University of California Cooperative Extension Fresno County

Vine Lines

Stephen J. Vasquez, Viticulture Farm Advisor

February 2010 Issue

California's Water Supply and Demand

California faces serious water supply issues, in which agricultural uses must compete with environmental uses and the demands of a growing population. Several options are open to policymakers regarding the state's supply, demand and transport of water.

California's primary source for water is California precipitation—rain and snowfall, not water imported from other regions or from desalinization. Much of the precipitation is stored as surface water in reservoirs or as groundwater. In a normal precipitation year, the state will receive a total of about 200 million-acre-feet of water (maf), including 5 to 10 million maf of imports from Colorado, Oregon and Mexico. Of the total surface supply, about 60 percent is used directly by native vegetation or cropland, evaporates, or flows to salt sinks like the Pacific Ocean, saline aquifers and the Salton Sea. The remaining 40 percent, or about 80 maf, is referred to as "developed" or "dedicated" and is distributed among agricultural, urban and environmental uses or is stored in surface or groundwater reservoirs. About 34.2 maf is used for agricultural irrigation and about 8.9 maf is devoted to urban and industrial uses in a normal year.

Most of the precipitation occurs in the mountains north and east of the Sacramento-San Joaquin Delta. However, irrigation water demand is highest in the state's valleys and coastal plains south of the Delta so storage and transport systems were developed to capture this runoff and deliver it during the dry months. California has more than 1,200 surface water reservoirs, in addition to an extensive conveyance network

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The USDA-ARS Raisin Grape Breeding Program

Introduction

The USDA/ARS has been developing earlier-ripening raisin grape cultivars to allow early harvest for tray dried raisins, allowing drying of the raisins before fall rains occur. The early-ripening cultivars also allow the harvest to be spread over a longer period of time, making more efficient use of limited labor resources. Fiesta, DOVine and Selma Pete were released as early-ripening cultivars. Because these cultivars are early-ripening, they are also adapted to the current raisin production practice of cutting canes to induce fruit drying on the trellis for mechanical harvest. Initial investment costs for the trellis of this production system are high because of the extensive trellis used. However, production is also higher on these trellises. Raisin characteristics that allow for even greater reduction of production costs are essential to keep the raisin industry viable.

Objectives of the raisin breeding program

The current objectives to reduce production costs and increase consumer desirability of raisins are:

1.) Develop natural dry-on-the-vine (DOV) raisin grapes. This eliminates the need to cut canes to induce raisins to dry on the trellis for mechanical harvest.

2.) Develop powdery mildew resistant raisin grapes.

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Viticulture and Enology Information for San Joaquin Valley Growers

The past few months, there have been inquiries regarding information on San Joaquin Valley Winegrape production. The requests have ranged from technical production to wine marketing information. Ten years ago it would have been a short conversation but today there are several organization websites that cover every aspect of growing and marketing winegrapes.

Below are organizations that provide winegrape information. It is important to note that most sites also have their own "links" page that will direct you to additional information.

Production and Technical Information

UC IPM: Information on grapevine pests and diseases and year round IPM.

UC Cooperative Extension: UCCE county offices provide information relevant their location.

UC Integrated Viticulture: This website has information developed by UC researchers working in a variety of areas in grape production throughout California.
San Joaquin Valley Technical Group: Organizes monthly meetings focused on production.
Contact: 559-661-5539

Marketing

San Joaquin Valley Winegrowers Association: The SJV Winegrowers Association represents grower and vintners of California's San Joaquin Valley.
Contact: 559-354-1409

Allied Grape Growers: Allied Grape Growers is a California winegrape marketing cooperative that exists for the purpose of efficient and competitive marketing of its members' grapes.
Contact: 559-276-7021

California Association of Winegrape Growers: CAWG is an advocate for farmers, providing leadership on public policies, research and education programs, and trade policy to enhance the California winegrape growing business.
Contact: 800-241-1800

Regulation

CA County Ag Commissioners: Select a County from the Text Links
Contact Fresno County at: 559-456-7510 Contact Madera County at: 559-675-7876

CA Organic Program: CDFA's Organic Program is responsible for enforcement of the federal Organic Foods Production Act of 1990, and the California Organic Products Act of 2003.

CA Department of Pesticide Regulation: DPR's mission is to protect human health and the environment by regulating pesticide sales and use, and by fostering reduced-risk pest management.
Contact: 916-324-4100

Grape Breeding Program

This will reduce or eliminate the need for fungicide sprays. The table/raisin industry applies millions of pounds of sulfur each year (17.4 million pounds in 2004) as well as other newer chemicals to control powdery mildew.

3.) Develop Pierce's disease resistant raisin grapes. This will reduce or eliminate the threat of Pierce's disease and its vectors which have devastated some grape growing regions when not controlled.

4.) Develop raisins with high anthocyanin content for health benefits. This will provide consumers with a healthier product and increase the demand for raisin grapes.

Methods

The most important trait needed for any new raisin grape cultivar is seedless fruit. To aid in the development of seedless grapes, we continue to use embryo rescue procedure to make possible the hybridization of seedless x seedless grapes. This greatly increases our chances of finding seedless types from which we can select individuals with the additional desired traits. Once seedlings are developed, they are screened for Pierce's disease resistance with molecular markers in test tubes or for powdery mildew resistance in the greenhouse. Leaves are taken from the greenhouse plants and cultured in sugar solution to screen for anthocyanin development which is correlated to red flesh in the fruit. These early screening methods to select seedlings with desirable traits reduce the number of plants needed to be grown in the field. As the seedlings fruit in the field, they are selected for the highest fruit quality and for the natural DOV trait. The best selections are propagated into production trials to determine their commercial potential. Any selections that are better than existing cultivars are then released and made available for production.

Table 1. Production trial of best Natural DOV selection.

Crop Year	Harvest Date	Yield (T/A)	% moisture	% BorB
1st CSUF[a]	10/10/02	1.4		
2nd CSUF	2003	2.6		
3rd CSUF	9/30/04	3.7	11.9-14.0	100
4th CSUF	10/13/05	5.8	14.4	90
5th CSUF	10/01/06	4.5	16.8	90
3rd leaf[b]	10/01/08	3.4	15.2	89
4th leaf	10/05/09	3.8		

[a]Based on 2 vine plot.
[b]Based on 18 vine plot @ Parlier. 14.4% moisture on 9/16 – oven method.

Results

Natural DOV raisin grapes

Each year crosses are made to develop new natural DOV raisin seedlings (Fig. 1). In 2009, 14 seedless x seedless crosses were made. These crosses consisted of 36,091 emasculations and resulted in 3,864 berries which yielded 4,370 ovules that were cultured on nutrient media in test tubes. Seven hundred sixty two embryos developed and are being grown into plants. Last year 162 seedlings for natural DOV raisin were planted in the field. The best selections have been propagated into 2 vine plots to evaluate their production, raisin quality and ability to DOV naturally. In 2008 and 2009, 13 and 24 selections respectively were propagated. Of the 61 fruiting selections in production trial, 34 were dry enough by October 1, 2009 to harvest. Production, moisture and fruit quality is being evaluated to determine their commercial potential. Four selections have been good enough from past evaluations to increase them to a 27 vine production trial. Three were planted in 2009 and will start to fruit in 2011. The fourth selection has fruited for two years at Parlier and has averaged from 3.4 to 3.8 Tons/Acre based on 18 vines (Table 1). Production on spurs is equivalent to cane pruned vines. This selection has Thompson Seedless size raisins with a fruity flavor. It has commercial potential.

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Water Supply

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dependent on rivers, levees, canals and pumping stations. Since most of the urban demand lies in the South and along the coast, a series of pumps must transport water at great expense over mountain ranges. The irrigation provided by this system, together with the Mediterranean climate through much of the state, allows the cultivation of a great variety of crops. However, precipitation varies significantly from year to year and water supplies are therefore unpredictable. Moreover, current climate change models suggest that the Sierra Nevada snow pack, which serves as a natural reservoir with gradual release, is likely to decrease in the future.

Recently, increased efficiency in usage has contributed to the state's ability to meet water needs. However, urban and industrial water demand has risen as the population has continued to grow. Urban water usage, including residential, commercial and industrial uses, is about 8.9 maf annually and growing. Environmental and agricultural water usage varies significantly from year to year, depending on drought conditions. In a normal precipitation year, agriculture will irrigate about 9.6 million acres of cropland with 34.2 maf of water, equivalent to 41 percent of total applied surface and groundwater usage. In particularly dry years, agricultural usage has exceeded 50 percent of total usage (including stream flows for environmental benefits).

As more water has been allocated to urban and environmental uses, agricultural producers have adjusted by using less water. In many cases, water application is already relatively efficient so further reductions will be difficult. Moreover, decreases in water applications may lead to decreased yields. Yet field efficiency in agriculture can undoubtedly be improved, perhaps at substantial cost, through the widespread adoption of micro-irrigation techniques. In some cases, water savings and the value of crops produced will not justify the added capital or variable costs and land fallowing or a shift in land use will follow.

The "Delta"—the confluence of the Sacramento and San Joaquin rivers at the eastern edge of the San Francisco Bay—is central to the current delivery of water from Northern California to the San Joaquin Valley and beyond. However, the water supply through the Delta is not reliable because of fragile levees, variable precipitation, and saline tidal flows. Poor quality means that Delta water has to be treated before being used for urban and industrial purposes.

The Delta's flow is controlled to enable exports. Flows below the minimum needed to sustain the local ecosystem cause severe environmental consequences. As a result, to protect fish species federal court action has restricted water exports from the Delta. The federal Central Valley Project, authorized in 1937 with first deliveries to the San Joaquin Valley in 1951, and the State Water Project, constructed during the 1960s, each export water from the southern end of the Delta. The Central Valley Project (CVP) typically delivered 7 maf, but 2008 deliveries amounted to 5.7 maf. The State Water Project originally delivered 2.2 maf. Although 2009 deliveries initially amounted to only 15 percent of this amount, after May snow and rains the final allocation was raised to 40 percent. Uncertainty about water supply is an important factor in farm decisions.

The state has sufficient surface and groundwater storage capacity to withstand one or two dry years. However, long droughts – projected to become increasingly common due to climate change – will have even larger consequences. Droughts cause economic harm and the loss of crops. They lead to lower water quality, and raise the risk of fires and species loss. As noted above, groundwater becomes the primary water source during droughts. However, many aquifers are contaminated with metals, nutrients, or salinity due to poor land use practices. Some regions withdraw too much groundwater and do not allocate water such that aquifers recharge fully during wet years. Such overdraft has not been assessed since 1980, but DWR believes that the statewide deficit averages 2 million acre feet each year. When properly managed, conjunctive use of ground and surface water enables aquifers to recharge in wet years for withdrawal in dry years.

The 2007-9 drought is causing significant economic harm in agriculture and the rest of the economy. Water shortages are projected to lead to the loss of crop

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Farming: The Original 'Green Collar Job'

Stewart Truelsen

As the economy loses blue collar and white collar jobs, one bright spot in the employment outlook appears to be so called "green collar jobs." But what exactly are green collar jobs?

Vice President Joe Biden described green collar jobs this way: "They provide products and services that use renewable energy sources, reduce pollution, and conserve energy and natural resources." Biden did not say this, but by his definition farming is a green collar job. In fact, farming is the original green collar job.

Farmers were among the original users of renewable energy to provide products and services. Early agriculturalists relied on solar power to grow crops just as we do today. They used wind power to draw water and grind grain into flour. They built irrigation systems to make more efficient use of the water.

Yet, the term "green collar jobs" was unheard of until recently. It was first used as the title of a book 10 years ago, but there were references to green collar workers prior to that. It became part of everyday vocabulary during the last presidential campaign when the candidates, particularly President Barack Obama, talked about creating millions of green collar jobs.

There already were millions of green collar jobs a hundred years ago, but the rise in agricultural productivity made many of those farmers unnecessary. They went to the cities and took blue collar jobs in manufacturing. As manufacturing jobs moved overseas in more recent times, white collar and service sector jobs replaced some of that employment.

The farmers who stayed on the land built American agriculture into the unparalleled success it is today. They don't get enough credit for their green collar accomplishments over the years.

Before there was an environmental movement, farmers were learning and adopting soil and water conservation measures.

It was a painful lesson taught by the Dust Bowl of the 1930s. During the Great Depression, the American Farm Bureau Federation and others encouraged research into ethanol from corn and a variety of other crops and crop residues. They were decades ahead of the times, but again in the 1970s Farm Bureau revived its push for renewable fuels.

AFBF and state Farm Bureaus also were leaders in conservation tillage, well-water testing and many other environmental improvements of the 20th Century. And just as they were with ethanol, farmers were early adopters of modern wind energy and the use of methane from manure to generate electricity.

The green collar economy is really not a new thing for farmers or even for this country in times of economic trouble.

President Franklin Roosevelt had a similar idea with the Civilian Conservation Corps. It's just a little more high-tech this time around — installing solar panels, weatherizing homes, building a new power grid and hybrid cars.

Long after the current excitement about the green economy has worn off, American farmers and ranchers will remain green collar workers as they always have been — efficient producers of food, fiber and fuel, and stewards of natural resources.

Stewart Truelsen is a freelance writer and a regular contributor to the American Farm Bureau Focus on Agriculture column. This article first appeared in the May 2009 issue.

6 International Table Grape Symposium

Symposium
June 24-26, 2010

Technical Tour
June 28-30, 2010

http://groups.ucanr.org/GoGrapes2010/

Abstracts now being accepted.

Grape Breeding Program

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Powdery mildew resistant raisin grapes

Breeding to develop powdery mildew resistant grapes started in 1994 with the evaluation of grape cultivars reported to be resistant to powdery mildew in a no fungicide spray plot. Crosses were started in 1999. This year 8 seedless x seedless crosses consisting of 22,882 emasculations were made to develop raisin grapes with powdery mildew resistance. They produced 2,264 berries, 2,524 ovules and 314 embryos which are being grown into plants. Raisin selections with powdery mildew resistance have been made and propagated into 2 vine production trials. They will begin fruiting in 2011. The resistance to powdery mildew comes from: native North American grape species such as *Vitis aestivalis, V. cinerea, V. rotundifolia*; China, *V. romanetii*; and Europe, *V. vinifera*. Molecular markers have been developed for several of these sources of resistance. These markers are necessary to identify the plants that are resistant and carry the genes from all resistant sources used. This very important and will allow the pyramiding of many sources of powdery mildew resistance into one plant. This type of resistance will be very durable.

Pierce's disease resistant raisin grapes

Breeding to develop Pierce's disease resistant grapes started in 2000. The Glassy-winged sharpshooter arrived several years earlier in California, causing the spread of Pierce's disease and the destruction of some grape production areas. This is a collaborative breeding project with Dr. Andy Walker, University of California, Davis. The main source of resistance is derived from *V. arizonica* and it has been backcrosses to raisin grapes for 5 generations. This is important to be able to recover raisin quality that is as good as Thompson Seedless and still retain Pierce's disease resistance. This year the BC3 generation (94% *V. vinifera*) fruited and the first BC4 generation (97% *V. vinifera*) crosses were made. Of the 216 BC3 seedlings, 110 (51%) fruited in their second leaf and have been evaluated for fruit quality. Fourteen tray dried and 6 natural DOV raisins were selected of which 3 tray dried and 3 natural DOV raisins were good enough for production trials. Those put into production trials have very small seed traces and have been dried for evaluation in the laboratory for raisin quality. Crosses are made each year to develop better seedlings for improved raisin quality and Pierce's disease resistance. This year 32 seedless x seedless crosses were made which resulted in 3,756 berries, 4,768 ovules and 1,150 embryos. Plants are growing in test tubes and leaves from 761 plants are being tested with molecular markers for resistance. Only the plants with the markers will be planted to soil in the greenhouse for planting and evaluation of fruit quality in the field. Resistance to Pierce's disease is always verified with greenhouse tests.

Figure 1. New natural DOV raisin.

Red flesh raisin grapes

The second generation (BC1) of seedlings for red flesh raisin grapes fruited for the first time this year. Five third generation crosses (BC2) were made this year consisting of 12,863 emasculations.

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Grape Breeding Program

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They produced 1,363 berries, 2,056 ovules and 430 embryos from which plants are being produced. The natural DOV trait is also being incorporated into this material. From 390 BC1 seedlings in the field, 11 seedless raisin types were select for propagation to determine production and raisin quality. No fruit was dried this year to evaluate raisin quality. Production is generally good in these seedlings as is their fresh fruit quality. The red flesh comes from the wine grape Rubired so there are very few off flavors compared to those found in wild grape species. Tests for levels of anthocyanins in the first generation (F1) showed seedlings containing as much anthocyanin as Rubired.

Conclusions

A raisin grape with natural DOV ability without cutting canes has shown good commercial potential. Raisin selections with powdery mildew or Pierce's disease resistance and good raisin quality have been propagated for production trials. Breeding to increase the anthocyanin content of raisin grapes is progressing and should increase the health benefits of raisin grapes.

David W. Ramming is a grape breeder with the USDA, Agricultural Research Service in Parlier, CA.

Water Supply

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value of about one billion dollars in 2009. The drought also exacerbated conditions during the worst fire season in the state's history. In addition the risk of levee failure and catastrophic flooding from earthquakes, rising sea levels and predicted higher flood flows makes the state's North-South water transfer process vulnerable to failure.

In November 2009, the legislature and Governor agreed on a comprehensive water package consisting of four policy bills and an $11.14 billion general obligation bond proposal, which must be approved by the voters in 2010. The bills establish a Delta Stewardship Council, require local monitoring of groundwater elevations, require statewide water conservation and increase State Water Resources Control Board enforcement of illegal water diversions. Together with local cost sharing, funds from the $11.14 billion bond measure will be used for drought relief, water supply reliability, statewide operational improvement including development of additional storage, groundwater quality protection, water recycling, conservation and watershed restoration projects. It is not clear if the state is in a financial position or the voters will agree to make these investments.

Desalinization has been suggested as another possibility to address part of California's water shortage. However, the reverse osmosis process is expensive because of high energy requirements and yields relatively little water. California's 24 desalting plants now in operation have a combined capacity of only 79,000 acre-feet. With current technology, desalinization costs are more than $1,000 per acre-foot of water plus the costs of brine disposal.

Public-works projects of the scale that made large-scale irrigated agriculture feasible in California have largely fallen out of favor. Therefore, conservation must play an even more significant role in addressing California's water crisis. Furthermore, restricted water supplies mean that California's future urban development will likely become denser, with less water demand for landscaping – upwards of 80% of total residential demand. Nonetheless additional water is likely to be transferred from agriculture.

This is one paper in a series of Ag Issue Center, UC Davis white papers that outlines a major issue facing California agriculture. These white papers are designed to provide quick readable introductions to major issues that will be useful to industry and stakeholders and analysts, as well as public decision makers and advisors. For additional information on this and other topics visit: http://aic.ucdavis.edu/

Unusual Wood-Boring Worms

Stephen Vasquez, Walt Bentley and Matthew Fidelibus

Over the last four years some growers have noticed an unusual worm in their vineyards. The worms are difficult to see if you are passively walking the vineyard but if you peel the old loose bark away from the head, trunk or cordons until you reach the newest bark, you may find holes with large white larvae (Fig. 1). The insect is a moth and has been identified as a member of the *Givira* genera, which have been mostly associated with old (>35 years) Thompson Seedless vineyards but have been found in vineyards planted to other cultivars. Many of the older raisin vineyards located in Fowler/Del Rey and to the east in Sanger/Parlier area have documented this wood boring worm. Whether or not they cause direct economic damage is uncertain; most of the worms we saw seemed to be boring into dead wood. However, some growers have said they have seen these worms feeding on living cambial tissue and on young emerging buds and green shoots. Their burrows also offer refuge to vine mealybug, which is undesirable to growers trying to mange this pest.

Often what first attracts a grower's eye is the adult cast left behind after emergence. The casts stick half way out of a bored hole in old wood (Fig. 2); resembling planes that crash dove into the wood.

Currently, little is know about the moth's biology but there are plans to do some trapping in March. Using black light traps, UC researchers hope to catch adult moths that can then be used to identify the species and give researchers a better idea of what potential management methods could be used to reduce populations. Additionally, surveys will take place to try to identify egg masses associated with this genus.

Figure 1. Givira larvae shown in holes after bark is peeled away.

Figure 2. Adult cast left in the wood after emergence (blue circles). Inset shows adult cast pulled from the hole.

Stephen Vasquez is the UC Cooperative Extension Viticulture Farm Advisor in Fresno County. Matthew Fidelibus and Walt Bentley are Viticulture Extension Specialist and UC IPM Entomology Advisor, respectively, located at the UC Kearney Agriculture Center.

Calendar of Events

Local Meetings and Events

6th International Table Grape Symposium
June 24-26, 2010 — Symposium
June 28-30, 2010 — Technical Tour

Contact: Stephen Vasquez or Jennifer Hashim-Buckey at 6thinttablegrapesymposium@gmail.com.
http://groups.ucanr.org/GoGrapes2010/

U.C. Davis University Extension Meetings

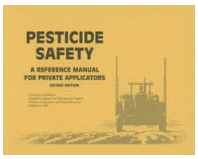
(800) 752-0881

Current Wine and Winegrape Research
February 18, 2010
9:00 a.m. — 4:00 p.m.
UC Davis: Freeborn Hall, North Quad
Davis, CA
Instructor: Deborah Golino
Section: 093VIT203

Varietal Wine Grape Production Short Course
February 23-25, 2010
8:30 a.m. — 6:00 p.m.
UC Davis: Freeborn Hall, North Quad
Davis, CA
Instructor: Faculty
Section: 093VIT200

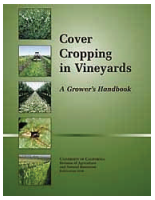
Managing a Small Vineyard I
February 27, 2010
9:00 a.m. — 4:00 p.m.
Medical Science Building, E Health Science Dr.
Davis, CA
Instructor: Donna Hirschfelt
Section: 093VIT212

Publications from the University of California



Pesticide Safety: A Reference Manual for Private Applicators
ANR Publication 3383
Price - $7.00 + tax and shipping

Updated in 2006, this manual covers information essential for anyone using pesticides on California farms, including growers, managers and employees. The manual covers pesticide labels, worker safety (handlers and fieldworkers), how to mix and apply pesticides, calibration, the hazards of pesticide use including heat related illness, and pesticide emergencies.



Cover Cropping In Vineyards
ANR Publication 3338
Price - $20.00 + tax and shipping

This guide features cutting-edge methods for using cover crops to enhance vineyard performance. Based on extensive research, this guide details technical and theoretical information on how cover crops affect vineyards and promote ecological stability.

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