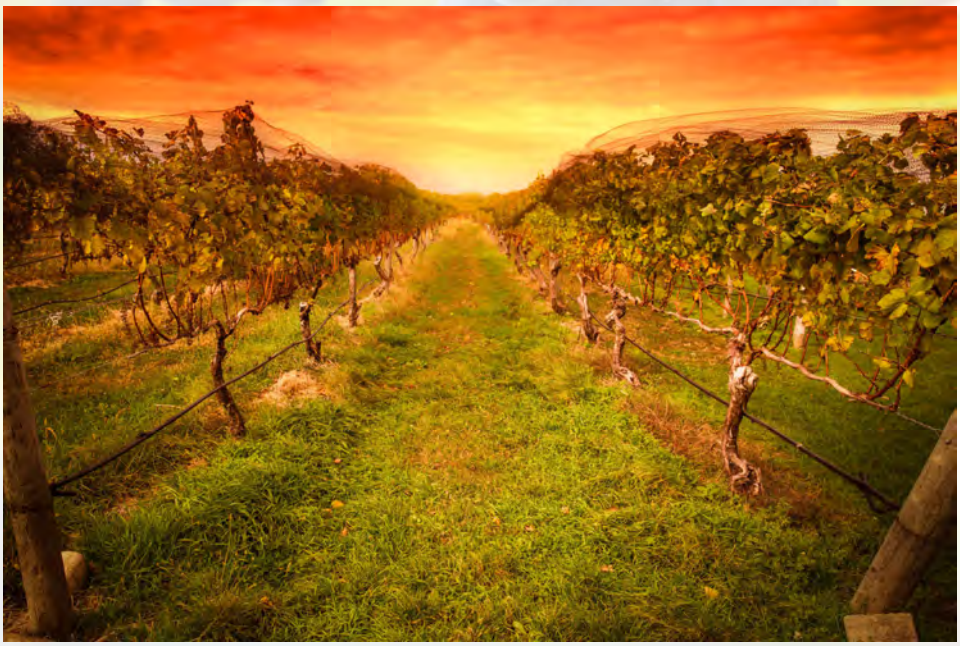
American Society for Enology and Viticulture-Eastern Section

47th ASEV-Eastern Section Annual Meeting
Austin, TX
June 7-9, 2023

Workshop
Droughts to Floods: Growing Grapes in Challenging Environments



Email: info@asev-es.org
Website: http://www.asev-es.org/

Conference Overview

Conference Events: Hyatt Regency Austin

Hyatt Regency Austin (208 Barton Springs Road, Austin, TX 78704)

Wednesday, June 7, 2023

Conference Registration	Foothills Foyer	**7:00-8:00 am**
Tour Texas Vineyards & Wineries	Lobby	**8:15 am-5:30 pm**
ASEV-ES Board Meeting/Dinner	Location Offsite	**6:30-9:00 pm**

Thursday, June 8, 2023

Conference Registration	Foothills Foyer	**7:30 am-5:00 pm**
Welcome and Overview	Foothills II	**8:00-9:00 am**
Student Poster Flash Talks	Foothills II	**9:00-9:30 am**
Break/View Posters	Foothills II	**9:30-10:00 am**
Technical Sessions	Foothills II	**10:00-11:00 am**
Student Presentation Competition	Foothills II	**11:00 am-12:00 pm**
Lunch and ASEV-ES Business Meeting	Foothills II	**12:00-1:30 pm**
Student Presentation Competition	Foothills II	**1:30-3:00 pm**
Break/View Posters	Foothills II	**3:00-3:30 pm**
Technical Sessions	Foothills II	**3:30-5:15 pm**
View Posters	Foothills II	**5:15-5:30 pm**
Oenolympics & Wines of East Reception	Texas Ballroom	**5:30-7:00 pm**

Friday, July 9, 2023

Conference Registration	Foothills Foyer	**7:30 am-2:00 pm**
Welcome and Announcements	Foothills II	**8:00-8:15 am**
Distinguished Service Award	Foothills II	**8:15-8:45 am**
Technical Sessions	Foothills II	**8:45-9:45 am**
Break/View Posters	Foothills II	**9:45-10:00 am**
Poster Flash Talks	Foothills II	**10:00-10:15 am**
Technical Sessions	Foothills II	**10:15-11:15 am**
Lunch	Own Your Own	**11:15 am-1:30 pm**
Droughts to Floods Industry Workshop	Foothills II	**1:30-6:00 pm**
Grand Awards Banquet	Cooper's Old Time Pit Bar-B-Que	**7:00-9:00 pm**

ASEV-ES Conference Sponsors

(Sponsors are recognized throughout the program.)

Wednesday, June 7, 2023

Tour Texas Vineyards & Wineries

Tour Coordinators: Justin Scheiner, Andreea Botezatu, and Michael Cook, Texas A&M AgriLife

Meet in Hyatt Regency Austin Lobby	**8:15 am**
Depart for Heath Sparkling Wines	**8:30 am**
Vineyard Tour 10:00-10:45 am	
Wine Tasting and Purchases 10:45-11:45 am	
Depart for William Chris Vineyards	**11:45 am**
Lunch with Wine Tasting 12:00-1:15 pm	
Vineyard and Winery Tour and Purchase Wines 1:15-2:15 pm	
Depart for Slate Theory Winery and Vineyards	**2:15 pm**
Winery Tour and Tasting 2:30-4:00 pm	
Depart for Hyatt Regency Austin	**4:00 pm**
Arrive at Hyatt Regency Austin	**5:30 pm**

William Chris VINEYARDS

/slāt ə/ THEORY WINERY+VINEYARDS

HEATH SPARKLING WINES

Thursday, June 8, 2023

Welcome 8:00-8:15 am

Moderators: Mark Hoffmann, North Carolina State University and ASEV-ES Chair & Gill Giese, Arkansas State University and ASEV-ES Chair Elect

Overview of Enology and Viticulture in Texas 8:15-9:00 am

Justin Scheiner, Andreea Botezatu, and Michael Cook, Texas A&M AgriLife

Student Poster Flash Talks (3 minutes each) 9:00-9:30 am

Impact of Extended Maceration on Chemical Properties of Red Wines Made From Interspecific Grape Cultivars
David Carter, Carmen Vavra, and Aude A. Watrelot*

Genetic Study of Postharvest Berry Rot Resistance in a *Vitis aestivalis*-derived 'Norton'-based Population
Achyut Duwadi, Li-Ling Chen. and Chin-Feng Hwang*

Genomic Prediction of Basic Fruit Chemistry in a Cold-Hardy Interspecific Hybrid Grapevine Population
Venkateswara Rao Kadium, Ramesh Pilli, John Stenger, Collin Auwarter, Xuehui Li, Andrej Svyantek*, and Harlene Hatterman-Valenti

Verjus: A Natural Method to Improve Wine Acidity
Andrew Lyne*

Vineyard Nitrogen Management and Its Impact on Wine Sensory Characteristics
Megan E. Mershon, Dana Acimovic, Tony K. Wolf, Martha D. Calvert, Elizabeth Chang, Jacob Lahne, and Amanda C. Stewart*

Investigating the Impact of Timing of Basal Leaf Removal and Fruit Thinning on Potassium Accumulation in Red Wine Grapes
Jacob Muras*, Michael Cook, Andreea Botezatu, Julie Howe, and Justin Scheiner

Updated Texas High Plains AVA Vineyard Phenoxy Herbicide Leaf Tissue Survey
Srijana Panta, K. Trey Ruland, Kyle W. Lauterbach, and D. Thayne Montague*

Break/View Posters 9:30-10:00 am

Technical Sessions (20 minutes each) 10:00-11:00 am

Towards Zonal Prediction Maps for Vineyard Nutrition: A Comparison of Practical Options
Rob Chancia*, Terry Bates, and Jan van Aardt

Gewurztraminer and Refosco Performance on Nine Rootstocks in the Four-Corners Region of New Mexico
Gill Giese*, Kevin A. Lombard, Ciro Velasco-Cruz, Michael Leonardelli, Bernd Maier, Maryel Lopez, Daniel Goodrich, and Samuel Allen

Consumer Acceptability of New Fresh-Market Muscadine Grapes from the University of Arkansas System Division of Agriculture Fruit Breeding Program
Jordan Chenier, Margaret Worthington, and **Renee Threlfall***

Student Oral Presentation Competition (15 minutes each) 11:00 am-12:00 pm

Effects of Post Fruit Set Leaf Removal on Polyphenols in Marquette Red Wine
Yiliang Cheng and Aude A. Watrelot*

Beyond Primary Bud Necrosis: A Bud Dissection Methodology to Assess Individual Bud Fruitfulness and Development
Kyle A. Freedman* and Mark Hoffmann

Chemical Properties of Red Wines from Cold-Hardy Hybrid Grape Cultivars
Alexander D. Gapinski and Aude A. Watrelot*

Production of Cold Hardy Wine Grapes under Caterpillar Tunnel in North Dakota: Assessment of Phenology, Yield and Quality
Bijaya Ghimire and Harlene Hatterman-Valenti*

Lunch and ASEV-ES Annual Business Meeting 12:00-1:30 pm

Student Oral Presentation Competition (15 minutes each) 1:30-3:00 pm

Cold Hardiness in Chambourcin-based Hybrids
Tabinda Shahid, Li-Ling Chen, and Chin-Feng Hwang*

How Soil Type Mediates Tillage Effects on Grapevine Performance
Mathew R. Lange and Patricia A. Skinkis*

Reduction of Methyl Anthranilate in Concord Juice by Nanofiltration-Resin (NFR) Processing Yields Wine with Perceptively Less Native Character Aroma
Demetra M. Perry, Ana Gabriela Ortiz-Quezada, and Gavin L. Sacks*

The Influence of Packaging Material on the Properties of Carbonated Muscadine Wine under Accelerated Storage Conditions
Nicholas A. Wendrick, Andrew J. MacIntosh, and Katherine A. Thompson-Witrick*

Developing a Method for Rapid Cordon Establishment and Replacement in Winegrapes
Elda L. Quintana* and Justin J. Scheiner

Developing Diagnostics for Detecting Crown Gall Bacteria
Jacquelyn M. Wray, Sylvia M. Petersen, and Wenping Qiu*

Break/View Posters 3:00-3:30 pm

Technical Sessions (20 minutes each) 3:30-5:15 pm

Varying Harvest Date and Berry Exposure of La Crescent Vines has Grape and Wine Aroma Impact
Erin L. Norton*, William J. Colonna, and Randall J. Vos

The American Grape Terroir: Influence of Agricultural Management on the Microbiome
Patrick Ewick and **Elsa Petit***

On-Farm Experimentation for Precision Viticulture using Digital Ag Software
Jennifer Phillips Russo*

Berry Cuticle Enhancement Products Do Not Impact the Incidence and Severity of Sour Rot in New York Grapes
Hans Walter-Peterson* and Alice Wise

The Use of Clone and Rootstocks to Optimize Vine Performance and Fruit Quality of Cool Climate *V. vinifera* Cultivars within the Niagara Peninsula
James J. Willwerth*, Tae-Rim Chung, Claire Findlater, Alexandra Gunn, and Austin Szarek

View Posters 5:15-5:30 pm
Adjourn 5:30 pm
Oenolympics & Wines of the East Reception 5:30-7:00 pm

USDA NIFA Agriculture and Food Research Initiative (AFRI) Conference Grant Sustainable Agroecosystems: Health, Functions, Processes and Management Program

USDA National Institute of Food and Agriculture
UNITED STATES DEPARTMENT OF AGRICULTURE

Friday, June 9, 2023

Welcome and Announcements — 8:00-8:15 am

Moderators: Mark Hoffmann, North Carolina State University and ASEV-ES Chair & Gill Giese, Arkansas State University and ASEV-ES Chair Elect

ASEV-ES Distinguished Service Award — 8:15-8:45 am

Overcoming Challenges for Grape Growers in Varying Regions

Fritz Westover, Westover Vineyard Advising

Technical Sessions (20 minutes each) — 8:45-9:45 am

Texas High Plains Winter Bud Damage Survey
Kirk Williams*, Trey Ruland, Kyle W. Lauterbach, D. Thayne Montague, and Pierre Helwi

Spatial Data Processing to Inform Variable-Rate Dry Fertilizer Applications in Vineyards
Terry Bates*, Rob Chancia, Nick Gunner, and Markus Keller

Modeling Acidity in Red Wine Grapes
Justin Scheiner*, Rachael Sampson, Michael Cook, and Danny Hillin

Break/View Posters — 9:45-10:00 am

Poster Flash Talks (1 minute each) — 10:00-10:15 am

Effect of Planting Distance on Yield and Fruit Quality of PD Resistant Predominately *Vitis Vinifera* Grapevine '502-20'2
Jarrett Price and **Elina Coneva***

Georgia Viticulture: Industry Perceptions on Future Plantings
Nathan Eason* and Clark MacAllister

Genomic Prediction of Wine Chemistry and Quality in a Cold-Hardy Interspecific Hybrid Grapevine Population
Venkateswara Rao Kadium, Ramesh Pilli, John Stenger, Collin Auwarter, Xuehui Li, Andrej Svyantek*, and Harlene Hatterman-Valenti

Using Cover Crops to Promote Beneficial Insects in New Mexico Vineyards
Miranda L. Kersten*, Maryel Lopez, and Gill Giese

Vine Development and Berry Maturation Enhancement Through Cover Crop Planting in a Southern New Mexico Malbec Vineyard
Maryel Lopez*, William Gill Giese, and Miranda Kersten

Exploring the Feasibility of *Vinifera* Grape Production in High Tunnels
Paul E. Read*, Benjamin A. Loseke, and Stephen J. Gamet

International Viticulture and Enology Society – IVES
Roland Riesen*

Spray and Pray: Foliar Fertilizers Interact with Genotype to Affect Winter Acclimation but Underperform Non-Treated Controls
Avery K. Shikanai, Andrej W. Svyantek, Collin P. Auwarter, and Harlene M. Hatterman-Valenti*

Fractionation and Characterization of Polyphenols and Tannins from Grapevine Leaf Tissue
Stephan Sommer*, Marnelle Salie, Esteban Garcia, Anthony Reyes, Steven C. Ebersole, Rachel P. Naegele, Sonet Van Zyl

Freeze Storage and Maceration Technique Effects on Microscale Winemaking of Cold Climate Frontenac and Honeyberry
Brent C. Trela*

Virus Infections Impact on Berry Juice Quality in the Interspecific Cultivar Norton
Dean S. Volenberg*, Cooper R. Adams, Harper F. LaFond, Zhiwei D. Fang, Christine Spinka, and James E. Schoelz

Profiling of Texas Grapevines using Untargeted Mass Spectrometry-based Metabolomics
Diana Zamora-Olivares*, David Sarabia, Gabriella Montemayor, Soham Datar, Alexia Telios, Nevin Lewis, and Eric V. Anslyn

Technical Sessions (20 minutes each) — 10:15-11:15 am

Sulfur Dioxide Concentrations and Chemical Properties of Red Wines During Aging
Aude A Watrelot*, Carmen Vavra, David Carter, Alexander Gapinski, and Yiliang Cheng

Polysaccharides Influence the Formation and Quantitative Analysis of Polymeric Pigments in Red Wine
Stephan Sommer*, Julia Graves, Jan-Peter Hensen, Fiona Hoening, A. Faeth Anderson, and Fabian Weber

Using Non-Saccharomyces Yeast for pH Reduction during Wine Fermentations of Chambourcin Grapes from a Warm Growing Region
Amanda J. Fleming and Renee T. Threlfall*

Lunch Own Your Own — 11:15 am-1:30 pm

Industry Workshop 1:30-6:00 pm

Droughts to Floods: Growing Grapes in Challenging Environments

Presentations, Interactive Discussions, and Tastings

This workshop addresses the extreme challenges in U.S. grape and wine production and possible solutions for our industry with keynote speakers.

Welcome and Introductions **1:30-1:45 pm**
Moderators: Justin Scheiner, Andreea Botezatu, and Michael Cook, Texas A&M AgriLife

Managing Heat and Drought Stress in Vineyards **1:45-2:30 pm**
Markus Keller, Washington State University

Use of Verjus as Wine Acidifier: Technical and Economic Considerations (tasting) **2:30-3:00 pm**
Andreea Botezatu, Texas A&M University

Wine Grape Cultivars for Warm-growing Regions from University of Arkansas System Division of Agriculture (tasting) **3:00-3:30 pm**
Renee Threlfall, University of Arkansas System Division of Agriculture

Break/View Posters **3:30-3:45 pm**

Evaluating Vineyard Nutrition across Climates through the HiRes Vineyard Nutrition Project **3:45-4:30 pm**
Patty Skinkis, Oregon State University

Winemaking with Challenging Grape Compositions **4:30-5:15 pm**
Aude Watrelot, Iowa State University

Resilient Varieties from Cornell: 'Aravelle' and its Buddies (tasting) **5:15-6:00 pm**
Bruce Reisch and Anna Katharine Mansfield, Cornell University

Adjourn **6:00 pm**

ASEV-ES Grand Awards Banquet **7:00-9:00 pm**
Cooper's Old Time Pit Bar-B-Que
217 Congress Avenue, Austin TX 78701

Workshop Speakers

Dr. Andreea Botezatu is an Assistant Professor and Extension Enology Specialist at the Department of Horticultural Sciences at Texas A&M University. She received her Honors Bachelor degree in Horticulture, majoring in Oenology from the University of Agronomy and Veterinary Sciences "Ion Ionescu de la Brad", Iasi, Romania in 2000 and her Masters degree in Agricultural Management from the same university in 2001. Dr. Botezatu worked as a commercial winemaker in Europe and Canada. She obtained her PhD (Oenology) in 2013 from Brock University in St. Catharines, Canada where she then held a postdoctoral position. Her mission is to serve the Texas winemaking industry through applied research as well as developing educational opportunities for current and prospective winemakers. She is directing her research towards solving wine quality issues associated with hot climate winemaking with a focus on chemical and sensory aspects related to wine quality.

Dr. Markus Keller is the Chateau Ste. Michelle Distinguished Professor of Viticulture at Washington State University's Irrigated Agriculture Research and Extension Center in Prosser. He received his MS in plant science and PhD in natural science from the Swiss Federal Institute of Technology in Zürich, and has conducted viticulture research and taught in North and South America, Europe, and Australia. His research focuses on how environmental factors and management practices influence crop physiology and production of wine and juice grapes. He is the author of "The Science of Grapevines" and currently serves as the science editor for the American Journal of Enology and Viticulture.

Anna Katharine Mansfield is an Associate Professor of Enology, Director of the Cornell Craft Beverage Institute, and Associate Director of Cornell AgriTech in Geneva, NY. She received a BA in English from Salem College and graduate degrees in Food Science at Virginia Tech and the University of Minnesota. Dr. Mansfield served as Enology Project Leader at the University of Minnesota from 2001-2008, where she developed a new enology extension program to serve the rapidly-developing cold-climate wine industry in the Upper Midwest. She has been a member of the Cornell Enology Extension Lab since 2009, where she strives to aid regional wineries through outreach and applied research on hybrid wine phenolics and proteins, fermentation nutrition, and regional typicity. Dr. Mansfield has served as a board member of the ASEV-ES from 1998-2012 and 2020-22, as chair of the ASEV -ES Oenolympics since 2010, and as a board member of ASEV since 2019.

Dr. Bruce Reisch is a Professor, Horticulture Section and Plant Breeding Section in the School of Integrative Plant Science at Cornell University. He specializes in the development of new wine and table grape varieties, as well as modern grape breeding techniques using the tools of genomics, at Cornell AgriTech, the New York State Agricultural Experiment Station in Geneva, NY. Since joining the Cornell faculty, his program has released 15 new wine and table grape varieties. Disease resistance is a high priority, along with low temperature tolerance and fruit quality, leading to viticultural sustainability and resilience. Dr. Reisch chaired the Grape Crop Germplasm Committee for over 10 years, a national committee advising the U.S. Department of Agriculture efforts to preserve wild and cultivated grapevines and is a member of the Scientific Advisory Board of the National Grape Research Alliance. He co-led the "VitisGen" project <www.vitisgen2.org; 2011-2022> to apply next-generation DNA sequencing tools to grape breeding programs across the United States. Dr. Reisch has also enjoyed teaching courses in Grapevine Biology, Viticulture, Genetic Improvement of Crop Plants, and general Plant Genetics.

Dr. Patty Skinkis is a Professor and Viticulture Extension Specialist at Oregon State University. Dr. Skinkis conducts applied research and provides outreach and education programs for the Oregon wine grape industry. Her research program focuses on applied viticulture and whole plant physiology studies designed to understand management of vine vigor/vine balance and impacts on fruit composition and wine quality. Her research also includes work on wine grape yield, fine-tuning canopy management methods, sustainable viticulture production, and understanding factors that drive industry production decision-making. As Extension Specialist, Patty develops educational programs and informational publications for the industry in Oregon and the Pacific Northwest. Her outreach efforts include bringing producers together in technical groups to foster information exchange between industry and academics, and she serves on industry advisory committees. She also teaches undergraduate and graduate level viticulture courses at Oregon State University. She served as a board member and held leadership positions in the American Society for Enology and Viticulture, is a member of the National Clean Plant Network – Grapes Advisory Board and is an associated editor for the American Journal of Enology and Viticulture.

Dr. Renee Threlfall is a Research Scientist at the Food Science Department in the University of Arkansas System Division of Agriculture, Fayetteville with a split position of 47% research, 35% extension and 18% teaching. At the University of Arkansas, she completed her B.S. in Microbiology and M.S. and Ph.D. in Food Science with an emphasis in enology and viticulture. Dr. Threlfall's research and extension is focused on processing and postharvest storage of specialty crops (wine grapes, muscadine grapes, table grapes, blackberries, strawberries, peaches, hops, etc.) and value-added processing of horticultural crops. She teaches an introduction enology and viticulture class, Uncorked: Vines to Wines. Dr. Threlfall is a member of the American Society of Enology and Viticulture (ASEV), ASEV-Eastern Section, American Wine Society, American Society for Horticultural Science, and North American Raspberry and Blackberry Association. She has served as the administrator of ASEV-ES since 2012. Dr. Threlfall is on the Extension and Outreach Committee for the National Grape Research Alliance. She is also the director of the Arkansas Quality Wine Program.

Dr. Aude Watrelot is an Assistant Professor and Extension specialist of Enology in the Department of Food Science and Human Nutrition at Iowa State University (ISU). Dr. Watrelot's research area is fruit, grape and wine tannin and polysaccharide chemistry and their relationship with wine quality. Dr. Watrelot graduated with a PhD degree in Food Science from the French National Institute for Agricultural Research (INRA) and the University of Avignon in France. Following graduation, Dr. Watrelot moved to California both at CSU Fresno and UC Davis to conduct research into polyphenol-macromolecular interactions on red wine chemistry. At ISU, she is currently conducting research on understanding viticultural and winemaking practices that could maximize phenolics extraction and improve wine quality. Dr. Watrelot develops extension programs to answer the growing wine industry in Iowa and in the Midwest. She is currently serving on the Board of Directors for the American Society of Enology and Viticulture – Eastern Section (ASEV-ES) and for the Groupe Polyphenols.

2023 ASEV-ES Distinguished Service Award

Fritz Westover

Owner, Westover Vineyard Advising

Fritz Westover is Viticulturist and owner of Westover Vineyard Advising, based in Houston, Texas. Westover obtained his BS in Horticulture and MS in Plant Pathology from Penn State University, where he worked on projects including grapevine decline, grape disease management, and the science of compost application in vineyards. He specializes in vineyard consulting for over 1,500 acres of vineyard and is active in research and education in the south and southeastern United States, drawing from more than 15 years experience in the vineyard industry including extension and outreach positions in Virginia, Texas, and California. Westover contributes to wine industry educational programs in several states and is founder of Virtual Viticulture Academy, a leading resource for practical grape growing information for all levels of winegrape production.

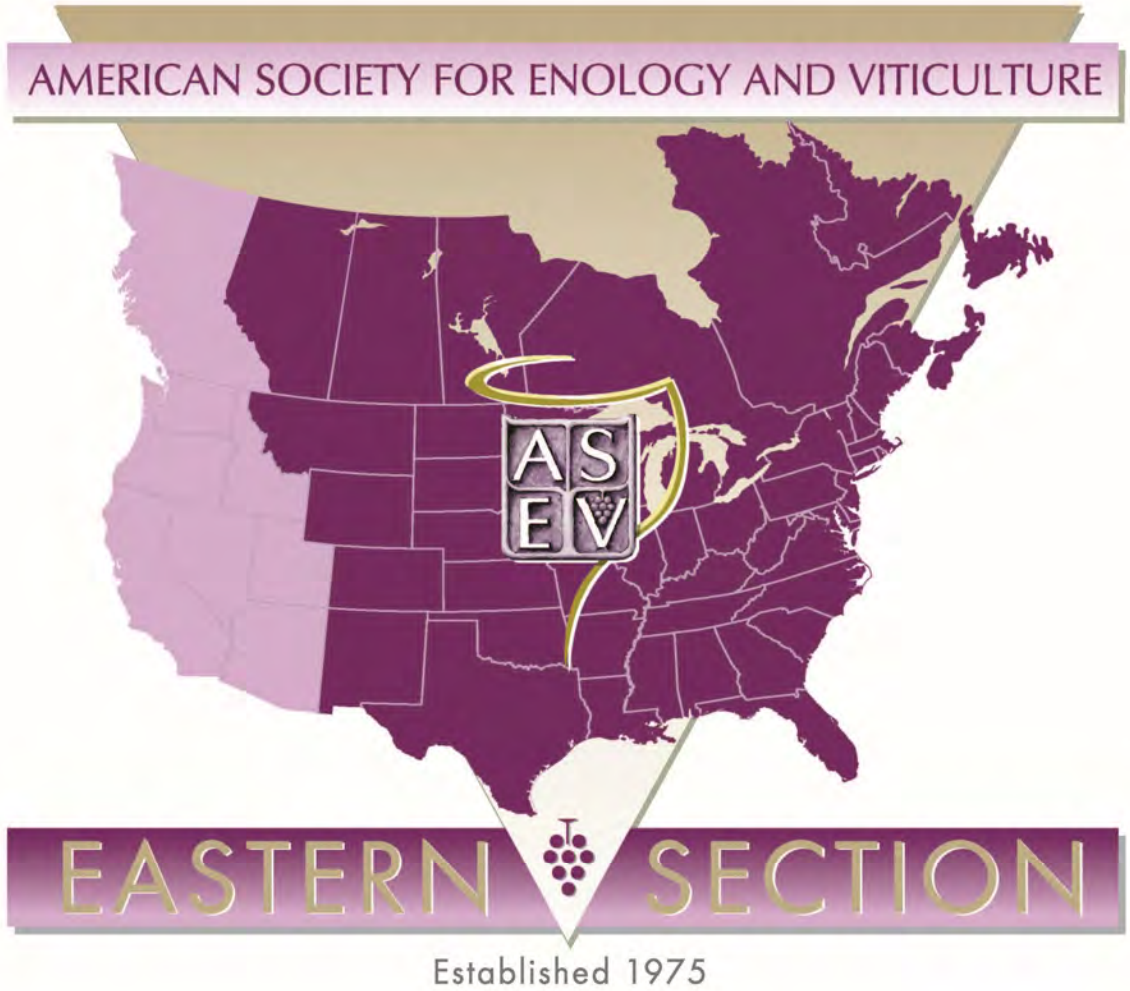
Sponsor of Oenolympics & Wines of the East Reception
Midwest Grape and Wine Industry Institute

About ASEV-Eastern Section

Our mission is to provide forums for the presentation, discussion, and publication of research and technology developments for the advancement of wines and the solution of problems of specific interest to the enology and viticulture of grapes grown in the Eastern United States and Canada.

ASEV-Eastern Section Regions

The ASEV-Eastern Section's geographical area includes all U.S. states and Canadian provinces with territory east of the Continental Divide.



2023 ASEV-ES Scholarship Recipients

Yiliang Cheng, Iowa State University

Michael Cook, Texas A&M University

Briann Dorin, York University

Kyle Freedman, North Carolina State University

Meredith Persico, Penn State

Nicholas Wendrick, University of Florida

2023 Scholarship Fundraiser Raised over $8,000

The ASEV-ES works every year to raise scholarship funds for students working toward careers in viticulture and enology. ASEV-ES typically awards graduate students a $1,000 scholarship (in addition to conference registration and lodging). Thanks to Eastern Winery Exposition and scholarship donor for your contributions.

Donate to the ASEV-ES Scholarship Fund at http://asev-es.org/PaypalASEVES.php

Auction Donors

*** Live Auction**

AEB Biochemical, USA
AstraPouch
Chris's Stuff*
Double A Vineyards
ETS Laboratories*
Enartis USA
Fermentis
It's A Dusey
Grape Motif Collection
It's A Dusey
Lakewood Cork

Auction Donors

Oesco, Inc.
O-I Packaging
Onset
Prospero Equipment Corporation*
Shellt Grow Tubes*
Sunridge Nurseries*
Red Vanilla
Scott Laboratories
Vance Metal Fabricators
VESTA Resource Center
Waterloo Container Company*
Wine Packaging by Naylor

Cash Donors

Fritz Westover (Silver Donor)
Maria Smith (Bronze Donor)

Student Presentation Competition Abstracts

Abstracts ordered alphabetically by last name of presenting author in bold

Effects of Post Fruit Set Leaf Removal on Polyphenols in Marquette Red Wine

Yiliang Cheng and Aude A. Watrelot*
*Corresponding author: Iowa State University, Department of Food Science and Human Nutrition, 536 Farm House Lane, Ames, IA 50011, USA, watrelot@iastate.edu

Post fruit set leaf removal was applied to cold-hardy hybrid grapevines, cv. Marquette (*Vitis* spp.), to produce well-balanced red wines with lower acidity and higher tannin concentration. We previously reported that leaf removal treatment did not impact the tannin concentration in Marquette grape juices. However, the extractability of tannin from grapes is impacted by alcohol concentration and macromolecular interactions during winemaking. This study aims to evaluate how leaf removal treatment affects polyphenols extraction in Marquette wines throughout the winemaking process. Marquette grapes were harvested from separate panels of early leaf removal (ELR) and control (NLR) grapevines to make wines in triplicate in 2021. Tannin, monomeric phenolics, total iron-reactive phenolics (IRP) concentrations, and color parameters were quantified in musts and wines at bottling and after nine months of aging, by HPLC-DAD/FLD and UV-Vis spectrophotometry, respectively. ELR musts and wines contained higher concentrations of IRP, monomeric phenolics, and higher color intensity than NLR wines due to the higher concentrations of monomeric anthocyanins. At bottling, the tannin concentration was higher in ELR wines than in NLR wines, which could be attributed to either a change of cell wall material structure in ELR conditions or to a competition of anthocyanins to bind to cell walls during maceration. However, after 9-months of aging, the tannin concentration was not statistically different between ELR and NLR wines. The impact of leaf removal on cell wall polysaccharides and tannin composition will be further studied.

Beyond Primary Bud Necrosis: A Bud Dissection Methodology to Assess Individual Bud Fruitfulness and Development

Kyle A. Freedman* and Mark Hoffmann
*Corresponding author: NC State University, Department of Horticultural Science, 2721 Founders Drive, Raleigh, NC 27607, USA, kafreedm@ncsu.edu

Bud dissections in grapevines have traditionally been used as a quick way to assess primary bud necrosis (PBN) in vineyards as a result of cold or frost damage. Methods include using a razor blade to make a cross section cut through the compound bud which can indicate PBN through brown coloration of the primary bud tissue. While this method works to assess PBN, it is less effective in evaluating other traits such as bud fruitfulness and anatomy. Few resources exist that provide a step-by-step guide to conduct bud dissections that give more information on compound bud development. Therefore, we developed a comprehensive methodology to conduct bud dissections by isolating primary, secondary, and tertiary buds separately. Assessing individual bud fruitfulness is an important component of data analysis in our Precise Indoor Vine Conditioning project. This can better enable researchers to assess multiple compound bud characteristics including yield parameters such as bud fruitfulness, bud size, number and size of inflorescence primordia, bud developmental stage, and effects of management practices. This methodology has been tested on two cultivars, 'Concord' and 'Traminette' across two growing seasons. Canes are collected during dormancy and compound buds are severed from the node and each individual bud is isolated and dissected to ensure the integrity of bud tissue. This allows inflorescence primordia for primary, secondary and tertiary buds to be studied increasing the accuracy of compound bud fruitfulness assessment. In this presentation we will give a detailed introduction to the methodology and discuss potential applications in viticulture research.

Chemical Properties of Red Wines from Cold-Hardy Hybrid Grape Cultivars

Alexander D. Gapinski and Aude A. Watrelot*
*Corresponding author: Iowa State University, Department of Food Science and Human Nutrition, 536 Farm House Lane, Ames, IA 50011, USA, watrelot@iastate.edu

Despite plentiful investigation on wine made from V. vinifera L., limited chemical data are reported on wines made from cold-hardy hybrid cultivars commonly grown in the U.S. Midwest. Specifically, cultivars such as Crimson Pearl and Petite Pearl have not been deeply studied, making it challenging for growers and winemakers to develop best winemaking practices for high quality red wines. In this study, basic chemical parameters, tannin, and iron-reactive phenolics (IRP) concentrations were quantified using RP-HPLC-DAD and UV-Vis spectrophotometry, respectively, in musts and wines of Crimson Pearl, Marquette, and Petite Pearl cultivars, made following the same process and the same yeast strain ICV D254, at three time points (crushing, pressing, and bottling) in 2021 and 2022. Marquette musts had higher titratable acidity than Crimson Pearl and Petite Pearl musts in both years probably because Marquette grapes were harvested 1-2 weeks earlier. Even with the shorter ripening period, Marquette wines had the highest ethanol concentration at bottling in both years. The vintage with higher alcohol concentration had higher IRP concentration for each cultivar. Despite the observed trend in ethanol and IRP concentrations, there were no statistical differences in tannin concentration between cultivars at bottling in either year. This lack of difference was surprising because tannins are better extracted under higher ethanol concentration conditions and may indicate challenges in extractability or retention due to the affinity of tannin for other macromolecules. Investigation into tannin and phenolic content in skins and seeds of these cultivars is ongoing to further investigate these trends.

Student Presentation Competition Abstracts

Production of Cold Hardy Wine Grapes Under Caterpillar Tunnel in North Dakota: Assessment of Phenology, Yield and Quality
Bijaya Ghimire and Harlene Hatterman-Valenti*
*Corresponding author: North Dakota State University, Department of Plant Sciences, 1360 Abrecht Boulevard, Fargo, ND 58102, USA, h.hatterman.valenti@ndsu.edu
Fruit and vegetable production in North Dakota is limited by several environmental constraints and a short growing season. Studies have been done to extend the growing season of some fruits and vegetables, but season extension of wine grapes using tunnel structures is not reported in North Dakota. The objective of this study was to compare the phenology, yield, and quality of wine grape cultivars grown under a caterpillar tunnel and open field environment in North Dakota. Two cold-hardy wine grape cultivars (Marquette and Petite Pearl) were grown under both environments. A numerical comparison among the cultivars within and between the environments was made. Our results showed that the caterpillar tunnel improved the microclimate and accelerated the ripening process. However, berries weight, number of berries per cluster and cluster compactness differed only with cultivars. Compared to open field condition the tunnel promoted earliness in the accumulation of soluble solid concentration in the berries. Similarly, the caterpillar tunnel also reduced the acidity level, however, it did not reach the desired level of < 10 g L-1. The result suggests that caterpillar tunnels provide a better environment to hasten fruit ripening of cold-hardy wine grapes. However, further comparisons need to be made with more tunnel replications for statistical analysis.

How Soil Type Mediates Tillage Effects on Grapevine Performance
Mathew R. Lange and Patricia A. Skinkis*
*Corresponding author: Oregon State University, 4017 Ag & Life Sci Building, 2750 SW Campus Way, Corvallis, OR 97331, USA, patricia.skinkis@oregonstate.edu
Perennial grass in vineyard alleyways is used to increase worker traction, decrease erosion, and limit vine vegetative growth in Oregon's Willamette Valley. In recent years, drought events led growers to implement late-spring tillage to reduce competition for available soil moisture. While tillage is known to mitigate competition, little research has been done to understand how site-specific characteristics, like soil, affect this relationship. To better-understand how tillage effects vine performance of different soils, a 2-year study comparing till and no-till alleyways was conducted in a dry-farmed Pinot noir vineyard containing sedimentary, volcanic, and glacial deposit soils. Tillage consistently increased tissue nitrogen (N) in vines of all soils both years. Higher N in tilled vines resulted in heavier pruning weights in both the sedimentary and glacial deposit soils in the second year, while minimally impacting yield. In the first year, tillage led to reduced plant water stress (higher stem water potential and stomatal conductance) in the sedimentary soil, while having little effect in volcanic or glacial deposit soils. During the first year, vines in the sedimentary soil had higher titratable acidity and lower anthocyanins, tannins and phenolics. Conversely, vines in the volcanic soil had lower anthocyanin and phenolics in the tilled plots, while tillage had no effect on fruit composition in vines from the glacial deposit soil. Fruit composition was not affected during the second year due to more adequate rainfall. Results from this study show that vineyard floor practices influence vine performance differently based on soil type and seasonal climate.

Reduction of Methyl Anthranilate in Concord Juice by Nanofiltration-Resin (NFR) Processing Yields Wine with Perceptively Less Native Character Aroma
Demetra M. Perry, Ana Gabriela Ortiz-Quezada, and Gavin L. Sacks*
*Corresponding author: Cornell University, 251 Stocking Hall, Ithaca, NY 14853, gls9@cornell.edu
Concord grapes have high concentrations of the "grapey, foxy" odorant methyl anthranilate (MA), which distinguishes these grapes from *Vitis vinifera*. Previous work has shown that MA can be selectively stripped from Concord grape juice by nanofiltration followed by resin (NFR) treatment of the permeate. New research evaluated the suitability of fermenting this treated juice in comparison with untreated and *vinifera* juices. NFR treatment did not decrease yeast assimilable nitrogen (YAN), and all juices processed by NFR were able to ferment to dryness (residual sugar ≤ 1.5 g/L). A trained sensory panel evaluated wines produced from a control Concord juice and an NFR-treated Concord juice, along with a young, unoaked red *V. vinifera* wine and a 75:25 blend of the *vinifera* and NFR treated wine. The perceived "foxy" odor of wines correlated with the concentrations of MA measured using GC-MS, in the order of: *vinifera* ≈ 75:25 blend < NFR-treated Concord ≪ untreated Concord.

Developing a Method for Rapid Cordon Establishment and Replacement in Winegrapes
Elda L. Quintana* and Justin J. Scheiner
*Corresponding author: Texas A&M University, Department of Horticultural Sciences, College Station, TX 77843, USA, equintana@tamu.edu
Regular cordon replacement is often necessary to maintain consistent grape production. However, replacing cordons can be challenging due to limited cane availability in the head region of vines. Furthermore, cordons are often established incrementally due to apical dominance leading to a labor-intensive process. In an effort to improve the efficiency of cordon replacement and establishment, two studies were conducted in Blanc du Bois vineyards in the Texas Gulf Coast. The first study evaluated the impact of hydrogen cyanamide (HC) and gibberellic acid (GA) applied to the trunks of mature grapevines. The second study examined the impact of HC and GA treatments applied to the middle region of the renewal canes. While neither HC nor GA had an impact on shoot development in established trunks, HC advanced budbreak in the treated regions of renewal canes by several days compared untreated regions and untreated canes. Shoot length was also greater on renewal canes of HC treated vines versus untreated vines suggesting better potential spur development. Further investigation is necessary to determine the impact of HC on newly established grapevines.

ASEV-ES Conference Planning in Texas
Justin Scheiner, Andreea Botezatu, and Michael Cook
Texas A&M AgriLife

Student Presentation Competition Abstracts

Cold Hardiness in Chambourcin-based Hybrids

Tabinda Shahid, Li-Ling Chen, and Chin-Feng Hwang*
*Corresponding author: Missouri State University, Department of Environmental Plant Science and Natural Resources, State Fruit Experiment Station at Mountain Grove Campus, 901 S. National Avenue, Springfield, MO 65897, USA, chinfenghwang@missouristate.edu

Low-temperature injury is one of the limiting factors to grape production in the north and regions like the Mid-West where highly variable temperatures during severe winters can damage the grapevines resulting in their eventual death. Therefore, there is a need to develop new cultivars that can acclimate to cold temperatures (cold hardiness). The traditional European grape cultivars, like *Vitis vinifera* 'Cabernet sauvignon', are used worldwide for commercial wine production, but face bud damage at temperatures below freezing. On the other hand, *Vitis* interspecific hybrid 'Chambourcin', shows higher tolerance to low temperatures. As the wines produced from hybrid grapes gain popularity, a cross between 'Chambourcin' and 'Cabernet sauvignon' resulting in 150 genotypes were made to provide good wine quality that can thrive in cold climate regions. The objective of this research is to conduct Differential Thermal Analysis (DTA) for bud cold hardiness (phenotype) by identifying the freezing exothermic reactions that occur upon exposure of buds to low temperatures. Low temperature exotherm profiles were then used to identify the F_1 progeny that withstood the winter temperature fluctuations. An approximate of twenty interspecific hybrid cultivars were selected for their superior midwinter cold hardiness, where maximum levels of hardiness were observed at -25°C to 27°C. For continued research, second year data will be added, and DNA markers will be used to identify the Quantitative Trait Loci (QTL) associated with cold hardiness to promote hybrid cultivar selection that can thrive under wider climatic conditions to benefit the wine and grape industry.

The Influence of Packaging Material on the Properties of Carbonated Muscadine Wine Under Accelerated Storage Conditions

Nicholas A. Wendrick, Andrew J. MacIntosh, and Katherine A. Thompson-Witrick*
*Corresponding author: University of Florida, Food Science and Human Nutrition, 586 Newell Dr., Building 461, Gainesville, FL 32611, USA, kthompsonwitrick@ufl.edu

Wine is a complex beverage containing an array of flavor compounds generally derived from volatile compounds and basic tastes attributed to sugars (sweetness), organic acid (sourness), and polyphenols (bitterness/astringency). As these components can interact with wine packaging, the consumer experience can be greatly affected by the package material, transport, and storage conditions. Other researchers have shown that it is critical for the package to be inert to prevent flavor migration from the package to the wine (flavor tainting) and the sorption of flavors from the wine to the package (flavor scalping), with preliminary research suggesting that aluminum cans induce the production of flavor defects. This research aims to understand the chemical changes that muscadine wine undergoes during accelerated storage conditions when packaged in aluminum cans compared to glass bottles to parse the capacities of alternative packaging. Muscadine wine from Paulk Vineyards was packaged in cans and bottles and then stored at 37°C for 30 days with sample points every 5 days. pH, titratable acidity, free and total sulfites, color, phenolic compounds, antioxidants, flavor compounds (GC-MS), and polyphenols (HPLC) were analyzed. The canned wine had significant changes in color, free sulfites, total phenolics, total antioxidants, and flavor compounds compared to bottled wine. Significant color intensity degradation first occurred in the can sample on day 15 ($p < 0.05$) then became exacerbated until the conclusion of the experiment. These research findings will provide insight into the strengths and weaknesses of aluminum cans as a viable alternative package to the muscadine wine industry.

Developing Diagnostics for Detecting Crown Gall Bacteria

Jacquelyn M. Wray, Sylvia M. Petersen, and Wenping Qiu*
*Corresponding author: Missouri State University, Center for Grapevine Biotechnology, W.H. Darr College of Agriculture, Springfield, MO 65897, USA, WenpingQiu@MissouriState.edu

Crown gall disease causes significant economic loss to the grape and wine industry. Preventive strategies are most effective for mitigating the loss of grapevines in vineyards, as there is no known cure for this disease. Crown gall is caused by the bacterium *Allorhizobium vitis* carrying a tumor-inducing (Ti) plasmid. *A. vitis* bacteria live systemically in the grapevine before causing visible symptoms and can survive in residual plant tissues and in soil for two years or longer. Diagnostic methods have been developed to detect *A. vitis* bacteria in grapevines and soil, but more reliable, specific, and high throughput diagnostics are still needed for screening nursery stocks and soil. We have found primer sets unique to *A. vitis* chromosome and virulence regions of the Ti plasmid and have developed procedures and protocols for reliably detecting *A. vitis* bacteria. Our preliminary results showed that *A. vitis* bacteria are present in soil near and within the sampled vineyard soil, but whether they are tumorigenic requires further investigation. Currently, we are conducting a survey of Missouri vineyard soil and grapevines to know the distribution of *A. vitis*. The results obtained from this research will help the grape and wine industry to develop effective strategies for preventing and managing crown gall disease in vineyards.

Spatial Data Processing to Inform Variable-Rate Dry Fertilizer Applications in Vineyards

Terry Bates*, Rob Chancia, Nick Gunner, and Markus Keller
*Corresponding author: Cornell University, Cornell Lake Erie Research and Extension Laboratory, 6592 West Main Road, Portland, NY 14769, USA, trb7@cornell.edu

The High-Resolution Vineyard Nutrient Management project (https://highresvineyardnutrition.com/) is a multi-disciplinary effort funded by the USDA-Specialty Crop Research Initiative. The objectives of the project are to (a) develop new sensing technologies for the spatial measurement of vine nutrient content, (b) conduct vine nutrition research to improve nutrient recommendations and develop a nutrient decision support tool, and (c) integrate the new technology and information for variable-rate fertilizer applications. For the latter objective, predicted vine nutrient content (N and K) spatial maps from drone hyperspectral imagery are validated with stratified field tissue nutrient samples. Vine nutrient maps are processed, interpolated, validated, and translated in the MyEfficientVineyard software tool. Fertilizer prescription maps are generated through k-means cluster analysis and this process can be done on a single vineyard data layer, such as on N content alone, or on multiple joined data layers, such as N content joined with soil electrical conductivity, yield, pruning weight, or crop load. Final prescription maps are exported to commercial precision agriculture platforms to control variable-rate fertilizer spreaders. This research demonstrates how new sensing technologies can be integrated with free spatial data processing tools and commercial implements for variable-rate fertilizer applications.

Technical Session Abstracts

Towards Zonal Prediction Maps for Vineyard Nutrition: A Comparison of Practical Options

Rob Chancia*, Terry Bates, and Jan van Aardt
*Corresponding author: Rochester Institute of Technology: Center for Imaging Science, 54 Lomb Memorial Drive, Rochester, NY 14623, USA, roccis@rit.edu

The National Institute for Food and Agriculture (NIFA) has funded a Specialty Crop Research Initiative (SCRI) to develop near real-time sensing tools for vineyard nutrition. The primary investigation hinges on acquiring high spectral resolution observations of vineyard foliage with proximal or remote sensing systems. This data is used to determine the wavelengths most useful for assessing various nutrient deficiencies. The wavelengths necessary for direct measurement of nutrient status, e.g., nitrogen, reside in the short-wave infrared (SWIR) spectral region. Current sensors capable of observing these wavelengths are cost-prohibitive and complex in terms of large-area acquisition. Fortunately, multiple low-cost visible and near-infrared range (VNIR) sensors are readily deployable to determine relative zonal maps that provide a proxy for vital nutrient status, including nitrogen (RMSE=0.2% in samples with 2.4-4.5% N) and potassium (RMSE=0.1% in samples with 0.6-1.4% K). By combining relative nutrient maps with other contextual layers of spatial data (e.g., water, soil, pruning weight, crop load, yield, etc.) we can begin to approach nutrient management at a precision level. We will assess the viability of three existing sensors for zonal nutrient mapping, including ground, drone, and satellite- based sensing platforms in this presentation.

Using Non-Saccharomyces Yeast for pH Reduction during Wine Fermentations of Chambourcin Grapes from a Warm Growing Region

Amanda J. Fleming and Renee T. Threlfall*
*Corresponding author: University of Arkansas, Department of Food Science, 2650 N. Young Avenue, Fayetteville, AR 72704, USA, rthrelf@uark.edu

Chambourcin (*Vitis* hybrid) grapes from warmer growing regions can have high pH at harvest, affecting wine quality. Like acid additions or malolactic fermentation (MLF), use of non-Saccharomyces yeast, such as *Lachancea thermotolerans*, can modify pH, acidity, and other attributes during fermentation. In 2021, 168 kg of commercially-grown Arkansas Chambourcin grapes were harvested and transported to the University of Arkansas System Food Science Department, randomized into batches, crushed, and destemmed for wine production. Four inoculation treatments in duplicate were conducted using S. cerevisiae (SC) without and with malolactic cofermentation (SC-MLF) and *L. thermotolerans* with a sequential inoculation with S. cerevisiae (LT-SC) without and with malolactic cofermentation (LT-SC-MLF). Basic composition, sugars, and organic acids were evaluated daily during fermentation for 14 days at 21Â°C with all inoculation treatments completing fermentation in 6 days (total sugars < 0.3%). Prior to inoculation, pH and titratable acidity were 3.51, and 0.73%, respectively. Regardless of malolactic fermentation, by day 6, titratable acidity, lactic acid, and total organic acids were higher in LT-SC compared to SC wines, while pH of LT-SC was lower than SC wines. From fermentation day 0 to bottling, use of L. *thermotolerans* in Chambourcin wine production resulted in acidity attribute changes with reductions in pH (~4%) and malic acid (~10%) but increases in titratable acidity (~55%), lactic acid (64%), and total organic acids (~58%), regardless of malolactic fermentation. Fermentations with *L. thermotolerans* and *Saccharomyces* yeasts produced wines with lower pH and higher acidity with potential for enhanced color and microbial stability.

Technical Session Abstracts

Gewurztraminer and Refosco Performance on Nine Rootstocks in the Four-Corners Region of New Mexico

Gill Giese*, Kevin A. Lombard, Ciro Velasco-Cruz, Michael Leonardelli, Bernd Maier, Maryel Lopez, Daniel Goodrich, and Samuel Allen
*Corresponding author: Arkansas State University, College of Agriculture, PO Box 1080, State University, AR 72467, USA, wgiese@astate.edu

A rootstock field trial was conducted in the Four Corners Region of New Mexico. Refosco and Gewürztraminer (*Vitis vinifera* L.) grapevines were field grown on nine rootstocks, 3309C, Kober 5BB, Paulsen 775, 779, 1045 and 1103, Richter 110, and Teleki 5C in a completely randomized design with six replications, at >1,700 m elev. from 2008 to 2022. Vine phenology, yield, pruning weight, and Ravaz index (ratio of yield divided by pruning weight of subsequent dormant season) were measured from 2017 through 2022. Soluble solids, pH, titratable acidity, potassium, tartaric acid, glucose/fructose, and yeast assimilable nitrogen was measured in: 2017, 2018 and 2022. Refosco vines had greater percentage of vine mortality compared to Gewürztraminer in 2010 and 2017 but not in 2018, regardless of rootstock. Regardless of cultivar, vines grafted to 5 BB Kober had the absolute highest mortality (58%). Yield differed between cultivars, rootstocks, and vintages. Pruning weights were inversely related to yield and vines grafted to 110 Richter generally had the lowest pruning weight and those grafted to Paulsen 779 the greatest, among tested rootstocks. Interestingly, the Ravaz index was highest for Gewürztraminer and lowest for Refosco grafted to 110 Richter rootstock. Vintage most affected berry soluble solids content (°Brix) in the Refosco cultivar and titratable acidity (TA) in Gewurztraminer, in 2017 and 2018. Overall, in this multi-year field trial in the Four Corners Region of New Mexico, USA, 1103 Paulsen improved yield, vine hardiness, and fruit composition regardless of scion variety, relative to the other tested rootstocks.

Varying Harvest Date and Berry Exposure of La Crescent Vines has Grape and Wine Aroma Impact

Erin L. Norton*, William J. Colonna, and Randall J. Vos
*Corresponding author: Iowa State University, Midwest Grape and Wine Industry Institute, 536 Farm House Lane, Ames, Iowa 50011, USA, elnorton@iastate.edu

La Crescent is an important cold-hardy interspecific cultivar in the Upper Midwest since its release from University of Minnesota in 2002. A commercial vineyard in Iowa with La Crescent vines was subjected to 3 treatments of canopy exposure management: minimal, moderate, and intensive. The grapes were harvested on three dates starting in late August (1-week intervals): early, mid, late. After harvest, the wine was made under basic conditions at the ISU Winery in duplicate. Grapes were prepared to analyze free volatile terpenes (FVT) and potential volatile terpenes (PVT). A spectrophotometric method was used on the grapes to compare the total PVT between treatments. From this analysis, harvest date affected overall terpenes and canopy management did not. Grapes from the late harvest had more total terpenes than the early harvest. Samples from grapes and wine from each treatment were also analyzed using a HS-SPME-GCMS method and identified monoterpenoids were identified and semi- quantified based on an internal standard. Results indicate that in grape samples, the monoterpenoids geraniol, linalool and alpha-terpineol increased as the canopy management intensified. Similar trends were observed in the wine samples for the monoterpenoids limonene, linalool and alpha-terpineol. Overall, we recommend grape growers to be mindful of both harvest date and canopy exposure to obtain the desirable monoterpenoid compounds in the resulting wines.

The American Grape Terroir: Influence of Agricultural Management on the Microbiome

Patrick Ewick and **Elsa Petit***
*Corresponding author: University of Massachusetts, Stockbridge School of Agriculture, Amherst, 111 Fernald Hall, Amherst, MA 01002, USA, epetit@umass.edu

Agroecology has brought attention to the role that the microbiome plays in plant health. Grapes are typically heavily managed and as a result have an artificially constructed holobiont. The recent divergence of North American cultivated grapes from their native wild counterparts allows for comparing the effect of agricultural management on their microbiomes in their native ranges. We sampled two grape species, *Vitis riparia* and *Vitis labrusca* in three different locations in Western Massachusetts. We compared the assemblage of bacteria and fungi, their diversity evenness and richness, in the soils, roots, leaves, and fruits in managed and wild ecosystems and on different host species. We then explored the documented impact of the identified microbes on plant health to determine how modifying the management and/or host could influence the sustainability of viticulture. There is a significant difference in microbial diversity between wild and managed systems with overall a higher diversity in wild systems. Fungal diversity in all compartments (soil, roots, leaves and berries) is reduced in managed systems. Bacterial diversity is reduced only in berries and leaves in managed systems compared to the wild, but soils and roots are not affected. There are soil and root fungal taxa unique to both the managed and wild. Wild soil and root fungal taxa include an entomopathogen-related fungus, absent from managed system. Managed systems include the root/trunk disease-causing fungus *Cylindrocarpon* but also the arbuscular mycorrhiza *Gigaspora*, absent from the wild samples. Leaves and berries fungal taxa in the managed system are a subset of the wild community. Soil and root bacterial taxa in the wild systems are a subset of the managed communities and there are soil and root bacterial taxa unique to the managed systems. Leaves bacterial taxa in the managed systems are a subset of the wild communities but there are leaves bacterial taxa unique to the wild. The berry bacterial wild and managed communities have no taxa unique to either. We conclude that management significantly reduces microbial diversity and select for specific fungal and bacterial taxa.

Technical Session Abstracts

On-Farm Experimentation for Precision Viticulture using Digital Ag Software
Jennifer Phillips Russo*
*Corresponding author: Cornell's Lake Erie Regional Grape Program, 6592 W. Main Street, Portlan, NY 14769, USA, jjr268@cornell.edu
The USDA-NIFA-AFRI project, cost effective spatial data visualization and decision support for small and medium-sized vineyards, aims to increase the adoption of precision viticulture for small vineyards by (A) completing the development of a web- based spatial data platform for growers, (B) demonstrating the value of precision viticulture through research field trials, and (C) providing experiential learning activities for producers to implement in their own operations. Our model is to provide the process (software tools), content (research-based information), and experience (hands-on learning activities) for transformational education and improved adoption of spatial-data-driven vineyard management. The project launched the MyEfficientVineyard (MyEV) spatial data processing tool, a free web-based software platform for vineyard managers to import, process, and visualize spatial data in their own operations. Ongoing precision viticulture research at the Cornell Lake Erie Research and Extension Laboratory provides support for variable-rate vineyard management. These activities feed into the establishment of on-farm precision viticulture trials with commercial grape growers. In 2022, spatial vineyard data was collected using proximal soil (DualEM) and canopy (CropCircle NDVI) sensors. With support from the project team, growers are processing the spatial data and identifying spatial patterns in their vineyards to drive management decisions. In 2023, field trials are being established to test the application of grower identified variable-rate management. We believe our approach to this project addresses at-scale investment for smaller operations through the MyEV tool, identifies vineyard management business needs for the technology, and educates vineyard managers and owners on the use and benefit of precision viticulture.

Modeling Acidity in Red Wine Grapes
Justin Scheiner*, Rachael Sampson, Michael Cook, and Danny Hillin
*Corresponding author: Texas A&M University, Department of Horticultural Sciences, 2134 TAMU, College Station, TX 77843, USA, jscheiner@tamu.edu
Wine pH is function of organic acids and potassium, and many viticulture factors have been correlated with acidity. However, factors that directly influence pH are poorly understood leading to few viable management strategies to control acidity in the vineyard. A two-year field study was conducted in seven commercial Tempranillo vineyards in the Texas High Plains and North Texas regions to identify viticulture and climatic factors that most directly correlate with individual acids in juice, potassium, pH and titratable acidity. A wide range of viticulture parameters were measured on twenty individual vines at each site including measures of canopy density and cluster light exposure, vine nutrition, yield components, carbon isotope composition, and berry composition. Partial least squares regression (PLSR) models were constructed to predict acidity at each vineyard site as well as across all vineyard sites. The variance in juice pH observed within and across sites at version and harvest sites was best explained by potassium (K) concentrations in berries. Models constructed to predict K at harvest identified measures of cluster light exposure, crop load, and vine water status as most important. The strong correlations observed between berry K and juice pH in Tempranillo were also observed in Malbec, Grenache and Carnelian grapes.

Polysaccharides Influence the Formation and Quantitative Analysis of Polymeric Pigments in Red Wine
Stephan Sommer*, Julia Graves, Jan-Peter Hensen, Fiona Hoening, A. Faeth Anderson, and Fabian Weber
*Corresponding author: University of Missouri, Grape and Wine Institute, 223 Eckles Hall, Columbia, MO 65211, USA, ssommer@missouri.edu
Polysaccharides extracted from grapes and microorganisms play an important role in the physical stability of wine. Especially pectin fragments and mannoproteins interact with polyphenols, proteins, and crystals, influencing their colloidal stability. Our experiments also revealed that polysaccharides can disrupt the interactions between proteins and polymeric pigments, leading to data artifacts in pigment precipitation assays. Well established protein precipitation assays rely on albumin to precipitate tannins and precipitable polymeric pigments. In the presence of polysaccharides, this complexation is impaired and the reading for non- precipitable polymeric pigments (np PPs) is artificially increased. Other trials have revealed that pectin fragments can bind anthocyanins and pigments, which leads to an apparent increase in polymeric pigments. These pigment -polysaccharide adducts (PPA) have been identified in model systems and, more recently, in red wines where they are contributing to total color. These adducts are not bleached by sulfites but rapidly disrupted by pectolytic enzymes. They also further increase the reading for np PPs, making the analysis of polymeric pigments in the presence of polysaccharides less reliable. While the analytical portion can be addressed by our modified assay conditions, the percentage and chemical composition of remains mostly unknown. There appear to be several reaction mechanisms that give these adducts a varying degree of stability with very different implications for young wines compared to their aged counterparts. This ongoing research has important implications for the characterization of red wine pigments but also for the targeted use of polysaccharides for color improvement and long-term stability.

Consumer Acceptability of New Fresh-Market Muscadine Grapes from the University of Arkansas System Division of Agriculture Fruit Breeding Program
Jordan Chenier, Margaret Worthington, and **Renee Threlfall***
*Corresponding author: University of Arkansas, Department of Food Science, 2650 N. Young Avenue, Fayetteville, AR 72704, USA, rthrelf@uark.edu
Fresh-market muscadine grapes (*Vitis rotundifolia* Michx.) are an important regional crop in the Southeast United States with a loyal consumer base that value the grapes unique flavor and pronounced floral and foxy aromas. The University of Arkansas System Division of Agriculture (UA System) Fruit Breeding program established a muscadine breeding program focused on developing new cultivars for the fresh-market and processing industries. Of the four genotypes evaluated, AM-70 had the highest soluble solids (16.50%) and pH (3.87) while AM-223 had the highest titratable acidity. Fifty-eight attendees of the 2022 UA System Muscadine Field Day and Workshop participated in the consumer sensory study to evaluate three breeding selections (AM- 70, AM-223, and AM-231) and one cultivar (Supreme). Each consumer evaluated attributes on the 9-point verbal hedonic scale (1 = dislike extremely; 9 = like extremely) and a 5-point Just About Right (JAR) scale (1 = not nearly enough 3 = just about right; 5 = much too much). Additionally, consumers were asked to rank their favorite and least favorite genotypes. AM-70 (37%) was ranked highest, followed by Supreme (27%), AM-231 (20%), and AM-223 (16%). There was no difference in overall impression, texture, sourness, or flavor of the four genotypes. The panelists liked the appearance of the three black-fruited genotypes (AM-70, AM-223, Supreme) to the bronze-fruited (AM-231). AM-70 and AM-231 had higher liking for sweetness than AM- 223. Overall, AM-70 performed comparably to Supreme, a fresh-selection that is prized for its consumer quality.

Technical Session Abstracts

Berry Cuticle Enhancement Products Do Not Impact the Incidence and Severity of Sour Rot in New York Grapes

Hans Walter-Peterson* and Alice Wise
*Corresponding author: Cornell Cooperative Extension, 417 Liberty Street, Penn Yan, NY 14527, USA, hcw5@cornell.edu

Sour rot is an increasingly common disease complex affecting winegrape vineyards in regions that experience growing season rainfall, particularly in the period between veraison and harvest. It is caused by a combination of yeast, fungi, and bacteria that infect injured berries, converting sugars within the fruit into acetic acid. Affected fruit is undesirable for winemaking, resulting in significant yield losses immediately prior to harvest. It is rapidly spread within a vineyard by fruit flies (Drosophila spp.) which carry the microbes from infected to uninfected fruit. Management of sour rot is primarily accomplished by multiple applications of anti- microbial materials and insecticides just prior to harvest to control both the causal organisms and their vectors. Recent discoveries of insecticide resistance in multiple fruit fly populations, plus the desire to avoid chemical applications just before harvest, make this solution both less reliable and less desirable. We evaluated two products designed to thicken the cuticle layer of the berries to determine if they were able to reduce berry splitting, and therefore the incidence and severity of the disease and the need for chemical applications near harvest. Sensory differences were noticeable in the "toughness" of the skins when chewed, but these differences could not be accurately quantified. While there were occasional instances where each product seemed to result in a small decrease in cluster rots, they were not consistent across years and significant enough to be economically viable for most growers.

Sulfur Dioxide Concentrations and Chemical Properties of Red Wines During Aging

Aude A Watrelot*, Carmen Vavra, David Carter, Alexander Gapinski, and Yiliang Cheng
*Corresponding author: Iowa State University, Department of Food Science and Human Nutrition, 536 Farm House Lane, Ames, IA 50011, USA, watrelot@iastate.edu

Oxygen is key in winemaking and can have both beneficial, including color stability, and detrimental effects such as browning over time. Sulfur dioxide (SO2) is a common preservative in the wine industry, especially important in wine at bottling to protect wines. However, in wine, the molecular form of SO2 is the most effective form but is present in the least amount under acidic conditions (wine pH). A rational use of SO2 in wine made from non-Vitis vinifera grape cultivars is challenging as the chemical composition of those wines during aging is not well known. The chemical composition, including phenolic compounds, acetaldehyde, free and total SO2 concentrations, and color parameters in Marquette and Frontenac wines aged for up to 7 years were first evaluated. Then, wines made in 2022 from Marquette, Petite Pearl, and Crimson Pearl grape cultivars were bottled with 30, 60 and 90 mg/L free SO2. After four months of aging, the chemical composition of those wines was evaluated including free and total SO2, phenolic compounds, acetaldehyde concentrations, and color parameters. The highest concentration of free SO2 at bottling in all wines negatively impacted the color intensity. In Crimson Pearl and Petite Pearl wines, the acetaldehyde concentration was lower in the 90 mg/L free SO2 condition and the hue and b* parameter were higher. The concentration and composition of anthocyanins in those wines will be further studied to explain the different impact of SO2 concentrations on Marquette, Crimson Pearl, and Petite Pearl wine quality

Texas High Plains Winter Bud Damage Survey

Kirk Williams*, Trey Ruland, Kyle W. Lauterbach, D. Thayne Montague, and Pierre Helwi
*Corresponding author: Texas Tech University, Department of Plant and Soil Science, 2911 15th Street Suite 122, Lubbock, TX 79409, USA, kirk.w.williams@ttu.edu

The majority of grape bearing acreage and grape production in Texas are located on the Texas High Plains. The Texas High Plains is part of the southernmost extension of the Great Plains and has elevations ranging from 914 to 1,250 meters. Climatic conditions within the Texas High Plains can be extreme with large winter and spring temperature swings, hailstorms, high wind speeds and drought. One of the biggest challenges to achieving consistent yields of grapes in the Texas High Plains is dormant bud damage. A 2021 bud dissection project surveyed five Texas High Plains vineyards containing 33 varieties. Varieties with primary bud survival below 10% were Barbera, Cabernet Franc, Furmint and Zinfandel. Varieties with primary bud survival above 90% were Albarino, Dolcetto, Mourvedre, Petit Verdot, Pinot Noir and Sauvignon Blanc. Differences were also observed between vineyard locations. Knowing and quantifying bud damage can help Texas High Plains growers make pruning decisions in regards to bud number retention to achieve consistent yields over time.

The Use of Clone and Rootstocks to Optimize Vine Performance and Fruit Quality of Cool Climate *V. vinifera* Cultivars within the Niagara Peninsula

James J. Willwerth*, Tae-Rim Chung, Claire Findlater, Alexandra Gunn, and Austin Szarek
*Corresponding author: Brock University, 1812 Sir Isaac Brock Way, St. Catharines, ON L2S 3A1, Canada, jwillwerth@brocku.ca)

Proper cultivar selection is essential for optimal production and wine quality. In addition, clones and rootstock choice can also impact vine performance, however, their effects on cold tolerance and regional influence are lesser known. The Niagara Peninsula is a cool, semi-continental climate that can have variable climate with occasional extreme weather events. Vineyard soils also vary considerably across the region. The objective of this research was to evaluate different cultivar x clone x rootstock combinations to identify grapevine material that is optimal for the Niagara Peninsula. Two research vineyards were planted in 2018 and 2019. Each vineyard was planted with 5 different *V. vinifera* cultivars (Chardonnay, Pinot noir, Sauvignon blanc, Merlot, Cabernet franc and Cabernet Sauvignon). Multiple clone x rootstock combinations were chosen for each cultivar and these combinations were planted in a randomized block design with six 5-vine replicates (30 vines/combination). Vine phenology, cold tolerance, vine performance (yields, vine size) and fruit composition were assessed beginning in 2021. Results to date indicate that both clone and rootstock can impact vine performance, fruit quality and cold tolerance. Preliminary data suggests that rootstocks such as 101-14 MGT and Riparia Gloire can have improved cold tolerance, early maturation but may have lower yields. Clonal selection can also impact fruit composition and cold tolerance. However, specific clone and rootstock interactions cannot be ignored. This research will help understand clone and rootstock effects on cultivar performance and assist with future selections in cool climate regions be used as an adaptation strategy for changing climates.

Student Poster Competition Abstracts

Impact of Extended Maceration on Chemical Properties of Red Wines Made From Interspecific Grape Cultivars
David Carter, Carmen Vavra, and Aude A. Watrelot*
*Corresponding author: *Corresponding author: Iowa State University, Department of Food Science and Human Nutrition, 536 Farm House Lane, Ames, IA 50011, USA, watrelot@iastate.edu
The chemistry of wines made from cold-hardy grape cultivars is not well known, making it challenging to develop the best winemaking practice to produce high-quality wines capable of aging. 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.

Genetic Study of Postharvest Berry Rot Resistance in a *Vitis aestivalis*-derived 'Norton'-based Population
Achyut Duwadi, Li-Ling Chen. and Chin-Feng Hwang*
*Corresponding author: Missouri State University, Department of Environmental Plant Science and Natural Resources, State Fruit Experiment Station at Mountain Grove Campus, 901 South National Avenue, Springfield, MO 65897, USA, chinfenghwang@missouristate.edu
Penicillium is one of the major fungal pathogens causing deterioration and decay amongst a wide range of postharvest plant products including grape berries. This study focuses on Penicillium expansum, which was isolated from diseased berries and suggested by its nuclear ribosomal internal transcribed space (ITS) sequences. P. expansum produces a range of mycotoxins, including patulin, which is detrimental to human health and also negatively impacts the wine quality. Since successful control of this disease can only be achieved through a combination of canopy management and fungicide application, the use of resistant germplasm would result in more efficient and sustainable disease management. Vitis aestivalis-derived 'Norton'; the State grape of Missouri, is one of the very few commercial red grape cultivars that can be grown under elevated fungal pressure while V. vinifera (the European grape species used for most wine making worldwide, e.g., 'Cabernet Sauvignon') is highly susceptible. However, the molecular mechanisms that govern postharvest rot resistance are not yet known. Tests on the F1 progeny from a cross between 'Norton' and 'Cabernet Sauvignon' may elucidate the underlying genetic and molecular mechanisms of berry rot resistance and berry quality. To accomplish this, a mapping population of 193 genotypes was developed from a cross between 'Norton' and 'Cabernet Sauvignon.' Preliminary data analysis with simple sequence repeat (SSR) and single nucleotide polymorphism (SNP) markers indicated a potential major resistance locus on linkage group 9. Finding markers linked with these quantitative trait loci (QTLs) will accelerate the direct release of new Norton-based cultivars and improve efficiency of selection in subsequent generations.

Genomic Prediction of Basic Fruit Chemistry in a Cold-Hardy Interspecific Hybrid Grapevine Population
Venkateswara Rao Kadium, Ramesh Pilli, John Stenger, Collin Auwarter, Xuehui Li, Andrej Svyantek*, and Harlene Hatterman-Valenti
*Corresponding author: Montana State University, Western Ag. Research Center, 580 Quast Ln, Corvallis, MT 59828, USA, andrej.svyantek@montana.edu
Grape growers in North Dakota and the Upper Midwest face significant production constraints such as perennial risk of winter injury, spring frost damage threats, and abnormal fruit chemistry at harvest stemming from an extremely short growing season and *Vitis* riparia lineages. Despite the environmental resilience provided by progeny derived from wild *Vitis* species, their fruit chemistry parameters, particularly related to acidity, often deviate from traditional expectations leading to unique challenges in commercial wine fermentation. Identifying the role of genetics in the control and expression of critical fruit chemistry traits in interspecific hybrid populations will improve breeding towards environmentally adapted cultivars. For this purpose, an incomplete diallel mapping population composed of individuals derived from three interspecific breeding lines was field planted in 2017 in Fargo, ND. The population was genotyped with ~36000 GBS markers and ~2000 rhAmpSeq markers. Phenotypic data for berry mass, soluble solid content (°Brix), pH and total acidity was collected across all fruiting individuals of the population at three time points each year across three consecutive growing seasons (2020-22). Genomic prediction was performed for these traits using 60% of the population as a training set to predict performance on the remaining 40% of the population (the testing set). Preliminary results showed that fruit chemistry traits performed adequately with prediction accuracies around ~0.70. These results indicate potential benefits of genomic prediction in grapevine breeding. Further work is necessary to validate predictions across populations and for simultaneous prediction of performance and selection for multiple quantitative traits at once.

Verjus: A Natural Method to Improve Wine Acidity
Andrew Lyne*
*Corresponding author: Texas A&M University, Horticultural Sciences - Enology & Viticulture, 2134 TAMU, College Station, TX 77843, USA, andrew-lyne@tamu.edu
In hot climates like Texas, high pH juice/wine is a major challenge for winemakers. High pH, low acid wines are made from grapes grown warm climates resulting in low bodied, bland wines. High pH wines increase the potential for microbial spoilage, oxidation, & shorter shelf life. Winemakers typically will acidify wines by adding tartaric acid before or after fermentation to help lower the pH and increase acidity to create a balanced wine. Although used as a winemaking tool, large additions of tartaric acid can create sensory and bitartrate issues. Tartaric acid can be an expensive addition when dealing with high pH wines. To help combat high pH wines there is a potentially natural, sustainable alternative to using tartaric acid. Verjus is acidic juice produced from unripe fruit that is characterized by low sugar, low pH, & high acidity. Grapes used to make verjus are harvested while still green or unripe. This timing for verjus corresponds with cluster thinning. Cluster thinning is a common vineyard practice to moderate yield. Cluster thinned grapes are a source of waste that are discarded on the vineyard floor. Using verjus as an acidifying agent may improve the overall acid balance of wines, lower the pH, & create a sustainable winemaking practice that will help improve Texas wine quality. This could provide a new winemaking practice to help against pH issues related to climate change in the future.

Student Poster Competition Abstracts

Vineyard Nitrogen Management and Its Impact on Wine Sensory Characteristics

Megan E. Mershon, Dana Acimovic, Tony K. Wolf, Martha D. Calvert, Elizabeth Chang, Jacob Lahne, and Amanda C. Stewart*
*Corresponding author: Virginia Tech, Department of Food Science and Technology, 1230 Washington Street SW, Blacksburg, VA 24061, USA, amanda.stewart@vt.edu

Nitrogen compounds are commonly used in the wine grape industry as soil and foliar fertilizer which can influence yeast assimilable nitrogen concentration and fruit composition. These factors can then influence fermentation rate, yeast cell density, and aromas via yeast metabolism. Mature Chardonel vines, grown in Northern Virginia, were used to test the effect of three levels of soil and two levels of foliar nitrogen application on juice and wine chemistry, and wine sensory characteristics. The field experiment was laid out as a split-plot randomized block design with five replicates. Grapes harvested from each field replicate were combined to generate six juice lots representing the six experimental vineyard conditions. Juice for each of the six lots was separated into two lots for fermentation by two different commercially available yeast strains: S. cerevisiae x bayanus EC1118 or S. cerevisiae x bayanus QA23. Fermentations were performed in triplicate, fermented to dryness, bottled, then stored in bottle for 4 months at 4Â°C. A free sorting task was then conducted with 65 untrained panelists who detected no differences between the different vineyard nitrogen treatments nor the yeast strains. Data analysis to investigate interaction effects between yeast strain and nitrogen treatment is in progress, as is the chemical analysis of fruit and wine, including YAN and individual amino acids in juice. This information can help vineyard managers and winemakers better understand the potential for nitrogen management in the vineyard to impact fermentation and wine sensory and chemical characteristics.

Investigating the Impact of Timing of Basal Leaf Removal and Fruit Thinning on Potassium Accumulation in Red Wine Grapes

Jacob Muras*, Michael Cook, Andreea Botezatu, Julie Howe, and Justin Scheiner
*Corresponding author: Department of Horticultural Sciences, Texas A&M University, 2134 TAMU, College Station, TX 77843, USA, muras.jacob@tamu.edu

In hot climates such as Texas, high juice/wine pH represents a serious challenge for wineries. In red wines, pH has been reported to correlate with potassium concentrations in berries. The objective of this study was to evaluate the impact of timing of basal leaf removal and cluster thinning on potassium concentrations in Tempranillo and Camminare Noir grapes as a possible means to mitigate problems associated with high pH. This research took place during the 2021 and 2022 growing seasons in two vineyards, one in the Texas Gulf Coast and the other in the North Texas region. Treatments consisted of basal leaf removal from the first three nodes on the morning sun side of the canopy, cluster thinning to one cluster per shoot, and leaf removal plus cluster thinning. Each treatment was carried out at berry set and at veraison. Differences in yeast assimilable nitrogen were observed in 2021 in Camminare Noir with an increase following leaf removal and cluster thinning at berry set, and a decrease in the leaf removal treatment at veraison, but other differences in chemical composition parameters observed were inconsistent across the rootstocks (420A and 1103P). No differences in fruit composition were observed for Tempranillo over two years, likely due to low yields resulting from winter injury.

Updated Texas High Plains AVA Vineyard Phenoxy Herbicide Leaf Tissue Survey

Srijana Panta, K. Trey Ruland, Kyle W. Lauterbach, and D. Thayne Montague*
*Corresponding author: Texas Tech University, Department of Plant and Soil Science, 2911 15th Street Suite 122, Lubbock, TX 79409-2122, USA, thayne.montague@ttu.edu

The grape and wine industry has an economic impact of over $20 billion within the state of Texas. Currently, there are more than 500 wineries and greater than 2,000 ha of vineyards in the state. Within the Texas High Plains American Viticulture Area (AVA), nearly 80% of all Texas wine grapes (*Vitis vinifera L.*) are produced. This same area is a major cotton producing region and updated formulations of auxin based herbicides are used by the agriculture industry. Synthetic auxin herbicides (predominantly dicamba and 2,4-D) are applied to a high percentage of cotton grown on the Texas High Plains. Grapevines are known to be sensitive to auxin herbicides, and vineyard proximity to cotton fields have made vineyards particularly vulnerable to herbicide volatilization and drift injury. High Plains AVA grape growers report phenoxy herbicide injury often causes significant reductions in grape yield. During the 2020 and 2021 growing seasons monthly leaf tissue sampling was conducted within six Texas High Plains AVA vineyards. Results indicate early season leaf tissue concentrations of dicamba were greater than 260 ng g-1, while late season leaf dicamba concentrations were generally much lower. Early season leaf 2,4-D concentrations were somewhat lower compared to dicamba concentrations and followed similar seasonal trends. Visual vineyard appraisals indicate damage to vine vegetative tissues and decreased vegetative growth. These surveys give High Plains AVA growers crucial information on extent and frequency of synthetic auxin herbicide volatilization and drift related events within Texas High Plains AVA vineyards.

Poster Session Abstracts

Effect of Planting Distance on Yield and Fruit Quality of PD Resistant Predominately *Vitis Vinifera* Grapevine '502-20'2

Jarrett Price and **Elina Coneva***
*Corresponding author: Auburn University, Department of Horticulture, 101 Funchess Hall, Auburn, AL 36849, USA, edc0001@auburn.edu

Vitis vinifera acreage is limited in Alabama due to Pierce's disease (PD). UC Davis breeding program has developed PD resistant germplasm and has released 5 predominantly *V. vinifera* cultivars. Although PD resistant *V. vinifera* cultivars are currently available, no *V. vinifera* management recommendations exist for production in Alabama. An experimental vineyard was planted at the Chilton Research Extension Center, AL in 2017 to determine the effect of planting distance on PD resistant 94% V. vinifera selection '502-20' growth and productivity. The experiment utilizes RCBD consisting of three replications and three vines/replication. Vines were planted at distances of 1.8m x 3.7m, 2.1m x 3.7m, and 2.4m x 3.7m. Total yield and number of clusters was measured at harvest. Fruit samples were collected to determine fruit total soluble solids (TSS), titratable acidity and pH. Our results suggest that 2.4m x 3.7m treatment resulted in the highest yield of 17.4 kg/vine in 2022, significantly higher than yields from other treatments. Planting distance of 2.4m x 3.7m resulted in the highest number of clusters/vine (53), while vines planted at 1.8m x 3.7m responded with the lowest number (38) of clusters/vine. Planting distance of 2.4m x 3.7m resulted in the largest cluster weight of 540g and also had the highest TSS. Current results indicate planting distance 2.4m x 3.7m is optimal for sustainable production of PD resistant 94% *V. vinifera* grape '502-20'. Further research will be conducted to expand current knowledge, and develop management recommendations for the successful production of V. *vinifera* grapes in Alabama.

Georgia Viticulture: Industry Perceptions on Future Plantings

Nathan Eason* and Clark MacAllister
*Corresponding author: University of Georgia Extension, 1241 Helen Hwy, Cleveland GA 30528, USA, neason@uga.edu

Grape growing in Georgia is still a relatively new burgeoning industry. Much is still to be learned on which varieties work best in the varied climactic zones of the state. Many challenges face Georgia grape growers. Ever-increasing pest pressures, such as Pierce's disease, downy mildew, powdery mildew, grape root borer, and spotted wing drosophila continue to plague growers throughout the state. Frequent environmental challenges, including extreme weather events and climate change pressures are beginning to challenge the long-term sustainability of traditional *Vitus vinifera* varieties. With increasing demand for Georgia-grown wine, grape growers are searching for varieties which are better acclimated to the Southeast. As with many states in the Eastern section, attempting to keep a pulse on the industry's growth and needs can prove difficult. In order to help focus programmatic needs, as with any good Extension model, an industry-wide survey was used to see where producers felt were important areas of research and education efforts should move forward. Participants were surveyed on a number of topics, including knowledge level, access to informational resources, perceptions of varieties, future outlook, and lessons learned from previous plantings. Survey data will be used to guide future Extension programming and research efforts.

Genomic Prediction of Wine Chemistry and Quality in a Cold-Hardy Interspecific Hybrid Grapevine Population

Venkateswara Rao Kadium, Ramesh Pilli, John Stenger, Collin Auwarter, Xuehui Li, Andrej Svyantek*, and Harlene Hatterman-Valenti
*Corresponding author: Montana State University, Western Ag. Research Center, 580 Quast Ln, Corvallis, MT 59828, USA, andrej.svyantek@montana.edu

Use of Genomic Prediction to improve traits in grapevine breeding programs is new and underexplored despite its potential advantages such as reduced generation interval, increased selection intensity, and improved selection accuracy for quantitative traits. Wine chemistry and sensory quality are two examples of quantitative traits controlled by many genes that are challenging to phenotype due to cost, labor, and the delayed timeline of fruit production with juvenile seedlings. To examine genomic prediction as a tool for selection of wine quality in interspecific grapevine breeding at North Dakota State University, this research assessed wine chemistry and sensory attributes in an interspecific hybrid breeding population. The population was genotyped with ~36000 GBS markers and ~2000 rhAmpSeq markers across all 19 linkage groups. Single vine fermentations of 84 vine samples were carried out following thawing of frozen berries. Quantitative must and wine data were measured prior to inoculation and at the completion of fermentation. Qualitative data was obtained through sensory analysis via a trained panel. The R package BGLR (Bayesian Generalized Linear Regression) was used to train genomic prediction of the traits using five different models with 20-fold cross validation using 60 individuals as training set and remaining 24 as testing population. Preliminary results showed that quantitative wine traits performed adequately with prediction accuracies around ~0.50, but the qualitative sensory traits performed poorly with considerably lower prediction accuracies. These results give insights into the benefits of genomic prediction as a tool in grapevine breeding.

Using Cover Crops to Promote Beneficial Insects in New Mexico Vineyards

Miranda L. Kersten*, Maryel Lopez, and Gill Giese
*Corresponding author: New Mexico State University, Agricultural Science Center at Los Lunas, 1036 Miller Rd. Los Lunas, NM, 87031, USA, mkersten@nmsu.edu

Through appropriate vineyard floor management, vineyards can provide important habitat for pollinators and other beneficial insects. Establishing and maintaining ground cover, such as native vegetation or cover crops, in vineyard rows, can increase soil organic matter, reduce wind and water erosion, improve water infiltration and soil aggregate stability, reduce greenhouse gas emissions, suppress weeds, and increase biodiversity of beneficial insects. By selecting seed mixes that support these insects, vineyards can provide habitat resources (food resources and nesting sites) needed for increased ecosystem services and conservation of these species. We planted native seed mixes at 4 vineyards in central and southern New Mexico in 2022. We selected native flowering plants as studies show these can result in a greater diversity and abundance of bees than weedy vegetation and often support more native pollinators than non-native plant species, and once established may require less maintenance and resources, especially irrigation water. Reseeding will need to occur in 2023 due to low germination rates; however, in preliminary surveys, we collected 16 genera of bees through sweep netting and pan traps at two vineyard sites in central New Mexico. Ten groups of natural enemies were present in sweeps, including spiders, parasitoid wasps, syrphid flies, ladybeetles, Collops beetles, nabid bugs, assassin bugs, minute pirate bugs, lacewings, and big-eyed bugs. Despite seed establishment drawbacks and many lessons learned in the first growing season, vineyards can provide valuable pollinator habitat in our semi-arid climate.

Poster Session Abstracts

Vine Development and Berry Maturation Enhancement Through Cover Crop Planting in a Southern New Mexico Malbec Vineyard
Maryel Lopez*, William Gill Giese, and Miranda Kersten
*Corresponding author: New Mexico State University, 5813 Tarpon Drive, El Paso, TX 79924, USA, maryel16@nmsu.edu
Cover crops in vineyards offer numerous benefits to grape growers, including soil health improvement, addition of organic matter, reduction of soil erosion, weed management, and soil moisture conservation. In this study, we are interested in how these benefits influence the biological and chemical development of vines growing within the cover crop environment. During 2019 and 2020, we conducted a cover crop study in the same vineyard located in Southern New Mexico. Furthermore, we reseeded the whole vineyard during Fall 2022. In 2019, 5 cover crop treatments were planted including two annual crops. However, the treatments in 2020 were reduced to 4 once the annual crops were replaced by a perennial. In 2022, a custom wildflower and perennial pollinator mixture was planted in the whole vineyard to monitor pollinator habitat enhancement. In seeded rows, we found an increase in soil moisture retention; the petioles from vines in seeded rows presented a higher presence of micro-nutrients like nitrate-nitrogen, phosphorous, potassium, and magnesium. A lower abundance of sodium, boron, copper, and iron was also observed. Seeded rows also indicated decreased wed biomass. The phenology of these vines displayed quicker development through the season; their berries had overall higher Total Acidity levels, lower pH levels, and more rapidly increasing sugar concentration during berry maturation. At harvest, berry weight and crop yield increased. Therefore, cover crops in vineyards enhance the vines' development and berry maturation processes through micro -nutrient acquisition and soil moisture conservation.

Exploring the Feasibility of *Vinifera* Grape Production in High Tunnels
Paul E. Read*, Benjamin A. Loseke, and Stephen J. Gamet
*Corresponding author: University of Nebraska - Lincoln, Department of Agronomy and Horticulture, 377J Plant Science Hall, Lincoln, NE 68583, USA, pread1@unl.edu
The University of Nebraska Viticulture Program conducted a two-year research project to evaluate the effect of storage time on the quality and marketability of five table grape cultivars grown in a high tunnel. Following harvest, they were stored in a cooler for six weeks, analyzed weekly for soluble solids, pH, and titratable acidity, and photographed to evaluate visual appeal. Significant differences in pH were recorded among all the cultivars, indicating an overall tendency to increase over time. Titratable acidity, on the other hand, remained stable throughout the six-week study in both years. Soluble solids (degrees Brix) increased over time for most cultivars, with the exception of Marquis, which showed an initial increase in the first four weeks and then declined in the following two weeks. We hypothesize that the increase in degrees Brix was likely because of water loss. All cultivars remained visually appealing and thus marketable for six weeks. This study provides valuable information for grape growers regarding ideal storage conditions and duration for high tunnel-grown table grape cultivars. Regular monitoring of pH and soluble solids levels during storage is crucial to maintain grape quality and marketability. The study also highlights the importance of selecting the appropriate cultivar for specific storage durations to achieve optimal grape quality. The results of this study are of significant importance to grape growers because it allows them to optimize the storage conditions for different grape cultivars and maintain product quality.

International Viticulture and Enology Society – IVES
Roland Riesen*
*Corresponding author: International Viticulture and Enology Society, Chemin de la Louve 8, CH-1196 Gland, Switzerland, roland.riesen@ives-openscience.eu
The **International Viticulture and Enology Society** (IVES) is a non-profit association dedicated to viticulture and enology (https://ives-openscience.eu). Founded in 2017 by a group of leading universities and research institutes, it aims to make the results of scientific research in this field freely available online. IVES publishes **OENO One (**https://oeno-one.eu**),** a peer-reviewed scientific journal, IVES Technical Reviews – Vine and Wine (https://ives-technicalreviews.eu)**,** a peer-reviewed technical journal designed for professionals, and IVES Conference Series – Viticulture and Enology (https://ives-openscience.eu/ives-conference-series), a platform for proceedings from international conferences. IVES is currently supported worldwide by 30 academic members and 44 private and institutional partners. The vision of IVES and its Diamond Open Access model, which is unique in viticulture and enology, will be explained.

Spray and Pray: Foliar Fertilizers Interact with Genotype to Affect Winter Acclimation but Underperform Non-Treated Controls
Avery K. Shikanai, Andrej W. Svyantek, Collin P. Auwarter, and Harlene M. Hatterman-Valenti*
*Corresponding author: North Dakota State University, Department of Plant Sciences, 1360 Abrecht Boulevard, Fargo, ND 58102, USA, h.hatterman.valenti@ndsu.edu
Freezing tolerance depends on successful autumn acclimation. However, in regions were killing freezes can arrive without extended periods of cool weather, grapevines may not sufficiently acclimate. Freezing tolerance depends on morphological and biochemical changes, all mediated by essential plant nutrients. Therefore, we sought to investigate the role of supplemental foliar fertilization in cold acclimation. Calcium (Ca) and potassium (K) additions were investigated for three locally important grapevines ('King of the North', 'Frontenac Gris', and 'Marquette'). Supplemental foliar fertilizer treatments (non-treated control, NPK, NPK + Ca, and NPK + K) were assessed for their effects on growth, acclimation, and cold hardiness. The experiment was also performed under decreasing photoperiods in a growth chamber set to 22° C. Significant time by treatment by cultivar interactions were observed for plant height, mature node development, and periderm formation. 'King of the North' did not hasten acclimation in response to any fertilizer treatment, while 'Marquette' developed mature buds and periderm similarly in response to all treatments. Notably, NPK + Ca decreased growth rate of 'Frontenac Gris', an initial step in winter acclimation. However, decreased growth rate of 'Frontenac Gris' in response to NPK + Ca did not hasten bud maturation or periderm formation. Instead, the greatest periderm formation was observed in the 'Frontenac Gris' non-treated control group. Furthermore, fertilizer treatments did not significantly affect final periderm formation, or bud maturation for 'King of the North' or 'Marquette'. Together, these results suggest that evaluated foliar fertilizers are not viable means to hasten cold acclimation or freezing tolerance in these varieties. However, further research is needed to understand if temperature cues can interact with nutrient status to improve acclimation.

Poster Session Abstracts

Fractionation and Characterization of Polyphenols and Tannins from Grapevine Leaf Tissue

Stephan Sommer*, Marnelle Salie, Esteban Garcia, Anthony Reyes, Steven C. Ebersole, Rachel P. Naegele, Sonet Van Zyl
*Corresponding author: University of Missouri, Grape and Wine Institute, 223 Eckles Hall, Columbia, MO 65211, USA, ssommer@missouri.edu

Plants accumulate different types of phenolic material in their tissue as a response to biotic as well as abiotic stress. Monomeric polyphenols and smaller oligomers can serve as protection against ultraviolet radiation or prevent oxidative tissue damage, while larger molecules such as tannins can be the plant's reaction to an infection or physical damage. Therefore, characterization, profiling, and quantification of diverse phenolics can provide valuable information about the plant and the stress status at any given time. A method was developed that allows the extraction of polyphenols and tannins from leaf tissue, followed by fractionation and quantification. Extraction was performed with liquid nitrogen and 30% acetate- buffered ethanol. The separation of tannins from smaller polyphenols was achieved by bovine serum albumin precipitation and resuspension in a urea-triethanolamine buffer. Tannins were reacted with ferric chloride and analyzed spectrophotometrically. Monomeric non-protein-precipitable polyphenols were then analyzed via HPLC-DAD from the supernatant of the precipitation sample. This way, a more complete spectrum of compounds can be analyzed from the same plant tissue extract. The method was tested with a variety of grape cultivars and showed great improvements of the chromatography that would otherwise be impacted by tannins. With the fractionation suggested here, hydroxycinnamic acids and flavan-3-ols can be separated and quantified with good accuracy and precision. Stress status and plant responses can be monitored using the total concentrations of polyphenols and tannins, as well as the ratio between those compound classes.

Freeze Storage and Maceration Technique Effects on Microscale Winemaking of Cold Climate Frontenac and Honeyberry

Brent C. Trela*
*Corresponding author: Northern Crops Institute, 1240 Bolley Dr., Fargo, ND 58102, USA brent.trela@ndsu.edu

Chemical and sensory analyses were evaluated on wines made from fresh and frozen Frontenac grapes and frozen honeyberries (haskap) individually fermented at 300 g microscale using four different pomace maceration techniques: 1) continuously submerged cap; 2) emersion blended/accentuated cut edges (ACE); 3) twice-daily cap submersion/plunging and 4) twice-daily inversion by container rotation. The musts were fermented with 0, 1, 2, and 5 days of skin contact after yeast inoculation. Sample collection occurred at crush, press, and first racking at 30 d for fermentation progress, basic chemistry, color attributes, and total phenolics. Wine sensory evaluation occurred 90 d after inoculation. ACE and continuous cap submerged wines from frozen grapes are expected to have higher pH, total phenolics, red color, tannin, bitterness, and astringency than other methods. Fermentation and analyses are currently in progress. These results will reveal the differences among fresh and frozen fruit, maceration duration, and treatments to characterize their chemical and sensory impacts. The results will support rapidly approximating macro volume cellar technique results on a laboratory microscale and stylistic winemaking decisions.

Virus Infections Impact on Berry Juice Quality in the Interspecific Cultivar Norton

Dean S. Volenberg*, Cooper R. Adams, Harper F. LaFond, Zhiwei D. Fang, Christine Spinka, and James E. Schoelz
*Corresponding author: Division of Plant Science & Technology, 214 Waters Hall, Columbia, MO 65211, USA, volenbergd@missouri.edu

Grapevine leafroll-associated virus 3 (GRLaV-3) and Grapevine red blotch virus (GRBV) are the two viruses that are considered to pose the greatest threat to grape and wine production in the United States. Both of these viruses are prevalent in Missouri vineyards, and in particular, in the cultivar Norton. However, most research on the impact of GRBV and GLRaV-3 has been conducted in *Vitis vinifera*, and little is known about how they might affect the interspecific cultivars commonly grown in Missouri. In this study, we identified 10 Norton vines infected with either GLRaV-3, GRBV, or neither virus in a Norton vineyard, and we assessed individual berry weight, Brix, titratable acids (TA) and pH at seven (2021) or four (2022) different timepoints. We also determined the number of grape clusters per vine and pruning weight. In quantifying berry weight, Brix, TA, and pH, there were no significant differences between vines infected with GLRaV-3 and virus-free vines. Furthermore, GLRaV-3 infection had no effect on cluster numbers per vine or pruning weight. By contrast, berries from vines infected with GRBV were significantly larger than berries from healthy vines and the TA of the juice was significantly higher. Furthermore, pruning weight of GRBV-infected vines was significantly lower than healthy vines in only 2021. No significant impact on Brix or pH was observed between juice from GRBV-infected vines and healthy vines over 2 years. These results indicate that Norton may be tolerant to GLRaV-3 infection and may be only moderately affected by GRBV infection.

Profiling of Texas Grapevines using Untargeted Mass Spectrometry-based Metabolomics

Diana Zamora-Olivares*, David Sarabia, Gabriella Montemayor, Soham Datar, Alexia Telios, Nevin Lewis, and Eric V. Anslyn
*Corresponding author: , The University of Texas at Austin, 110 Inner Campus Drive, Austin, Texas 78712, USA, diana_z.o@utexas.edu

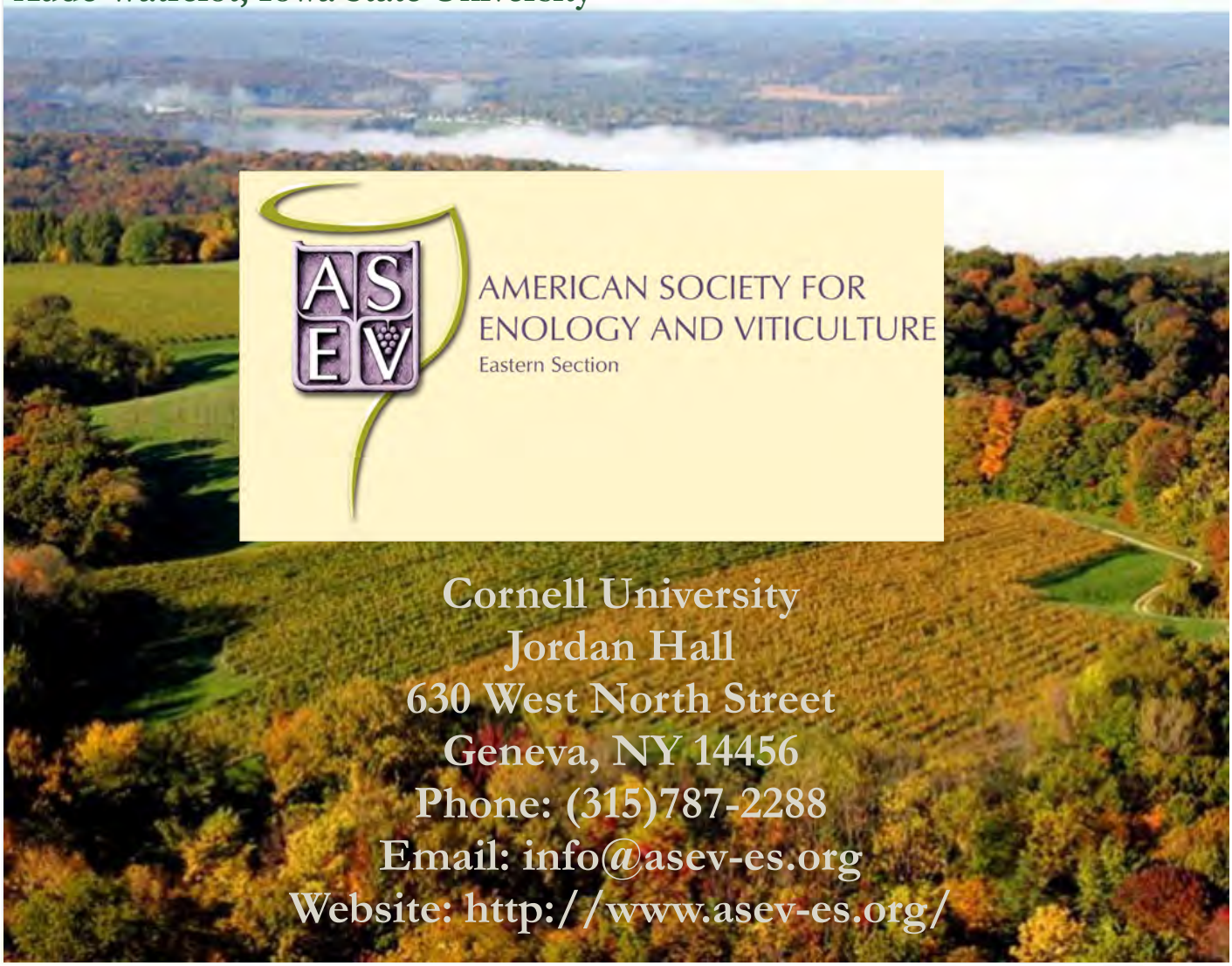
Vitis vinifera is economically one of the most important plant species. Worldwide, the U.S.A. is the fourth highest wine producing country, where 87% of grapes harvested from Vitis vinifera are used for wine production. Top state producers include Texas, which encompasses eight American Viticultural Areas (AVAs). Comprehensive characterization of metabolites and biomarkers to uncover signatures specific to the producing regions has been accomplished by leading wine-producing countries. Central Texas endures harsh environmental conditions such as heatwaves and drought during the growing season in comparison to other regions, but wine produced in this region is considered of singular high quality, showing a major increase in wine production in the last decade. Thus, it is imperative to identify wine metabolites and biomarkers specific to the Central Texas region. To our knowledge, there is no research precedent on the relationships between grapevine physiology-metabolism and berry-wine composition over the course of a growing season. Herein, the goal is to characterize for the first time, the metabolomic profile of 17 grapevines from 5 vineyards located in the Texas Hill Country and Mesa AVAs using untargeted mass-spectrometry-based metabolomics. The second aim is to analyze multivariate data to obtain information about correlations, similarities, and differences between identified metabolites with their grapevine varietals using metabolomics software. The following metabolomic workflow stages have been completed: 1) harvest of grapevine samples, 2) extraction of metabolites using a liquid-liquid phase extraction 3) experimental analysis using high-resolution mass-spectrometry for untargeted metabolomic profiling, and 4) identification of over 100 key metabolites.

2022-2023 ASEV-Eastern Section Officers and Board of Directors

Chairman: Mark Hoffmann, North Carolina State University
Chair-Elect: Gill Giese, Arkansas State University
Past Chair: Jim Willwerth, Brock University
Secretary: Justin Scheiner, Texas A&M AgriLife
Treasurer: Elizabeth Chang, Virginia Tech
Section Representative: Anna Katharine Mansfield, Cornell University
Section Administrator: Renee Threlfall, University of Arkansas

Directors

Andreea Botezatu, Texas A&M University
Michela Centinari, Penn State
Matthew Clark, University of Minnesota
Michael Cook, Texas A&M University
Nathan Eason, University of Georgia
Aude Watrelot, Iowa State University



Cornell University
Jordan Hall
630 West North Street
Geneva, NY 14456
Phone: (315)787-2288
Email: info@asev-es.org
Website: http://www.asev-es.org/