



## *Esca* [BLACK MEASLES] and *Petri disease* [YOUNG ESCA] of Grapevines

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Esca, also known as black measles, and Petri disease or young esca, are caused by a complex of fungal pathogens. Esca typically occurs in older grapevines and is caused primarily by *Phaeoacremonium aleophilum* (*Togninia minima*) as well as other species of *Phaeoacremonium*. Young esca, also known as vine decline as it occurs on immature grapevines, is typically caused by another closely related fungus *Phaeomoniella chlamydospora*. However, both of these fungi can be found in plants affected by both disorders. When diseased wood is obtained from nurseries or disease occurs in newly planted vineyards, symptoms can be seen in vines as young as two to three years of age.

**Symptoms, pathogen biology and disease cycle** Leaf symptoms of measles include small chlorotic interveinal areas, which look like a “tiger stripe” pattern and which enlarge and dry out. In red varieties, those areas will be surrounded by dark red margins. Severely affected vines will experience leaf drop and cane dieback. The fruit can have small, dark spots, which may be surrounded by a purple ring. In severely affected fruit, the berries will crack and dry out or will raisin or wilt. The causal fungus isolated from symptomatic vines was *Phaeoacremonium* spp. Recent work has shown in greater detail that there is a group of pathogens that occur as weak endophytic pathogens, meaning they reside systemically within the grapevine water conducting tissues. These fungi belonging to the genus *Phaeoacremonium* produce fungal resting structures called perithecia in old, rotted, vascular tissue of pruning wounds and in cracks in cordons, trunks and spurs. Spores are released from these overwintering structures with rainfall and the sexual spores or ascospores reinfect the grapevine through pruning wounds, which remain susceptible for up to 16 weeks. Insect transmission of sexual spores may also occur. The pathogen then overwinters as perithecia or

in the endophytic phase within the grapevine.

Symptoms of young vine decline include vascular streaking of the woody cylinder, stunted growth, and small chlorotic leaves. Both diseases exhibit shoot tip dieback. *Phaeomoniella chlamydospora* resides on the wood as specialized fungal structures called pycnidia in three to five year-old pruning and girdling wounds and spores are released with rainfall during the months of November through April. Symptoms generally are expressed either in the year that new infections occur or one year later.

New diagnostic methods have been developed and include use of sensitive lab tests for fungal DNA called Polymerase Chain Reaction (PCR) tests which can distinguish between five to seven species of *Phaeoacremonium* and the single species *Phaeomoniella chlamydospora*. Several other fungi have also been associated with esca symptoms including *Phialophora* spp and *Caudophora* spp.



**Esca Management** Research has shown the disease cycle to be similar to that of *Eutypa lata* in that spores are released during fall, winter and spring rainfall. We know where the fruiting bodies reside on the grapevine and we know that spores infect pruning wounds and other injured tissue. Lime sulfur will kill the fruiting bodies but it needs to be applied to cracks and crevices in the wood where the fruiting bodies reside. It is clear that pruning time is not as important as is the case with *Eutypa* dieback. These pathogens are capable of infecting pruning wounds made at any time during the winter and spring. Double pruning alone probably would work best for spur pruned vines, but larger wounds should be protected. Chemicals used for *Eutypa* are also effective in protecting against Esca pathogens such as Topsin-M (WSB 1%) which is a thiophanate fungicide with a restricted entry interval of 7

# JOIN US FOR THE *Summer* VITICULTURE RESEARCH SEMINAR

July 17, 2007

8:00am – 1:00pm

Burgundy Hall,

Lodi Grape Festival Grounds

## AGENDA:

8:00 – 8:30am: Sign –in and refreshments

8:30–8:45: Dr. Cliff Ohmart, Research/IPM Director LWWC – Update on activities of Research Committee and Grower Program

8:45–9:15am: Scott Hudson, Agriculture Commissioner, San Joaquin County - Importance of Invasive Species to Lodi vineyards and an update on the Light Brown Apple Moth recently found in the Bay Area.

9:15–10:15am: JJ Gonsalves, Constellation Brands, USA – Results of a 5 Year Intensive Air Temperature Study of the Lodi Region and Fruiting Zone Light Measurements Under Various Canopy Designs in Lodi.

10:15 – 10:30am: Break

10:30–11:30am: Dr. Andy Walker, University of California Davis, Dept. of Enology and Viticulture – Will there be GMOs in California vineyards – What are the issues and what can we expect?

11:30am–12:30pm: Dr. Jim Wolpert, University of California Davis, Dept. of Enology and Viticulture – Vine balance and Lodi winegrowing.

12:30pm: Lunch

Catered by Touch of Mesquite

**RSVP to Cliff by July 13, 2007,  
Phone: 209-367-4727**

days. To use it mix as a 1% paste and apply to cut or pruned surfaces immediately after cutting. It is registered for Esca control where its use is allowed under a Special Local Needs label, check with your local County Agricultural Commissioner. Control can also be achieved with use of liquid lime sulfur but the product must be applied such that it gets into the cracks and crevices of the vine because that is where the fungal fruiting bodies reside. Other treatments still under development include use of wax or tree tar to fill the holes on the vine thus physically blocking the fungus from re-infecting the vine. Finally materials such as boric acid at 5000 ppm and Dreft detergent are also effective but the latter is not currently registered for such uses on grapes in California.

*Young Esca or Petri Disease Management* It is always important to obtain clean, healthy planting stock and to plant using appropriate cultural practices, and to provide sufficient irrigation and fertilization to young, newly planted vines to avoid establishment problems. These pathogens are common in soil and they occur as epiphytes on the exterior of grapevines. They also are endophytes (live in the water conducting tissue of grapevines). If the vines are stressed, the pathogens appear to become more virulent and cause disease. Petri disease or young esca is a root disease of newly planted vines that were at one time or another put under some kind of stress. Research has shown that predisposition stresses involved in Petri disease include early fruiting of the vines (before year three), “J” rooting, and poor irrigation management or water deficit stress. Once the stress has occurred and vines

display symptoms, they must be removed and new vines replanted. However, the entire vineyard does not have to be removed but rather, only the vines showing symptoms. There is differential susceptibility of grapevine varieties and rootstocks with all of the Phylloxera and nematode resistant stocks being more susceptible than AXR1 rootstock. For example, 3309, 101-14, and 5C are very susceptible to *P. chlamydospora* whereas AXR1 is nearly immune to the disease.

## References:

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UC Pest management guidelines, UC IPM web site, Disease of Grapevines, Esca  
<http://www.ipm.ucdavis.edu/PMG/r302100511.html>  
<http://www.ipm.ucdavis.edu/PMG/r302100511.html>

## LODI WINEGRAPE COMMISSION AWARDED TWO US EPA GRANTS

It was recently announced that the Lodi-Woodbridge Winegrape Commission was awarded two grants from the US Environmental Protection Agency, Region IX. The first is a Pesticide Environmental Stewardship Program Regional grant for \$49,200 over a two year period. The goal of the grant is to achieve a critical mass of growers and wineries participating in the Lodi Rules for Sustainable Winegrowing program. The second grant is a Food Quality Protection Act grant for \$49,000 over a 12 month period. The goal of this grant is to develop and IPM program for Vine Mealybug, in partnership with Dr. Kent Daane, University of California Berkeley.

The dry and mild spring has encouraged good fruit set and cluster counts are at normal or above, although as with each year there are exceptions by variety and by site. The total rainfall has ended up well below average, but there were some very effective rain events and most sites show good vine growth with little to no stress at this point.

Irrigation has already been of interest because of the dry winter, but with summer officially approaching irrigation will become of primary interest. Because of the mild and dry spring, vines have used most soil moisture and care should be taken to avoid severe water deficits during any possible hot spells. Fortunately, the weather has cooperated well so far with a mild May and very cool start to June. That can change fast and preparation should be made for meeting full vine water use during any heat spikes, especially if you are using Regulated Deficit Irrigation (RDI) strategy.

With respect to nitrogen needs there continues to be two main questions: “When should I apply nitrogen?” “How much nitrogen is needed?” Research and field experience over the last 10 to 15 years indicates that the best use of your nitrogen fertilizer dollars is between bloom and veraison, earlier is better than just before veraison when nitrogen and potassium may be preferentially directed by vines to the clusters; both to the concern of vintners.

Shoot growth from budbreak to bloom relies almost exclusively on stored reserves and there is little to no feeder (new) root growth until about bloom. So the window for the best time to apply nitrogen has been open and remains open as irrigation needs begin. This optimum period ends as veraison or color break/berry softening begins, even though water needs continue. The other good opportunity for nitrogen application is immediately after harvest. In the case of potassium, just about any time before early July or after harvest is okay. While foliar

sprays may provide some of the macronutrients such as potassium, nitrogen or other macronutrients, it is an expensive way to fertilize. There has been a lot of testimonial to foliar nutrient sprays, but never any replicated vineyard experimental trials that I have seen with data to suggest improved quality or sugar accumulation.

“How much N should I be putting on?” Generally, grapes get by with 1/3 to 1/8 what most other crops require on a per acre basis. As a prorated estimate, a vine can use about 35 grams for leaves, 10 grams for stems, 30 grams for clusters, for a total use of 75 g per vine, based on a vine spacing of 454 vines per acre. That roughly comes to about 75 pounds of actual Nitrogen per acre or roughly 3 pounds of N per ton of grapes produced. Several sources need to be considered before you start to apply nitrogen every year. Nitrogen is available from well water used for irrigation, from prunings and leaves each winter, cover crop (use and production) and from soil reserves, which has been hard for researchers to quantify. Over the last 15 years I have seen nitrogen (N) applications go from 50, 60 or 100 pounds of actual N per acre, down to 40 or 30 to 25 or 15 pounds of actual N per acre. For most varieties, at average yields of 7 to 8 tons per acre, 20 to 25 units of N are probably plenty on an annual basis. With the efficiency of drip systems, in many cases nitrogen needs on a seasonal basis, may require only 10 or 15 units per acre. This depends on soil, rootstock, variety, cover crops, vine health, age and long-term goals.

Well water nitrogen levels as measured by nitrates should be checked at some point in the life of a vineyard and can fluctuate from year to year. For every foot of applied water, a one ppm nitrate-nitrogen (NO<sub>3</sub>-N) water provides 2.73 pounds of actual nitrogen! Some labs report nitrates as just NO<sub>3</sub>, which translates to 0.61 pounds of N per acre-foot. So be careful to read how your water analysis may be reported. In any case, you may save some

nitrogen and some money, as it is not uncommon for some local wells to have 10 to 15 ppm of NO<sub>3</sub>-N. If you put on just 6 inches of water, at 10 ppm NO<sub>3</sub>-N, that would be 13.7 pounds of nitrogen during the year by just turning the pump on. Bottom line, maybe it’s worth checking your well. Tissue analysis is very good for monitoring most nutrients, except unfortunately for nitrogen. Nonetheless, annual petiole samples are good. Leaf blades DO NOT provide better samples than petioles. Soil analysis is good for long-term base lines, but shouldn’t be used for fertilizer assessment unless you are growing row crops.

A third question is often, “What kind of fertilizer is best?” Generally the vine doesn’t care. But long term use of ammonium base fertilizers can acidify the soil and may short change the vine on a lot of little things. Which leads to the question “Is compost or cover crops better nitrogen for vines?” We seem to care more than the vines does, but it is good to consider compost, cover crops, nitrate-based materials, sometimes manure or a combination. What organic forms of fertilizer are able to provide is a little bit of everything in a time release form. The very nature of organic matter can help improve, on a temporary basis, soil structure and encourages some beneficial microbes.

Irrigation is still a hot topic the last few years and it should be, as it is one of the biggest steps towards improving wine quality, while saving on field pumping costs. As I finish writing this column the first 100 degree days are at hand, which means the pumps should be running. On extremely deep soils, especially in wet years like 1998, a post harvest irrigation might be all that is needed.

Vine shoot tip and tendril growth are much more sensitive to water stress than either the vine itself or the fruit being carried. There is an artful skill of observing vine growth to determine water stress, but monitoring vine status by pressure bomb is becoming more common. A pressure bomb provides an objective method to measure the actual vine water status and can be a fairly reliable indicator of when to start.

“How much do I need to irrigate?” As

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with nitrogen, grapevines get by with much less than most other crops. For the Lodi area, vine water needs seem to be met with a seasonal total of 18 acre inches of water that is about 65 to 70 percent of what the vine could use if allowed. This total seasonal need includes available water in the soil from winter rains, any rainfall after budbreak and irrigation. Actual irrigation that may be needed depends on soil, rootstock, variety, trellis system, irrigation system efficiency, spacing, vine health and of course, winery goals. A very general example might start with a deep sandy loam soil and an average winter rainfall of 17 inches. For Zinfandel (red program) on a vigorous rootstock, a seasonal schedule could total about 120 to 175 hours of actual run time, using two 1/2 gallon emitters per

vine. Chardonnay may be a little more at 175 to 225 total hours. This year we may need to add the extra water by the end of the season to make up for the dry spring. A little extra water during any Extreme hot spells of 100 degrees F over several days is good to keep in mind.

Recently, a new potential pest to be on the lookout for is the Light Brown Apple Moth (LBAM). It has been found in several Bay Area counties and in Napa. It is an Australian hitchhiker that could pose a threat for many crops including grapes. It is similar to OLR in many respects, but as a potential new pest could cause major problems and increase pest management costs once again. If you have any questions or concerns give one of our offices a call or the Ag Commissioner's office or the CDFA web site.

## CALENDAR OF EVENTS

**July 17, 2007** 8:00am – 1:00pm: LWWC Summer Viticulture Research Seminar, Burgundy Hall, Lodi Grape Festival Grounds.

**July 18-20, 2007** 1st Annual National Viticulture Research Conference, Studio Theater, Robert and Margrit Mondavi Center, Davis, CA. For more information visit: <http://groups.ucanr.org/nvrc/index.cfm>. Deadline for registration July 1.

**September 10, 2007** 8:15am – 4:30pm: California Sustainable Winegrowing Alliance/Wine Institute 2007 Winery/Grower Workshop, Wine & Roses Hotel. Topics to be covered: Maximizing tasting room and wine club opportunities, New Regulations and Laws Impacting Winery Operations A State-by-State Review of New Direct Shipping Laws, Sustainable Winegrowing Self Assessment (using the Code of Sustainable Winegrowing Practices Workbook. For more information contact Cliff at 209 367 4727 or HYPERLINK "mailto:cliff@lodiwine.com" cliff@lodiwine.com.

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