

Viticulture and Enology Research Center

California Agricultural Technology Institute

Jordan College of Agricultural Sciences and Technology

Annual Report 2020 - 2021

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By

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Viticulture and Enology Research Center

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Progress towards 2020-21 Goals and Objectives

The last set of five goals was established based on input from several sources including faculty, staff, JCAST leadership, and the Viticulture and Enology Industry Advisory Board. Some of these goals were considered long-term objectives that were not meant to be achieved in one year. Progress towards all goals is reported annually, however, some objectives will carry forward into the next fiscal year until they can be closed.

I. Hire a permanent laboratory and research technician stateside to support faculty research programs and research winemaking in VERC.

This goal was not achieved.

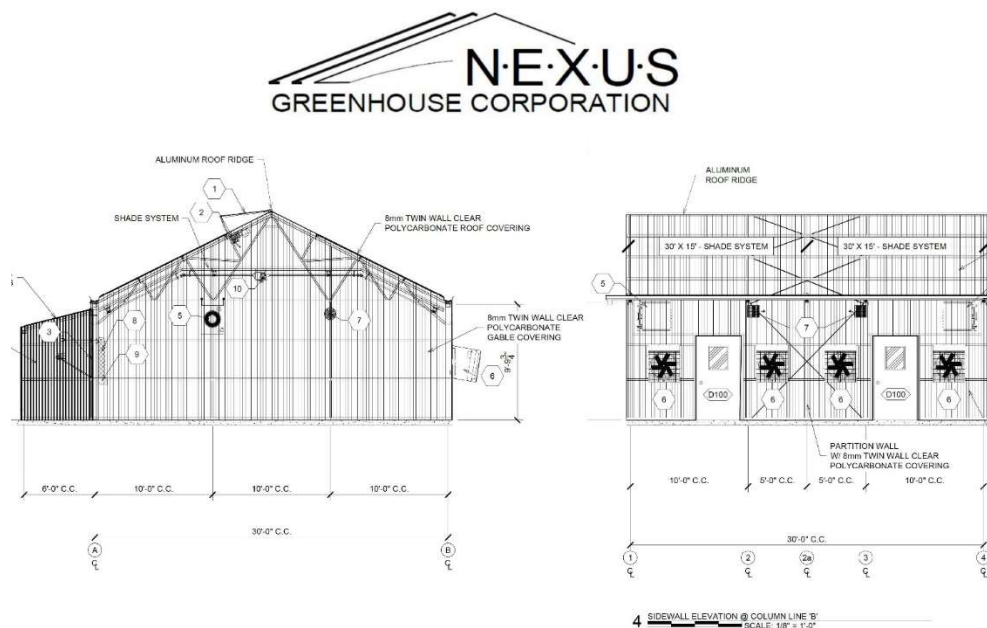
The position description was drafted, approved, and advertised as planned. After the posting closed, a search committee selected and interviewed qualified candidates and was getting ready to make a hiring recommendation when the search was cancelled. Budgets restrictions and changes to the existing personnel structure on campus resulted in a hiring freeze that is still in effect. After the restrictions were lifted in Spring 2021, the position was posted again and the search committee is in the process of working with the applications. Since the posting is still active, there is no definite timeline for the hiring process at this point.

This goal carries forward into the next year and is expected to be completed.

II. Renovate and expand research space with priority set on a greenhouse and the research winery.

There was significant progress made towards this goal.

The new construction of the **greenhouse** was officially started in January 2021 with the groundbreaking ceremony. The Nexus Greenhouse Corporation delivered plans for a 30' by 30' structure shown below.



After a short delay due to missing approvals, construction officially started in June 2021. A contractor is currently preparing the construction site, since the greenhouse manufacturer will only deliver everything above ground. All connections to water, sewer, electricity, and network including the sloped concrete foundation will be finished by early Fall 2021. The greenhouse will be pre-manufactured and installed during the Fall with an expected completion and inspection date of January 2022.

The renovation of the **research and teaching winery** is currently further delayed due to unexpected problems with the building structure that were discovered during a review by an engineering company. The architects that were hired to develop a concept of the space, delivered a plan that would expand the space to include a covered crush pad as well as a multi-functional room for an educational brewery and distillery. The rendering of their plans is shown below.



Since the roof needs to be replaced due to age, the plan is to extend the new roof across the whole building and the crush pad. Currently, the engineers discovered problems with the foundation of the building and the strength of the existing walls. Proposals to resolve these issues are developed and a final set of plans is expected to be presented to the planning committee in late 2021.

This goal carries forward into the next year.

III. Address accessibility, wayfinding, and compliance in all laboratories and buildings associated with Viticulture and Enology.

This goal was not achieved.

Due to ongoing COVID-19 restrictions and budgetary restraints, this project is on hold. When the majority of the campus community is expected to return to campus in the Fall 2021, this goal will be brought up again. Work orders for some of the compliance issues in VERC laboratories have already been submitted and will be addressed as soon as possible.

This goal carries forward into the next year.

IV. Elaborate on existing assistantship and scholarship opportunities to increase accessibility and establish new opportunities for graduate student research.

There was significant progress made towards this goal.

In addition to the existing VERC assistantships that are maintained through the university and AgOne, one additional assistantship was established during the past fiscal year. Laffort USA, a company that is currently supporting research and teaching in viticulture and enology at Fresno State, committed to a five year assistantship in enology with an annual payout of \$2,500.

The only assistantship that is currently unavailable is the Garabedian Family Assistantship. The guidelines to receive this award are outdated and too restrictive at the moment and need to be updated. As soon as this can be done, this goal will be closed.

V. Reorganize laboratory and equipment allocation to further align VERC with policies and procedures in JCAST.

This goal was achieved.

A group of faculty and staff developed an equipment database system for the Jordan College that is based on the VERC database that was established last year. The idea of sharing resources and making equipment available to researchers across the disciplines will help to spark collaboration and better utilize what was already purchased. The policy that specifies all the details is finished and was submitted for approval to the appropriate entities on campus. The system is expected to be available to faculty and staff at some point during the Fall semester.

Since all the work on this project is completed, the goal will be closed.

Description of 2020-21 Activities

Due to the COVID-19 precautions and restrictions, professional activities in person were very limited. The following lists show all the virtual meetings, workshops, and seminars that were offered to stay in touch with the industry and the community.

Professional events attended and/or organized

08/04/2020	Fresno State Grape Day (virtual event)
08/06/2020	Organic Fertilizer Association Sustainable and Organic Production (Webinar)
08/07/2020	Himalayan College of Agricultural Sciences and Technology, Kathmandu, Nepal (Webinar)
08/09 – 08/13/2020	ASHS Annual Conference 2020, Florida (virtual event)
08/26/2020	Fresno State Eno-Vit 199 Seminar Series (Webinar)
09/02/2020	Fresno State Eno-Vit 199 Seminar Series (Webinar)
09/09/2020	Fresno State Eno-Vit 199 Seminar Series (Webinar)
09/09/2020	Western Integrated Pest Management Center (Webinar)
09/10/2020	Fresno State Winery online event
09/13/2020	Fresno State JCAST and Ag One Virtual Ag Boosters BBQ
09/16/2020	Fresno State Eno-Vit 199 Seminar Series (Webinar)
09/18/2020	Virtual Annual Department of Viticulture & Enology Welcome Back Orientation for new and returning students, staff, and faculty
09/23/2020	Fresno State Eno-Vit 199 Seminar Series (Webinar)
09/30/2020	Fresno State Eno-Vit 199 Seminar Series (Webinar)
10/07/2020	Fresno State Eno-Vit 199 Seminar Series (Webinar)
10/14/2020	Fresno State Eno-Vit 199 Seminar Series (Webinar)
10/19 – 11/20/2020	Food, Family, and Farm Month
10/21/2020	Fresno State Eno-Vit 199 Seminar Series (Webinar)
10/28/2020	Fresno State Eno-Vit 199 Seminar Series (Webinar)
11/04/2020	Fresno State Eno-Vit 199 Seminar Series (Webinar)
11/05/2020	Institute for Food and Ag (IFA) 39th Annual Ag Business Conference Virtual “Wine Sales Analytics, Economics and Consumption Changes Session”
11/05/2020	Universidad Autonoma de Baja California, Facultad de Enologia y Gastronomía 4 th Edition of the Virtual Conference, Ensenada, Mexico

11/06/2020	Enartis Webinar Series
11/09 – 12/04/2020	Sustainable Ag Expo & Int'l Sustainable Winegrowing Summit, San Luis Obispo (virtual event)
11/10 – 11/11/2020	Tree & Vine Expo by Malcolm Media, Turlock (virtual event)
11/12/2020	E & J Gallo Winery Recruiting Webinar presented by Fresno State Viticulture & Enology / Jordan College / Career Services
11/12/2020	9 th Annual Vineyards & Wineries Continuing Education Class Series by the Napa County Farm Bureau & Ag Commissioner's Office (Webinar)
11/17 – 11/18/2020	XIII International Terroir Congress, Australia (virtual event)
11/18/2020	Fresno State Eno-Vit 199 Seminar Series (Webinar)
11/19/2020	Food, Family & Farm Month "Wine Down" virtual wine tasting by the Fresno State Winery
11/19 – 11/20/2020	Cal Poly SLO Food and Environmental Sciences Research (CAFES) Seminar Series
12/02/2020	Fresno State Eno-Vit 199 Seminar Series (Webinar)
01/25 – 01/26/2021	California Weed Society Annual Conference (virtual event)
01/26 – 01/29/2021	Virtual Unified Wine & Grape Symposium Conference and Trade Show
01/27/2021	Virtual Fresno State Annual Alumni & Friends Reunion
01/29/2021	Fresno State Viticulture Greenhouse Virtual Groundbreaking Event
02/01/2021	Fresno State Viticulture & Enology Virtual Resume Workshop
02/02/2021	Lodi Grape Day UCANR (Webinar)
02/03/2021	Harvesting the Leaders of Tomorrow Virtual Career & Internship Fair, JCAST/USDA
02/09 – 02/11/2021	World Ag Expo, Virtual presentations including 2020 Grape Day video
02/10/2021	Fresno State Eno-Vit 199 Seminar Series (Webinar)
02/17/2021	Fresno State Eno-Vit 199 Seminar Series (Webinar)
02/18/2021	Meet The Wine Group (Virtual Session)
02/21/2021	Fresno County Superintendent of Schools Virtual STEM for Girls Conference
02/24/2021	Fresno State Eno-Vit 199 Seminar Series (Webinar)
03/03/2021	Fresno State Eno-Vit 199 Seminar Series (Webinar)
03/10/2021	Fresno State Eno-Vit 199 Seminar Series (Webinar)

03/11/2021	Fresno State Department of Viticulture and Enology Spring 2021 Commitment to Success: Meet with Alumni Virtual Series
03/17/2021	Fresno State Eno-Vit 199 Seminar Series (Webinar)
03/24/2021	Fresno State Eno-Vit 199 Seminar Series (Webinar)
03/25/2021	Fresno State Department of Viticulture and Enology Spring 2021 Commitment to Success: Meet with Alumni Virtual Series
04/07/2021	Fresno State Eno-Vit 199 Seminar Series (Webinar)
04/08/2021	Fresno State Department of Viticulture and Enology Spring 2021 Commitment to Success: Meet with Alumni Virtual Series
04/14/2021	Fresno State Eno-Vit 199 Seminar Series (Webinar)
04/18/2021	Fresno State Top Dog Ceremony – televised on ABC 30
04/21/2021	Fresno State Eno-Vit 199 Seminar Series (Webinar)
04/22/2021	Fresno State Department of Viticulture and Enology Spring 2021 Commitment to Success: Meet with Alumni Virtual Series
04/26/2021	Napa Valley Wine Tech Group Meeting (virtual event)
04/28/2021	Fresno State Eno-Vit 199 Seminar Series (Webinar)
04/30/2021	Ag Scholar Recipient Awards Virtual Ceremony hosted by Assemblyman Jim Patterson
05/03/2021	JCAST Honors Program Virtual Research Presentations
05/05/2021	Fresno State Eno-Vit 199 Seminar Series (Webinar)
05/07/2021	Fresno State High Impact Practices Virtual Symposium
05/13/2021	Fresno State Department of Viticulture and Enology Virtual Graduate Recognition - Celebrating the Class of 2021 Video
05/13/2021	Santa Rosa Junior College Lecture (virtual event)
06/21 – 06/24/2021	ASEV Annual Conference 2021 (virtual event)
06/23/2021	SJVWA Grower Education Series

Effectiveness: The majority of the events addressed faculty and staff outreach to the grape and wine industries in support of their research projects. These activities are very effective in establishing and maintaining contact with growers and winemakers across CA. The meetings promote interactions with industry, establish opportunities for collaboration, and confirm the importance and relevance of the Viticulture and Enology department and research center to stakeholders.

Presentations (Oral, Poster, Conference Proceedings)

Name of faculty in bold * indicates student involvement

Brillante, L. (2020). Remote sensing in viticulture. San Joaquin Valley Winegrowers Association Research Roadshow. June 4th, 2020.

Brillante, L. (2020). Vineyard soil reclamation by different forms and doses of CaSO₄ Amendments in the San Joaquin Valley of California, Fresno State Grape Day, August 4, 2020, virtual event.

Brillante, L. (2020). Organic Fertilizer Association of California, Sustainable & Organic Production Webinar - Organic Fertilizer Association of California, August 6, 2020.

Brillante, L. (2020). Vineyard soil reclamation by different forms and doses of CaSO₄ amendments in the San Joaquin Valley of California. Universidad Autonoma de Baja California, Facultad de Enologia y Gastronomía. November 5, 2020.

Brillante, L. (2020). Grapevine responses to water deficit and heat stress. Tree & Vine Expo, November 11, 2020, virtual event.

Brillante, L. (2021). Within-vineyard variability in grape composition at the estate scale can be assessed through machine-learning modeling of plant water status in space and time. A case study from the hills of Adelaide District AVA, Paso Robles, CA, USA. XI International Terroir Congress Adelaide 2021. IVES Conference Series, n.6686.

Brillante, L. (2021). Three ways to improve color in red wine grapes. American Vineyard Magazine (Online Video). March 12, 2021.

Brillante, L. (2021). The HYPERVID project, hyperspectral virus identification and detection. Napa Valley Wine Tech Group, April 26, 2021.

Brillante, L. 2021. Assisting irrigation scheduling through machine-learning modeling of grapevine water status in space and time. 72nd National ASEV Conference, June 21 – 24, 2021, virtual event.

Celaya-Finke, G.*, K. Waselkov, L. Sosnoskie, and **A. Shrestha** (2021). Effects of moisture and salt stress on germination of common waterhemp (*Amaranthus tuberculatus*). California Weed Science Society Annual Meeting, virtual event.

De Censi, P.*, Singh, K.*, Sanjuan, A., **Brillante, L.** (2021). Use of VIS-NIR Hyperspectral Imaging to Quantify Anthocyanins, Soluble Solids and Titratable Acidity in Grape Berries. 72nd National ASEV Conference, June 21 – 24, 2021, virtual event.

Galvan, K.*, **A. Shrestha**, and K. Waselkov (2021). Effects of salinity and pH on common waterhemp (*Amaranthus tuberculatus*) germination. California Weed Science Society Annual Meeting, virtual event.

Groves, L.*, Mehlman, M.*, Person, E., Coetzee, J., **Van Zyl, S.** (2021). Evaluating Foliar applied Calcium Carbonate on Table Grapes and Observing Cold Storage Potential. 72nd National ASEV Conference, June 21 – 24, 2021, virtual event.

Kampen H.* and Benitez B.* (2021). Impact of Yeast Derivative Treatment on Smoke-Tainted Cabernet Sauvignon Wine. 72nd National ASEV Conference, June 21 – 24, 2021, virtual event. (supervised by Dr. Q. Sun).

Kampen H.* and Benitez B.* (2021). Impact of Activated Carbon and Polyvinylpolypyrrolidone Treatments for Amelioration of Smoke Tainted Cabernet Sauvignon Wine. 72nd National ASEV Conference, June 21 – 24, 2021, virtual event. (supervised by Dr. Q. Sun).

Lloyd, J.*, Morales, G.*, **Sommer, S., Van Zyl, S.** (2021). Fermentation kinetics and sensory of microbially impacted red and white wine. 72nd National ASEV Conference, June 21 – 24, 2021, virtual event.

Lopez, A.J.*, **A. Shrestha**, L. Synoskie, and K.E. Waselkov. (2021). Origins of *Amaranthus tuberculatus* (waterhemp) in Central Valley agroecosystems: A population genetics approach using genotyping-by-sequencing. California Weed Science Society Annual Meeting, virtual event.

Lum, R.*, **A. Shrestha**, and K.E. Waselkov. (2021). Characterizing herbicide resistance in Southwestern U.S. and invasive California populations of *Amaranthus palmeri*. California Weed Science Society Annual Meeting, virtual event.

Morales, G.*, Lloyd, J.*, **Sommer, S., Van Zyl, S.** (2021). Calibration of microbial spoilage indicators via mycobiota levels in wine grapes. 72nd National ASEV Conference, June 21 – 24, 2021, virtual event.

Pedroza, M. (2020). Demonstration of Biopotentials as a New Tool to Evaluate Sensory Stimulation Evoked by Wine Aroma, Fresno State Grape Day, August 4, 2020, virtual event.

Pedroza, M. (2020). Biopotentials as a new tool to evaluate sensory stimulation evoked by wine aroma, 4to Seminario de investigacion de “De la vid al vino”, Ensenada, Baja California, Mexico (Online conference, 11/5/2020).

Pedroza, M. (2020). Internet of Things and Winemaking. Enartis Webinars (Online, 11/5/2020).

Pedroza, M. (2021). Wine faults: Sulfur. Invited Lecture: Santa Rosa Junior College. Santa Rosa, CA. 5/13/2021.

Pedroza, M. (2021). Characterization of wine aroma pleasantness using facial muscular activity. 14th Pangborn Sensory Science Symposium, Sustainable Sensory Science, (Online conference, 08/09/21 – 08/12/21).

Pedroza, M. (2021). Perceptual differences of wine impact odorants between consumers and industry experts. 72nd National ASEV Conference, June 21 – 24, 2021, virtual event.

Pineda, S.*, **Van Zyl, S.** (2021). Effects of color and pigmentation on Crimson Seedless grapes from OR-151 applications. JCAST Honors program presentations, May 3, 2021, virtual event.

Shrestha, A. (2020). Agroecology: a pathway to agricultural sustainability. Himalayan College of Agricultural Sciences and Technology, Kathmandu, Nepal, August 7, 2020 (invited webinar).

Shrestha, A. (2020). A developing and developed countries perspective on implementation of integrated weed management. Western IPM Center, Davis, CA, September 9, 2020 (invited webinar).

Shrestha, A. (2020). Vineyard weed management issues: issues, challenges, and opportunities. Sustainable Ag & International Sustainable Winegrowing Summit, Nov. 9 – Dec. 4, 2020 (invited webinar).

Shrestha, A. (2020). Cover-crop crimping, practical applications in vineyards. 9th Annual Vineyards & Wineries Continuing Education Class Series, Napa County Farm Bureau Foundation and the Ag Commissioners Office, Nov. 12, 2020 (invited webinar).

Shrestha, A. (2021). Aspects of vineyard weed management. Virtual Lodi Grape Day, University of California Agriculture and Natural Resources, Feb. 2, 2021 (invited webinar).

Singh, K.*, Daane, K., **Brillante, L.** (2021). Control of Vine Mealybug (*Planococcus ficus* Signoret) in Organic Viticulture. 72nd National ASEV Conference, June 21 – 24, 2021, virtual event.

Singh, K.*, De Censi, P.*, **Brillante, L.** (2021). Monitoring Grapevine Response to Calcium Based Soil Amendments through Remote Sensing in San Joaquin Valley, California. 72nd National ASEV Conference, June 21 – 24, 2021, virtual event.

Sommer, S., J. F. Harbertson, J.F., F. Weber, F., Cohen, S.D. (2020). Polysaccharides in Wine Production. Fresno State Grape Day, August 4, 2020, virtual event.

Sommer, S., Anderson, A.F.*, Fricke, L., Larsen, L., Weber, F. (2021). Effect of Polysaccharide Extraction and Addition Strategies on Color Stability and Pigment Formation in Red Wines. 72nd National ASEV Conference, June 21 – 24, 2021, virtual event.

Sommer, S., Tondini, F. (2021). Sustainable Replacement Strategies for Bentonite in Wine using Renewable Fining Agents. 72nd National ASEV Conference, June 21 – 24, 2021, virtual event.

Sommer, S. (2021). Flow Cytometry to Monitor Yeast during Fermentation. AOAC International - Pacific Southwest Section Annual Meeting, June 29 – 30, 2021, virtual event.

Steinhauer, K.*, **A. Shrestha**, J. Bushoven, and K.E. Waselkov. (2021). Environmental conditions on postemergence herbicides control of glyphosate-resistant junglerice (*Echinochloa colona*). California Weed Science Society Annual Meeting (Virtual).

Sun, Q. (2020). Impact of Deficit Irrigation and Mechanical Leafing on Yield and Berry/Wine Composition of Cabernet Sauvignon in the SJV. Fresno State Grape Day, August 4, 2020, virtual event.

Sun, Q. (2020). 2019 Cabernet Sauvignon Trial Update. The Wine Group Inc. Grape Growers and Winemakers meeting, virtual event.

Sun, Q. (2020). Impact of Deficit Irrigation and Mechanical Leafing on Yield and Berry/Wine Composition of Cabernet Sauvignon in the SJV. Fourth Edition of the Virtual Seminar from Vine to Wine at Autonomous University of Baja California (UABC), Mexico, virtual event.

Sun, Q. (2020). Impact of Deficit Irrigation and Mechanical Leafing on Yield and Berry/Wine Composition of Cabernet Sauvignon in the SJV. College of Agriculture, Food and Environmental Sciences (CAFES) Research Seminar Series, California Polytechnic State University. Virtual event.

Sun, Q., Zhuang G., and Wang Z. (2020). Backyard Soil, Water, Fertilizer Management and Grape Growing. Chinese American Faculty Association (CAFA) Annual Community Service Series, virtual event.

Sun, Q. (2021). My STEM Career. Fresno County Superintendent of Schools Virtual STEM for Girl Conference, virtual event.

Sun, Q., Zhuang S.J., Marinos, A.*, Wilson, J., and Garcia, D.*. (2021). Investigate the Differences of Cabernet Sauvignon Grapes and Wines Between Madera AVA and Other California Wine Regions. 72nd National ASEV Conference, June 21 – 24, 2021, virtual event.

Vasquez, K.*, Fuchs M., Cooper, M., **Brillante, L.** (2021). Remote Sensing-Assisted Scouting of Virus Infections in Vineyards. 72nd National ASEV Conference, June 21 – 24, 2021, virtual event.

Zhuang, S.J. and **Sun, Q.** (2021). Impact of Mechanical Leafing on Yield and Berry Composition of Ruby Cabernet grown in the San Joaquin Valley of California. 72nd National ASEV Conference, June 21 – 24, 2021, virtual event.

Zhuang, S.J. and **Sun, Q.** (2021). Effect of Deficit Irrigation and Mechanical Leafing on Yield, Berry and Wine Chemistry of Cabernet Sauvignon in California. 72nd National ASEV Conference, June 21 – 24, 2021, virtual event.

Publications (peer-reviewed and trade journals)

Bois B., Pauthier B., **Brillante L.**, van Leeuwen C., Mathieu O., Leveque, J., Castel, T., Richard Y. (2020). Sensitivity of grapevine soil–water balance to rainfall spatial variability at local scale level. Frontiers in Environmental Science 8:110.

Brillante, L., Bonfante, A., Bramley, R., Tardaguila, J., Priori. (2020). Unbiased scientific approaches to the study of terroir are needed! Frontiers in Earth Sciences 8:539377. doi.org/10.3389/feart.2020.539377.

Brillante, L., Martinez-Luscher, J., Yu, R., Kurtural, S. K. (2020). Carbon isotope discrimination ($\delta^{13}\text{C}$) of grape musts is a reliable tool for zoning and the physiological ground-truthing of sensor maps in precision viticulture. Frontiers in Environmental Science 8:176.

Brillante, L. (2020). Autonomous predictions of vineyard yield – Machine learning modeling of remote sensing and historical data assist at the block level. Progressive Crop Consultant. 09/2020.

Brillante, L. (2020). Autonomous predictions of vineyard yield: machine-learning modeling of remote sensing and historical data assiste at the block level. My Ag Life (podcast).

Cecotti, H., Rivera, A., Farhadloo, M., & **Pedroza, M. A.** (2020). Grape detection with convolutional neural networks. Expert Systems with Applications, 159, 113588. doi:10.1016/j.eswa.2020.113588.

Martinez-Lusher, J., Chen, C., **Brillante, L.**, Kurtural, S. K. (2020). Mitigating heat wave and exposure damage to ‘Cabernet Sauvignon’ wine Grape with partial shading under two irrigation amounts. Frontiers in Plant Sciences 11:579192.

Mitchell, J., **A. Shrestha**, T. Willey, and J. Warnert. (2020). Improving farming systems for the common good. Organic Farmer: 36-38. <http://organicfarmermag.com/2020/08/improving-farming-systems-for-the-common-good/>.

Priori, S., **Brillante, L.**, Bonfante, A., Vaudour, E., Winter, S., Conticelli, S. (2021). Editorial: Biogeosciences and wine, the management and environmental processes that regulate the terroir effect in space and time. Frontiers in Environmental Sciences. doi: 10.3389/fenvs.2021.711347.

- Shrestha, A.,** M.P. Anwar, A.K.M. Mominul Islam, T. Gurung, S. Dhakal, A. Tanveer, M.M. Javaid, M. Nadeem, and N.A. Ikram. (2021). Weed science as a new discipline and its status in some south Asian universities and colleges: Examples from Bangladesh, Bhutan, Nepal, and Pakistan. CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources. Online: <http://dx.doi.org/10.1079/PAVSNNR202116017>.
- Sommer, S.,** Tondini, F. (2021). Sustainable Replacement Strategies for Bentonite in Wine Using Alternative Protein Fining Agents. Sustainability 13(4): 1860. doi:10.3390/su13041860.
- Sun, Q.,** Groves, L.* and **Van Zyl S.** (2021). Viticultural Manipulation and New Technologies to Address Environmental Challenges Caused by Climate Change. Wine Business Journal Special Issue. Abstract Accepted.
- Sun, Q.,** Vasquez, K.*, and Zhuang SJ. (2021). The Impact of Labor Shortage and Adaptation Options for Vineyards. Wine Business Journal Special Issue. Abstract Accepted.
- Sun, Q.,** Zhuang, S.J., and Asci S. (2021). Berry Composition and Economic Analysis of Cabernet Sauvignon Treated by Mechanical Leafing and Deficit Irrigation. Catalyst: Discovery into Practice. Submitted.
- Yu, R., **Brillante, L.,** Torres, N., Kurtural, S.K. (2021). Proximal sensing of vineyard soil and canopy vegetation for determining vineyard spatial variability in plant physiology and berry chemistry. OENO One, vol. 55, No. 2.
- Yu, R., **Brillante, L.,** Martínez-Lüscher, J., Kurtural, S.K. (2020). Spatial Variability of Soil and Plant Water Status and Their Cascading Effects on Grapevine Physiology Are Linked to Berry and Wine Chemistry. Frontiers in Plant Science, 11:790.

Grants and funding proposals

- Brillante, L.** (2020). On-the-go mapping of grape composition in the field through hyperspectral machine-vision. Submitted to the Agricultural Research Institute (ARI), project duration 2 years, funding requested \$88,182.
- Brillante, L.** (2020). On-the-go mapping of grape composition in the field through hyperspectral machine-vision. Submitted to the American Vineyard Foundation (AVF), project duration 2 years, funding requested \$60,500.
- Brillante, L.** (2020). Control of vine mealybugs in organic production (*Planococcus ficus* Signoret). Submitted to the American Vineyard Foundation (AVF), project duration 2 years, funding requested \$48,500.
- Brillante, L.** (2020). Physiological responses of grapevine to salt stress and remediation by CaSO₄ amendments in Central Valley of California. Submitted to the American Vineyard Foundation (AVF), project duration 2 years, funding requested \$39,400.
- Brillante, L.** (2020). Collaborative Research: HDR DSC Engaging Underserved Communities of Learners in Data Science (EUCLIDS) Program in the Central Valley. Submitted to the National Science Foundation (NSF) - Data Science Corps, project duration 3 years, funding requested \$100,000.

Brillante, L. (2020). Solar panel collocation and grape production in vineyards. Submitted to DOE – EERE Solar Energy Technologies, project duration 3 years, funding requested \$225,000.

Brillante, L. (2020). Enhancing Education and Research Capacity in Data Assimilation for the Spatial Analysis of Soils and Crop Performance. Submitted to the USDA NLGCA, project duration 3 years, funding requested \$149,062.

Brillante, L. (2020). Image processing and pattern recognition courses for agricultural technology: a project-based learning with research experience approach. Submitted to the USDA HIS, project duration 3 years, funding requested \$250,000.

Cecotti, H., **Pedroza, M., Brillante, L.** (2020). Applications of image processing and pattern recognition in agricultural technology with project-based learning courses and research experience. Submitted to the National Institute of Food and Agriculture (NIFA), project duration 4 years, funding requested \$249,900.

Licon, C., **Pedroza, M.** (2020). Increasing the diversity of cheeses in the Central Valley: characterization of pressed cheese soaked in wine. Submitted to the Agricultural Research Institute (ARI), project duration 1 year, funding requested \$10,000.

Licon, C., **Pedroza, M.**, Shulze, J., Pheasant, S., Dervishian, G., Sommer, S. (2020). Characterization of food volatiles by Stir Bar Sorptive Extraction (SBSE) coupled with Gas Chromatography (GC) - tandem Mass Spectrometry (MS). Submitted to the USDA-Equipment Grant Program, project duration 3 years, funding requested \$494,700.

Licon, C., **Pedroza, M.**, Pheasant, S. (2020). US Wine and Cheese Export Promotion for Burma. Submitted to USDA-Cochran, project duration 2 years, funding requested \$86,800.

Pedroza, M. (2020). Bodily responses as a new parameter to estimate emotions evoked by wine aroma: practical applications. Submitted to the Agricultural Research Institute (ARI), project duration 1 year, funding requested \$10,000.

Pedroza, M., Sanchez, D. (2020). Smoke taint detection and recognition thresholds in California red wines and mitigation strategies. Submitted to the Agricultural Research Institute (ARI), project duration 1 year, funding requested \$46,000.

Pedroza, M., Pachelbel, R., Sommer, P. (2020). Techniques for Boosting Aroma Quality in San Joaquin Valley white wines. Submitted to the Agricultural Research Institute (ARI), project duration 1 year, funding requested \$48,000.

Pedroza, M., Pachelbel, R., Sommer, P. (2020). Techniques for Boosting Aroma Quality in San Joaquin Valley white wines. Submitted to the American Vineyard Foundation (AVF), project duration 1 year, funding requested \$48,000.

Shrestha, A. (2020). Automatic rate control spray systems. Submitted to John Deere, project duration 2 years, funding requested \$24,808.

Shrestha, A. (2020). Glufosinate in avocado, sub-contract from UCCE, project duration 1 year, funding requested \$2,000.

Shrestha, A. (2020). Cover cropping impacts on vineyard water demands and weed population dynamics. Submitted to UCSAREP, project duration 1 year, funding requested \$6,952.

Shrestha, A. (2020). Cover cropping impacts on vineyard water demands and weed population dynamics. Submitted to the American Vineyard Foundation (AVF), project duration 2 years, funding requested \$53,878.

Sommer, S. (2020). Sotto Method Comparison Validation Study. Submitted to Universal Biosensors Pty Ltd., project duration 1 year, funding requested \$11,500.

Sommer, S., Sun, Q., Maitra, K. (2021). Design and Implementation of a Sustainable Wastewater Treatment and Recycling System for Wineries. Submitted to the American Vineyard Foundation (AVF), project duration 2 years, funding requested \$67,000.

Sun, Q., Zhuang, G., Liu, L. (2020). Using Cover Crops to Mitigate the Negative Effect of Winery Wastewater Application on Soil, Crop Yield, Grape and Wine Quality in San Joaquin Valley of California. Submitted to the American Vineyard Foundation (AVF), project duration 2 years, funding requested \$60,000.

Zhuang, S., **Sun, Q.,** Kurtural, K., Fidelibus, M. (2020). Interactive Effect of Trellis and Water Deficit on Yield Performance, Berry and Wine Compositions of Cabernet Sauvignon, Petite Sirah and Petite Verdot under Mechanical Pruning System in the San Joaquin Valley. Submitted to the American Vineyard Foundation (AVF), project duration 2 years, funding requested \$105,526.

Sun, Q., Shrestha, A., Liu, L., Wang, Z. (2020). Using Cover Crops to Mitigate the Negative Effect of Winery Wastewater Application on Soil, Crop Yield, Grape and Wine Quality in San Joaquin Valley of California. Submitted to the Agricultural Research Institute (ARI), project duration 3 years, funding requested \$85,226.

Sun, Q., Ascii, S. (2020). Interactive Effect of Trellis and Water Deficit on Yield Performance, Berry and Wine Compositions of Cabernet Sauvignon, Petite Sirah and Petite Verdot under Mechanical Pruning System in the San Joaquin Valley. Submitted to the Agricultural Research Institute (ARI), project duration 2 years, funding requested \$59,652.

Van Zyl, S., Person, E., Groves, L., Mehlman, M. (2020). Oro Agri Inc. – Calcium Carbonate applications. \$5,000 per year for two years.

Van Zyl, S., Person, E., Groves, L., Mehlman, M. (2020). The Effects of Foliar Applied Calcium Carbonate on Table Grapes – From Berry Formation to Post-Harvest Storage. Submitted to the Agricultural Research Institute (ARI), project duration 2 years, funding requested \$38,000.

Service contracts

Van Zyl, S. (2020). Allied Grape Growers – Grape juice sample analysis. \$15,000.00 per year.

Van Zyl, S. (2020). Agajanian Vineyards – Grape juice sample analysis. \$3,000 per year.

Summary

written	# of proposals		Amount of funding		
	funded	pending	requested	received	pending
28	14	4	\$2,478,586	\$560,916	\$851,552

Financial Statement

The following table summarizes the budget and expenses from the VERC Operating Fund (#34281).

Dept Fdescr	Fund Fdescr	Acct Cat Fdescr	Current Budget	Actuals	Encumbrances	Balance Available	% Used Fiscal Year
34281 - Viticulture & Enology ReschCtr	90000 - TF-CSU Operating Fund	580 - Other Financial Sources	(225,602.30)	(225,602.30)	0.00	0.00	100%
		601 - Regular Salaries and Wages	249,666.00	231,772.09	0.00	17,893.91	93%
		603 - Benefits Group	146,694.75	146,694.75	0.00	0.00	100%
		604 - Communications		3,185.76	0.00	(3,185.76)	
		619 - Equipment Group	(224,652.00)	0.00	0.00	(224,652.00)	0%
		660 - Misc. Operating Expenses	243,956.30	10,039.06	0.00	233,917.24	4%
	90000 - TF-CSU Operating Fund Total		190,062.75	166,089.36	0.00	23,973.39	87%
34281 - Viticulture & Enology ReschCtr Total			190,062.75	166,089.36	0.00	23,973.39	87%
Grand Total			190,062.75	166,089.36	0.00	23,973.39	87%

The following table summarizes the third-party research funding for active projects in 2020/2021 that were administered through VERC (new funding with start date after June 30, 2021 is not included).

VERC Current Activity of Grant Funding for 2020-2021			
Investigator	Short Project Title	Agency/Industry Name	Total Amount
Brillante	Grapevine Salts Stress	AVF	\$49,400
	Remote Sensing Virus Infections	ARI	\$127,276
	Grape Composition Sensing	AVF	\$60,550
	Organic Mealybug Control	AVF	\$55,905
	Virus Infected Grapes	C DFA	\$279,757
	Salt Stress and Soil	AVF	\$39,400
Van Zyl	Producing Red Wines	ARI	\$120,500
	Spoilage Effects in the Wine	California Winegrape Inspection Advisory Board	\$65,000
	Foliar Calcium Applications	ARI	\$38,000
	Grape Juice Samples & Analysis	Allied Grape Growers	\$15,000

	Sample Testing	Agajanian Vineyards & Wine Company	\$3,000
	Pierce Disease (ID & Durability of Novel Sources)	ARI	\$193,774
	Evaluation of OR-151	ARI	\$75,000
Pedroza	Emotions of Wine	ARI	\$42,000
	Emowine	CM	\$10,500
Shrestha	Automatic Rate Systems		\$24,808
	Glufosinate on Avocado		\$2,000
Sun	Effect of gypsum compost	ARI	\$48,000
	Berry Composition & Wine Chemistry	The Wine Group	\$15,000
	Mechanical Leafing & Deficit Irrigation in Cabernet Sauvignon	UC Regents/AVF	\$15,000
	Aging Phenolic Content	ARI	\$9,000
	Berry Total Phenolics	CM	\$3,000
Riar	Evaluation of Exogenous	ARI	\$10,000
Benes	Drainage Management	SWR	\$299,528
	Irrigation & Soil Alfalfa	ARI	\$179,074
	Remote Sensing Salinity	ARI	\$45,000
Brar	New Almond Production	ARI	\$89,704
	High Density Almonds	CM	\$36,712
	Foliar Nitrogen Almonds	CM	\$89,820
	Rootstocks for Almonds	CM	\$11,279
Ellis	DNA Extraction	ARI	\$42,979
	Nematicides in Almonds	CM	\$21,526
	Plant Pathology	CM	\$6,500
	Identification of <i>Fusarium</i>	ARI	\$75,766

	Interaction of <i>Fusarium</i>	CM	\$32,491
	USDA ARS <i>Fusarium</i>	CM	\$62,545
Sommer	Sulfur dioxide validation study	Universal Biosensors Pty Ltd.	\$11,500
TOTAL FUNDING 2020-2021			\$2,179,878

Space and Equipment Utilization

The Vincent E. Petrucci Viticulture building houses the majority of research space that is utilized by Viticulture and Enology faculty and staff. The building includes offices and laboratories, as well as a library collection as part of the Henry Madden Library and administrative offices. Every faculty member has a laboratory assignment to maintain an active research program and encourage undergraduate and graduate student research. Currently due to a very active research, the department chair Dr. Anil Shrestha, Enology faculty Dr. Miguel Pedroza, and the Bronco Chair for Viticulture Dr. Luca Brillante use additional laboratory space in the Jordan Agricultural Research Center provided by the college. Other buildings used by faculty and staff for research are the Donald E. Gumz Enology building, the Viticulture and Enology Annex, and the Raising Processing Plant. All building resources are utilized to maximum capacity at this point due to the fully staffed department and center. Both building projects outlined in this report will increase the available research and teaching space for faculty, staff, and students, and further the mission of the viticulture and enology programs.



Similar to the equipment sharing efforts described in the previous annual report, a stronger emphasis on sharing laboratory space has been implemented in the past year. The new policies and procedures handbook was released in the Fall 2020 and the first annual revision is being finalized for release in Fall 2021. The handbook specifies all policies related to space utilization and sharing. It has been made available to all faculty, staff, and student employees.

Industry Advisory Board

Members and General Information

Prefix	First Name	Last Name	Position	Company	Street Address	City	State	Zip Code
Mr.	Dwayne	Cardoza	Chairman	Raisin Bargaining Association	1258 W. Manning Ave	Fresno	CA	93706
Mr.	Jim	Coleman	CEO	E.&J. Gallo Winery	600 Yosemite Blvd	Modesto	CA	95354
Mr.	John	Crossland	Owner	Crossland Vineyards			CA	
Mr.	Jerry	DiBuduo	President	DiBuduo Land Management Co., Inc.	2555 W. Bluff Ave, #157	Fresno	CA	93711
Mr.	Nat	DiBuduo		Independent Consultant			CA	
Ms.	Cathy	Ference		Constellation Brands			CA	
Mr.	Matt	Frank	Viticulturist	Trincher Family Estates	100 St. Helen HWY, P.O. Box 298	St. Helena	CA	
Mr.	Fred	Franzia	CEO	Bronco Wine Co.	6342 Bystrum Rd	Ceres	CA	95307
Mr.	Keith	Horn				Napa	CA	
Mr.	Wayne	Kirschenman	President	Kirschenman Enterprises, Inc.	12826 Edison Hwy	Edison	CA	93220
Ms.	Dianne	Nury	President	Vie-Del Company	11903 S Chestnut Ave	Fresno	CA	93725
Mr.	Brott	Ritzel	COO	The Wine Group	17000 E. Highway 120	Ripon	CA	95366
Mr.	Rick	Stark	Grower Relations	Sun Maid	13525 S Bethel Ave	Kingsburg	CA	93631

Last Name	Email	Business Phone	Cell Phone	Industry	Position on Advisory Board	Term begin	Term end	# of terms served
Cardoza	dwayne.cardoza@gmail.com		(559) 269-7831	Raisins	Member	3/22/2019	6/30/2020	1
Coleman	james.coleman@ejgallo.com			Wine	Member	7/1/2016	6/30/2020	6
Crossland	jcrossland@vineyardpro.com	(805)550-1564		Wine Grapes	Member	7/1/2016	6/30/2020	2
DiBuduo	jdibuduo@dmlco.com			Table Grapes	Member	7/1/2017	6/30/2021	2
DiBuduo	nat.dars@gmail.com			Wine Grapes	Member	7/1/2016	6/30/2020	6
Ference	cathy.ference@cbrands.com		(707) 484-8798	Wine	Vice Chair	7/1/2018	6/30/2022	3
Frank	mfrank@tfwines.com		(916) 919-5266	Wine Grapes	Member	3/22/2019	6/30/2020	1
Franzia	fredtfranzia@broncowines.com			Wine	Member	7/1/2016	6/30/2020	5
Horn	horn4@comcast.net	(707) 974-3800		Wine	Member	7/1/2017	6/30/2021	2
Kirschenman	wkirschenman@keiproduce.com			Table Grapes	Member	7/1/2017	6/30/2021	2
Nury	dnury@vie-del.com	(559) 834-2525		Wine	Chair	7/1/2018	6/30/2022	6
Ritzel	brott.ritzel@thewinegroup.com			Wine	Member	1/1/2020	6/30/2022	1
Stark	rstark@sunmaid.com			Raisins	Member	7/1/2016	6/30/2020	4

Meeting Agendas

Meeting agenda on November 20, 2020

Guests: Dennis Nef

1.	Call to Order	J. Coleman	5 minutes
2.	Approval of Agenda	All	5 minutes
3.	Approval of Minutes	All	5 minutes
4.	College Update	D. Nef	15 minutes
5.	COVID-19 and virtual operation	A. Shrestha, S. Sommer	10 minutes
6.	Department Annual Report	A. Shrestha	10 minutes
7.	Research Center Annual Report	S. Sommer	10 minutes
8.	Bylaws Update	N. DiBuduo, D. Nury	20 minutes
9.	Nominations	All	10 minutes
10.	Items from the floor		10 minutes
11.	Adjournment		
			100 minutes total

Meeting agenda on January 21, 2021

1.	Call to Order	D. Nury	5 minutes
2.	Approval of Agenda	All	5 minutes
3.	Approval of Minutes	All	5 minutes
4.	College and University Update	D. Nef	10 minutes
5.	Vineyard Planting Update	M. Salwasser	10 minutes
6.	Construction and Renovation Updates	S. Sommer	15 minutes
7.	VERC Research Advisory Committees	S. Sommer	20 minutes
8.	Bylaws Update	N. DiBuduo, D. Nury	10 minutes
9.	Nominations	All	10 minutes
10.	Items from the floor	All	10 minutes
11.	Adjournment		
			100 minutes total

Guests: Dennis Nef, Mark Salwasser

Meeting agenda on April 15, 2021

1.	Call to Order	D. Nury	5 minutes
2.	Approval of Agenda	All	2 minutes
3.	Approval of Minutes	All	3 minutes
4.	Board Member Update	D. Nury	10 minutes
5.	Bylaws Update	N. DiBuduo, D. Nury	15 minutes
6.	University Update	S. Jimenez-Sandoval	15 minutes
7.	Vineyard Planting Update	D. Nef	20 minutes
8.	Research Advisory Committees	S. Sommer	15 minutes
9.	Research Update	Selected faculty	15 minutes
10.	Department Update	A. Shrestha	10 minutes
11.	Items from the floor		10 minutes
12.	Adjournment		
			120 minutes total

Guests: Saul Jimenez-Sandoval, Dennis Nef

IAB Updates

The industry advisory board underwent a variety of changes in the 2020/21 academic year that include **changes in leadership** and **new members on the board**. After more than 30 years of service on the IAB, James Coleman stepped down from his role as chairman and, later in June 2021, announced his retirement from the board. The new chair of the IAB is the previous vice chair Dianne Nury. The new vice chair is Cathy Ference. Brian Vos and Rick Stark announced their retirement from the board in late 2020. Brian Vos has been replaced by the COO of The Wine Group, Brott Ritzel. Fred Franzia and Keith Horn also announced their retirement from the board but up to the end of the academic year in June 2021, finding suitable candidates to fill open seats on the board are still underway.

As outlined in the previous annual report, the industry advisory board suggested the implementation of **research advisory committees (RAC)**. The plan was to establish two separate committees for viticulture and enology, and focus on industries that are not currently represented on the board. In order to make sure that the mission of the IAB is considered on these committees, the chair must be an active member of the IAB. Due to the pandemic, the enology RAC has not been formed yet since recruitment was not possible. The viticulture RAC on the other hand is assembled and will be formally appointed in the July 2021 meeting. The proposed members are Matt Frank (IAB member); Trincherro Family Estates, Stephanie Boulton; Lodi Wine Grape Commission, Steve McIntyre; Monterey Pacific, John Duarte; Duarte Nursery, and Mike Beagle; Sun View Vineyards.

The **update of the board bylaws** has been on the agenda in the past few years and, under the leadership of Dianne Nury and Nat DiBudo, a new draft was created. The changes include the annual meeting schedule, sub-committees, and reporting responsibilities of the board as well as V&E leadership. The bylaws update is scheduled for discussion and vote as soon as possible.

Changes in Governing Policies

As described in the annual report 2019/2020, updates and changes of policies and procedures were on hold between 2015 and 2019. In an effort to update the old policies, a handbook was released that outlines all policies and is updated annually. There were only minor changes to governing policies in 2020/2021, which are described in detail below. Policies regarding the pandemic are not described here except for the changes in travel restrictions because those policies are very fluid and have been constantly adjusted to the recommendations of the CDC and other public health authorities.

Building and key card access: Access doors to laboratories as well as the lab entrance door to the V.E. Petrucci Viticulture building were converted to keycard access. Other connecting doors, the graduate student office, and the entrance doors to the V.&E. Annex are in the process of being converted. The goal is to have better control over shared areas where students need access. Providing and taking entrance privileges away is much easier and more transparent this way. Metal keys are handled through the department main office, while key card access is managed through VERC.

Travel policies: Travel on University business was restricted for the entire academic year due to COVID-19. All travel needed a justification and Provost's approval and was limited to day trips and the use of Foundation funds. Blanket travel authorizations for local trips were also suspended. After some of the restrictions were lifted on June 1, 2021, local travel could resume for the most part. Other trips are still restricted and require special approval until further notice.

Conference room: The conference room in the V.E. Petrucci Viticulture building was under construction but is now completed. The room is now updated and fully usable. The usage and reservation policy was modified and will be included in the new revision of the policies and procedures handbook. A new price structure for conference room rentals through external clients as well as an updated reservation process were established.

2021-22 Goals and Objectives

The goals and objectives will partially carry forward from the past fiscal year because of the COVID19 pandemic and the resulting restrictions on campus operation. Some of the expectations, especially in the areas of hiring and construction needed to be revised and readjusted. The budget situation within the CSU system put additional pressure on campus processes and lowered the probability of making significant progress.

The goals I., II., III., and IV. that were not or only partially achieved in the past year, carry forward into 2021-2022 with the expectation to close at least one of them. One new goals is added.

- I. Hire a permanent laboratory and research technician stateside to support faculty research programs and research winemaking in VERC.
- II. Renovate and expand research space with priority set on a greenhouse and the research winery.
- III. Address accessibility, wayfinding, and compliance in all laboratories and buildings associated with Viticulture and Enology.
- IV. Elaborate on existing assistantship and scholarship opportunities to increase accessibility and establish new opportunities for graduate student research.
- V. Launch the third phase of the Building Campaign (phases I and II between 1978 and 1992) to improve the V&E complex.