University of California Cooperative Extension Fresno County

Vine Lines

Stephen J. Vasquez, Viticulture Farm Advisor

August 2006 Issue

Monitoring Raisin Moisture for Delivery

Stephen Vasquez

Deciding when to collect raisins from the field is a decision based on many different factors. Some of these factors include: cultivar, production method, time of harvest, and weather forecasts that include potential rain events. With the increased acreage of dried-on-the-vine (DOV) and continuous tray (CT) raisin production, identifying the fruits' moisture content is extremely important when deciding when to harvest or pickup the crop. Raisins are inspected by the USDA-Processed Products Branch with an emphasis on moisture content and the presence of mold and other defects. Additional tests are conducted as the raisins move through the process of being "cleared" for delivery to the respective packer. Standards for moisture have been set at a maximum of 16%. Raisins that are found to be higher than 16% will need to be reconditioned using the services of a commercial dehydrator or an efficient on-farm dryer that can dry several tons simultaneously. The following procedure can be used to determine fruit moisture prior to pickup from DOV or CT raisin vineyards. Most packers will run a complimentary moisture test for their growers, knowing that it improves the overall quality of the product they deliver to their clients. Growers should consult with packer field representatives for additional information. These are only guidelines and should be adapted to fit specific farming operations.

Collecting Samples:

The sample area should be represented by the same cultivar, trellis, and production method. For example, if vineyard "A" is represented by 40 year old Thompson Seedless grown on a "T" trellis that is harvested onto a CT should be sampled separately from vineyard "B" represented by eight year old Fiesta grown on an open gable trellis that is dried-on-the-vine. Collecting samples to be tested for moisture from both vineyards are similar in theory but should be sampled and tested separately.

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Biologically Integrated Farming Systems for Table Grapes

Walter Bentley

University of California Cooperative Extension, UC Sustainable Agriculture Program, and UC Statewide Integrated Pest Management have started a project entitled Biologically Integrated Farming Systems for Table Grapes with farmers in Kern, Tulare, and Fresno Counties. This is an on farm project to develop pest management information in table grapes; a crop where cosmetic appeal is high and pest tolerance is low. The low tolerance for pests is exacerbated by the stringent requirements for export to foreign countries.

Six table grape farmers have agreed to divide vineyards such that a portion is managed with registered insecticides, fungicides, and herbicides that are considered reduced risk to both people and the environment. The remaining portion of the vineyard will be managed with more traditional pesticides when needed. Detailed monitoring will be done in both vineyard areas. Information on pest abundance and diversity,

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Monitoring Raisin Moisture for Delivery

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Similar to collecting samples for monitoring nutrition or fruit composition analysis (Brix), the size of the sample should be large enough that it represents the entire vineyard that is uniform in growth and fruit maturity. The following protocol will eliminate some variability but areas represented by distinct soil differences or rootstocks should be sampled and submitted separately.

Supplies Needed:
1. Two five gallon buckets
2. Gloves
3. Plastic zip style bags—1 gal.
4. Felt tip marker

Sampling a DOV vineyard:

- Select a row at least two rows away from the end of the block being sampled. Walk down the row to vine 20. Randomly collect five clusters from both the north and south sides within the fruiting row of an overhead system planted east-west for a total of 10 clusters. Samples from an open gable vineyard are collected in a similar fashion, collecting from the north and south sides while walking between vine rows. Make sure to sample clusters that represent high and low and inside and outside locations in the canopy.
- Place the 10 clusters into a five gallon bucket and break apart the raisins and rachis. Major stems and leaves should be removed, leaving only raisins in the bucket. Mix the raisins thoroughly and place a handful into the second bucket. This is the first of 10 samples to be collected for your composite sample. Continue down the row and collect four more samples in a similar fashion. An additional five samples will be collected from another row ten or fifteen rows away from the first set of samples.
- Once all the samples have been taken, the final composite should be mixed and a two pound sample place in a marked plastic zip style bag and taken to the respective packer for moisture testing. Bags should be identified with a growers name, field, and date.

Sampling a CT vineyard:

- Select a row at least two rows away from the end of the block being sampled. Walk down the row to vine 20. Randomly select a one foot section on the paper tray. Collect all the fruit from that section and place it into the first bucket.
- Mix the raisins thoroughly and place a handful into the second bucket. This is the first of 10 samples to be collected for your composite sample. Replace the collected fruit back onto the tray. Continue down-the row and collect four more samples in a similar fashion.

  An additional five samples will be collected from another row

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Table Grapes

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may be done in both vineyard areas. Information on pest abundance and diversity, grape quality and yield, and pest management costs will be gathered. Key pests that will be challenging to manage include vine mealybug, grape mealybug, western flower thrips, powdery mildew, botrytis bunch rot, and mares tail. These are key not only because of the damage they cause, but more so, because of the reduced risk pesticides used to control them in a cost effect manner. Products such as chlorpyrifo (Lorsban), methomyl (Lannate), mancozeb (Dithane and Pencozeb), myclobutanil (Rally), trflumizole (Procure), simizine (Princep), and oxyflourin (Goal) are considered Priority I pesticides targeted for reduction by the Food Quality Protection Act. Fortunately, there are alternatives (see UCIPM Pest Management Guidelines for Grapes) but the cost of these alternatives needs evaluation. Interestingly, the cooperators in this project have already led the way in looking to these alternatives but need solid data on efficiency and costs. We hope to do so with this project. More importantly, we want to reach out to other table grape farmers and pest control advisers with this information so they may gain confidence in managing the mentioned pests with reduced risks products.

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Monitoring Raisin Moisture for Delivery

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ten or fifteen rows away from the first row sampled.

- Once all the samples have been taken, the final composite should be mixed and a two pound sample place in a marked plastic zip style bag and taken to the respective packer for moisture testing. The remaining raisins can be placed back onto a tray. Bags should be identified with a growers name, field and date.

NOTE: Do not discriminate against fruit that may have noticeable defects such as; green berries, mold, excessively dry or caramelized fruit, or other imperfections. These are defects that should be represented in a composite sample and will contribute to an accurate moisture content level.

Once the moisture is determined for a specific field, the decision to deliver or recondition can be made. Raisins with moistures less than 16% should be delivered to the packer as soon as possible. Raisins with higher moistures can be blended if necessary with drier raisins. If blending is needed, raisins should be mixed using a shaker, placed in bins and allowed to sit so moisture will equalize. Precautions should be taken to protect the fruit from inclement weather and rodents. Once moisture is stable and below 16%, the fruit should be sent to the packer for USDA grading and handling.

Stephen Vasquez is a UC Cooperative Extension Farm Advisor in Fresno County.

Table Grapes

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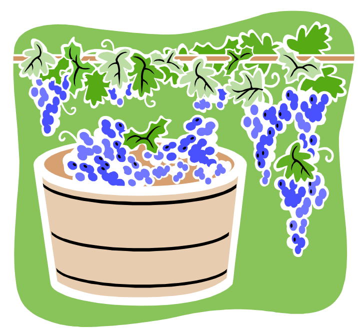
The project is well underway and viticulture advisors in Kern, Tulare, and Fresno Counties are actively involved. Field meetings will be held addressing problem pests specific to each location. We hope to get active involvement and feedback from table grape growers throughout the Valley. I am confident that with the help of these farmers and pest control advisers we will develop a successful program that addresses their needs as well as the needs of farm workers and consumers.

Walt Bentley is a Entomologist at the Kearney Agricultural Center.



Wine in China

Wine in China is a report by Drs. Scott Rozelle and Daniel Sumner, Department of Agriculture and Resource Economics, UC Davis, on China's wine economy. The work, in part, was supported financially by the California Association of Winegrape Growers (CAWG). The funds provided by the CAWG were mostly used to support a survey of wine producers and interviews with wholesalers and winery managers in rural China as well as data analysis. It also went to support the procurement of a dataset that was collected on wine and China's supermarkets. The report also includes information from additional sources outside the funding source mentioned.

The report is organized into three sections: The first section is on China's horticulture economy. It covers, in detail, China's horticultural industry minus any significant information on the grape industry. The discussion in Section I helps explain some of the direction that China's wine grape industry has taken. However, the majority of the information on the winegrape industry is saved for Section

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Unraveling an Olmo Mystery

In 1989, Dr. Harold Olmo gave Dr. Andy Walker a collection of grape seeds that he had produced the previous year. Walker believed they had the potential for resistance to both Pierces' Disease (PD) and the dagger nematode (*Xiphinema index*) that vectors fanleaf virus. They were the offspring of two *Vitis rupestris* females and six *Muscadinia rotundifolia* males. The rotundifolia is known to confer resistance to PD, *X. index* and fanleaf virus. Walker's lab began investigating the actual value of these rootstocks as parents in breeding new genotypes with effective resistance across a broad spectrum of applications, including rootstocks, raisin, table and wine grape production. For the next fifteen years, they tested and retested the populations, both in the laboratory and in actual field situations. Trials are ongoing, and results with the dagger nematode and PD are very promising. At least one big question has been answered, however; the high level of resistance is not coming from rotundifolia.

Research Summary

In initial testing, the rootstock crosses, called the 89 populations, were found to have very good resistance to phylloxera, a necessary attribute of any commercial rootstock. When they were tested for resistance to the root knot nematode, some were found also to have strong resistance to *Meloidogyne incognita*. These seedlings were then tested for resistance to the dagger nematode. However, when the plants were tested, the resistance test results made no sense to the researchers; the actual segregation ratios were inconsistent with the expected resistant: susceptible ratios. Many of these selections were very resistant and were put into commercial rootstock trials across the state. The next step was to cross siblings of the 89 populations, which created the 96 populations. When these "F2" progeny were tested, the segregation ratios implied that resistance to dagger nematode was controlled by a single gene. The researchers then began their studies on resistance to PD, caused by the bacterium *Xylella fastidiosa* (Xf), hoping that these dagger-nematode-resistant selections based on "rotundifolia" would also resist PD. If so, they could be crossed with high quality resistant vinifera table, raisin and wine grapes to form the basis of a PD breeding program. The 89 populations had strong resistance to PD and resistance segregated as a single locus in the same population being studied for dagger nematode resistance. The researchers then began compiling a genetic map for resistance to both dagger nematode and PD in the 9621 population, a cross of two "siblings" from the 89 populations – D8909-15 x F8909-17. This project was initiated to create DNA markers capable of optimizing breeding and to launch an effort to find the genes responsible for resistance to Xi and PD. They first began mapping with AFLP-DNA markers and made good progress positioning these resistance traits. But, AFLP markers do not establish parentage. All along, the researchers had encountered actual physical inconsistencies in these populations that nagged at them, leading them to question their source material. For instance, neither *V. rupestris* or *M. rotundifolia* have hair on their stems or leaves, yet some of the 89 progeny and the 9621 progeny had light amounts of hair on their leaves. And, very importantly, the progeny are fertile, even though crosses between Vitis species and rotundifolia should have 39 chromosomes and be sterile. But the progeny did have combined resistance to both Xf and Xi, which is rotundifolia characteristic.

Dr. Summaira Riaz, working in the Walker lab, began adding SSR markers to the study, and greatly increased the number of individuals in the 9621 map. SSR markers are capable of establishing parentages and were used to clarify the origin of 'Chardonnay' and 'Cabernet Sauvignon' by Dr. Carole Meredith. When they were added to the 9621 map, it became clear that there were important flaws in the original assumptions: the *M. rotundifolia* 'Cowart' was not the male parent and the two F2 progeny chosen for the sibling cross were not actually even siblings! The researchers found the original pollination records and checked with Dr. Olmo, but no further clues to the unknown male parents were uncovered.

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Unraveling an Olmo Mystery

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They looked at the original 89 progeny and found at least four different leaf types. In the spring they went back to the original, and now abandoned, field where the crosses were made. They found that most of the plants that were in bloom at the same time as the *V. rupestris* female vines and nearby were from a collection Dr. Olmo made during a trip to Mexico in 1961. At the UC Davis Herbarium, they found good records of the original Mexican collection. The pressed plants matched the living plants well. And they found Dr. Olmo's trip journal. They then tested a total of 85 Mexico collection genotypes and all the original rotundifolia parents of the 89 populations with 18 SSR markers to determine which if any may have inadvertently pollinated the rupestris females. The results found that many of these Mexican species were pollen parents of the 89 populations, rather than the rotundifolia parents that Dr. Olmo had attempted to use in the crosses. Many of the most resistant 89 progeny were in fact crossed to *V. arizonica* and its hybrids with *V. candicans*. There were a few of the intended *V. rupestris* x *M. rotundifolia* crosses, but the majority of the progeny were unintentional outcrosses. This is very important because these little-known, unintentional parents have the same level of disease resistance as the supposed parent, *M. rotundifolia*, a species with extreme resistance to Xi and PD. This leaves the researchers with an entirely new direction to pursue. They can focus on arizonica as a new source of disease resistance, and complete testing on the entire Mexican collection. These findings also imply that PD may have evolved with grape species in Mexico, since the resistance is so strong there, and that nematode resistance in these species needs to be further studied.

Conclusion

Nature can still have her way, sometimes in spite of our own best efforts. It may take her a little longer, but she has good sense. The researchers now have DNA markers for both Xiphinema and PD resistance from *V. arizonica*, and the markers have been utilized in Dr. Walker's breeding program, improving its efficiency.

Dr. Walker and his staff still have a lot more work to do. Their current focus includes determining whether rootstocks with high dagger nematode resistance can prevent infection by the fanleaf virus that the nematodes vector; whether the DNA markers they have identified function in the entire range of Xi and PD resistant species; and whether the genes controlling resistance to Xi and PD can be identified and characterized. Progress continues on the classical breeding of PD-resistant raisin, table and wine grapes and on nematode resistant rootstocks. The eventual hope is to transform grape varieties and rootstocks once the genes controlling resistance are identified. Meanwhile, the Walker lab continues to benefit from Dr. Olmo's past intentional and unintentional efforts.

Dr. Harold P. Olmo died at the the age of 96 on June 30, 2006. Even after retiring in 1977, his hard work and dedication to California viticulture is still experienced in the many cultivars he developed. Redglobe, Perlette, and Ruby Cabernet are a few of the cultivars that make up greater than 50 thousand acres planted in California.

San Joaquin Valley Grape Symposium

January 10, 2007

More information in the October Issue.

New Post-Harvest Process May Replace Methyl Bromide

A new method for ridding harvested fruits and vegetables of insect pests and microorganisms, without the use of ozone-depleting chemicals like methyl bromide, has been developed by researchers at UC Davis.

The technique, called metabolic stress disinfection and disinfestation, effectively suffocates insects found in harvested produce. Forces produced by alternating vacuum and pressurized carbon dioxide applications cause irreversible changes in cell chemistry and damage to essential respiratory structures. Ethanol gas also is applied briefly to accelerate killing of fungi and bacteria and to damage insect eggs.

The process would be applied to pallets of fruits and vegetables to prevent damage during storage and shipping, and to avoid transporting potentially invasive insects from one country to another. A patent is pending on the technology, which was reported in the July issue of the *Journal of the Science of Food and Agriculture.*

"All major fruits, including table grapes, citrus, apples, pears, bananas and kiwifruits, as well as vegetables and ornamental flowers, retain their quality when treated with this technology," said Manuel Lagunas-Solar, a research chemist at UC Davis' Crocker Nuclear Laboratory. The process also has been shown to be effective in controlling spoilage and insect pests in dried fruits, grains and nuts. Soft-tissue fruits, such as raspberries and blackberries, are among the very few commodities that do not withstand the forces used in this method, he noted.

The researchers hope that the new technique will replace the use of post-harvest pesticides and allow for the complete phase-out of methyl bromide. Although originally slated for phase-out in 1997 because it destroys the Earth's ozone layer, the use of methyl bromide by processing companies and farmers has been extended because of a lack of feasible alternatives for fumigation.

An added environmental benefit of the new procedure is that the carbon dioxide and ethanol used during the treatment are recovered and recycled.

Lagunas-Solar is preparing a collaborative research project to test the new method's effectiveness on several insect pests and fruit flies with U.S. Department of Agriculture labs in Cape Cod, Mass., and in Hilo, Hawaii. He anticipates the new technology will receive regulatory clearance, and commercial processing units could be available in two to three years.

Wine in China

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The reader solely interested in wine should go directly to Section II, "The Wine Economy of China." In a few sections that reference material in Section I, the authors give the reader an indication on where information can be found so the reader can reference the relevant information for comparisons. However, parties only interested in wine grapes are given sufficient information to understand China's industry from production to market.

Section III, "U.S. and California Wine Relationships with China," provides trade statistics and discussion on survey information from California wineries who expressed interests in marketing in China.

The complete 260 page report can be downloaded from the following web link

http://aic.ucdavis.edu/research1/Wine_in_China.pdf

Questions and comments should be addressed to the authors and can be reached at:

Scott Rozelle - rozelle@primal.ucdavis.edu and Daniel Sumner - dan@primal.ucdavis.edu

Calendar of Events

Local Meetings and Events:

Raisin Production Issues
November 8, 2006
San Joaquin Valley Viticulture Technical Group
Fresno County Farm Bureau,
1274 W. Hedges Ave. Fresno, CA.
Contact: Jon Holmquist (559) 661-5539

U.C. Davis University Extension Meetings

(800) 752-0881

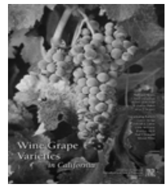
Introduction to Sensory Evaluation of Wine
October 14-15, 2006
Da Vinci Building, 1632 Da Vinci Ct.,
Davis, CA. 9:00 a.m. — 4:00 p.m.
Instructor: John Buechsenstein
Section: 062VIT200

Establishing a Small Vineyard
October 21, 2006
Young Hall, East Quad
Davis, CA. 9:00 a.m. — 4:00 .p.m.
Instructor Donna Hirschfelt
Section: 062VIT210

Public Relations for Small Wineries
November 3, 2006
Da Vinci Building, 1632 Da Vinci Ct.,
Davis, CA. 9:00 a.m. — 4:00 p.m.
Instructor: Rusty Eddy
Section: 062VIT211

Current Issues in Vineyard Health
November 29, 2006
Da Vinci Building, 1632 Da Vinci Ct.,
Davis, CA, 9:00 a.m. — 4:00 p.m.
Instructor: Andy Walker
Section: 061VIT201

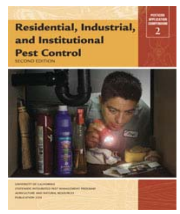
Publications from the University of California



Wine Grape Varieties in California, 2003
ANR Publication 3419
Price - $30.00 + tax and shipping

A comprehensive variety publication. Covers all the grape growing districts in California, highlighting 36 major varieties.

Revised Edition



Residential, Industrial, and Institutional Pest Control, 2nd Edition, 2006
ANR Publication 3334
Price - $30.00 + tax and shipping

Volume 2 in the Pesticide Application Compendium focuses on managing structural, food, and fabric pests, rodents, birds, and weeds.

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Wine Grape Varieties		$30.00	

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Vine Lines

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