

THE CATCH WIRE

A quarterly newsletter

Jordan College of Agricultural Sciences & Technology
Department of Viticulture & Enology

Vol. 2, Issue 3

August 2014



FRESNO STATE

Viticulture and Enology

In This Issue

Chair's Message	3
Our Viticulture & Enology Team	4
UPDATES	
Summertime in the Vineyard	5
Recognizing a Job Well Done	6
From Crush to "Sip-tember"	7
CLUB NEWS & EVENTS	
Fall Forward with the Viticulture Club	8
Enology Society's Thursday Night Tradition	9
RESEARCH	
Wine Industry Sought for Study on Red Wine Quality	10
Working to Maximize Our Industry's Potential	11
The Impact of Fresno State Research	12
Jim Kennedy	12
Kaan Kurtural	13
Hend Letaief	17
Susan Rodriguez & Roy Thornton	19
Sonet Van Zyl	21
V. E. PETRUCCI LIBRARY	
Open Access: A Model for Academic and Industry Conversations	26
FEATURES	
A Winemaker's Reflection on Crush	29
When it is Hot, Too Hot: Vineyard Management in High Heat	30
EVENTS	
Recent Highlights	32
Calendar—Where You Can Find Us	35
In Memoriam	35

Student research assistants carrying research supplies and equipment to the vineyard site. Photo by Cary Edmondson

Chair's Message

A Summer of Research and a New School Year

In our last issue of *The Catch Wire*, we covered the Department of Viticulture and Enology graduating class of 2014. It was the spring issue and for many of our students, they were beginning a new chapter in their lives. For many of you, summers in the Department of Viticulture and Enology at Fresno State are thought of as a time for relaxation and vacation. On the contrary, summers here are simply a different shade of busy. In this issue of *The Catch Wire* you will read about what makes up a major portion of our lives during the summer: research. In the process of training the next generation of leaders in our industry, we are developing new knowledge that will help our growers and winemakers remain competitive in this rapidly changing industry.

One of the most important career lessons that I have learned is that adaptability is paramount to business success. When the price you get paid for your fruit and wine are as dependent upon global economics as they are today, we must all be able to respond with speed to the various threats that our industry faces. For our industry this means that we must be able to adapt rapidly to new pests, diseases, climatological anomalies, and global economic pressures. For these pressures and others, the threat to survival is often unforeseen until the situation is critical. In the Department of Viticulture and Enology, we are doing our part to develop new knowledge that will help our industry maintain relevancy. Whether direct or indirect, a line can be drawn from virtually all of our research projects to the long-term success of your business. The task for you is to never stop learning and always ask questions; the continued competitiveness of each of our businesses depends upon it.

With a new school year, we have many new and fresh faces around campus and the department. New classes, club activities, and friendships are forming for our students and we are so happy to have them back. With over 160 students in the Department of Viticulture and Enology, we are truly thriving. Our jobs while our



Dr. Kennedy gets wet for the Ron Metzler ALS Ice Bucket Challenge on August 28 at Fresno State

students are here is straightforward-- to support them towards graduation and to encourage their lifelong learning in this discipline and industry for which we all share a passion. Our students and the knowledge that they generate during their careers will ensure that our industry is a lasting one.

James Kennedy, Chair
Department of Viticulture and Enology

Email: jakennedy@csufresno.edu

Web: <http://fresnostate.edu/jcast/ve>

On the Cover

Graduate and undergraduate research assistants working in vineyard. Photo by Cary Edmondson

Join Our E-List

Our Viticulture & Enology Team

Faculty and Instructors

James Kennedy, Faculty Chair

Grape and wine phenolic chemistry, with an emphasis on tannins

William Edinger, Lecturer

Microbial wine spoilage, development of improved and automated detection and enumeration of wine microorganisms

Richard Gahagan, Lecturer

Regulatory issues

Sanliang Gu, Faculty

Ricchiuti Chair of Viticulture

Fruit quality improvement, plant nutrition, plant-water relations, cold hardiness, cultivar evaluation, trellis systems and canopy management

Kaan Kurtural, Faculty

Bronco Viticulture Research Chair

Precision viticulture, whole grapevine physiology, mechanization of canopy management practices, vineyard efficiency

Hend Letaief, Faculty

Wine chemistry, quality improvement research, microbial wine spoilage, wine production

Susan Rodriguez, Research Fellow & Lecturer

Wine microbiology, wine sensory evaluation, grape rot quantification

Kevin Smith, Winery Marketing & Lecturer

Winery business and marketing

Roy Thornton, Faculty

Wine microbiology, wine yeast genetics and physiology, manipulation of wine flavor, and quantifying microbial rot on wine grapes

Sonet Van Zyl, Faculty

Table and raisin grape production and marketing, industry focused research for California's table grape and raisin industries

Staff

Geoffrey Dervishian, Viticulture Associate

Mechanical canopy management, crop load and irrigation stress on yield and fruit quality in the SJV

Britt Foster, Librarian, V. E. Petrucci Library

Ryan Hessler, Assistant Vineyard Manager

Raisin, table, and wine grape production

Carrie Irby, Accounting Technician

Jayne Ramirez, Administrative Assistant to the Chair and Director, and Office Manager

Matt Rule, Interim Winemaker

Winery operations, wine production

Mark Salwasser, Vineyard Manager

Raisin, table, and wine grape production

Aude Watrelot, Post-Doctoral Research Scholar

Grape and wine phenolic chemistry, with an emphasis on tannins

Cynthia Wood, Outreach and Event Coordinator

Viticulture and Enology Emeriti

Sayed Badr, Professor Emeritus of Viticulture, and former chair, Plant Science Department

Kenneth Fugelsang (FERP), Professor Emeritus of Enology

Barry Gump, Professor Emeritus of Chemistry and former Adjunct Faculty of Enology

Carlos J. Muller, Professor Emeritus of Enology

Vincent E. Petrucci, Professor Emeritus of Viticulture, and former Director, Viticulture & Enology Research Center

Robert L. Wample, Professor & Chair Emeritus of Viticulture, and former Director, Viticulture & Enology Research Center

Viticulture & Enology Industry Advisory Board

Jim Coleman, IAB Chair, E & J Gallo Winery

John Crossland, Vineyard Professional Services

Jerry DiBuduo, DiBuduo Land Management Company

Nat DiBuduo, Allied Grape Growers

Cathy Ference, Treasury Wine Estates

Fred Franzia, Bronco Wine Company

Glen Goto, Raisin Bargaining Association

Keith Horn, Constellation Brands

Hal Huffsmith, Sutter Home Vineyards

Wade Kirschenman, Kirschenman Enterprises

Dianne Nury, Vie-Del Winery

Rick Stark, Sun-Maid Raisin Growers

Brian Vos, The Wine Group

Viticulture & Enology Newsletter Editorial Staff

Britt Foster

James Kennedy

Cynthia Wood

Contact: 559.278.2089

<http://fresnostate.edu/jcast/ve>

Updates

Summertime in the Vineyard

The Fresno State vineyard, located just a few steps away from the Department of Viticulture and Enology, is an integral component of our grape and wine teaching, research, and production programs. Each day throughout the season our vineyard team is hard at work, managing over 120 acres of table, raisin, and wine grapes.

An especially rewarding time of year for the vineyard team is when customers enjoy the fruits of their labor by purchasing fresh and tasty table grapes from the Gibson Farm Market on campus. This year, Flame Seedless and Black Emerald table grapes kicked off the earlier than normal harvest season in late June. These varieties made it to the market shelves just in time for the 4th of July holiday. The final variety that will be harvested on campus will be a wine grape variety, Touriga Nacional, the second week of September.



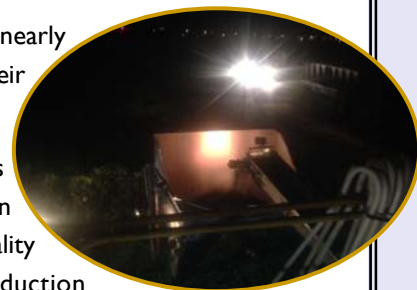
Table grape harvest in the Fresno State vineyards

“By fall, over 100 acres of table and wine grapes will have been hand or machine harvested at Fresno State. Approximately 11% of the wine grapes are received by the Fresno State Winery while the remaining wine grapes are sold to various outlets through [Allied Grape Growers](http://www.alliedgrapegrowers.org) (www.alliedgrapegrowers.org),” said Mark Salwasser, vineyard manager. This includes the 18-acre block of French Colombard wine grapes that were planted in 2013 with support from West Coast Grape Farming and several other industry partners as part of the vineyard’s ongoing redevelopment plan. These vines were machine harvested

on August 17 and produced nearly 4 tons of fruit per acre in their second leaf.

All in all, Salwasser and his assistant manager Ryan Hessler have seen good quality grapes and average production figures this year. “The raisin block, planted in 2014 with support from [Sun-Maid Growers of California](http://www.sunmaid.com) (www.sunmaid.com), is doing well on the open gable trellis system, but is not yet in production,” Salwasser added.

In addition to the busy harvest season, research faculty and teams have also been utilizing the Fresno State vineyard



Growth in the new Selma Pete raisin block that was planted in 2014

this summer to collect research data for their on-campus projects. Now that the fall semester is underway, faculty are conducting classes in the vineyard again, providing students with added opportunities for hands-on learning. It’s no surprise because this is what Fresno State is all about!



Fresh table grapes from the Fresno State vineyards at the Farm Market

Stay tuned for vineyard updates as we grow and fulfill our commitment to providing quality education and research for the grape and wine industry.



***“The past ten years have been very rewarding for me—professionally and personally. Working with and training enology students has been the highlight of my time at Fresno State.*”**

The dedicated faculty and staff of the viticulture and enology program have made this one of the premier programs in the world and I am honored to have been a part of it.”

John Giannini, winemaker
Fresno State Winery
(2004-2014)

Updates

Recognizing a Job Well Done

After ten years of dedicated service, John Giannini is moving on. During his tenure at this institution his wines showcased what Fresno State and the larger San Joaquin Valley are capable of achieving. Under his leadership, the Fresno State Winery won local, regional, national, and international awards. In addition to his remarkable winemaking skills, he has trained and mentored countless graduates of Fresno State’s enology program.

“John will forever be recognized for his patience, integrity, amiable character, and tolerance for new ideas. The number of students that he has trained and, by extension, the impact that his training has had on today’s wine industry, will become John’s legacy,” said Jim Kennedy, chair of the Department of Viticulture and Enology.

Since 2004, John has made many friends both on– and off-campus. A farewell reception was hosted by the Department of Viticulture and Enology and the Ag Operations office in his honor on August 7 in the enology building on campus. Many friends attended and had an opportunity to personally thank him for his dedication and bid him a fond farewell.

Several industry friends and former students have reached out to John and shared their sentiments through other means, including Facebook. A common theme is one of thanks and gratitude. One Facebook post by Sebastian Donoso Lorca, former enology student and winery intern, says it well (text only reprinted with permission):

“I wanted to share these pictures of the time I attended Fresno State and worked side-by-side with you for a year after graduating from the program. These pictures represent memories of an amazing period of my life where I got to learn the foundations of practical winemaking from not only an amazing winemaker but also a wonderful person. You have taught us so many valuable lessons which we will carry with us for the rest of our careers. It is only fair to thank you for everything you did and continue to do not only for me but for many of us that consider you our mentor and a friend. Good luck in your future endeavors!”

— Sebastian Donoso Lorca, winemaker, Campovida Winery

John’s positive spirit and attitude have been instrumental in the growth of this department and he will be missed by all of us. “Thank you, John, for your contributions and service to the winery, to the department, and to the university as a whole,” said Kennedy. The Fresno State Ag Foundation is currently managing efforts to fill this position.

John Giannini—winemaker, mentor, and friend



Updates

From Crush to “Sip-tember”

“Summer was a rewarding time for the Fresno State Winery. With our tasting room open seven days a week at the Gibson Farm Market on campus, our Wine Club really began to grow,” said marketing manager Kevin Smith. “We also opened some new restaurant accounts in the mountain areas around Fresno.”

September is California Wine Month and on September 4, the Fresno State Winery kicked off “Sip-tember” in a big way by holding a special media event at the Farm Market that attracted the attention of local television stations. Interim winemaker Matt Rule and enology student Lauryn Meissner announced recent wine competition results and on behalf of the winery and department presented Fresno State President Joseph Castro with two gold and five silver medals. These awards of excellence represent the following wines and commercial wine competitions:

- **2011 California Syrah**—Gold, California State Fair; Silver, Pacific Rim Competition
- **2007 Saviez Syrah**—Gold, Pacific Rim Competition; Silver, Orange County Wine Competition
- **2010 Zinfandel**—Silver, California State Fair; Silver, Pacific Rim Competition

To read the full story and [watch the video](#) of this presentation visit www.fresnostatenews.com.

Looking ahead, our Art & Science wines will be released at the Fig Garden Wine Walk in Fresno on September 25 before being formally released to our Wine Club in the October shipment. These wines will include three brand new blends with special label designs by Fresno State art student Lori Kirby. Join the [Fresno State Wine Club](#) at www.UnleashedWines.com to get your shipment this fall.

The winery is also giving back to our local community in a big way this fall. Students will be gaining valuable marketing experience as they learn how to represent our wines at the several local events. Refer to the calendar in this issue of *The Catch Wire* for details and dates.

“We’re also very excited about our upcoming winemaker’s dinner at the Narrow Gauge Restaurant near the south gate of Yosemite the first of November,” said Smith. Invitations will go out to Wine Club members prior to being sent to the general winery mailing list. Interested parties should call the winery at 559.278-4867 for details. We hope to see you this fall at many of our events!

Meet Matt Rule, Our Interim Winemaker

Matt Rule grew up in the central valley and graduated from Fresno State in 2008 with a B.S. in criminology. Because of his keen interest in wine, he decided to return to Fresno State where he enrolled in the Department of Viticulture and Enology’s certificate program in enology. Matt immediately got involved with the winery and volunteered as much as he could between classes. “I learned a lot from this experience and eventually was hired as a student assistant in the winery,” said Matt. “Our winemaker John Giannini taught me a great deal about winery processes and wine production and made my experience in the winery a very positive one. When Matt graduated in 2014, he was hired by John to work for one year as the winery’s paid intern for 2014-2015.

In July, Matt willingly stepped into the role of interim winemaker for the Fresno State Winery, at a time when the harvest and crush season was in full swing. “Matt has accepted many new challenges and long hours and has done a great job for the enology program. His training as a student prepared him for the job, and we are glad he is on the winery team,” said Dr. Jim Kennedy, department chair. According to Matt, he is looking forward to the coming year and the great times he’s come to know processing fruit and making wine for the university.



Left to right: J. Kennedy, L. Zelezny, J. Castro, L. Meissner, M. Rule. Bottom left: J. Toste. Read the full story and watch the video at www.fresnostatenews.com



Club News & Events

Fall Forward with the Viticulture Club

During the Department of Viticulture and Enology's annual graduation dinner celebration on May 15 the newly elected **Viticulture Club** officers were announced for 2014-2015:

- Derick Webb- President
- Kelli Williamson- Vice President
- Sadi Cardiff- Treasurer
- Jacquelynn Chenoweth- Secretary
- Horacio Lopez-Segura- Sergeant-at-Arms
- RJ Wilson- Historian

After the summer break, these officers have returned this fall semester in a big way and have already begun to juggle their classes, work, and club activities. As shown on the Viticulture Club's Facebook page, it's a busy time for many students who are going to school by day and working at wineries by night.



OPA! The 54th Fresno Greek Fest celebration at the St. George Greek Church in Fresno was the Viticulture Club's first activity this year. Held only a few days after the first day of classes, club officers quickly and successfully rallied members to help staff a booth and pour wines for three days at this popular community event held in Fresno on August 22-24.



The first meeting of the semester on September 2 reportedly drew several new and returning members. president Derick Webb and his team of officers outlined several projects and activities for the year, including:

History of the Viticulture Club Project The Viticulture Club historian is trying to put together a complete list of **former officers** and other key information on the history of the club. "As students it is important for us to know and acknowledge those who have come before us as

student leaders," said Webb. Since some of our records are incomplete, this effort will require input from our alumni. If anyone has any information, including stories or photographs that could be compiled and shared, please email the club at fresnostatevitclub@gmail.com or contact Cynthia Wood in the Department of Viticulture and Enology at cynthiaw@csufresno.edu.

62nd Annual Viticulture Club Fall Harvest BBQ Get your tickets now! This popular event will be held on **November 14** at Wolf Lakes in Sanger, just a few minutes east of Fresno. Tickets can be purchased online at <https://squareup.com/market/fresno-state-vit-club>. This event is the club's annual fundraising activity for the year and will feature a steak and shrimp dinner. For each of the past two years, over 400 people enjoyed a fun evening and a delicious meal while supporting the club. "We are seeking donations for auction items, as well as sponsorships which will help students attend," said Webb. If interested in contributing to this good cause, email Derick Webb at fresnostatevitclub@gmail.com.

Duarte Greenhouse Project The club continues to raise money for the **Jim & Anita Duarte Greenhouse project**. "We are excited about raising funds to build a new structure that will be used by students in the viticulture and enology program," said Webb. To date, the club has collected about a third of the money needed to finish this project. "Help is needed. All gifts are tax deductible and a plaque with your company or name will be forever displayed," said Webb. If you are interested in supporting this project, please contact Jim Kennedy in the Department of Viticulture and Enology.

Stay in touch with the **Viticulture Club** on Facebook (Fresno State Viticulture Club) to learn more about how you can get involved in these and other activities. The student members look forward to connecting with alumni and the grape and wine industry in the year to come.

Club News & Events

A Thursday Night Tradition

The newly elected officers of the **Enology Society of Fresno** are excited to host you during the coming school year. The organization is here to provide the community and students with the opportunity to attend wine tastings that promote the education of wine and the wine industry. "During our fall semester we explore wines that express particular characteristics of wine regions throughout the globe while focusing on specific wine varietals. The spring semester is our winemaker series where we invite several different winemakers to share their experiences in the industry and sample wines that they have brought for us to taste," said Randy Gardenhire, president of the Enology Society.

The weekly meetings and wine tastings on Thursday evenings are intended to give the novice wine consumer a setting in which to feel comfortable as they introduce themselves to the world of wine while receiving an education in the formalities of tasting and verbage of the wine world. Those who consider themselves to be seasoned veterans of wine tasting are also welcome. The Enology Society is a perfect venue for those individuals to further develop their palate and to participate in advanced wine discussions. Whatever level wine taster you may consider yourself, this is the place to learn and ask the questions that you may not have the opportunity to ask in a tasting room.

At 6:30 PM each Thursday the meeting begins with a thirty-minute social gathering in the Enology Building at Fresno State, home of the award-winning Fresno State Winery. The tasting begins at 7:00 PM and food pairings are provided with the wines.

Join the Enology Society! Weekly tastings are only open to individuals who are 21 years of age or older. Each week the meeting is only \$10.00 or there are community and student memberships available. Community memberships are \$60.00 per semester while the student memberships are \$50.00 per semester.

"We had a fantastic group of guests last year and we want to invite everyone to return. By attending our meetings, you will have the chance to sign up for our email list so you can follow our schedule of tastings and events. For those of you on Facebook, please 'like' our page at [Enology Society of Fresno](#) and follow us. All of our officers are here to ensure that you have a fun and comfortable experience," said Gardenhire.



Support the Enology Society

Wine Donations

Auction Items

Guest Winemakers

Donations

PLEASE EMAIL

enologysocietyoffresno@gmail.com

The Enology Society of Fresno continues to strive to source some of the best wines for their educational venues. The following officers look forward to you joining them at their weekly meetings as well as at special events throughout the coming year.

- Randy Gardenhire- President
- Lauren Barret- Vice President
- Sadie Cardiff- Treasurer
- Roy Oneto- Secretary
- Kelli Williamson- Social Chair
- Stephanie Reynolds- Compliance
- James Campbell & Derek Sanchez- Acquisitions
- Horacio Lopez Segura & Ethan Howell- Food Chairs

Research

Wine Industry Sought for Study on Red Wine Quality

A research project now underway by Fresno State and UC Davis enologists will examine the chemistry and management of red wine quality and with the harvest and crush now in full swing, they are inviting the wine industry to submit wines for analysis.

Jim Kennedy, professor and chair of the Department of Viticulture and Enology at Fresno State, is spearheading the project that combines his expertise in wine chemistry with the sensory science expertise of Hildegard Heymann, professor in the Department of Viticulture and Enology at UC Davis.

Funded jointly by the American Vineyard Foundation and the California State University Agricultural Research Institute, the three-year project will include wines bottled this year, said Kennedy, an internationally recognized scientist in grape and wine tannin chemistry.

“Recent advances in our understanding of tannin chemistry and its routine measurement affords us with the ability to define wine composition like never before,” Kennedy said.

Heymann’s research in wine sensory evaluation provides a complementary and synergistic role in the investigation.

“The opportunity to overlay sensory response to wine chemistry provides us with a unique and exciting opportunity to enhance our understanding of mouthfeel quality and our ability to manage mouthfeel descriptors,” she said.



Fresno State graduate student Matthew Revelette analyzes wine in Kennedy’s research laboratory

Mouthfeel is the physical sensation a food or drink creates in the mouth, including the tongue and the roof of the mouth.

This study’s first phase, expected to take six to nine months, will analyze a large enough set of wines so that a subset can be selected for the second phase of study which will focus on sensory aspects, Kennedy explained.

“In the final phase of the study, chemistry and sensory data will be combined to provide meaningful information to the wine industry with regard to managing mouthfeel descriptors,” he said.

The researchers encourage the wine industry to be part of this study by submitting wine samples for analysis. Criteria:

- Wines bottled from January-June 2014
- Two bottles of each wine must be submitted for analysis
- For wines that are submitted, an additional 12 bottles may be required for the second phase of study, should the wine be selected for further study. Decisions on additional wine needs would be made by January 2015

In exchange for their involvement, participating wineries will receive a report summarizing data gathered and in context of all other wines submitted, Kennedy said.

To submit analysis samples or for more information, contact Kennedy at jakennedy@csufresno.edu.

Full press release at www.fresnostatenews.com (<http://www.fresnostatenews.com/2014/08/wine-industry-sought-for-study-on-red-wine-quality/>)

Research

Working to Maximize Our Industry's Potential

Research plays a big role in the viticulture and enology program at Fresno State. Our faculty scientists remain focused on important issues facing today's growers and winemakers and have a reputation for performing practical research that offer solutions to the industry. Throughout the year our research teams are working hard to develop new technologies and practices that will help California vineyard and winery operations remain competitive in the global marketplace.

Summertime is one of our busiest times of year for those who are a part of our grape and wine research program. Shortly after classes end in May, our hallways and laboratories are filled with faculty, staff, students, and graduate students who are responsible for performing a variety of research tasks typical of this extra busy harvest and crush season. Early morning crews can be found loading vehicles and heading for the vineyards on- and off-campus. Long days and nights are a reality. Our graduate and undergraduate research assistants should feel a sense of reward, knowing they are enhancing their academic careers by being a part of our grape and wine research program.

On the following pages, we hope that you enjoy reading about some of our **current research projects**. The knowledge gained from these projects will help to shape how grapes and wine are produced in the future, while educating tomorrow's leaders. In addition to **The Catch Wire**, the results of our research are published in peer-reviewed journals and presented to peers as well as practitioners. As such, we believe that we are addressing the issues that our industry is facing today as well as tomorrow.

Research Briefs and Recent Publications

- On June 6, Jim Kennedy gave a presentation on phenolic evolution from grapes to wine at Winemaking 101, held at UC Davis. On August 12, he also presented his work on exploring the role of oxidation on the development of tannin stickiness in red wine at the American Chemical Society meeting held in San Francisco.
- Several Department of Viticulture and Enology faculty, staff, and graduate students gave vineyard, oral, and poster presentations on grape and wine topics at **Fresno State Grape Day** on August 5: Graduate students A. Beebe, M. Cook, C. Nelson, M. Revelette, and V. Towers. Staff G. Dervishian, and Drs. S. Gu, K. Kurtural, H. Letaief, S. Rodriguez, R. Thornton, and S. Van Zyl.
- Post-Grape Day articles in online magazines included, "Fresno State Dedicates Vineyard to Mechanization Research," by [Wines and Vines](http://www.winesandvines.com) (www.winesandvines.com) and "Smorgasbord of latest grape research from Grape Day," by [Western Farm Press](http://www.westernfarmpress.com) (www.westernfarmpress.com).

Jim Kennedy Publications

Revelette MR, Barak JA, Kennedy JA (2014) High performance liquid chromatography determination of red wine tannin stickiness. *Journal of Agricultural and Food Chemistry* 62: 6626–6631.

Cheah KY, Howarth GS, Bindon KA, Kennedy JA, Bastian SEP (2014) Low molecular weight procyanidins from grape seeds enhance the impact of 5-fluorouracil chemotherapy on colon cancer cells. *PLOS ONE* 9(6): e98921.

Thomas W, Brunier N, Gates D, Revelette M, Kennedy J, Scholasch T (2014) Effect of lag phase thinning on Zinfandel. *Wines and Vines* July: 70-73.

Kaan Kurtural Publication

Wilson PE, Archbold DD, Masabni JG, and Kurtural SK (2014) Cropload management of 'Vidal blanc' improves primary bud cold hardiness and maintains berry composition in the lower midwestern United States. *HortScience* 49(7): 874-880.



RESEARCH

JIM KENNEDY, Department Chair

Project Title: *Tannin stickiness and its management during grape and wine production*

Principal Investigator(s): JA Kennedy

Anticipated project duration: 2014-2017

Contributing staff/scholars: A Watrelot (postdoctoral scholar)

Contributing graduate students: M Revelette, R Yacco

Other contributing students: S Hazel, R Wolff

Funding source(s): American Vineyard Foundation, California State University Agricultural Research Initiative (ARI)

Background: The primary objective of this project is to develop tools for effectively managing astringency quality during red wine production. The basis for this project is a recently developed analytical method that measures tannin stickiness. This method is unique in that it moves away from tannin concentration as a measurement of astringency. While tannin concentration is an important element of astringency, tannin structure variation has been shown to have an impact on astringency (e.g.: color incorporation, oxidation of tannin structure), and analytical methodology for measuring the effect that structure has on activity (i.e.: stickiness) has been lacking. This new and novel approach provides stickiness information.^{1,2}

Coupled to providing data from this analytical approach, this project is also focused on understanding the role of various grape and wine production variables on tannin stickiness. In addition, our research group is working closely with Dr. Hildegard Heymann at the University of California, Davis to measure the sensory consequence of stickiness variation.

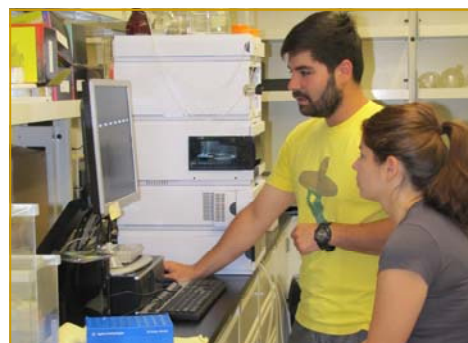
Projected results: This project will result in the development of an objective way for tannin activity measurement and the development of tools for effective red wine astringency quality management.

Industry significance: This research is expected to provide vintners and growers with improved tools for managing tannins in the vineyard and winery. This improved ability to manage red wine astringency quality will improve overall production efficiency.

Literature:

¹Revelette MR, Barak JA, Kennedy JA (2014). High performance liquid chromatography determination of red wine tannin stickiness. *Journal of Agricultural and Food Chemistry* 62 (28): 6626–6631.

²Barak JA, Kennedy JA (2013). HPLC Retention thermodynamics of grape and wine tannins. *Journal of Agricultural and Food Chemistry* 61(18): 4270-4277.



Graduate student Ralph Yacco assists undergraduate student Rebecca Wolff in laboratory



Eric Baugher, winemaker at Ridge Vineyards, giving graduate students Ralph Yacco and Matthew Revelette a tour of Ridge's facilities

BENEFITING

The grape and wine industry



KAAN KURTURAL, Bronco Wine Co. Viticulture Chair & Professor of Viticulture

Project Title: *Comparison of crop load management systems and differential regulated deficit irrigation (RDI) on vegetative compensation, whole-canopy photosynthesis, and vine performance in procumbent Vitis vinifera L. in a warm climate*

Principal Investigator(s): SK Kurtural, JA Kennedy

Anticipated project duration: 5 years

Contributing staff: A Beebe, G Dervishian

Contributing graduate students: LM Cook, C Nelson

Other contributing students: A Castillo, A Mendez, C Huizar, T Gunduz

Funding source(s): American Vineyard Foundation (AVF)

Background: There is anecdotal evidence that combination of a mechanically box-pruned single, high-wire trained vine managed with differential RDI methods can indeed maintain a Ravaz Index of 10 lbs yield to each pound of pruning weight with improved fruit and wine quality. Pruning alone cannot be used to achieve grapevine balance. Growers therefore attempt to achieve yield targets with shoot and cluster thinning through manual and mechanical means. However, hand-applied practices require rigorous crop estimation, and may be economically prohibitive as their application by manual methods increases labor operation costs in the vineyard.



Setting up the photosynthesis chamber in the vineyard



The photosynthesis chamber

This study is designed to: 1) Evaluate selected crop load management systems and differential RDI method combinations and to compare their efficiency in: a) How whole canopy photosynthesis is seasonally modified in mechanically managed single, high-wire sprawling systems as compared to bi-lateral cordon trained, spur-pruned sprawling systems and cane pruned and vertically separated systems factorially arranged with commercial RDI and differential RDI application, and b) To investigate if and how seasonal whole canopy photosynthesis is linked to final vine balance and production efficiency; 2) Evaluate the effect of selected crop load management systems and RDI methods on: a) Evolution of canopy architecture and microclimate, b) Components of yield, fruit and wine phenolic composition, and c) Investigate if and how seasonal canopy photosynthesis and production efficiency are linked to fruit and wine phenolics; 3) To provide outreach to California wine



Kurtural and Dervishian set up randomized block design in vineyard

conversion so far has relied upon estimation of leaf layer numbers, percent of exposed and shaded leaves through point quadrat analyses, or by measurement of bunch assessment of photosynthetic photon flux density using ceptometers. Indeed, changing the amount of light reaching the basal buds of converted trellis and pruning systems in concert with differential RDI application would be one of the expected effects. However, the implications for crop load management by these approaches are truly beyond that for complexity and importance. For example, expected growth compensation from a sparsely populated, mechanically box-pruned sprawling canopy would cause a seasonal and dynamic variation in leaf area production, canopy age and source-sink balance that requires a whole-canopy assessment of photosynthetic capacity in addition to the end of season vine balance and crop load assessment via Ravaz Index calculation. Therefore, this study is designed to: a) establish how whole canopy net photosynthesis is modified with trellis and pruning system conversion in concert with differential RDI application, and b) to investigate if and how seasonal whole canopy net photosynthesis modifications are linked to fruit and wine phenolics in addition to vine balance.

grape growers with presentations of research results and field days and popular research articles as well as peer-reviewed research articles.

Projected results: The aim of the project is to point to the exact window after irrigation restriction with the identified pruning system. It is our hope that a completely mechanized pruning system be devised from this trial with ideal Ravaz Index achieved without adversely affecting the phenolic composition of fruit and wine. A complete mechanization of pruning and differential deficit irrigation has reduced operating cost by 76% by the investigator in two recent publication.

Industry significance: Our gap in understanding seems to be that canopy physiology assessment of trellis or pruning systems

Project Title: *Improving coverage and reducing volume and off-target movement of sulfur in wine grape vineyards*

Principal Investigator(s): SK Kurtural, A Shrestha

Anticipated project duration: 3 years

Contributing staff/scholars: G Dervishian

Contributing graduate students: C Nelson

Other contributing students: A Mendez, A Castillo

Funding source(s): American Vineyard Foundation

Background: This project is designed to: A) Determine if the efficacy of sulfur and Lorsban applications can be increased while the drift potential is decreased from vineyards in the Central Valley. We hypothesize that electrostatic sprayer technology will place sulfur and Lorsban applications on the grapevine canopies and bark material as effectively as a conventional sprayer but with reduced volume of material, and, therefore, with a reduced amount of active ingredient; B) To analyze the economic feasibility of applying pesticides using electrostatic sprayers



Li-Cor leaf area meter with conveyor belt attachment

by conducting comparative cost analysis of them with conventional sprayers; and C) The final objective of this project will be to develop and implement an outreach program to farmers in the Central Valley.

Projected results: In the initial year of the study we reported a 7.5% savings in amount of sulfur applied. However, the post-harvest assessment and economic analysis is not yet complete.

Industry significance: By using alternate methods of delivery, the project aims to decrease the total amount of product delivered per acre and hence reduce the resulting drift.

Project Title: *Interactive effects of mechanical leaf removal timing and differential regulated deficit irrigation on phenolics and green aroma compounds of Merlot in northern San Joaquin Valley*

Principal Investigator(s): SK Kurtural, JA Kennedy

Anticipated project duration: 3 years

Contributing staff/scholars: G Gambetta, Y Zhang (postdoctoral scholar), G Dervishian

Contributing graduate students: C Nelson

Other contributing students: A Mendez, A Castillo, C Huizar, S Rios, T Gunduz

Funding source(s): American Vineyard Foundation

Background: There are several practices that effect fruit quality as well as vine vigor. For many vineyard practices the understanding of how a practice specifically influences grape composition at the biochemical level is still poorly understood (e.g.: modifying leaf area to fruit ratio on grape composition, or irrigation on fruit green aromas). In contrast, the role of fruit exposure on red grape and wine color is understood at the practical and fundamental level. We focus on the hypothesis that vineyards located in warm regions are subject to conditions that promote more rapid vine growth in early stages of the season, therefore resulting in high or at least the same level of shoot extension per week as in cooler regions, hence occluding the cluster and making the canopy less efficient.



Projected results: We aim to deduce the ideal timing to do leaf removal in the warm climate and match it to an irrigation regime that can be managed with existing farm staff.

EL-50 Clemens mechanical leaf remover equipment in the vineyard

Industry significance: Fruit/wine phenolic compounds and green aromas are an important driver of quality in red wine grapes. A mechanical leaf removal method with a targeted timing approach combined with a differential regulated deficit irrigation method would not only provide continued exposure but would increase the gene expression in the isoflavonoid biosynthesis pathway for color production. Furthermore, late season exposure has increased fruit aromas in red wine thereby masking green aromas in recent publication by the investigators.

Project Title: *Interaction of rootstock, mechanical crop load management systems and differential regulated deficit irrigation on mineral nutrient requirements of wine grapes in southern San Joaquin Valley*

Principal Investigator(s): SK Kurtural

Anticipated project duration: 5 years

Contributing staff/scholars: JA Kennedy, Y Zhang (postdoctoral scholar), G Dervishian

Contributing graduate students: C Nelson, M Cook

Other contributing students: A Mendez, A Castillo, C Huizar, T Gunduz

Funding source(s): American Vineyard Foundation

Background: There is lack of recent information on nitrogen efficiency trials; since the last trials were conducted, wine grape acreage in the SJV was increased, as well as the economic threshold to grow grapes for a commercial profit. A management approach allows for greater potential for productivity, but it increases the total biomass production by the grapevine and thus may increase the demand for Nitrogen (N). There is a lack of knowledge on how best to use N to fertilize the grapevine under the new management approaches. Furthermore, the manner in which regulated deficit irrigation is being used to manage crop load has changed drastically over the last 30 years.

To fully and consistently exploit the benefits of mechanical crop load management and differential RDI application, more information is needed on N fertilizer, as there is a lack of knowledge concerning the long-term impact of mechanical viticulture and nutrient requirements on the overall growth, yield, and sustained capacity of the vines. While there have been numerous crop load, RDI and nutrition studies conducted on wine grapes in California and North America, the majority have looked at these two factors separately and few have included mechanization of crop load management practices. Therefore, we propose to study various N fertility treatments in combination with conventional and mechanical crop load management for wine grapes in concert with differential RDI, determine their impacts on crop yield and quality, assess their impact on vine nutrition and wine quality, and to develop science-based recommendations that will be extended to vineyard managers



Mechanical California sprawl pruner on tracks with dual heads

Projected results: The project scientists have initiated and finalized various studies in canopy management, mechanization, and mineral nutrition. The project scientist also has a well-established track record in extending information throughout California and beyond. A Pinot gris mechanical crop load management trial in southern SJV was the impetus for the project. The Pinot gris mechanical crop load project identified a crop load of 10 to 13 as the optimum load for warm climates to achieve economical yields. At the identified range of sustainable yield, there was no indication of degeneration as pruning weight per meter of row was in the recommended range of 0.8 to 1.0 kg/m. However, when Pinot gris was fertilized at the recommended rate of 28 lbs/A, the yearly depletion of petiole nitrate concentration at bloom was above the recommended rate. It was evident from the crop load study that the current nitrogen recommendations may be in excess and needs further investigation for mechanical management approaches.

Industry significance: This study is in year two of five. The significance for the industry is the pending nitrogen plan for permanent crops. There is no guidance or recent work done in the San Joaquin Valley of California to set a limit using current production methods for nitrogen use.

HEND LETAIEF, Assistant Professor of Enology

Project Title: *Assessing grape texture and its relationship to wine composition and perception*

Principal Investigator(s): H Letaief

Anticipated project duration: 2 years

Contributing staff/scholars: L Richaud

Other contributing students: L Barrett, S Dos, B Hananouch, L Meissner

Funding source(s): American Vineyard Foundation

Background: Although it is the long-term goal of winemakers to identify a relationship between phenolic extractability and wine characteristics, to date progress in this area is limited. Grape texture analysis could be a useful tool to reach that target. Having this knowledge would improve the ability to manage harvest decisions and the production process as well as to predict wine composition when grapes are received in the winery.

Grape textural analysis is the practice of objectively measuring berry physical characteristics related to deformation under an applied force.¹ The first studies applying instrumental texture analysis to wine grapes started in the 1980s with a particular focus on the changes in berry texture during ripening.² Recently, the necessity of investigating new parameters to understand and predict the extractability of phenolic compounds from the berry skin and seeds has stimulated the application of instrumental texture analysis to winegrapes.^{3,4} The effectiveness of grape texture properties as varietal markers has also been investigated. In a study conducted on Barbera, Brachetto, Cabernet Sauvignon, Dolcetto, Freisa, Nebbiolo and Pinot noir, texture profile analysis (TPA) was shown to be the most appropriate test for varietal differentiation.⁵

If we are to understand the role of grape texture on the potential for skin phenolic extraction, measuring texture in grape samples is important. Based upon recent research, it is not sufficient to measure the total concentration of tannin in skin tissue. This is due to the presence of diffusional barriers (e.g.: cell wall material) that restrict the extractability of skin phenolic compounds.^{6,7} A critical target for this project is the development of an analytical method that measures the extraction potential of skin phenolic compounds while measuring grape texture.

Projected results: The objectives of the project are the following:

- Develop an optimized analytical method for measuring grape texture.
- Determine the relationship between grape berry physical properties and corresponding extractability of anthocyanins, tannins and aroma precursors.
- Validate the methods by analyzing different grape varieties from different locations.

Industry significance: Challenges for the grape and wine industry include prediction of optimal fruit maturity for the types and styles of wines desired and understanding the relationships between fruit quality



Hend Letaief and Lauryn Meissner, student research assistant. Photo by Steve Olson



Undergraduate student research assistant Lauren Barrett working in the lab under the direction of Letaief

and wine production. While it is understood that grape maturity can have a profound impact on wine, other factors including cultivar, climate, soil and notably vine water status as well as vineyard management and winemaking protocols are also important.

Research has found that grape texture becomes modified during maturation, but what is clearly lacking in wine production in the SJV wine industry is an analytical approach to measuring texture in the winery and understanding the relationship between phenolic extractability and wine quality.^{8,9}

A major purpose of the proposed project is first to improve our understanding of how grape textural properties influence wine production practices and to develop analytical methodology based on previous research that will provide information on the relationship between grape texture and its phenolic extraction potential as well as wine quality. In order to identify the utility of the texture findings, an additional goal is to use these methodologies in wine production operations.

Members of the California wine industries (e.g.: E&J Gallo) responded to the proposed project very positively, as demonstrated by their assistance and participation in the proposed project as cooperators.

The success of the proposed research will result in a significant increase in wine quality and value. An additional challenge includes replacing time-consuming grape sampling and evaluation methods with a new technique that is fast, accurate and precise.

Literature

¹Bourne MC. *Food texture and viscosity concept and measurement*. 2nd. ed.; Academic Press: San Diego, 2002.

²Lee CY, Bourne MC (1980). Changes in grape firmness during maturation. *Journal of Texture Studies* 11(2): 163-171.

³Rolle L, Torchio F, Lorrain B, Giacosa S, Segade SR, Cagnasso E, et al (2012). Rapid methods for the evaluation of total phenol content and extractability in intact grape seeds of Cabernet Sauvignon: Instrumental mechanical properties and Ft-Nir Spectrum. *Journal International des Sciences de la Vigne et du Vin* 46(1): 29-40.

⁴Rolle L, Torchio F, Ferrandino A, Guidoni S (2012). Influence of wine-grape skin hardness on the kinetics of anthocyanin extraction. *International Journal of Food Properties* 15(1-2): 249-261.

⁵Letaief H, Rolle L, Gerbi V (2008). Mechanical behavior of winegrapes under compression tests. *American Journal of Enology and Viticulture* 59(3): 323-329.

⁶Cerpa-Calderón FK, Kennedy JA (2008). Berry integrity and extraction of skin and seed proanthocyanidins during red wine fermentation. *Journal of Agricultural and Food Chemistry* 56(19):9006-14.

⁷Hernández-Hierro JM, Quijada-Morín N, Martínez-Lapuente L, Guadalupe Z, Ayestarán B, Rivas-Gonzalo JC, et al (2014). Relationship between skin cell wall composition and anthocyanin extractability of *Vitis vinifera* L. cv. Tempranillo at different grape ripeness degree. *Food Chemistry* 146: 41-47.

⁸Letaief H, Maury C, Symoneaux R, Siret R (2013). Sensory and instrumental texture measurements for assessing grape seed parameters during fruit development. *Journal of the Science of Food and Agriculture* 93(10): 2531-2540.

⁹Waldron KW. *Texture in food: Solid foods*. Woodhead Publishing Limited: Cambridge, 2004.

SUSAN RODRIGUEZ, Research Fellow and ROY THORNTON, Professor of Enology

Project Title: *Quantification of rot in red and white wine grapes*



Nassaeth Ordaz Toribio tagging vineyard for rot

Principal Investigator(s): S Rodriguez, R Thornton

Anticipated project duration: 2009- 2015

Contributing staff/scholars: T Stephenson

Contributing graduate students: J Ramirez-Perez, H Durgin

Other contributing students: M Morales, J Maldonado, I Natarajan, N Ordaz, J Campbell, E Howell, D Haskell, P Jackson, J Maher, M Nelson, D Michue, R Gardenhire, A Phillips, J Randal, A Toscano, E Gritz, S Kelly, E Grahn, M Atkinson, S Wood, M Crawford, G Ozcan

Funding source(s): California Winegrape Inspection Advisory Board, California State University Agricultural Research Initiative (ARI)

Background: Machine harvesting of grapes and long travel distances has made quantifying rot in grapes by visual inspection virtually impossible. Detached berries floating in a sea of juice in the gondola is a common sight at test stands. An objective method has been sought for over 30 years. The project has been supported since 2009 by the California Winegrape Inspection Advisory Board (CWIAB) through American Vineyard Foundation (AVF) and by the ARI. With the assistance of Dr. Nick Dokoozlian and E & J Gallo we have developed calibrations to measure rot in Chardonnay and Zinfandel grapes by FT infrared spectroscopy (FTIR).

Projected results: The Chardonnay and Zinfandel calibrations were field tested in 2013 with the assistance of E & J Gallo Winery, Delicato Family Wines, and Golden State Vintners. Random block samples were taken from vineyards one to two days prior to harvest and the % rot was predicted using our calibrations. The % rot was also predicted from spectra of samples taken from gondolas at the test stands from the same vineyards. A high test-retest reliability, a prerequisite for



method accuracy, was obtained for both subsamples taken from each block and for the sugar stand-field sample predictions. The test-retest reliability within a block was 95% for Chardonnay and 88% for Zinfandel. It was reasoned that the lower reliability was due to the mixture of Red, Light Red and White Zinfandel grapes in the laboratory prediction model. Red Zinfandel and White Zinfandel grapes are farmed very differently and the spectra of their juices would be expected to be different. Thus, a separate White Zinfandel calibration is the focus of the 2014-15 research. Work is also proceeding on a 'universal red' calibration: a prediction model built from a limited number of Cabernet sauvignon, Merlot and Red Zinfandel samples fits the data very well. There is also evidence to suggest that a 'universal white' calibration is possible. Work will continue on both of these calibrations with 2014 grape samples.

By spring 2015 we hope to be able to provide an accurate rot prediction tool for hand- and machine-harvested San Joaquin Valley grapes for the California wine industry.

Industry significance: An objective and accurate measure of rot in machine-harvested grapes has been elusive. The adoption of this technology will give both grape growers and winemakers an objective measure of grape rot that can be used when drawing up equitable contracts.

Project Title: *Early detection of grape trunk disease by Raman spectroscopy*

Principal Investigator(s): S Rodriguez, R Thornton

Anticipated project duration: 2013- 2015

Other contributing students: P Jackson, M Nelson, D Michue, R Fishman, R Justice

Funding source(s): Research proposals focusing on the development of a method for early detection of trunk diseases have been submitted to ARI by Rodriguez and Thornton and to California Department of Food and Agriculture Specialty Crop Block Grant Program (SCBGP) by Rodriguez, Thornton and Alejandro Calderon-Urrea of the Department of Biology, California State University, Fresno. The ARI grant has been awarded for 2014-2015. SCBGP announces awards in October; the SCBGP proposal, if funded, would be for 2014-2016.



Student research assistants Pat Jackson and Ron Justice counting spurs

Background: Hundreds of millions of dollars are lost annually due to grapevine trunk diseases. These fungal diseases threaten the sustainability of vineyards in nearly every raisin, table and wine grape production region in California. The cost associated with the 30-62% decrease in productivity of infected vines and the cost of increased vineyard management could be substantially reduced through the use of a simple, rapid early detection method.^{1, 2, 3}

Projected results: To obtain preliminary data in 2013, grapevines with trunk disease were identified in commercial Cabernet sauvignon and Chardonnay vineyards in the Lodi area, with help from Hal Huffsmith of Trinchero Family Estates and William Cranston III in one of his Cabernet vineyards. Four enology

students collected sap from 12 healthy vines and 12 diseased vines in the Trinchero vineyards. Susan & Roy collected sap from Cranston's vineyard – but only from diseased vines as healthy vines could not be found in that vineyard block. Vines that were sampled were tagged for later determination of disease severity: in May the students returned to the vineyards to count the total number of spurs and the number of dead or lost spur positions. Myles Nelson worked on several spectral protein and nucleic acid assays on filtered samples using a UV-Vis spectrometer of Dr. Calderon-Urrea's that uses only 2 microliters of sample. It was determined that the samples are so dilute that concentration will be needed. Samples were run on the Raman spectrometer by Rachael Fishman. Chemometric analysis of the Raman spectra will be conducted with the goal of developing a model to predict vine health status. If a predictive model can be developed, it could be transferred to the user with a hand-held Raman spectrometer for use in the vineyard.



Collecting sap for analysis.

Industry significance: The annual cost to the California wine industry of trunk diseases caused by the fungi, *Eutypa*, *Botryosphaeria*, *Phaeoacremonium*, and *Phomopsis*, is estimated at \$260 million. This cost is associated with decreased vineyard longevity, fruit yields, and fruit quality, as well as increased management costs and replanting. A management plan of early detection, treatment and/or replacement would optimize vineyard productivity and limit the spread of these diseases.

Literature:

¹Rolshausen PE, Urbez-Torres JR, Rooney-Latham S, Eskalen A, Smth RJ, Gubler WD (2010). Evaluation of pruning wound susceptibility and protection against fungi associated with grapevine trunk diseases. *American Journal of Enology and Viticulture* 61(1):113-119

²Smart RE (2014). Grapevine trunk disease: A larger problem than ever posed by phylloxera. *Practical Winery and Vineyard*, 2014 Special Edition, supplement to *Wines & Vines*, pp. 9-13.

³Urbez-Torres JR, Leavitt GM, Voegel TM, Gubler WD (2006). Identification and distribution of *Botryosphaeria* spp. associated with grapevine cankers in California. *Plant Disease* 90(12):1490-1503.

Research

SONET VAN ZYL, Assistant Professor of Viticulture

Project Title: *The evaluation of different cultural practices on Scarlet Royal table grapes to determine post-harvest quality*

Principal Investigator(s): S Van Zyl

Anticipated project duration: 2012- 2014

Contributing staff/scholars: L Richaud

Contributing graduate students: V Towers

Other contributing students: H Topete, E Palumbo, A Burke



Labeling boxes and bins for table grape harvest

Funding source(s): California Table Grape Commission, California State University Agricultural Research Initiative (ARI)

Background: Scarlet Royal is a red, seedless late season table grape. Due to its lateness, Scarlet Royal is subject to late season rain, which increases its susceptibility for *Botrytis* infections under long-term cold storage conditions. Growers cover these grapes with plastic for rain protection, but it is known that the plastic covers increase humidity in the vineyard that can also lead to mold infections. This project looks at different cultural practices under covered and uncovered conditions to determine optimum treatments.

Projected results: In the first year of the trial, no rain occurred before harvest. Results in terms of cold storage potential for the different treatments were no significant. During the 2013 season, the grapes will be sprayed with water in the field to simulate rain conditions.

Industry significance: Table grape growers can lose a significant portion of their crop if it rains just before harvest. This study will provide an optimum method for cultural practices under plastic covering to minimize losses due to rot.



Graduate and undergraduate students harvesting Scarlet Royal table grapes

Project Title: *The influence of post-veraison foliar potassium applications on table grape berry quality*

Principal Investigator(s): J Smilanack, S Van Zyl

Anticipated project duration: 2013- 2014

Contributing staff/scholars: Staff of the San Joaquin Valley Agricultural Sciences Center in Parlier, California

Contributing graduate students: Sijie Zhu

Funding source(s): California Table Grape Commission

Background: Sugar concentration and skin color (for pigmented table grape cultivars) are primary indicators of maturity and important for marketing purposes. Treatments that accelerate sugar and pigment development enable earlier harvest. Early harvest not only improves marketing, it reduces risks of losses from bird feeding or insect and pathogen damage because the residence time of the grapes in vineyards is reduced. In addition to accelerating maturity, increasing sugar content and improving color could also enable a larger crop to mature on the vines. Potassium is the primary soluble salt to affect xylem and phloem flows. Particularly important for sugar transport, potassium from the roots and vine are primarily transported into fruit after veraison, and it exceeds what the root system can deliver, even from well water soil with abundant potassium.



Graduate student Sijie Zhu working in the table grape block at Fresno State

The objectives of this project were to apply a potassium spray to the berries so their content would exceed that delivered naturally to the fruit, and determine if this altered the grapes compared to those with “natural” potassium content.

Projected results: Potassium significantly increased soluble solids content. Soluble solids of ‘Autumn Royal’, ‘Summer Royal’, ‘Scarlet Royal’, and ‘Sweet Scarlet’ increased at harvest to 20.3°Bx, 20.0°Bx, 21.8°Bx, and 19.3°Bx, after potassium treatment, from 15.5°Bx, 18.2°Bx, 18.1°Bx, and 16.7°Bx, respectively, among the controls. It significantly

increased fructose and glucose in berries, compared to controls. Fructose/glucose ratios from veraison onset to harvest time increased from about 0.65 to 0.90, independent of potassium treatment. Potassium application influence on fructose/glucose ratios varied, the only significant increase was to 'Autumn Royal', from 0.90 to 0.91 at harvest. Potassium also significantly increased berry firmness and color intensity; however, it significantly decreased berry size.

Industry significance: The table grape industry is always looking for methods to ripen their crop earlier, either for a more desirable market window and higher prices, or to protect the later varieties from fall rain. Potassium sprays are commercially used in the table grape industry, but not tested extensively. This project answers some questions related to the effectiveness of potassium applications as well as quality aspects of grapes treated. More research is needed to determine which potassium salt has the most significant influence on soluble solids accumulation. A project answering this question is underway. Research is also needed to determine the sensory aspects of potassium applications on table grapes.

Project Title: *Evaluation of nematode resistant rootstocks for use with early ripening raisin varieties grown for dried-on-the-vine raisin production*

Principal Investigator(s): M Fidelibus, S Van Zyl

Anticipated project duration: 2012- 2014

Contributing staff/scholars: S Vasquez, L Richaud

Contributing graduate students: V Towers

Other contributing students: H Topete, E Palumbo, A Burke

Funding source(s): California Raisin Marketing Board, ARI

Background: Raisin grape production accounts for 7.59% of the world grape production. The USA is the leading raisin producer averaging 400,000 tons annually representing 36% of the world's production. California accounts for over 90% of the production making raisins an important component of the viticulture industry in California with an annual farm-gate value of approximately \$500 million. Traditionally, 'Thompson Seedless' raisins are picked in late August, and tray dried between rows. The drying process typically takes two-three weeks to complete. The risk of inclement weather (cloudy skies and rain) during the drying period increases the chance of inadequate drying weather. Precipitation during the drying process can increase mold (*Alternaria*, *Aspergillus*, *Cladosporium*) growth on raisins and reduce its marketability. In addition to the risk, raisin processing is labor intensive. These two factors have created interest among raisin growers in dried-on-vine (DOV) raisin production.

DOV raisin production relies on two essential components: 1) early maturing varieties and 2) new trellis systems developed specifically for DOV production. Although DOV raisin production has many benefits (less labor intensive, better crop quality) it does have some drawbacks. One disadvantage is the severing of canes, which reduces the active canopy by half. This de-vigorating process can reduce the production of grapevines over time. High vigor is key to overcoming the de-vigorating process. Establishing a raisin vineyard on its own roots for DOV production subject vines to other problems. Raisin vineyards are often planted on sandy soils containing pests such as nematodes. The reduction and eventual elimination of methyl bromide in the coming years will make vineyard establishment more difficult.



VanZyl and graduate student Victoria Towers harvest Selma Pete grapes for raisin production research

Development of a new broad-spectrum fumigant equivalent to methyl bromide is not likely. New vineyards will conceivably be planted on rootstocks having resistance to root knot (*Meloidogyne* spp.), ring (*Criconebella xenoplax*), dagger (*Xiphinema* spp.) nematodes and phylloxera. High vigor rootstocks that have resistance to nematodes will be most beneficial to the longevity of DOV vineyards.

The objective for this project is to test the early ripening variety “Selma Pete” on 10 different nematode resistant rootstocks and evaluate raisin quality and general plant health.

Projected results: Raisins are currently tested by the USDA to determine quality aspects. This will give an indication on which rootstocks perform well for DOV production. Previous results are with Mr. Steve Vasquez and in the process of being analyzed.

Industry significance: Establishing a DOV vineyard is costly. Setbacks due to weak vines, which do not fill the trellis system, cost growers time and money. It is conceivable that rootstocks will play an important role in new DOV vineyards. The use of rootstocks that impart vigor and have nematode resistance will be important in DOV vineyard establishment.

Project Title: *Interactive effects of plant growth regulators and phenology based regulated deficit irrigation on the color development of Autumn Royal table grapes*

Principal Investigator(s): S Van Zyl, K Kurtural, JA Kennedy

Anticipated project duration: 2014-2017

Contributing staff/scholars: G Dervishian

Contributing graduate students: No graduate student

Other contributing students: V Towers, T Duval, A Pineda, J Chenoweth, C Huizar

Funding source(s): ARI, Grapery



Undergraduate student research assistant Alex Pineda

Background: The warm and semi-arid San Joaquin Valley (SJV) of California leads United States in black table grape production. However, the warm climate that lends itself to higher yield can inhibit color formation. Researchers have long known that warm climate causes lower anthocyanin content in SJV grapes, but the mechanism is poorly understood. There has not been any significant translation of this information to practices resulting in increases in color or decreases in irrigation application amounts. This project will provide growers with additional information to assist them in improving grape color and pack out rates of Autumn Royal, while reducing irrigation amounts.

Projected results: The investigators aim to define the temporal development of anthocyanin biosynthesis as up - or down-regulated by phenology based irrigation restriction while not adversely affecting pack-out rates of table grapes. Previous

research in wine grapes demonstrated that while irrigation restriction prior to veraison increased anthocyanin concentration in the berry at harvest. However, this irrigation approach reduced berry size by 25%. To counter this berry size decrease in table grapes the project scientists are using gibberellic acid and/or ethe-rel (a plant growth regulator) to attain correct berry size and anthocyanin development without adversely affecting yield.



Peeling skins to extract anthocyanins

Industry significance: Fruit phenolic compounds are important drivers of quality in table grapes. A regulated deficit irrigation method combined with the correct plant growth regulator application would not only provide better anthocyanin concentration in the berry to attain full color, exposure but would maintain the berry size not to adversely affect pack out rates while saving irrigation amounts. Furthermore, reduction in canopy density by irrigation restriction would limit cane cutting to open up canopy middles in open gable canopy types saving labor operation costs.

This project will address the highest industry priority currently listed by the California Table Grape Commission “Effect of plant growth regulators on fruit set, berry size, color and return fruitfulness” in combination with priority #7, “Evaluation of irrigation practices”.



Photo by Cary Edmondson

Open Access: A Model for Academic and Industry Conversations

Britt Foster, MLIS

Librarian —V. E. Petrucci Library

OUR MISSION is to serve the grape, wine, and raisin industries, the public, and the Department of Viticulture and Enology through access to research and information promoting the understanding and development of these disciplines. Library resources reflect the diversity of our patron community, with materials generated by the Department of Viticulture and Enology, by public and private research institutions and associations, and by other resources released regionally, nationally, and globally.

The idea of making resources accessible is a cornerstone of library services for libraries of any kind. At the V.E. Petrucci Library, we have a unique role as an academic library in providing access to information for not only our Fresno State patrons, but also the community and industry.

As we celebrate and explore the research of the Department of Viticulture and Enology in this fall issue of *The Catch Wire*, it's interesting to share some of the challenging practices in place that govern the way the V.E. Petrucci Library disseminates grape, wine, and related research to our industry patrons, and an idea that's being advocated for by many librarians, academics, and public advocacy groups.

This concept, known as open access (OA), is a sort of umbrella term for a range of publishing and licensing practices for research articles and data that all have a core purpose: making research information free and fully available to the public (<http://www.sparc.arl.org/issues/open-access>). This has the potential to completely change the way information moves between researchers and the industry, and is a major shift from most of the current models used in publishing.

The Challenge

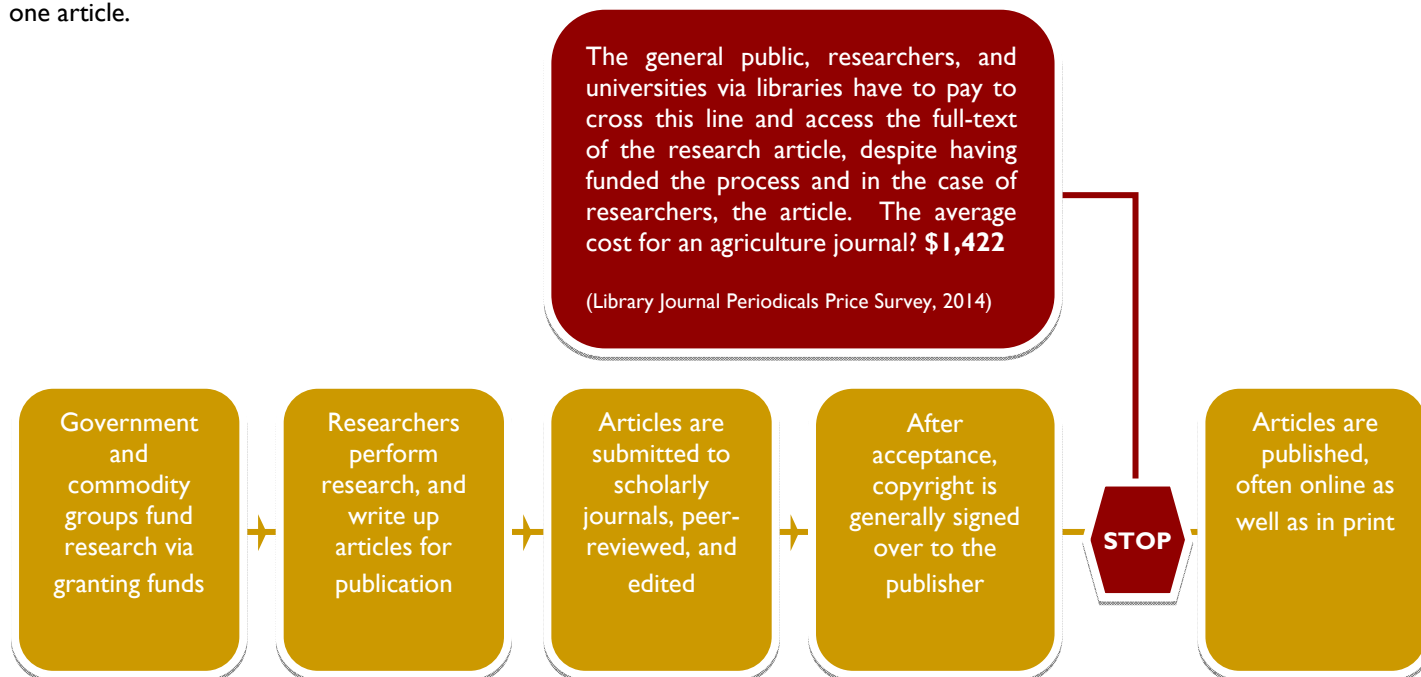
In this age of the internet access to information is expected to be almost instantaneous, and easy. The immediate return of a term typed into a Google search bar, however, hides some of the layers of information access and retrieval.

To continue using Google as an example—as the most popular website not only nationally, but globally, it is a leading information access tool (<http://www.alexa.com/siteinfo/google.com>)—users are given a list of returns for a search term. However, these returns are re-

trieved using *links*, not *queries*, which means that a large portion of digital information, including many full-text scholarly articles from academic journals, are “hidden” from the “spiders” Google uses to crawl the web(http://www.google.com/intl/en_us/insidesearch/howsearchworks/thestory/).

While there are search engines that have been developed to find this information in the hidden or deep web, **discovery is not access**. Google Scholar, for example, will retrieve titles and abstracts of scholarly articles, and even reveal relationships between the found article and other articles, but does not provide full-text access.

Gaining full-text access can be difficult because article copyright generally belongs to the journal, not the author or the funding body. Journals and publishers generate funds through access to full-text articles, through individual or institutional subscriptions. These subscriptions are often prohibitively expensive, and are limited to the individual or the institution by the terms of the license. This prevents both scholars and the public from accessing articles; the academic library may have to limit subscriptions due to cost, while the public is unable to access many electronic articles without paying fees potentially \$100 or more for just one article.



How OA Can Support Our Industry

Why does OA matter to our grape and wine industry? For several reasons:

Education

At Fresno State, we believe that excellence in education is critical to the success of our industry. We're proud of our rigorous curriculum, which is shaped through dialog with our industry and supported by innovative applied research. Access to this research is a critical component of our program, and with publishing practices making many research journals prohibitively expensive, the depth and breadth of access for our students can be limited.

Research Impact and Dissemination

In keeping research articles behind paywalls, it is difficult for research findings to have their full impact. Communication of ideas between scholars can be delayed, and communication between scholars and industry can be prevented.

Development and Innovation in Industry

With dissemination of research articles to the industry prevented by many traditional publishing models, the opportunity to translate research into applied practice is hindered.

Current Policy Shifts

There are currently a number of policies being implemented or pending at the Federal and State level that will promote OA research articles and data for the grape and wine industry:

Executive Directive on Public Access

In February 2013, the White House Office of Science and Technology Policy (OSTP) released a statement titled the *Executive Directive on Increasing Access to the Results of Federally Funded Scientific Research*. This directive states that re-

V. E. Petrucci Library Continued

THE LANGUAGE OF OPEN ACCESS

GREEN OPEN ACCESS

Full-text available through self-archiving by the author or the institution

GOLD OPEN ACCESS

Full-text available immediately upon publication through an open access journal

GRATIS OPEN ACCESS

Free full-text access available to read

LIBRE OPEN ACCESS

Free full-text access plus additional usage rights like sharing or modifying

CREATIVE COMMONS

A system of public copyright licenses that allow the creator to choose how their work can be shared, modified, or used by others

REPOSITORY

An online database, often hosted by a university, where researchers' works are freely available

OPEN DATA

Data collected during the course of research is made open and available for use

http://en.wikipedia.org/wiki/Open_access

search funded with tax-payer dollars (funding received from federal agencies such as the Department of Agriculture) along with the resulting data must be made freely available to the general public (<http://www.sparc.arl.org/advocacy/national/directive>).

Each federal agency was responsible for submitting plans on how they would comply with this directive by August 22, 2013: to date only the Department of Energy has released their plan. The anticipation of the plans yet to be released is the hope for a comprehensive vision from each agency on access, dissemination, and usage of tax-payer funded research. With a research budget of \$2.3 billion in 2014 (American Association for the Advancement of Science, Jan 15 2014: <http://bit.ly/lxgbbaM>), the US Department of Agriculture research dissemination plan will have a decided impact on the agricultural industries, opening a wealth of information previously available to the industry only through payment of high fees.

CA AB-609

CA AB-609 is a piece of legislation that is pending Governor Jerry Brown's signature. With text significantly amended from the original, AB-609 was submitted with the intent to mandate public access to research articles resulting from funding provided by the State of California. The current legislation now requires that only research funded by the State Department of Public Health be made public (http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB609). However, this mirrors the path of federal agencies, where the National Institute of Health adopted a public access policy in 2008, to be followed by the directive from the OSTP in 2013. As OA expands, perhaps the State of California may also expand the list of agencies whose funded research must be made publicly available.

UC Open Access Policy

A powerhouse of research in California, the University of California established the UC Open Access Policy in July 2013. With 8,000 faculty and 40,000 publications a year, this policy will open up a significant body of research articles. UCLA, UC Irvine, and UC San Francisco led the policy implementation by beginning to deposit research at eScholarship (<http://escholarship.org>) in November 2013. It is planned that the remaining seven campuses will begin depositing research in November 2014, pending UC Senate approval and review (Office of Scholarly Communication, University of California: <http://osc.universityofcalifornia.edu/>).

Prior to my position with the Department of Viticulture and Enology, I was a supporter of open access, like many of my librarian colleagues (<http://www.sparc.arl.org/membership/current-members>). Having been a librarian with the V.E. Petrucci Library for almost three years now, I have come to see open access as essential. The V.E. Petrucci Library weekly receives requests from industry for full-text articles that we cannot provide access to, and the only thing more challenging than explaining why we can't provide access to articles in journals whose subscriptions are paid for by industry support is having to send patrons eager for information away empty-handed, or at best, provide convoluted directions on how to access the article from another institution. In the spirit of service, and in the spirit of advancement and innovation in the disciplines of viticulture and enology, the V.E. Petrucci Library will continue to advocate for open access models, and work to provide our patrons with the fullest range of resources possible.

Feature

A Winemaker's Reflection on Crush

It's that time again when wineries are preparing to receive the year's grape harvest for crush. The word "crush" is used by wineries to denote the time of year (usually two to three months in the fall) when grapes are brought into the winery for processing. It's a time of anticipation and excitement about how this vintage's bounty will translate into this year's wines. Those of us who have experienced at least one crush know that this time of year requires hard work and long hours, and results in mental and physical exhaustion. Those that take on this task are dedicated and committed to their craft. Most winemakers and winery staff will never reap great monetary riches, but their reward comes when they experience the fruits of their labor.

We start with planning. Winemakers work closely with vineyard managers to ensure the best possible quality/price ratio. If grapes are being purchased from non-related vineyards, agreements should have been finalized prior to this time. Fresno State Winery only uses grapes grown in the Central Valley of California. Several weeks before the expected start of harvest, all crush equipment must be cleaned, serviced, and operated to ensure proper working condition. Supplies (cleaning and lab chemicals, enzymes, yeast, bacteria, nutrients, oak products, etc.) are ordered based on the number of grape tons the winery will receive. Supplies should be ordered well in advance to ensure all supplies arrive in the winery before the start of crush.

The process starts with taking grape samples from the vineyard to check maturity through chemical analysis and sensory evaluation. We check sugar, pH, and acidity. Each winemaker has their own parameters for determining harvest dates based on grape variety and wine style. Because we deal with Mother Nature, the ideal parameters are not always met: we can only try to get as close to ideal as possible. Once the harvest date is determined, the grapes are picked by hand or mechanical harvester. The harvested grapes are transported to the winery immediately after picking. The Fresno State Winery only receives hand harvested grapes in half ton bins.

After the grapes are picked, the lot is weighed at a certified scale. Total weight, truck and bin tare weights, grape net weight, grape variety, grower, and date must be document-

ed for each lot, and saved as part of the wine tracking documents.

When the grapes arrive at the winery, it is time to start work. At the Fresno State Winery, all grapes are hand sorted to eliminate any unwanted grapes cluster (rot, bird damage, etc.) and MOG (material other than grapes). After sorting, most white grapes are transferred directly to the wine press which gently squeezes the juice from the grapes. The juice is pumped to a fermentation tank, chemistry checked (sugar, pH, acidity, nitrogen), and additions made (enzymes, nutrients, sulfur dioxide). Most red grapes are sorted, destemmed and crushed, and pumped to a fermentation tank. Red fermentations occur with the juice, pulp, skins, and seeds in the tank. Most of the phenolic compounds (color, tannins, etc.) in a red wine are extracted from the skins and seeds.

John Giannini

Winemaker

The next step is to start the fermentation. We call ourselves "winemakers" but yeast are the real winemakers. Some winemakers choose to allow the fermentation to occur spontaneously through native yeast that reside on the grapes. Some winemakers choose to select a yeast strain available through several companies. The yeast strains are isolated from wine regions around the world, grown in a controlled environment, dried for convenience, and packaged for sale. There are dozens of strains to choose from, which offer various fermentation kinetics, as well as different aroma and flavor profiles.

Students enrolled in the viticulture and enology program at Fresno State learn first-hand what is required to make quality wine by participating in crush. Classroom instruction coupled with this practical training in a commercial setting offers our graduates the knowledge and confidence to be successful winemakers for many vintages to come.

Feature

When It Is Hot, Too Hot: Vineyard Management in High Heat

We are in the thick of summer heat, and high temperatures are everywhere in the news: “Historically hot,” says one headline, “Enough to melt sneakers,” reads another. This heat can be problematic for the people and for the grapevines in the warmer region of grape production, such as California’s Central Valley.

We, the human beings, are advised to limit time outdoors, stay in the shade, and stay cool. For those that must do strenuous outdoor activities, they are advised to stay hydrated by drinking plenty of water, or to work in the early morning when temperatures are lower. Otherwise, discomfort and potentially heat stroke will be the undesirable result.

The hardworking grapevines are experiencing the same heat and the same high temperatures. Of course, necessarily, grapevines are anchored into the soil in the vineyard. They are outside all the time and cannot move into a cooler place to limit exposure to or avoid high temperatures. However, they can be and should be protected from extreme heat and high temperatures for their survival, health, and productivity.

Irrigate with plenty of water. When well-watered, grapevines cool their leaves through water loss: leaf temperature can be 10°F cooler than air temperature. High air temperature combined with strong sunlight under water stress without adequate water supply will heat leaves quickly, resulting in partial or complete death (Figure 1). This will lead to reduced photosynthesis, slower fruit ripening and increased berry exposure to sunlight. Therefore, grapevines need to be irrigated to 80 – 100% crop evapotranspiration (ETC) on hot days. Regulated deficit irrigation, or RDI, should not be implemented in high heat due to the stressful and water deficit conditions created for the vines.

Provide shade for the fruit. Berries lose much less water and do not cool as leaves do, well-watered or not. Even in the shade, fruit temperature is no lower than air temperature. Under full sun, berries can be 30°F hotter



Figure 1. Leaves scorched on the top and outside of canopy under inadequate irrigation during hot days.

Sanliang Gu

Professor of Viticulture & Ricchiuti Chair of Viticulture

than the air temperature: fruit can be as hot as 140°F when the weather forecast calls for a 110°F day. Sunburn on the fruit will certainly happen if berries are fully exposed to direct sunlight, leading to lower yield and undesirable fruit quality for wine making. Therefore, canopy management in warmer regions should be practiced to protect fruit from high heat and direct exposure to sunlight through trellising grapevines in a “sprawl” fashion, and refraining from leaf removal.

Avoid hangtime. The word “hangtime” has been buzzing around red winegrape production for a while. Opinions on hangtime vary from being required for better wine quality regardless of variety, location, and vintage to being absolutely unnecessary with only negative impacts on crop yield, fruit quality, and vine health. Since fruit ripens during the hottest part of the season in July and August in warmer regions, hangtime should be avoided unless positive effects can be clearly identified. Otherwise, hangtime will expose fruit to longer period of hot days and reduce crop yield and fruit quality. Longer hangtime was associated with

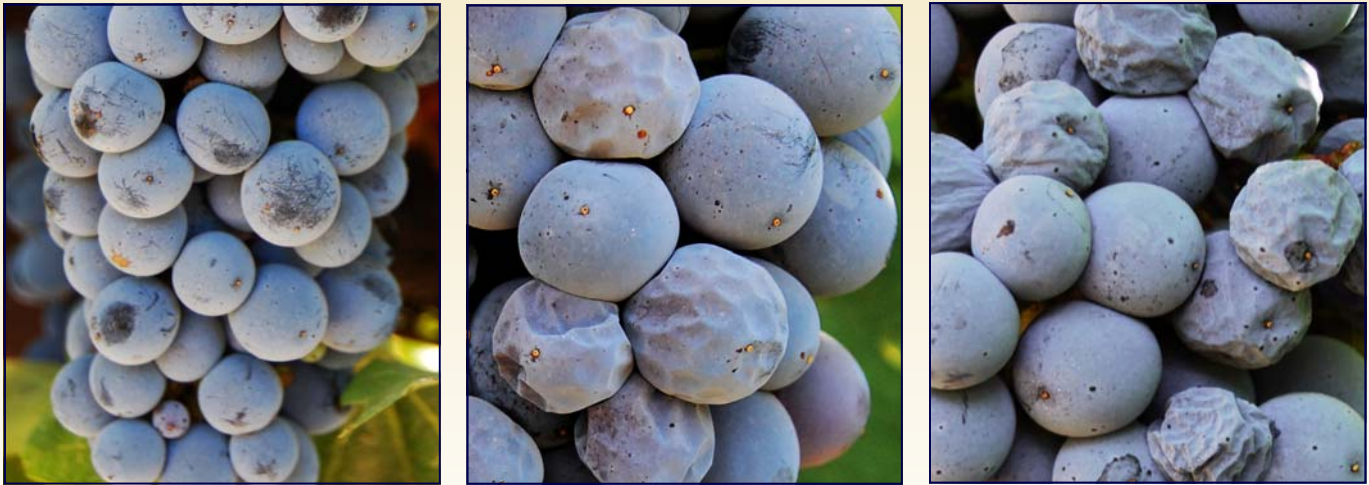


Figure 2. Dehydrating Cabernet Sauvignon berries during hangtime in Fresno, California

berry shriveling (Figure 2) and higher Brix, as well as reduced anthocyanins, phenolics, and tannins, potentially leading to poor color and inferior flavor of the fruit and wine.

Managing a vineyard in high heat requires close attention. It is, however, well worth the effort to maintain fruit quality and yield through the hot days by irrigating with plenty of water, providing shade for the fruit, and avoiding prolonged hangtime.

Selected References

- Bergqvist, J., N. Dokoozlian, and N. Ebisuda (2001). Sunlight exposure and temperature effects on berry growth and composition of Cabernet Sauvignon and Grenache in the Central San Joaquin Valley of California. *American Journal of Enology and Viticulture*. 52:1-7.
- Eddy, D. Growers left high & dry – Winegrapes left hanging longer in warmer climates can produce inferior wines. *Western Fruit Grower*. June 2011.
- Grant, S. Five-step irrigation schedule-- Promoting fruit quality and vine health. *Practical Winery and Vineyard*. May/June 2000.
- Olson, S. Hang Time – Scientist studies how hang time on the vine affects sugar level, quality of wine grapes. *CATI Update*. Spring 2008.
- Spayd, S. E., J. M. Tarara, D. L. Mee, and J. C. Ferguson (2002). Separation of sunlight and temperature effects on the composition of *Vitis vinifera* cv. Merlot berries. *American Journal of Enology and Viticulture*. 53:171-182.

Events

Recent Highlights

At the start of the summer, Jim Kennedy, chair of the Department of Viticulture and Enology had the honor of participating in the **Jordan Research Center's ground-breaking ceremony** on June 13. The new 30,000 square



foot research facility is expected to open in the fall of 2015 and will be located on the corner of Woodrow and Barstow. The center is a result of a 29 million dollar dona-

tion made by the Jordan Family to the [Jordan College of Ag.](http://www.fresnostate.edu/jcast/jrc/) (<http://www.fresnostate.edu/jcast/jrc/>). At the ground-breaking, Kennedy (shown in photo fourth from left) spoke on behalf of the faculty researchers and programs at this institution.

A few weeks later, many of our faculty and graduate students including Drs. Gu, Kennedy, Kurtural, and Van Zyl presented their findings at the [American Society of Enology and Viticulture](http://www.asev.org) (www.asev.org) in Austin, Texas and at the [American Society of Horticultural Sciences](http://www.ashs.org) (www.ashs.org) in Orlando, Florida. The ASEV national conference was held on June 23-27 and the ASHS conference was held on July 27-August 1, 2014. In his role as outgoing ASEV president, Kennedy also presented the society's Merit Award to Linda Bisson, UC Davis professor and microbiologist, on June 26.

In July, the department received the news that Gov. Jerry Brown signed **Assembly Bill 1989** into law, allowing students 18 years of age and older who are enrolled in wine-



making programs at universities and community colleges to taste—not consume—wine for educational purposes. What does this mean for Fresno State? The program will now be allowed to begin training enology students in palate development in their second year, as opposed to waiting

until they are 21. "Experiencing and understanding sensory characteristics created by winemaking styles, regions, vintages, and flaws is an important aspect of our students' education," said Kennedy. The passing of AB1989 enhances the department's ability to prepare students for careers in the wine industry. The new law becomes effective January 2015.

On July 17, the Department of Viticulture and Enology was pleased to have the opportunity to meet and spend the day with several winemakers from [Diageo Chateau & Estate Wines](http://www.diageo.com) (www.diageo.com) at Fresno State. Bryan Anthony, alumnus and grower relations manager at Diageo organized a company training session in the viticulture and enology conference room that also included research presentations by Kennedy and his team of graduate students.

On August 2, ten students from several North American



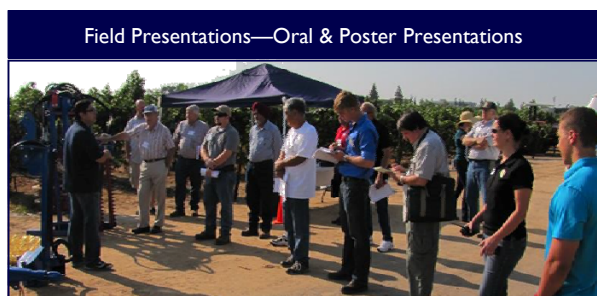
colleges and universities, including Fresno State, completed a seven-week **global wine industry internship program** in the Puglia region of Italy. Derick Webb, enology student from Fresno State was lucky enough to be

among this group and said the experience allowed him to gain a new and global perspective on winemaking. "It was a great opportunity. I was able to meet and work with fellow students from UC Davis, Oregon State, Arizona State, and Longwood University (Virginia) who shared a passion for wine. For the majority of the program we stayed in the city center of Lecce, where we also were able to tour wineries, taste wines, and see what the region had to offer," Webb said. Placed in internships based on their area of study, each student worked independently and on teams on different aspects of the wine industry in the Puglia region. The course required weekly reporting to Kennedy who also traveled to Puglia for the final week of the program.

On August 5 over 120 grape growers and winemakers at-



tended **Grape Day** on the Fresno State campus. Hosted by the Fresno State Department of Viticulture and Enology, the event received support from several industry partners. Grape Day attendees experienced morning presentations and equipment displays in the Fresno State vineyards and tours of two research laboratories, the newly remodeled V. E. Petrucci Library, and Fresno State's award-winning winery. "Grape Day is a great opportunity for attendees to learn more about us—what we do, and how our academic and research programs serve the grape and wine industry," said Cynthia Wood, event coordinator.



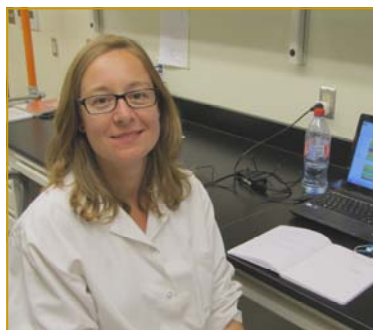
Organizing committee members Hend Letaief and Sonet Van Zyl were pleased to invite Jamal Rayyis, an internationally-noted writer and wine critic from New York to present the Grape Day keynote address this year. Rayyis, who authored several editions of *Food and Wine Magazine's Wine Guide* from 2002 to 2008, looked at the Central Valley's history, examined present trends, and shared his perspective on the future of the region, drawing parallels to other regions of the world. His presentation included an educational wine sampling of the following four wines:

- Manouches from Zelige-Caravent (from France)
- Barbera from Fresno State Winery
- Ruby Cabernet from Cardella Winery
- Alicante Bouschet from Papagni Wines

Grape Day is presented by Fresno State or UC Davis in alternate years. It includes presentations by faculty, staff, industry guests, and graduate students on current raisin, table grape, wine grape, and wine issues. For complete program information, visit www.FresnoStateNews.com.

In August, Kennedy and Hend Letaief attended the [American Chemical Society's](http://www.acs.org) (www.acs.org) national meeting in San Francisco where Kennedy presented his work on the role of oxidation on the development of tannin stickiness in red wine. During this meeting [Nomacorc](http://www.nomacorc.com) (www.nomacorc.com) reps also met with Letaief to review findings from Nomacorc-funded research on oxygen management during bottling operations.

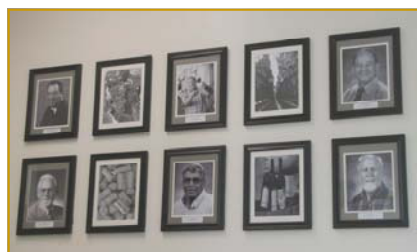
The department recently welcomed a **new post-doctoral research scholar**, Aude Watrelot, who will provide support to Kennedy's research team for three years. Watrelot



completed her PhD in biochemistry at INRA in Avignon, France (2013), and two M.S. degrees in biology and health science, and plant physiology and biotechnology.

A new photo collage

that recognizes our viticulture and enology emeriti now prominently hangs on the wall on the second floor of the Department of Viticulture and Enology. Jayne Ramirez headed this summer project that to date includes retirees Drs. Sayed Badr, Barry Gump, Carlos Muller, Vincent Petrucci, Bob Wample, and Professor Ken Fugelsang.



The department is pleased to welcome three **new Industry Advisory Board members**: Jerry DiBuduo, DiBuduo Land Management; Keith Horn, Constellation Brands; and Wade Kirschenman, Kirschenman Enterprises. The IAB provides guidance and support to the viticulture and enology programs at Fresno State (see page 4 for a complete list of members).

Anyone who visits the department, especially during the summer months, knows that our grape and wine facilities

are bustling with **research activities**. With all of the added work and commitment that comes with this time of year, there's also a comradery that builds among our students, staff, and faculty who work beside each other every day in the labs, vineyards, and winery. Fresno State is proud to provide students with this opportunity to enhance their academic careers with research experience.



Susan Rodriguez conducted a sensory evaluation workshop on August 11 for servers and bartenders of the [Woodfour Brewing Co.](http://www.woodfourbrewing.com) (www.woodfourbrewing.com) a brewery and restaurant in Sebastopol, CA that was co-founded by Fresno State enology alum Seth Wood.

On August 21, students returned to their classes and one week later the Department of Viticulture and Enology held



its annual **Welcome Back Orientation** for new and returning students. Total student **enrollment** for the fall semester reached 168, with a

growing number of incoming viticulture students. Our **new enology curriculum** also became effective this fall with new course requirements for Spanish, and wine business and marketing. An elective section has been created, and there are now opportunities for students to earn credit while participating in an internship.

Then and Now! This summer, the [V. E. Petrucci Library](http://www.fresnostate.edu/jcast/petrucclibrary/) (<http://www.fresnostate.edu/jcast/petrucclibrary/>) completed its **remodeling project** by receiving new furnishings for independent and group study for its patrons. Students returned to campus in August to a fresh new look and environment that will enhance their ability to learn and access the wealth of materials in this excellent re-



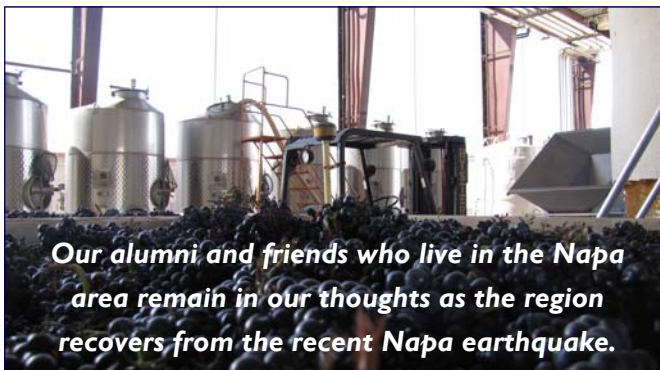
source that is available to students and the community.

On August 28, a group of viticulture and enology faculty, staff, students, and friends joined millions of people all over the world by taking the **"ALS Ice Bucket Challenge"** in honor of one of the Department of Viticulture and Enology's alums, [Ron Metzler](#), who lives with ALS. (The department took extra measures to ensure that water was not wasted.) "We are proud to spread awareness of ALS and give to this cause in Ron's name. We challenge all Fresno State viticulture and enology alums to do the same," said Kennedy, Metzler's friend and colleague. In addition to rais-



ing over \$300 in one evening, the department said that several grape and wine industry friends have also reportedly made donations directly to ALS in Ron's name. Donations forms are available at www.alsa.org. [Read the full story](#) and [watch the video](http://bit.ly/1l1eoRc) (<http://bit.ly/1l1eoRc>) of the challenge at www.FresnoStateNews.com.

As fall approaches, the department looks forward to another successful semester filled with many projects and activities. Students can already be found getting hands-on training in our vineyards and winery. It is these type of experiences that set our students apart as they prepare for the real world. Stay in touch with us on [Facebook](#) at www.facebook.com/FresnoStateViticultureandEnology.



Our alumni and friends who live in the Napa area remain in our thoughts as the region recovers from the recent Napa earthquake.

Events

Calendar—Where You Can Find Us

Stay tuned for dates and locations for our upcoming alumni gatherings—veaafresno.org

- **August 21**—Fall semester courses begin
- **August 28**—Department of Viticulture & Enology Welcome Back Orientation
- **September 7**—Ag One Ag Boosters BBQ, Rancho Vista del Rio, Madera
- **November 1**—Sensory Evaluation of Wine Workshop, Fresno State Continuing & Global Education
- **November 13**—Napa Valley Winegrowers Rootstock, Napa
- **November 14**—Central Coast Grape Expo, Paso Robles
- **November 14**—Viticulture Club Fall Harvest BBQ, Wolf Lakes, Sanger
- **November 18**—Grape, Nut and Tree Fruit Expo, Fresno Fairgrounds
- **December 3**—Viticulture & Enology Resume Workshop, Fresno State
- **January 15**—Spring Semester begins

- **January 27-29**—Unified Wine & Grape Symposium, Booth # 830 & Reunion on January 28
- **February 7**—FFA Vine Pruning Contest, Fresno State Vineyards
- **February 25**—Fresno State Viticulture & Enology Career Fair, Fresno State

Fresno State Winery Events

- September 16—Fresno Women's Conference
- September 19—Safari Night at the Chafee Zoo in Fresno
- October 1-13th—Big Fresno Fair, Fresno Fairgrounds
- October 25—Fall Wine Cornucopia, North Fresno
- November 1—Winemaker's Dinner, Narrow Gauge Restaurant, near Yosemite
- November 7—Fresno State Alumni Association's Top Dog Gala, Fresno
- November TBD—Holiday Event, Fresno State Winery

Visit www.FresnoStateWinery.com

In Memoriam—Tiffany Otto Cragin (1979-2014)

Tiffany (Otto) Cragin passed away August 2, 2014 after many years heroically battling a rare cancer. Tiffany touched the lives of so many students, staff, and faculty while earning her M.S. degree in enology at Fresno State in 2008. Her keen intelligence and tender kindness were her hallmarks. She was a graduate student of Drs. Roy Thornton and Susan Rodriguez and did a brilliant job on a very difficult, complicated project. Tiffany was also an active student and is pictured pouring wine at a Fresno State Winery event, with her husband on her right.

Drs. Thornton and Rodriguez described her thesis project by saying that she prepared wine spoilage bacteria, *Lactobacillus* and *Pediococcus*, to be sent to a company to make antibodies in chickens. She purified these antibodies and used them to detect bacteria in juice and wine. This detection involved a



sophisticated technology, flow cytometry, which she mastered extremely quickly. In her thesis acknowledgements, she included thanks to Thornton and Rodriguez for all their guidance during the course of her research and expressed her gratitude to the entire department for making her experience at Fresno State so valuable.

Tiffany developed into a resourceful and imaginative scientist and excelled in the fields of drug development, wine science, and medical research. She made her home in Minnesota with her husband, Allen, and two young daughters. She is survived by a large, extended family and many friends. Her friendship will be missed by so many of us who had the privilege of knowing her. Donations may be made in Tiffany's name to the [Chordoma Foundation](http://www.chordomafoundation.org) at www.chordomafoundation.org.



Students harvesting table grapes in the Fresno State vineyard

Photo by Cary Edmondson

FRESNO STATE
Viticulture and Enology