Agriculture and Natural Resources
Cooperative Extension

SONOMA COUNTY VITICULTURE NEWSLETTER

March 2006

Rhonda Smith, Viticulture Farm Advisor

MEETING ANNOUNCEMENTS

GRAPE NURSERY REGULATIONS REVIEW FOR THE CALIFORNIA GRAPEVINE REGISTRATION AND CERTIFICATION PROGRAM
NEXT MEETING DATE: Wednesday, April 26, 2006 TIME: 9AM to 12 Noon
LOCATION: The Heidrick Western Center for Agricultural Equipment, UC Davis
COST: None
RSVP is requested. Contact Foundation Plant Service - (530) 752-3590 or fps@ucdavis.edu - to be added to the mailing list for these meetings. Ask for directions to the meeting.

The California Grapevine Registration and Certification (R&C) Program regulates the production of grapevine nursery stock. The program is administered by the California Department of Food and Agriculture (CDFA) and regulations are developed with input from Foundation Plant Services (FPS), the nursery industry and growers. FPS is a self-supporting service department in the College of Agricultural & Environmental Sciences at the University of California, Davis which produces, tests, maintains and distributes premium foundation-level virus disease-tested plant materials for use by California nurseries.

Technology for the detection of grapevine viruses and other graft-transmissible pathogens has undergone rapid development in the last decade thus the current regulations of the Grapevine R&C Program need to be revised. These regulations serve both California grape nurseries and grape growers. Growers and nurseries are invited to participate in a series of meetings with CDFA and FPS to develop updated regulations for the California Grapevine R&C Program. The next meeting to review regulations for the program is described above.

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GRAPEVINE CLEAN PLANT WORKSHOP
DATE: Tuesday, June 20, 2006 TIME: 8:30AM – 4:30PM
LOCATION: DaVinci Building, UC Davis
COST: $49.00 (includes lunch and course materials)
TO ATTEND: Contact UC Davis Extension (1-800-752-0881) to enroll in section # 061VIT219 or watch for on-line posting in mid-April at http://universityextension.ucdavis.edu/

UC Davis Extension is offering a "GRAPEVINE CLEAN PLANT WORKSHOP". This workshop has been organized to introduce attendees to some of the technical issues which will need to be considered as revised regulations are developed by the California Grapevine R&C Program (see description above). Lectures will include speakers that are currently working to improve the R&C program in the areas of grapevine virus testing strategies, identification of varieties and in disease problems not currently addressed. The day will end with a panel discussion of the benefits and difficulties of field diagnosis using laboratory testing.

This course has been sponsored by the California Fruit Tree, Nut Tree and Grapevine Improvement Board (IAB) which is underwriting a large portion of the fee. Continuing Education Units have been requested.

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5TH INTERNATIONAL WORKSHOP ON GRAPEVINE TRUNK DISEASES
DATE: Monday – Friday, September 11 – 15, 2006
LOCATION: UC Davis
PROGRAM WEB PAGE: http://plantpathology.ucdavis.edu/research%5Flabs/gubler/escaweb/
FOR MORE INFORMATION: Contact Akif Eskalen, (503) 752-4982 or aeskalen@gmail.com

Workshop program and registration information can be emailed to you. Contact Akif Eskalen with your email address. Growers are welcome.

MEALYBUG INFORMATION

Three recent publications on mealybugs are available on the UC Cooperative Extension Sonoma County web page – cesonoma@ucdavis.edu. Go to **Available Publications** and under **Viticulture Topics** click on **Mealybugs**. These and other mealybug publications on that site are also available by request by phoning the office – 707-565-2621.

- **Which Mealybug is it, Why Should You Care?**

Describes the distinguishing characteristics of the three most common mealybugs found in California vineyards - grape, obscure and vine mealybugs – including their life cycles and timing of control measures. To successfully manage mealybugs, the grower must be able to identify the type of mealybug present and know the optimal timing for control efforts directed to that specific mealybug. This article describes morphological differences as well as what insect stage is most likely to be found on specific parts of the vine and when. It appeared in the January/February 2006 issue of Practical Winery & Vineyard Magazine. Reprinted with permission.

- **Managing Vine Mealybug in Winery Waste**

Vine mealybug can survive in grape pomace produced by pressing whole clusters. If mealybug infested grapes are delivered to the winery and pressed, then the pomace may contain viable insects. This article describes the results of research that investigated the survival of vine mealybugs in whole cluster press loads under two different press regimens. Additional field trials discovered that vine mealybugs could survive in uncovered pomace piles. Pomace infested with mealybugs could be a source of contamination for wineries or growers who traditionally spread this material directly in the vineyard. Pomace management practices are described that can reduce the future contamination of vineyards. This article appeared in the December 2005 edition of Wine Business Monthly. Reprinted with permission.

- **Mealybugs in California Vineyards**

This tri-fold contains photos and text that highlight the principle characteristics that are critical for the identification of grape, obscure and vine mealybugs. Available in English and Spanish.

Early Season Powdery Mildew Infections

The part of the powdery mildew disease cycle that growers spray to prevent from seeing on their vines in mid-season is the summer repeating stage of the disease. White to ash-gray mycelial mats are formed on green tissue and these produce the **conidiospores** which start new infections in the canopy. Understanding how the disease cycle starts in spring and focusing attention on the earliest fungicide applications will improve your overall success in preventing disease in your vineyard later in the season.

Powdery mildew disease is caused by 2 different stages of the fungus *Erysiphe* (*Uncinula) necator*. The sexual stage of the pathogen infects new tissue every year after spring rainfall causes spore release during periods of mild temperature. Under our "normal" spring conditions, these spores germinate then infect grape tissue not long after they are released. These infections often go unnoticed. A second set of environmental conditions is then needed to trigger epidemic growth of the asexual stage of the fungus. This stage of the disease or pathogen growth requires temperatures in the range of 70-85 °F for optimum growth.

How it all begins
The primary inoculum for powdery mildew in the North Coast is **ascospores** – a part of the sexual stage of *Erysiphe necator*. These spores are ejected from dark, round fruiting bodies called **cleistothecia**. Cleistothecia formed the previous year beginning in late summer through fall on green vine tissue infected with mildew. With fall rains, they are washed off the foliage and onto loose bark at the base of spurs and on cordons where they remain all winter.

Cleistothecia reach physiological maturity in 60 days and under the right moisture conditions these will eject ascospores up to 24 mm in distance. Ascospores will only infect green grape tissue, so spores that land on the soil or weeds die. Cleistothecia continue to mature through May and early June but in general ascospores become less efficient in causing disease the later they are released. Spores are ejected after 10 mm of rainfall – or a combination of rain, overhead frost protection and heavy fog. Optimum temperature for ascospore release is 59 °F. In California, ascospore germination efficiency is 70%. The UC Davis powdery mildew model forecasts ascospore infection events based on leaf wetness and temperature. Spore germination and infection will occur in 13 hours if the leaves remain wet for that length of time and the daily average temperature is 60-80 °F. At this point, infections caused by ascospores alone are difficult to see – even by skilled PCAs and viticulturists.

After an ascospore infection event, the model starts tracking temperatures differently. If temperature sensors inside the vineyard record 3 consecutive days with temperatures of 70-85 °F (technically 70.5-86 °F) for 6 continuous hours each day, then the asexual stage or summer repeating stage of the fungus is greatly accelerated. This stage is *usually* kicked off shortly after an ascospore infection event. Mildew colonies grow then develop **conidiospores**. These colonies can be found with careful monitoring. Survey your vines 7 to 10 days after a rainfall to look for quarter inch-sized or smaller mildew colonies on the undersides of the basal leaves.

What happened in 2005?
Last year, ascospore infections and growth of conidiospores were separated by several weeks. Early season ascospore release was followed by cool to cold spring temperatures i.e. 50-60 °F, which caused a cessation of fungal growth but did not kill the growth that had already occurred. Continued rainfall further slowed growth. While the powdery mildew model showed the index to be zero, the fungus was still present and waiting for favorable weather conditions to develop. This happened in late May or early June in most cases and the fungus immediately increased its growth rate. Within a few days, conidiospores were produced and these initiated new infections. The subsequent days with optimum temperatures allowed the spore population to increase very rapidly and the epidemic was under way.

Control strategy for a wet spring
Micronized sulfur or Stylet Oil applications beginning at bud break will trigger ascospore release and then kill the majority of those ascospores. If it is a wet spring and ascospore infection events occur, growers ought to go on eradication mode and use oil as soon as vineyard access permits. If the wet spring continues, stick with oil to eradicate the difficult-to-see disease infections initiated by ascospores. Hopefully 2006 will be a drier spring than last year and growers can return to applications of micronized sulfur or other products to prevent summer infections.

Volatile organic compounds (VOCs): what they are and how weed management practices may contribute to their reduction.

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University of California Statewide IPM Program

What are Volatile Organic Compounds?

Volatile organic compounds (VOCs) are carbon-containing substances that have a high vapor pressure and low water solubility. These compounds are present in hundreds of products such as paints, refrigerants, pharmaceuticals, exhaust fumes, cigarette smoke, household chemicals, formaldehyde, polynuclear aromatic hydrocarbons, and certain pesticides. Even if sold as a liquid, these compounds volatilize into gaseous or vapor form when exposed to air. VOCs can contribute to the formation of ground level ozone (by combining with nitrogen oxides in the presence of sunlight). VOCs also contribute to the greenhouse effect as methane and photochemical oxidants produced from them are both green house gases. Some VOCs are also believed to be common ground-water contaminants.

Why the recent concern about VOCs?

In California, all industries and sources of compounds that contribute to ozone formation are being asked to make changes to reduce emissions to meet the new more stringent ground-level ozone standard in the San Joaquin Valley. There are thousands of organic compounds in the troposphere that meet the definition of a VOC; however, most attention has been focused on the 50 to 150 most abundant hydrocarbons. One such focus of the California Department of Pesticide Regulation (DPR) is on VOC emissions from pesticides because many active and especially inert ingredients in pesticides are VOCs. Pesticides accounted for 6.3% of the total VOC emission in 2004.

Each state is required to submit a State Implementation Plan (SIP) for achieving and maintaining federal ambient air quality standards, including the standard for ozone according to the Federal Clean Air Act. Regions that do not meet either federal or state ambient air quality standards are called Nonattainment areas (NAAs) in California. The NAAs include the Sacramento Metro, the San Joaquin Valley, Ventura, South Coast, and the Southeast Desert. In 1994, California's Air Resources Board (ARB) and DPR developed a plan to reduce pesticidal sources of VOCs in NAAs as part of the California SIP to meet the 1-hour ozone standard. Pesticidal VOC emissions in the San Joaquin Valley NAA declined for several years, but have recently increased above the limit specified in the SIP. In April 2004, the U.S. EPA issued a more stringent 8-hour ozone standard, likely requiring additional VOC reductions. DPR is preparing a new SIP and it is very likely that additional VOC reductions from all sources will be required to meet the new ozone standard.

How does DPR estimate VOCs?

DPR estimates VOC emission as the product of VOC fraction in product and the amount of product applied (emission = VOC fraction in product X amount of product). The emission potential of the VOC is determined by lab test (thermogravimetric analysis, TGA), water inorganic subtraction, confidential statement of formula, or a default value. The DPR has been estimating VOC emissions from agricultural and commercial structural applications for each year since 1991. Their data show that more than 90% of the emission from pesticides is from agricultural sources except on the South Coast.

DPR, ARB, and others are working to increase the accuracy of VOC emission estimates and reduce VOC emissions from pesticides. It should be noted that the current method of estimation assumes a 100% loss of the VOCs in the pesticide. However, revisions are planned on the estimation methods.

So what does this mean for weed management?

In California, weed control remains a significant cost in crop production and in non-crop areas (e.g., roadsides, urban area, forests, aquifers and waterways, etc.) vegetation management. Herbicides are still the primarily tool for weed management in most crop and non-crop areas. DPR agricultural data shows that by acres treated, the pesticides with the greatest use in 2002, after sulfur, were glyphosate, oxyfluorfen, and paraquat dichloride, all herbicides.

Herbicides come in several formulations: solutions (S), liquids (L), dry flowables (DF), water dispersible granules (WDG), wettable powders (WP), flowables (F), micro-encapsulated (ME), and emulsifiable concentrates (EC). All these formulations are generally mixed with water and sprayed. There is a general focus on EC formulation of herbicides because they are believed to be the highest VOC contributors among the various formulations.

An EC is a pesticide formulation consisting of an active ingredient and an emulsifying agent in an organic solvent. The solvent is usually not soluble in water. When an EC product is mixed with water prior to application, the resulting mix is a dispersion of fine, oily particles in water.

Herbicides with an emission potential greater than 20 percent

Several herbicides are available in EC and other forms. The DPR has prepared a database of EC products with emission potentials of more than 20% by active ingredient. Table 3 shows the herbicides and the commodities which they are used in.

It should not be assumed that this is a complete list nor that changes will necessarily be made to any given product. As a general rule of thumb, DPR’s review will probably affect most products with an E or EC formulation. There are many glyphosate products with EC formulations, however. These products are currently under review.

Table 4 provides an example of the emission potential of some herbicides and their various formulations:

With so many common successful herbicides on the watch-list, it remains to be seen what affect these regulatory changes will have on day-to-day weed management. In some cases, it may be as simple as replacing an EC with a non-EC formulation. Similarly, in some cases it may be possible to obtain exemptions based on critical needs. However, we should be considering the impacts on production and investigating alternatives to manage weeds in our cropping systems.

[Tables follow on pages 6 and 7.]

Table 3. Herbicides with VOC concerns by commodity and acreage treated.			
Commodity	**Active ingredient[1]**	**2003 Application Acres**	**Share harvested Acres**
Almond	Oxyfluorfen	262,042	48%
Apple	Oxyfluorfen	3,527	13%
Bok Choy	Bensulide	137	-
Carrot	Trifluralin	9,487	13%
Cherry	Oxyfluorfen	8,060	32%
Cherry	Paraquat Dichloride	3,021	12%
Grape	Oxyfluorfen	70,036	21%
Kiwi	Oxyfluorfen	600	13%
Nectarine	Oxyfluorfen	12,403	34%
Onion, dry	Bromoxynil Heptanoate	14,138	32%
Onion, dry	Bromoxynil Octanoate	16,677	38%
Onion, dry	Oxyfluorfen	8,740	20%
Onion, dry	Pendimethalin	6,418	15%
Onion, green	Bromoxynil Heptanoate	239	-
Onion, green	Bromoxynil Octanoate	243	-
Onion, green	Oxyfluorfen	83	-
Peach	Oxyfluorfen	16,718	25%
Persimmon	Oxyfluorfen	136	-
Plum	Oxyfluorfen	9,250	26%
Squash, zucchini	Bensulide	105	-
Tangerine	Trifluralin	1,349	14%
Tomato	Trifluralin	12,147	33%
Tomato, Processing	Trifluralin	95,056	35%

[1]Herbicides (active ingredient with trade names in parenthesis) that have VOC emission potentials and might be subjected to reformulation include:

1. 2,4-D (Weedone Lo Vol 6, Albaugh Solve 2,4-D, Speed Zone St. Augustine Formula Broadleaf herbicide, Speed Zone Southern Broadleaf herbicide for turf, Crossbow, Spectracide Lawn weed killer 2 33 Plus, Weedar 64, Weedaxe, Nufarm Esteron 99 concentrate herbicide, Hivol-44, Brush Buster).
2. Acrolein (Magnacide H)
3. Alachlor (Lasso)
4. Bromoxynil Octanoate (Buctril, Buctril EC)
5. Clethodim (Prism 2 EC, Envoy)
6. Dicamba , Dimethylamine salt (Banvel)
7. Dithiopyr (Dimension)
8. Ethalfluralin (Sonalan HFP, Sonalan EC, Clean Crop Curbit EC)
9. Metolachlor, S-Metolachlor (Dual Magnum, Dual II Magnum, Pennant Magnum)
10. Oxyfluorfen (Goal 1.6 E, Goal T/O, Goal 2E, Goal 2XL, Galigan 2E)
11. Pendimethalin (Stomp 3.3EC, Prowl 3.3EC, Pendulum 3.3EC)
12. Sethoxydim (Poast, Grass Getter)
13. Triclopyr, Butoxyethyl ester (Turflon Ester, Garlon 4, Remedy)
14. Trifluralin (Treflan HFP, Tenkoz Trifluralin 4EC, Triap 4HF, Treflan EC, Treflan 5, Gowan Trifluralin 4, Gowan Trifluralin 5, Trilin 5, Trilin, Tenkoz Trifluralin 4EC, Clean Crop Trifluralin HF, Seadagri Trifluralin 480, Vegetable and ornamental weeder)

Table 4. Emissions potential by herbicide.

Herbicide	Emission Potential (EP)	Formulation
Glyphosate		
Glyfos X-tra herbicide	5.71	liquid concentrate
RoundUp Original Herbicide	0	liquid concentrate
RoundUp Superconcentrate Weed & Grass Killer	39.15	EC
RoundUp Ultra Herbicide	5.71	liquid concentrate
RoundUp Ultramax Herbicide	39.15	EC
Oxyfluorfen		
Goal 2XL Herbicide	39.15	EC
Galigan 2E Oxyfluorfen	39.15	EC
Goal 2XL	39.15	EC
Goal 1.6 E Herbicide	65.5	EC
Goal 2E Herbicide	39.15	EC
Trifluralin		
Gowan Trifluralin 4	39.15	EC
Triap 4HF	53.65	EC
Treflan HFP	53.65	EC
Clean Crop Trifluralin HF	39.15	EC
Tenkoz Trifluralin 4 EC	53.65	EC
Tenkoz Trifluralin 10G	3.31	Granular/Flakes
Gowan Trifluralin 10G	3.7	Granular/Flakes
Oryzalin		
Surflan A.S.	39.15	EC
Farmsaver.com oryzalin 4 A.S.	5.71	Aqueous conc.
Surflan A.S.	7.3	solution/liquid
Surflan A.S.	7.4	solution/liquid
Oryza AG	5.71	Aqueous conc.
Vegetation Manager Oryzalin 4 Pro	5.71	Aqueous conc.
Gramoxone		
Gramoxone Extra Herbicide	0	solution/liquid
Gramoxone Max	5.71	Aqueous conc.
Gramoxone Super Herbicide	37.54	EC
Gramoxone Paraquat Herbicide	7.3	solution/liquid
Ortho Paraquat CL	7.3	solution/liquid
Starfire Concentrate	0	Aqueous conc.
Clean Crop Paraquat Plus	7.3	solution/liquid
EPTC		
Eptam 7E selective herbicide (only active EPTC reg.)	97.9	EC

References:

DPR. Volatile Organic Compound (VOC) Emissions from Pesticides. Available online: http://www.cdpr.ca.gov/docs/pur/vocproj/vocmenu.htm

Goodhue, R. E., K. Groves, and R. T. Roush. 2005. Pesticide use and air quality in the San Joaquin Valley. Univ. of California Giannini Foundation. Update Agricultural and Resource Economics. Vol 8. No.4

Segawa, R. 2005. Volatile organic compound emissions from pesticides. Available online: http://www.cdpr.ca.gov/docs/pur/vocproj/overvw032305.pdf

Various reports submitted at ‘Volatile organic compounds: coordinating the needs of agriculture and proposed regulations’. A meeting organized by the California Minor Crops Council (CMCC) and UC Davis. Oct. 10, 2005, Kearney Ag Center, Parlier.

Sonoma County Viticulture Newsletter – March 2006

Meeting Announcements and Mealybug Articles

Powdery Mildew

Volatile Organic Compounds (VOCs) & Weed Management

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