordinator and Cider Specialist in the first 18 months of the contracted period and acts as supervisor for both.

Jenna Barazi serves as the Exchange Coordinator to coordinate sensory sessions for both wine and cider, as well as assist the content specialists in the many sample collection, administrative and data management tasks that accompany these roles. She is responsible for maintaining the ongoing database of grape wine metrics as well as website posting and upkeep. She also assists with project budgeting and tracking expenditures and receipts for reimbursement. As a former teacher, Ms. Barazi provides valuable insights in the development of educational materials. She has also taken the lead in developing standards for use during sensory sessions and activities for sensory training at these sessions.

Jocelyn Kuzelka was hired as the Cider Specialist to focus on the development of a community of cider experimentation among Virginia Cider producers and facilitate experiments to address their unique questions. The first 18 months of work included casting vision and recruiting participants for the first round of cider projects. She also recruited leaders in the community of Virginia Cider production to serve on a Technical Committee to assist with vision and planning for cider experiments. This role was initially estimated as 10-12 hours per week (25-30% of full time). In the first 18 months of the contracted period, Jocelyn averaged 12.75 hours per week.

(A3) During the contracted period, the Winemakers Research Exchange has continued to actively cultivate a community of wine growers committed to the ongoing improvement of Virginia wines through participation in experimentation and innovation. These efforts were

expanded to include growers and producers of cider in WRE activities. Efforts are made to include representation from a broad range of wineries and cideries.

Several aspects of WRE operations are in place to be as inclusive of people and ideas as possible. Though the WRE has been in operation for 9 years, we continue to welcome new participants each year. Several operational elements are in place to encourage new people to get involved:

- The Research Enologist and Cider Specialist make an effort to identify new faces at sensory sessions and roundtables and personally greet newcomers.
- WRE staff attends industry gatherings as a way of meeting new producers. Examples include Virginia Tech Cooperative Extension activities, VWA and VVA Annual Conferences, and presentations by enological companies.
- WRE sessions are held in different regions of the state as well as virtually to lower barriers to attendance (Table 1).
- When planning experimentation, a broad call for proposals is announced through social media and email. Staff also contact producers individually to encourage experimentation. Personal contacts include past participants, those who have expressed ideas for experiments, and those that have attended sensory sessions regularly without experimenting. Care is taken to maintain a tone of invitation rather than pressure to experiment.

As a result of these and other efforts, 97 unique individuals representing 64 wineries (Table 1) attended sessions in 2022-2023. Of these, 23 individuals attended wine sessions for the first time and 9 individuals conducted wine experiments through the WRE for the first time.

This contracted period included the unique challenge of initiating experimentation with Virginia Cider Producers, a community who had not previously been involved in structured practical experimentation. The Cider Specialist employed several strategies to cast vision and initiate experimentation:

- Several wine producers are also cider producers, so a general announcement/call for participants was issued through the WRE subscriber email list. Several producers asked to be added to the cider contact list as a result. Winemakers who were also known to make cider were contacted individually (ex: Doug Fabbioli, Scott Spellbring) and asked to participate in early roundtables and experiments.
- The Cider Specialist worked with the Virginia Cider Association to contact cideries to announce the inclusion of cider projects in WRE operations through email and at VCA meetings.

- Roundtables were organized to meet with cider producers to discuss their concerns and ideas for experiments as well as to explain how practical experimentation would proceed. Roundtables were held in different locations around the state in an effort to include a wide cross section of producers.
- The Cider Specialist followed up with any attendees of roundtables individually regarding ideas for experimentation.
- The Cider Specialist offered a presentation at the VCA meeting in winter 2022 to share the format and process of experimentation as well as a sensory analysis demonstration.
- Cider projects were presented at VCA meetings in the summer (2022) and winter (2023) both to disseminate results as well as to recruit additional experimenters.

As a result of these and other efforts, 32 unique individuals representing 17 cideries have attended sessions in the 2022-2023 season (Table 1).

(A4) During the contracted period, the WRE supervised 86 relevant, practical experiments at the production scale to evaluate potential solutions for improvement in quality in Virginia grape, cider apple, and wine production and competitiveness in the market. Table 2 lists each experiment along with the winery/cidery and maker. These experiments represent a broad range of topics including a wide range of wine and cider types/styles with interventions from field to bottle. For each experiment, experimental design balanced sound scientific practice with practical considerations to ensure application to a broad range of Virginia wineries and cideries, including large and small production facilities.

Three of the five regions identified for wine producers completed projects (Northern, Central, and Shenandoah). Historically, there has been less experimentation in the Southern and Peninsular regions due to lower overall number of wineries in these regions. One winery in the Peninsular region has committed to experimentation in 2023.

Ideas for experimentation may be winemaker initiated or brought by the content expert to address stated issues in the winery/cidery. For each, an effort is made to research relevant literature, provide adequate background information, and design practical approaches for testing. Experiments always include controls. When possible, replication within the winery is encouraged. If replication is not possible, an effort is made to find partner wineries to run similar experimentation or to repeat the experiment in subsequent years.

For example, in the 2022-2023 season, Enartis invited experimentation on a commercial strain of *Saccharomyces uvarum*, a yeast reported to increase malic acid and decrease volatile acidity as part of its fermentative metabolism. Both King Family Vineyards and Cunningham Creek

Winery were interested in using this yeast as a natural acidification for Viognier (as opposed to tartaric acid addition). At each winery, two barrels of juice were inoculated with *S. uvarum* while two others were inoculated with the winery's standard strain of *S. cerevisiae* yeast used for Viognier. Malic acid concentration was measured by a service lab as part of routine analysis in the juice and finished wine. No notable malic acid accumulation was seen in either experiment, however in all of the barrels fermented with *S. uvarum*, volatile acidity values were lower than in the control. *S. uvarum* is also known to produce a highly aromatic floral compound, which was evaluated during sensory sessions. The sensory characteristics of the wines were significantly in one of two experiments but not the other. In the experiment where the wines were different, the wine fermented with *S. uvarum* was rated as having higher Viognier varietal character. Presentation at the sensory session included background information from a literature review of *Saccharomyces uvarum* as well as the claims of the manufacturer and instructions for use. In addition to personal experiences tasting these wines, winemakers were provided with draft reports including full methodology and all chemical analysis. Reports for each of these experiments will be completed with an introduction to the experiment and reporting of sensory statistics during the fall/winter after the sensory session. At present, reports for all wine experiments completed in the 2021-2022 season have been completed and posted.

For each project, a list of relevant chemical analyses is compiled during the planning phase. WRE staff facilitate collection of samples, shipping to accredited service labs, and dissemination of chemical results to experimenters along with feedback. In addition to informing the experiments themselves, these analyses provide data that wineries may not be measuring on their own. In 2022-2023 alone, 447 separate samples were shipped to service labs for analysis. Table 3 lists common analysis panels. Data from juice chemistry panels, wine chemistry panels, phenolics analysis and microbiological analysis have been added to an ongoing database (initially funded by a VWB Grant in 2020). During the summer of 2023, these metrics will be summarized to provide an updated Summary of Virginia Grape and Wine Metrics.

(A5) In 2022-2023, the WRE has hosted regular gatherings for sensory analysis, group discussion, training, and education. These have occurred at sites around the state as well as virtually to encourage attendance from a wide range of participants.

Efforts were made to work with other organizations (Virginia Tech, Eastern Vineyard and Enology Forum, Virginia Wineries Association) to schedule events in a way that did not overlap or compete for attendance.

In 2022 and 2023, sensory sessions included both virtual and in-person sessions. Virtual sessions alleviate the burden of long travel times from remote vineyard/winery sites and have the benefit of convenience for winemakers who are able to do blind sensory analysis any time after receiving samples (usually Tuesday or Wednesday before a Thursday afternoon session). These are easily recorded, providing an additional educational asset for later viewing. However these sessions also have several drawbacks. Despite the convenience of receiving shipped samples, 20% of recipients do not complete their sensory forms. This number is lower than previous years (33%) due to increased efforts to remind people to fill out forms. Virtual sessions are more expensive to conduct than in-person sessions due to increases in supply and shipping costs. Fewer experiments can be presented at a given session, due to time limitations on preparing samples as well as a desire to limit Zoom calls to 90 minutes or less.

When there are more than 2 projects around a given theme, in-person sessions allow for all of the projects related to that theme to be evaluated in a single session, with appropriate background information provided to ensure participants understand the context and application of the material. In-person sessions have more robust discussion and tend to spur more projects for the next year. After the completion of sensory sessions in 2023, there were 23 project ideas already in process for 2023 harvest, as well as 5 additional winemakers requesting visits to discuss experiments (4 of whom will be new experimenters). Unfortunately, these sessions have a more regional representation of winemakers due to travel constraints, meaning that results for some projects remain less known in other regions of the state.

Though both virtual and in-personal formats include compromises, we believe the combination of approaches to be more inclusive and effective than any single approach alone. We will continue to evaluate each group of experiments to determine if a virtual or in-person session would be the most effective option for presentation and evaluation.

Host sites for sensory sessions were chosen based on location and capacity. Effort was made to host in-person sessions in different areas of the state, however, several host sites that were used in previous years were not available this year. WRE sensory sessions require approximately 450 glasses per session, which limits the number of potential host sites. Historically, host sites have been asked to provide personnel to help set up the session (help label glasses with random numbers, pour wines). In 2022-2023, personnel were not available for most of the host sites due to labor shortages, leading to WRE soliciting volunteers from the RSVP list.

For each sensory session, invitations were issued through our email list. The email list is segmented so that only producers from Virginia receive sensory session invitations. At present,

there are 336 recipients of invitations for wine sessions and 72 recipients for cider sessions. At the beginning of sensory session season, it became clear that changes in email algorithms meant several producers were not receiving invitations sent out through Mail Chimp. For this reason, invitations were sent by Gmail for subsequent sessions.

Whether virtual or in person, sensory sessions always included a welcome, instructions for sensory analysis, explanation of relevant background material, experimental design and chemical results of each experiment. Discussion focused on clarifying experimental protocols and sharing sensory impressions. These discussions always aimed to maintain a tone of curiosity and respect (A6).

(A6) The WRE participates in regular, broad communication of new or ancestral knowledge, techniques, products, and equipment of relevance to Virginia winegrowing through email, an updated website, and social media channels. Summary results are also presented at local, state, and national meetings. This communication includes, but is not limited to, promising experimental results to encourage good ideas to take hold with greater speed and breadth. We also act as a conduit of information for other entities such as the ViRV Grape Breeding initiative, Virginia Tech Food Sciences, Virginia Tech Viticulture, the Virginia Vineyards Association and the Virginia Wineries Association.

In addition to information presented at sensory sessions, as described above, the WRE disseminates all research findings in the form of reports and sometimes videos posted on the WRE website (www.winemakersresearchexchange.com). As of Dec 2022, all reports for wine experiments completed through the 2021-2022 season have been completed and posted. These are arranged by topic but can also be searched directly by keyword. The front page of the website highlights reports relevant to the current season of winemaking. For example, in January/February, sensory sessions and website materials focused on protein stabilization, an operation most wineries focus on during that season. Larger themes are explored in Learn modules, which usually includes a summary of literature that is understandable to the average producer, as well as a list of relevant experiments on that topic. As new experiments are completed, they are added to this list. The format of Learn modules is currently under review to ensure materials are written and presented in as accessible a fashion as possible.

All virtual sensory sessions are recorded and posted on YouTube. Links to the recordings are posted on the website and sent out through social media and email. At present, the WRE YouTube channel has 26 videos, averaging over 100 views each. The most recent post (from Sensory Session 4, recorded on April 27) also has the highest number of views. We hope this is due to recent efforts to disseminate information soon after the session.

Social media channels such as Instagram (828 unique followers), Facebook (649 unique followers) and Twitter (156 followers) are utilized to publicize events open to the public (for example presentations at conferences, VVA meetings) as well as experimental results and new YouTube postings. At present, sensory session invitations are not issued through social media as these are limited to production scale producers in Virginia.

When appropriate, summary articles are disseminated through the WRE website, conference presentations, and The Grape Press, the newsletter of the Virginia Vineyards Association. The Research Enologist and Cider Specialist presented WRE related materials at several state, regional, and national conferences and publications (Table 5).

(A7) The WRE acts as a representative of Virginia wine producers and facilitates dialogue with other stakeholders in the Virginia wine industry and beyond.

In both formal and informal ways, the WRE maintains active communication and, when appropriate, collaboration with academic partners. Joy Ting is the co-PI on two Wine Board funded grants with Beth Chang (In pursuit of dry Petit Manseng and Wine Acidity 201). Dr. Amanda Stewart is a member of the Cider Board. Dr. Ting also attends Sentinel Vineyard calls whenever possible. The WRE and VaTech are also in communication in more informal ways. When considering options for the future of VaTech Extension Enology and the Analytical Services Lab, Dr. Renee Boyer reached out to both Emily Hodson and Joy Ting. When Dennis Cladis joined the faculty of the Food Sciences Department, Ken Hurley connected him to Joy Ting as a potential resource for measurement of grape phenolics. Beth Chang solicited feedback on viticulture candidates from Ben Jordan and Joy Ting. We are proud of the progress we have made building a good working relationship with Virginia Tech and look forward to welcoming Dr. Andrew Harden, the incoming Viticulture Specialist, as well as the new Enology Extension Specialist when that position is filled.

The WRE also maintains relationships with companies offering enological products and equipment. Dr. Ting has had recent meetings with representatives from Laffort, Enartis, Scottlabs, Carolina Wine Supply, Sentia, Cloudspec, Wine & Beer Supply, Della Toffla and AEB. She frequently answers inquiries from journalists regarding climate change, labor shortages, effect of current weather on grape production, and competition results. While at Eastern Wineries Expo, the editor of Wine Business Monthly scheduled an appointment to discuss ideas for integrating practical trials into conferences (like Wine IQ).

Both Dr. Ting and Ms. Kuzelka currently serve on the Virginia Wine Board Research and Education Committee. Ms. Kuzelka is often the lone expert on cider production, and therefore provides much needed insight on cider proposals. Dr. Ting also serves on the Research and Technical committee of the Virginia Wineries Association. She takes an active role in recruiting speakers for technical programming such as the second day of the annual meeting and the Ask the Experts series. She also works with speakers to better understand the perspective of the audience for these events.

(A8) Continuous learning is an important aspect of the culture of the WRE. WRE content experts intentionally pursue new understanding through attendance at webinars and conferences, discussions with academics and product representatives. Each also maintains subscriptions to relevant technical publications. When faced with practical questions in wineries and cideries, these efforts serve as a reservoir from which to draw.

The Research Enologist and Cider Specialist each respond to numerous requests for enological information/advice from current experimenters as well as those not currently involved in WRE experiments. This role is anticipated to increase in upcoming years as Virginia Tech Enology Extension Specialist position will be vacant until a replacement for Dr. Beth Chang is hired. Though WRE staff do not keep a strict log of these contacts, Table 6 lists some examples of the requests received in the first 2 weeks of May 2023. Through these lower-commitment encounters, the Research Enologist and Cider Specialist facilitate the adoption of successful strategies and earn the trust of producers, which may also pave the way to greater involvement in the future. These encounters often provide opportunities to personally invite participation, as well as to disseminate results of previous experiments when they are most needed.

Both research enologist and cider specialist have conducted numerous site visits. On average, experimenters will receive at least three visits in the course of the experiment (planning, post-fermentation, pre-sensory). When possible, neighboring wineries/cideries also receive visits during road trips. Both content specialists have also scheduled site visits even when no experiment was running to assist wineries/cideries with other enological questions. For example, the research enologist has completed several visits to wineries to help train staff on new lab equipment. Efforts are made to combine trips whenever possible to conserve travel resources. For example, a trip to Winchester to attend a VT Enology session also included visits to Stone Tower, Delaplane and Cana Vineyards.

Publications and Activities Associated with Project: See Tables 4&5

Future Work:

In the first 18 months of the contracted period, the WRE invested time and resources in building an infrastructure to better serve Virginia wine and cider makers. These efforts included recruiting and training staff, obtaining appropriate office space for collaborative work and storage of shared supplies, and casting a vision of experimentation to a whole new community (cidermakers). This was also a time marked by emergence from the restrictions of the COVID pandemic, and the beginning of the biological invasion of the Spotted Lanternfly.

As we move into the next 12 months of practical experimentation, several goals/challenges emerge:

1. Dr. Ting and Ms. Kuzelka anticipate an uptick in general enology inquiries resulting from the gap in services left when Dr. Beth Chang leaves her position as Enology Extension Specialist at Virginia Tech. Each will do her best to fill this gap until this empty position is filled.
2. In the past 2-3 years, the WRE has generated many more findings than there has been time/resources to fully disseminate. In 2022-2023, reports from 2020 and 2021 were completed and added to the website library. In 2023, an effort will be made to highlight results that had significant impacts on wine quality and disseminate summary findings through email, social media, and presentations.
3. There are many benefits to meeting in person for sensory sessions, however one drawback is that there is no recording to be referenced at a later date. During the fall/winter, Ms. Barazi will investigate options for recording in-person sessions.
4. Since the COVID pandemic, it has been more difficult to schedule sensory sessions due to less overall availability of winery space as well as limited staff to assist in setup. In 2023/2024, we will investigate the feasibility of a consistent team to assist the Exchange Coordinator with sensory session setup and remove this obstacle to hosting a session.
5. After the first year of cider experimentation, it is time to add cider reports to the WRE website. This site was designed prior to expansion of services to cider, some work will need to be done to integrate cider reports. A virtual structure will be made to accommodate these reports and any completed reports will be loaded onto the site for reference.
6. In the contract, section A8b states: *Physical research assets of the Virginia Wine Board such as its library will be integrated into the existing archives of the WRE (searchable through the WRE website), allowing for greater search capability and access to these materials. When promising results are found in Wine Board Funded projects, results will be highlighted newsletters and social media posts. The Research Enologist and Cider Specialist will familiarize themselves with these materials to better assist producers with inquiries about technical issues.*

   This text was written according to the corresponding article in the statement of need. Discussion with the Wine Board resulted in the decision to delay this integration for a time,

due to anticipated turnover in the VDACS support position. As this position has recently been filled, the WRE is willing to revisit the issue upon request by the Wine Board and VDACS.

Concluding remarks:
The funding received in the past 18 months of operations has allowed the WRE to provide valuable enological research services to wine and cider makers statewide regardless of the scale of the winery or experience level of the maker. Through this programming, we have explored potential improvements to wine and cider quality at stages of production from field to bottle. We have recruited and trained passionate, capable staff to carry out this work, and provided opportunities for industry leaders and newcomers alike to discuss ideas, debate topics, and learn valuable tools to improve wine quality. During this time, we have built an infrastructure of people, processes, and physical space that will equip this work and amplify our efforts moving forward.

Final Budget and Justification
A summary of the final budget for this contracted period can be found in Table 7. Due to the nature of WRE activities, the budget for the first 6 months of operations (Jan 2022 – June 2022) is presented separately from the budget for July 2022-June 2023, the first full year of operations. This allows us to better understand several aspects of the fit between anticipated and actual expenses. A full discussion of spending during the first 6 months of operations can be found in the 6-month report submitted in June 2022.

Overall, the WRE was able to fulfill the services outlined in the contract with the budgeted amount.

- Travel expenses were more than anticipated, partially due to the amount of travel necessary for site visits and conference attendance, as well as the overall increase in the cost of travel from the time the budget was prepared (September 2021). For example, reimbursement rates for mileage have increased from $0.56 per mile in September 2021 to $0.655 in July of 2023.
- Overages in supplies and materials reflect increases in shipping costs over the past 18 months.
- Overages in travel, supplies and materials were offset by less spending in contractual items such as host stipends (which are not paid for virtual sessions) and reimbursements for wine used during sensory sessions. In the past 18 months an effort has been made to better estimate the number of bottles needed for each session, leading to less waste. Contractual spending also includes chemical analyses. There was less spending on analysis for cider

experiments than initially contracted. We anticipate this category to grow as more cider experiments are intiated.

- The small difference in “other” is due to the rent for office space totaling less than initially anticipated. Unfortunately this is not a sustainable source of savings as the rent for office space increased in 2023. It is still within the budgeted amount.

Appendix A: Personnel Structure of the Winemakers Research Exchange

Winemakers Research Exchange Board:
Matthieu Finot, Winemaker at King Family Vineyards
Kirsty Harmon, Winemaker and General Manager of Blenheim Vineyards
Michael Heny, Winemaker at Michael Shaps Wineworks
Ben Jordan, Co-founder and Winemaker at Common Wealth Crush
Emily Pelton, Winemaker at Veritas Vineyards and Winery

Cider Technical Committee:
Andy Hannas, Potters Craft Cider
David Timmerman, Albemarle Cider Works
Diane Flynt, Foggy Ridge Cider
Amanda Stewart, Virginia Tech Food Sciences

WRE Staff:
Research Enologist and Program Director: Dr. Joy H Ting,
Cider Specialist: Jocelyn Kuzelka
Exchange Coordinator: Jenna Barazi

Table 1a: Attendance and sensory participation at WRE Sensory Sessions in 2022-2023.

	Year	Total RSVP	Unique Individuals	Unique Wineries/Cideries
Wine	2022	181	87	52
	2023	182	97	64
Cider	2022	27	20	12
	2023	44	32	17

Table 1b: In 2022 and 2023, attendees at WRE Sensory Sessions includes representatives from 85 different wineries and 21 different cideries, from each of the identified production regions.

Region	Central	Northern	Shenandoah	Peninsular	Southern	Other	Total
Wineries	35	28	5	3	7	7	85
Cideries	5	3	5	2	4	3	22

Table 2: Practical experiments planned in 2022 and 2023

Experiment Title	Experimenter	Winery	Region	Stage of Completion
WINE 2022				
Exploring the effects of timing and amount of tartaric acid additions on chemical, microbial and sensory characteristics of Cabernet Franc (2021)	Kirsty Harmon	Blenheim Vineyards	Central	Sensory, Reported
Exploring the effects of timing and amount of tartaric acid additions on chemical, microbial and sensory characteristics of Petit Verdot (2021)	Kirsty Harmon	Blenheim Vineyards	Central	Sensory, Reported
Exploring the effect of timing and amount of tartaric acid addition on the chemical, microbial, and sensory characteristics of Petit Verdot (2021)	Matthieu Finot	King Family Vineyards	Central	Sensory, Reported
Cork trials: D3, D5, D10 on aromatic whites; start with Black label Chardonnay	Theo Smith	Rappahannock	Northern	Ongoing
Using chitosan (Enartis Stab Micro M) to minimize spoilage during ambient fermentations	Todd Henkle	Vineyard and Winery at Lost Creek	Northern	Sensory, Reported
Comparing chemical and sensory characteristics in Cabernet Franc inoculated with non-Saccharomyces yeast (Biodiva), Saccharomyces yeast (BDX), and non-inoculated fermentation (2021)	Todd Henkle	Vineyard and Winery at Lost Creek	Northern	Sensory, Reported
Exploring chemical and sensory effects of press program in Petit Manseng	Ben Jordan	Early Mountain	Central	Chemistry only
Monitoring anthocyanins in red cultivars as a primary harvest gauge	Emily Pelton	Veritas	Central	Chemistry only

Preventing malolactic fermentation during aging in sparkling wine base (2021)	Matthieu Finot	King Family Vineyards	Central	Sensory, Reported
Monitoring anthocyanins in red cultivars as a primary harvest gauge	Matthieu Finot	King Family Vineyards	Central	Chemistry, Reported
Effect of fermentation temperature in barrel fermented Chardonnay (2021)	Lee Hartman	Bluestone	Shenandoah	Sensory, Reported
Using glutathione to sustain thiol intensity during aging in Seyval (2021)	Theo Smith and Dani Bunce	Rappahannock	Shenandoah	Chemistry, Reported
Using Rapidase Proteostab to improve protein stability in unstable aromatic white wines	AJ	Hark	Central	Chemistry, Reported
Exploring stem inclusion in Chambourcin (2021)	Doug Fabbioli	Fabbioli Cellars	Northern	Sensory, Reported
Does addition of Rapidase Proteostab improve protein stability in unstable aromatic white wines? (2021)	Emily Pelton	Veritas	Central	Chemistry, Reported
Winemaking interventions drive style in Sauvignon Blanc (2021)	Matthieu Finot	King Family Vineyards	Central	Sensory, Reported
Exploring chemical and sensory consequences of barrel fermentation in Petit Manseng (2021)	Skip Causey and Hope	Potomac Point	Northern	Sensory, Reported
Effect of malolcatic fermentation in finding balance in PM	Skip Causey and Hope	Potomac Point	Northern	Sensory, Reported
Petit Manseng ripening kinetics - in-house data with frozen samples for ML (Veritas, King, Honah Lee, AREC, EMV, Walsh)	Many	Many	Many	Chemistry only; report with PM Acids grant
Assessing ripening and yield differences with different vineyard spacing	Reynolds Wilson, Tom Kelly	Tollgate Vineyard/MS WW	Shenandoah	Chemistry, Reported
Exploring the effects of co-fermentation in Mourvedre (with Tannat)	Michael Heny	Michael Shaps Wineworks	Central	Sensory, Reported

Exploring the effects of co-fermentation in Syrah (with Tannat and Viognier)	Michael Heny, Dawn Stein	Doukenie Winery	Northern	Sensory, Reported
Comparison of wine quality from three clones of Cabernet Franc	Nate Walsh	Walsh Family Wine	Northern	Chemistry, Reported
Testing the tests: a survey of accuracy and precision of juice chemistry analysis at Virginia service labs (2021)	Rick Tagg	Delaplane Cellars	Northern	Chemistry, Reported
Comparing chemical and sensory effects of destemmer rate in Cabernet Franc and Petit Verdot (2021)	Kirsty Harmon	Blenheim Vineyards	Central	Sensory, Reported
Comparing red processing techniques: crushed vs. whole berry in Merlot	Corry Craighill	Septenary Winery at Seven Oaks Farm	Central	Sensory, Reported
Effect of high SO2 addition to wine from sour rotted fruit	Maya Hood White	Early Mountain	Central	Chemistry, Reported
Does vineyard stress as identified by remote sensing affect fruit ripening and quality?	Auri Holtslag, Jim Itri	Brown Bear Vineyards	Northern	Chemistry, Reported
Assessing precision, accuracy, ease of use and cost of commonly used free SO2 detection methods: Phase III Aeration Oxidation vs. Sentia Wine Analyzer	AJ Greely	Hark Vineyards	Central	Chemistry, Reported
Calibrating Benchmarks for Virginia Grapes and Wine using Historic Data Sets	Various			Complete, Reported
WINE 2023				
Comparing efficacy and sensory effects of fermentation bentonite in Vidal Blanc	AJ Greely	Hark	Central	Sensory, Reported
Comparing SO2 sources: KMBS, liquid SO2, fizzies	AJ Greely	Hark	Central	Sensory, Reported
Effect of Maceration Time on Red Wine Style in Tannat	Michael Heny	Michael Shaps Wineworks	Central	Sensory, Reported
Effect of Whole Cluster Tannat Addition in Syrah	Shane McManigle	Doukenie	Northern	Sensory, Reported

Comparison of chaptalization with sugar vs. concentrate in Virginia reds	Shai Van Gelder	Blue Valley Vineyard	Northern	Dropped during harvest
How to Achieve Color Stability in Rose	Melanie Natoli	Cana Vineyards	Northern	Chemistry only 2022
Effect of timing and extent of cluster thinning on wine quality in Cabernet Franc	Joyce & Stephen Rigby	Boxwood Winery	Northern	Chemistry only 2022
Do Jacks Really Matter? Blenheim	Kirsty Harmon	Blenheim	Central	Sensory, Reported
Do Jacks Really Matter? Fabbioli Cellars	Doug Fabbioli	Fabbioli Cellars	Northern	Sensory, Reported
Assessing chemical and sensory effects of a continuous topping system compared to a traditional topping regime	Benoit Pineau	Pollak Vineyards	Central	Ongoing
Comparing chemical and sensory characteristics of wine aged in large vs. small format barrels	Maya Hood White & Jeremy Mersch	Early Mountain	Central	Sensory, Reported
Improving acidity in Petit Verdot using malic producing yeast	Rick Tagg	Delaplane Cellars	Northern	Sensory, Reported
Effects of aerative pumpover on mouthfeel and tannin quality in Merlot	Corry Craighill	Septenary	Central	Sensory, Reported
Effects of extended maceration on mouthfeel and tannin quality in Merlot	Corry Craighill	Septenary	Central	Sensory, Reported and ongoing
Exploration of the chemistry of volatile acidity and its sensory effects in various wine matrices	Ben Jordan, Emily Hodson, Todd Henkle	Various	Many	Postponed to 2023
Exploring effects of temperature, fruit processing, and maceration time on structure and weight of Cabernet Franc	Jason Lavalee	Wisdom Oak	Central	Senosory, reported
Improving acidity in Petit Verdot using malic producing yeast	Chelsey Blevins, Joy Ting	Fifty Third Winery	Central	Dropped during harvest
Mapping microbial population dynamics in ambient fermentations	Maya Hood White	Early Mountain	Central	Postponed to 2023

Use of Saccharomyces uvarum to naturally add acid in barrel fermented Chardonnay	Matthieu Finot	King Family	Central	Dropped during harvest
Use of Saccharomyces uvarum to naturally add acid in barrel fermented Viognier	Matthieu Finot	King Family	Central	Sensory, Reported
Continuing studies on preventing malolactic fermentation in sparkling wine base: SO2, Fumaric Acid, and Hedeki Tannin	Matthieu Finot	King Family	Central	Sensory, Reported
Correlation of juice potassium with acid and pH changes during fermentation in Virginia red wines	Kirsty Harmon	Blenheim	Central	Dropped during harvest
Development and validation of potassium testing of fresh juice at a local service lab	Audrey Skinner, Jessica Trapeni	Imbibe Solutions	Central	Chemistry only
Does use of Epsom salts in the vineyard decrease potassium uptake?	Matthieu Finot	King Family	Central	Ongoing
Effect of different type of cork on chemical and sensory properties of Reserve Chardonnay	Theo Smith	Rappahannock Cellars	Shenandoah	Sensory, Reported
Refining decisions on the amount of tartaric acid additions on chemical, microbiological and sensory characteristics of red wine (CF, PV)	Kirsty Harmon	Blenheim	Central	Sensory, Reported
Correlation of vineyard sampling techniques with harvest measures in Virginia vineyards	Françoise Seillier-Moiseiwitsch, Linda Young, Beth Chang	Revalation Vineyards	Central	Postponed to 2023
Improving acidity in Cabernet Franc using malic producing yeast	Rebecca Rainbow and Bruce Deal	Cunningham Creek	Central	Dropped during harvest
Use of Saccharomyces uvarum to naturally add acid in barrel fermented Viognier	Rebecca Rainbow and Matthieu Finot	Cunningham Creek	Central	Sensory, Reported
Assessing chemical and sensory effects of storing barrels on the side with a sealed bung	Matthieu Finot	King Family	Central	Sensory, Reported

Does short duration cold storage decrease moisture content and increase concentration in grapes grown under wet conditions??	Theo Smith, Dani Bunce	Rappahannock Cellars	Shenandoah	Dropped during harvest
Effect of time and temperature of stabulation on aromatic expression and mouthfeel in Chardonnay	Theo Smith, Dani Bunce	Rappahannock Cellars	Shenandoah	Dropped during harvest
Effect of timing of glutathione addition on aromatic retention in Seyval	Theo Smith, Dani Bunce	Rappahannock Cellars	Shenandoah	Dropped during harvest
Comparing chemical and sensory characteristics of Cabernet Franc and Cabernet Sauvignon aged in large vs. small format barrels	Lee Hartman	Bluestone Vineyards	Shenandoah	Sensory, Reported
Effect of post-malolactic racking of red wine on tannin evolution, fruit intensity, and microbial load	Lee Hartman	Bluestone Vineyards	Shenandoah	Sensory, Reported
Comparing SO2 sources: KMBS, liquid SO2, fizzies	Kirsty Harmon	Blenheim	Central	Sensory, Reported
Comparison of chaptalization with sugar vs. concentrate in Virginia Cabernet Sauvignon	Mark Ward and Chris Pearmund	Pearmund Cellars	Northern	Sensory, Reported
ETS monitoring of phenolic development in Petit Verdot and Cabernet Franc	Matthieu Finot, Emily Hodson, Steve Price	Multiple + ETS	Multiple	Postponed to 2023
Screwcap Trials - Viognier and Chardonnay 2013	Kirsty Harmon	Blenheim	Central	Sensory, Reported
Cab Sauv 2019 (French, Missouri, Virginia, Pennsylvania)	Jason Lavalee	Wisdom Oak	Central	Sensory, Reported
Effect of different type of cork on chemical and sensory properties of Rosé	Lee Hartman	Bluestone Vineyards	Shenandoah	Ongoing
Chemical, sensory, and cost considerations when using reverse osmosis to treat Brettanomyces infection in red wines	Vitor Gumarais	Morais Vineyards	Northern	Ongoing
Measuring post-bottling SO2 depletion in different wine types bottled under screwcap closure	Kirsty Harmon	Blenheim	Central	Ongoing
CIDER 2022				

Effect of SO2 dosing after fermentation on chemistry, microbiological evolution, and sensory attributes of Hewe's Crab	Taylor Benson	Blue Bee Cider	central	Dropped during harvest
Controlling microbes during aging using chitosan in Newtown Pippin cider	Andy Hannas	Potter's	Central	Sensory, Reporting in process
Controlling microbes during aging with chitosan in XX Cider	Taylor Benson	Blue Bee Cider	central	Dropped during harvest
Investigation of ullage management during aging on cider aroma and flavor	Chuck Shelton and David Timmerman	Albemarle Ciderworks	Central	Sensory, Reporting in process
Effect of different SO2 dosing levels after fermentation on the chemistry and sensory attributes of Gold Rush cider	Don Whitaker	Castle Hill Cider	Central	Sensory, Reporting in process
Controlling microbes during aging with chitosan in Red-fleshed cider	Chuck Shelton and David Timmerman	Albemarle Ciderworks	Central	Dropped during harvest
Effect of yeast selection on fermentation kinetics, chemistry, and sensory attributes of a cider blend	Jocelyn Kuzelka	Daring Wine Company	Southern	Sensory, Reporting in process
CIDER 2023				
Effect of yeast selection on fermentation kinetics, chemistry, and sensory attributes of a perry cider	Doug Fabbioli	Fabbioli Cellars	Northern	Dropped during harvest
Comparing chitosan products for controlling microbes during aging cider	Andy Hannas,	Potters Craft Cider	Central	Sensory, Reporting in process
Exploring how sorbitol in Hewes Crab affects fermentation kinetics, final chemistry, and sensory attributes	Zach Carlson	Sage bird Cider	Shenandoah	Dropped during harvest

temperature effects on aging cider chemistry and sensory	Don Whitaker	Castle Hill Cider	Central	Dropped during harvest
comparative study of sorbitol in hewes crab juice and finished cider	Glaize, lostboy, Castle Hill, Silver Creek	multiple	Multiple	Sensory, Reporting in process
Evaluating juice and cider changes that occur as Gold Rush are in storage from harvest to 6 months	David Timmerman	Albemarle Ciderworks	Central	Sensory, Reporting in process
Controlling microbes with chitosan prefermentation	David and Tegan	Lost boy Cider	Northern	Dropped during harvest
Evaluating apple juice quality changes in Ashmeades Kernel	Adam Cooke	SilverCreekCider	Shenandoah	Dropped during harvest
Evaluating apple juice quality changes in BlackTwig	Nikki West	Ciders from Mars	Central	Dropped during harvest
The role of yeast dosing rate on off odor production	Andy Hannas,	Potters Craft Cider	Central	Sensory, Reporting in process

Table 3: Common analyses conducted by service labs. Only common panels are listed. Other analyses are also completed depending on the experiment.

Common Panels	Metrics	Lab	Number completed
Juice Panel	Date, Brix, pH, titratable acidity, malic acid, YAN, NTU	Imbibe, Vinterra, ETS	46
General Wine Chemistry Panel	Ethanol, residual sugar, pH, titratable acidity, volatile acidity, malic acid, lactic acid, total SO2, free SO2, molecular SO2	ICV	201
Color Panel	Absorbance at 420 nm, 520 nm, 620 nm, Hue (420/520), Intensity (420 + 520), Intensity (420 + 520 + 620)	ICV	201
Red Wine Phenolic Panel	caffeic acid, caftaric acid, catechin, epicatechin, gallic acid, malvidin glucoside, monomeric anthocyanins, polymeric anthocyanins, quercetin, quercetin glycosides, tannin, total anthocyanins	ETS	16
Rapid Phenolic Panel	Catechin, catechin/tannin ratio, polymeric anthocyanins, polymeric anthocyanins/Tannin ratio, tannins, total anthocyanins	ETS	55
Wine Microbiology: Yeast and bacteria	*Lactobacillus kunkeei, L. brevis/hilgardii/fermentum, Zygosaccharomyces species, Brettanomyces bruxellensis,* Acetic acid bacteria*, pediococcus special, Labtobacillus plantarium/casei/mali, Saccharomyces cereviseia, Oenoccus oeni*	ETS	22
Bentonite Trials		Imbibe	9
Brettanomyces Panel	4-ethylphenol, 4-ethyguaiacol, *Saccharomyces cerevisiae*, fermentation positive yeast, presumptive *Brettanomyces*, other yeast, *Zygosaccharomyces* species, *Brettanomyces bruxellensis*, fungus, film forming yeast	ETS	16

Table 4: WRE Sensory Sessions conducted in the past 18 months.

Date	Location	Theme	Experiments Evaluated	RSVP	Forms Completed
2022					
WINE					
2/10/22	Virtual	White Redox	Permissive vs. Protective Oxygen Management During Sauvignon Blanc Fermentations	37	29
2/24/22	Virtual	Barrel Fermentation of White Wines	Effect of fermentation temperature in barrel fermented Chardonnay	41	32
			Exploring chemical and sensory consequences of barrel fermentation in Petit Manseng		
3/10/22	Virtual	Cofermentation	Exploring the effects of co-fermentation in Mourvèdre	26	21
			Exploring the effects of co-fermentation in Syrah		
3/31/22	Trump Winery	Red Processing	Exploring stem inclusion in Chambourcin	24	19
			Comparing red processing techniques: crushed vs. whole berry in Merlot		
			Comparing chemical and sensory effects of destemmer rate in Cabernet Franc and Petit		
4/20/22	Stone Tower	Managing Microbes	Using chitosan (Stab Micro M) to minimize spoilage during ambient fermentations	26	20
			Comparing chemical and sensory characteristics in Cabernet Franc inoculated with non-Saccharomyces yeast (Biodiva), Saccharomyceres yeast (BDX), and non-inoculated fermentation		
			Preventing malolactic fermentation during aging in sparkling wine base		
5/5/22	King Family	Managing pH	Exploring the effects of timing and amount of tartaric acid additions on chemical, microbial and sensory characteristics of Cabernet Franc	29	18
			Exploring the effects of timing and amount of tartaric acid additions on chemical, microbial and sensory characteristics of Petit Verdot (Blenheim and King Family)		

CIDER					
6/9/22	Potters	Controlling Microbes	Controlling microbes during aging using chitosan in Newtown Pippin cider	11	12
7/12/22	Castle Hill	Exploring how yeast selection and ullage management tools can affect fermentation kinetics, chemical, and sensory attributes in the finished cider.	Investigation of ullage management during aging on cider aroma and flavor	15	16
			Effect of yeast selection on fermentation kinetics, chemistry, and sensory attributes of a cider blend		
2023					
WINE					
1/25/23	Early Mountain	Closures and Bottle Aging	Comparing efficacy and sensory effects of fermentation bentonite in Vidal Blanc	24	19
			Can early bentonite addition improve color retention during protein stabilization in Rosé?		
			Comparison of Chardonnay and Viognier Wines with Screwcaps of Variable OTR Rates (2015, 2022)		
			Effect of cork type on chemical and sensory properties on reserve Chardonnay		
2/23/23	Virtual	*Saccharomyces uvarum*	Comparing chemical and sensory characteristics of Viognier barrel fermented with Saccharomyces cerevisiae (ambient) and *Saccharomyces uvarum* (Enartis QRho)	32	24
			Comparing chemical and sensory characteristics of Petit Verdot fermented with Saccharomyces cerevisiae (D254) and *Saccharomyces uvarum* (Enartis QRho)		
			Comparing chemical and sensory characteristics of Viognier barrel fermented with Saccharomyces cerevisiae (Lamothe Abeit Excellence STR) and *Saccharomyces uvarum* (Enartis QRho)		
3/22/23	Stone Tower	Jacks & Stems	Effect of whole cluster addition in Syrah	23	18
			Do jacks really matter? Blenheim and Fabbioli		
4/27/23	Virtual	SO2 Sources and Alternatives	Continuing studies on preventing malolactic fermentation in sparkling wine base: SO2, Fumaric Acid, and Hedeki Tannin	33	29
			Comparing sulfiting agents: KMBS powder, Inodose tablets (Scottlabs), and liquid SO2		

			Comparing sulfiting agents: KMBS powder vs. Effergran		
5/24/23	Trump Winery	Building a Bigger Red	Effects of aerative pumpover on mouthfeel and tannin quality in Merlot	34	26
			Effects of extended maceration on mouthfeel and tannin quality in Merlot		
			Exploring effects of temperature, fruit processing, and maceration time on structure and weight of Cabernet Franc		
			Effect of maceration time on red wine style in Tannat		
			Comparison of chaptalization with sugar vs. concentrate in Virginia Cabernet Sauvignon		
6/14/23	Veritas	Aging Considerations	Effect of post-malolactic racking of red wine on tannin evolution, fruit intensity, and microbial load	36	29
			Comparing chemical and sensory characteristics of Cabernet Franc and Cabernet Sauvignon aged in large vs. small format barrels (EMV and Bluestone)		
			What is the chemical and sensory impact of aging in oak barrels from different locations?		
			Assessing chemical and sensory effects of storing barrels on the side with a sealed bung		
CIDER					
1/9/23	Lost Boy Cider	SO2 Dosing and Chitosan with Hideki	Effect of different SO2 dosing levels after fermentation on the chemistry and sensory attributes of Gold Rush cider	21	24
			Comparing the effects of chitosan versus chitosan + Hideki tannin on aromatic preservation and prevention of microbial growth in Hewe's Crab cider during aging.		
2/2/23	CiderCon (Chicago)	Effects of Chitosan	Comparing the effects of chitosan versus chitosan + Hideki tannin on aromatic preservation and prevention of microbial growth in Hewe's Crab cider during aging.	n/a	85
7/17/23	Potters	Effects of Picking Time and Yeast Dosage	Evaluating the effects of different pick dates and storage times on 2022 Gold Rush juice and cider quality	22	25
			Comparing the effect *Saccharomyces cerevisiae* dosing rates on fermentation kinetics, aroma compounds, and cider quality		

Table 5: Participation in local, state and regional conferences and other opportunities for dissemination of information

Date	Meeting	Location
	2022	
Jan 27-29	North Carolina Winegrowers Association	Winston Salem, NC
Presentation	*Testing the limits of Chaptalization in Virginia red wines*	
May 12 - 13	VVA Technical Meeting	Charlottesville, VA
Presentation	*WRE Update: Ongoing projects (calibrating benchmarks, Petit Manseng ripening)*	
Presentation	*Grape Breeding Program (Ben Jordan, Emily Hodson, Dana Acimovic, Joy Ting)*	
1-Mar	Virginia Cider Association	Old Hill Cider, Timberville, VA
1-Mar	Wine Business Monthly	Publication
	Winemaker Trial: Partial Carbonic Maceration in merlot	
Mar 22-24	Eastern Wineries Expo	Syracuse, NY
Presentation	*Chaptalization trials: Testing the limits of chaptalization in Virginia red wines*	
June 19 - 24	American Society of Enology and Viticulture Conference	San Diego, CA
July 23-25	Shenandoah Valley Wine Trail Weekend	Shenandoah Valley
Panel Moderator	*Sparkling Wine Panel*	
Nov 11-12	Virginia Wine Experience at the Homestead	Hot Springs, VA
Judge	*Norton Cup*	
Nov 14-15	VWA Annual Conference	Fredericksburg, VA
Panel moderator	*SO2 Panel Discussion*	
Panelist	*Managing sulfurous off odors*	
7-Dec	Lucie's Follies	Madison, VA
Presentation	*Chitosan in the Vineyard: Year 1 of a 2 year Study*	
Winter 2022	The Grape Press	Online publication, VVA mailing list
Article	*Database offers insights into Va. fruit and wine trends*	
	2023	
9-Jan	VCA Meeting	Lost Boy Cider
17-Jan	Virginia Tech Enology Extension Webinar	Online
Presentation	*Chemical Foundation and Complexities of Wine Acidity*	
Feb 2-4	North Carolina Winegrowers Association	Winston Salem, NC
Presentation	*Modern Protein Stabilization*	
Feb 2-3	Cider Con	Chicago, Il
Presentation	Comparing the effects of different chitosan treatment son aromatic preservation and microbial growth in Hewes Crab during aging	
Feb 15-17	VVA Winter Technical Meeting	Charlottesville, VA

Presentation	*Winemakers Research Exchange Updates (Matthieu Finot and Tim Jordan)*	
March 14 - 16	Eastern Wineries Expo	Lancaster, Pennsylvania
Presentation	*Strategies for addressing high pH Cabernet Franc and Petit Verdot*	
19-Apr	Tom Tom Festival	Charlottesville, VA
Panelist	*The Many Faces of Virginia Wine*	
June 27 - 29	American Society of Enology and Viticulture Conference	Napa, California
Poster	*Practical strategies for early tartaric additions to high pH Cabernet Franc and Petit Verdot in Virginia*	

Table 6: Example general enology (non-experiment) related contacts to the WRE during two weeks of May

Date	Contact	Topic	Effort
5/11	Northern Virginia Winemaker	Marketing Tannat-based blend as Virginia's Big Red	Medium (30 minutes)
5/11	Beth Chang and Ben Jordan	Industry feedback on VaTech Viticulture candidates	High
5/11	Central Virginia Winemaker	Prevalence of spoilage organisms in port-style wines	Low (15 minutes)
5/11	USDA/Cornell Researchers	Responding to Norton growers for Grape Breeding	Medium
5/11	Central Virginia Winemaker	Following up on Norton, inquiring about recommendations for examples of quality Norton wines	Low (15 minutes)
5/15	Fred Reno (Jefferson Wine Consulting)	Suggesting higher level of experimentation with Norton	Medium (30 minutes)
5/17	Central Virginia Winemaker	Inquiry about personnel; looking to hire	Medium (30 minutes)
5/18	Central Virginia Winemaker	Inquire for contact information	Very Low
5/19	Lab Technician	Questions about chemistry of Ripper titration and chemical procurement	Medium (30 minutes)
5/23	Northern Virginia Winemaker	Recommendations for in-house lab testing (Sentia vs CDR)	Medium (30 minutes)
5/23	Climate News (Publication)	Asking for information about climate change in Virginia vineyards (referred to Ben Jordan and Dana Achimovic)	Low (15 minutes)
5/25	Product Rep	Talking about areas of interest for experimentation (new area rep)	High (90 minutes)
5/25	Renee Boyer	Discussion of relationship between Tech and Industry, extension position, Tech lab	High (90 minutes)

5/25	Small independent grower	Discussion of grape chemistry expectations for grower contract (database info, grape report)	Medium (30 minutes)
5/26	North Carolina Grower/Winemaker	Advising on North Carolina Winegrowers Research Cooperative	Medium (30 minutes)

Table 7: Budget expenditures for the first eighteen months of operations.

Item Type	January 2022-June 2022		July 2022 – June 2023	
	Original Awarded Amount	Final Amount Spent	Original Awarded Amount	Final Amount Spent
Personnel	$92,900.00	$92,900.00	$191,638.00	$191,638.00
Travel	$13,000	$10,594.16	$17,000	$21,033.78
Supplies & Materials	$11,919	$10,838.35	$7175	$7807.74
Contractual	$52,310	$19,582.59	$55,935	$40,489.06
Other	$13,650	$10,125.39	$27,000	$24,407.93
Total	**$183,779.00**	**$144,040.49**	**$298,748.00**	**$285,376.51**