VIT TIPS

San Joaquin Valley Viticulture Newsletter

UC CE University of California Agriculture and Natural Resources Cooperative Extension

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Nematode Sampling in Vineyards

Allison Ferry-Abee, UCCE Tulare & Kings Counties

In This Issue

Guidelines for Sampling Nematodes

Nematodes can be a problem in vineyards and they are a challenging pest to monitor. The symptoms of damaging nematode populations are very similar to other abiotic disorders (such as some nutrient deficiencies) or soil -borne diseases. Vines lack vigor, have restricted root growth, and reduced yield. They may also have slightly yellowing leaves. If you suspect there is a nematode problem in your vineyard, the best diagnostic test is to collect soil samples and send them to a lab for analysis. Testing for which species are present and their population levels is the only way to make appropriate management decisions.

In California, the most important nematode pests of grapevines include root knot (*Meloidogyne* spp.), dagger (*Xiphinema americanum* and *X. index*), citrus (*Tylenchulus semipenetrans*), lesion (*Pratylenchus* spp.) and ring (*Mesocriconema xenoplax)* nematodes. Most damage caused by nematodes is from feeding, which interferes with plant growth and uptake of water and nutrients. Dagger nematodes can also vector viruses, including fan leaf virus.

When and how you sample is determined by which nematode you're looking for. In general, the best time to take samples to cover the widest possible range of nematodes is in the winter.

Sampling Pre-plant

It is always a good idea to sample for nematodes before planting, especially if the ground had grapes or other perennial crops (including cherries, citrus, walnuts, and even alfalfa) on the land before. Dagger nematode can survive in the soil without a host for 10 years, so even if the ground has been fallowed for a few years, it's still a good idea to take samples.

It is important to test for populations of lesion nematodes (as well as root knot, dagger, citrus and ring nematodes) prior to planting. Lesion nematode feeding can restrict root growth, which is especially detrimental for young vines.

For every 5-10 acres, take enough 24" deep cores to make up about a quart of soil per sample. Take separate samples if there are differences in cropping history or soil type. Sample a couple of days after it rains and when the soil is moist.

...Nematodes continued on page 4

Around the San Joaquin Valley

County Updates

Kern County

Ashraf El-Kereamy

Glassy-winged Sharpshooter/Pierce's Disease Field Day, Sponsored by UCCE Farm Advisors David Haviland, Ashraf El-Kereamy, and the Consolidated Central Valley Table Grape Pest and Disease Control District was held on Wednesday, Aug 26, 2015. If you could not attend and need more information, call (661) 868-6226.

Tulare & Kings Counties

Allison Ferry-Abee

We need your help! On December 7-11 we will have a series of meetings held in Kern, Tulare and Fresno Counties to update the table grape Pest Management Strategic Plan (PMSP) for the Western IPM Center. Grower and PCA input is needed to provide information on current pesticide use, effectiveness, and future needs. If you're interested in being involved, please call or e-mail me at (559) 684-3316 or aeferry@ucanr.edu.

Madera, Merced, & Mariposa Counties

Lindsay Jordan

Raisin growers faced some very challenging conditions in September right as many were picking and laying trays. Several heat spikes threatened caramelization and a rain storm passed through the area posing the risk of sand contamination and rot. Several cases of apoplexy, a severe form of Esca, have been seen in the Valley. If you have noticed severe shoot dieback and think you may have Esca in your vineyard, contact your local UC Cooperative Extension viticulture farm advisor. For guidelines on how to manage Esca, check out the UC IPM webpage http://www.ipm.ucdavis.edu/PMG/r302100511.html

Fresno County

George Zhuang

Raisin harvest is still on going in Fresno. A rain event on Sept. 14th has raised concerns about rain damage. The potential damage will vary based on the severity and distribution of rain. You can look at the measured precipitation from your nearest weather station in the Fresno-Madera UC IPM network here: http://www.ipm.ucdavis.edu/WEATHER/SITES/pcnetfresno.html Watch out for embedded sand in raisins that were still unrolled during the rain and rot developing in wine grapes.

Pictured: Wet raisin trays after it rained in mid-September in Fresno County

Photo courtesy of George Zhuang

Benefits of Post-Harvest Irrigation in Dry Years

Matthew Fidelibus, UCCE and UC Davis Viticulture and Enology & George Zhuang, UCCE Fresno County

The 2015 growing season is coming to a close, but California's exceptional drought continues. Recently it was reported that California's snowpack was the lowest in 500 years. Thus, all Californians, especially farmers, continue to look for opportunities make the most of our finite supply of groundwater. Given the drought conditions, it may be tempting to overlook autumn and winter irrigation, but doing so could have negative consequences for vine health and productivity next year if dry weather continues into winter.

Usually winter rainfall is sufficient to replenish soil water reserves and fog helps reduce evaporative water loss. However, rainfall over the past several winters has been meager and the resulting lack of fog has contributed to higher winter evaporative demand. As a result, soils have become quite dry and in the absence of precipitation or irrigation, the dry soils will likely cause physiological problems for vines as they resume metabolic activity next spring.

The negative effect of dry winter weather was recently demonstrated by one study (Mendez-Costabel et al. 2014). They showed that two years without winter rainfall significantly reduced grapevine canopy size and yield by 30-50% even when vines received 70% crop evapotranspiration during the growing season. Deficit irrigation coupled with a dry winter and no post-harvest irrigation can be expected to negatively affect vine growth and yield in the SJV.

One beneficial effect of late season and winter precipitation and/or irrigation is the leaching of salts from the root zone. Salts can accumulate in the surface layers of deficit irrigated vines, especially when groundwater and drip systems are used. Salts may accumulate in leaf blades causing marginal necrosis and eventually a reduction in canopy size and yield. Winter precipitation and/or irrigation can help leach accumulated salts, thereby reducing salt uptake and thus improving vine health. Water and soil tests might be helpful to monitor salt levels and aid in decision making regarding the need for leaching.

Another potential beneficial effect of winter irrigation is a reduced risk of freeze damage. Winter freeze damage associated with dry soil conditions can devastate young vines and cause cracks that initiate the formation of Crown Gall by *Agrobacterium vitis* which can girdle and eventually kill the vine.

Dry soil in winter may also lead to delayed spring growth (DSG). Symptoms of DSG include poor and uneven bud break, bud necrosis, stunted shoot growth, flower clusters that are abnormally small or become necrotic and abscise, and sucker growth at the base of the vine. Some rootstocks seem particularly susceptible to DSG, including Harmony, and certain scions are also more susceptible than others, including Thompson Seedless.

Overall, post-harvest irrigation should be applied based on the vine status, soil type, anticipated climatic conditions and experience on your sites to maximize the yield for next year and maintain long-term productivity. No exact information on how much water needs to be applied during the dormant period is available and the amount can be variable based on individual site (e.g. soil type, previous irrigation, winter rainfall and vine status). However, making sure that a portion (at least 1/3) of the soil reservoir is recharged by mid-December is generally beneficial.

Pictured: Flood irrigation after harvest

...Nematodes from Page 1

Sampling in Established Vineyards

How you sample is largely up to your judgement based on your experience with the vineyard. You need to take enough soil core samples to collectively have about a quart of soil. Take a quart sized sample from the area of the vineyard where you suspect nematode problems and a quart sample from a healthy area for comparison. You can also compare samples from different soil types, cropping history, or whatever you think might be interesting. As with pre-plant samples, take 24" deep samples from the irrigation/root zone. Sample several days after rain or irrigation. Include any feeder roots you happen to collect with your soil sample.

Storing and Transporting Soil Samples

Put samples in a plastic bag labelled with your name, the sample description, and date sampled. Get the sample to the lab as soon as possible, and in the meantime, keep the samples cool. Do not freeze samples. Contact the lab you're sending samples to for specific instructions and sample forms.

Local Labs for Nematode Testing[1]

⇒ California AgQuest Consulting, Inc.
(559) 275-8095 www.calagquest.com

⇒ California Grower's Laboratory Inc.
(559) 275-3377 www.cagrowlab.com

⇒ Nematodes Inc.
(559) 891-9073

⇒ R.D.S. Laboratories, Inc.
(559) 592-5744

[1]The laboratories in this listing are for informational purposes only and do not constitute any endorsement or recommendation by the University of California Cooperative Extension.

There are several different methods for extracting nematodes from soil. The most accurate method will depend on which nematode you're looking for. For example, root knot nematode populations should be determined using the Baerman funnel and mist chamber method, while dagger nematode populations should be tested using sugar flotation. Consult with your lab to determine which extraction method is best for your needs.

Interpreting Your Results

The tolerance of grapevines to nematodes will vary depending on the species present, soil type, time of sampling, and your rootstock. For help interpreting your results and control recommendations, consult your farm advisor. There is also a helpful tool to assess nematode damage in vineyards in the third edition of the *Grape Pest Management* manual (Larry Bettiga ed. 2013).

Pictured: Nematode pests of grapes

Appearing top to bottom: Dagger nematode (*Xiphinema americanum*), root knot nematode (*Meloidogyne spp.*), root lesion nematode (*Pratylenchus vulnus*), and ring nematode (*Mesocriconema xenoplax).*

Vines to Wines: Understanding Acids in Grapes and Wines

Lindsay Jordan, UCCE Madera, Merced, & Mariposa Counties

Every grape grower knows that wine production begins in the vineyard. Good vineyard management promotes better fruit quality, which in turn creates fewer challenges in the winery. The acid composition of fruit and the resulting juice is a critical component of fruit quality, since acids contribute to the taste and mouthfeel of wine.

Tartaric acid, the main acid found in grapes, plays an important role in the chemical stability and flavor in wine. Grapes are unique among fruits in that they accumulate large amounts of tartaric acid. Malic acid is the second most important acid found within grapes. Together, tartaric and malic acids comprise 90% of the total acidity within grapes. There are several other organic acids found in grapes, including citric, succinic, and ascorbic acid, but these are in far smaller concentrations and not very important to harvesting or winemaking decisions.

The sourness or tartness of a wine will be determined by the concentration and composition of the different acids. Acids also impact the mouthfeel of wines; high acid wines can be perceived too sour and thin, whereas wines with low acid are often described as flabby or flat. To grow quality grapes that produce palatable wine, the acidity must be understood and considered.

For winemaking, acidity is measured as titratable acidity, abbreviated as TA. Titratable acidity is not actually the same thing as total acidity, although many people mistakenly use the terms interchangeably. Specifically, titratable acidity is an approximation of total acidity using a method called titration. To measure TA, a very small volume of base is added to a known amount of the juice, until the pH remains stable at 8.2. TA is subsequently calculated from the known volume of juice and added base. Titration is the standard method to measure juice and wine acids throughout the industry. It is typically reported as a concentration in g/L – referring to the grams of tartaric, malic and other acids per liter of juice or wine. TA levels can vary greatly in grapes at harvest, ranging from a low of 3 g/L in warm climates to greater than 10 g/L in cooler climates. The ideal TA will depend upon the desired wine style. Grapes destined for sparkling wine will be picked early to ensure high acid levels (10-14 g/L) whereas fruit with TAs of less than 5 g/L can make palatable table wines.

The acid composition and concentration at harvest is a result of cultivar characteristics, vineyard practices, and probably most importantly, climate.

Early in the season when berries are green, grapes have high concentrations of acids and very little sugar. Tartaric and malic acids will accumulate in the grape from fruit set until the lag phase, the time period where berries are no longer rapidly growing right before veraison. At the start of veraison, the fruit not only begins to rapidly accumulate sugars, but acids start to decrease. Both tartaric and malic acids will be used for cellular respiration, lowering the total acidity of the fruit. Malic acid is more readily used for respiration and therefore concentrations decline rapidly compared to tartaric acid which is relatively more stable.

Under the same management practices, grapes will have higher levels of acid, especially malic acid, at cooler temperatures (59-68°F) versus hotter conditions (77-89°F). It is not surprising, given this temperature-acid relationship, that grapes ripening in cooler climates will have considerably higher acid levels than grapes in warm climates for this reason. In the Central Valley we typically experience not only hot summer days but also warm summer nights. This climate favors rapid acid consumption in grapes compared to Coastal-influenced climates which have notably cooler night time temperatures.

...Acids continued on page 6

...Acids continued from page 5

Knowing that temperature influences acidity, there will be relationship between canopy management and acidity. Canopy management practices that increase sun exposure, like leaf thinning, can result in increased canopy temperatures and lower acidity. Conversely, if fruit zone shading is allowed, this shading can create lower temperatures in the canopy and result in higher acid levels. Different trellis types and vineyard row directions can affect canopy exposure and therefore canopy temperatures and acidity.

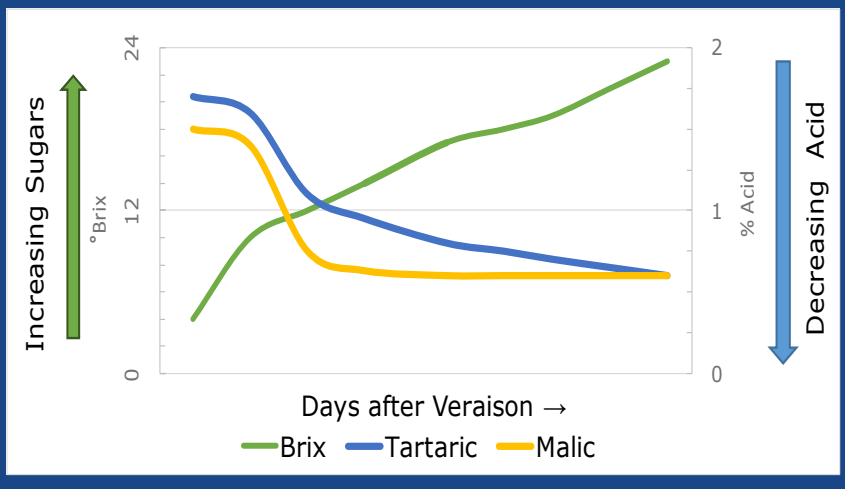
Understating how irrigation and nutrition management influence acidity is important as well. Aggressive irrigation and/or fertilization can stimulate excessive vegetative growth. Vigorous growth has been shown to decrease acidity and reduce fruit quality even when shading was not a factor. Additionally, if rapid berry growth later in the season is encouraged, malic acid is already declining; the remaining concentration of acids is diluted, resulting in a lower TA. Directly and indirectly, many vineyard management choices may influence the acid composition of the fruit at harvest.

Acidity is one factor that differentiates grape varieties. For example, Riesling, Merlot and Grenache have naturally higher concentrations of tartaric acid, while Zinfandel and Syrah are proportionally high in malic acid. Knowing that acidity is an inherent quality of grape varieties, the acidity of a wine grape variety should be considered before planting in warmer sites.

As the season progresses and sugars accumulate while acids decline in the berry, the decision to harvest must take these opposing relationships into account. Proper fruit sampling for both sugars measured by °Brix and acids by TA will allow a grower to track not only how close they are to the target °Brix for harvest, but also how rapidly the acids are declining. It may be preferable to sacrifice one or two additional °Brix to ensure a higher acid content at harvest if TA suddenly start to plummet.

If acid levels have declined too far by the time fruit reaches target 22-24 °Brix, there are several steps that can be taken in the winery. Acid additions are a common practice. Identifying varieties or specific vineyard blocks that favor higher acid concentrations can be a valuable tool for combining fruit or blending wines to reach the ideal acid content. Winemakers may also seek to create a more balanced acid profile by promoting malolactic fermentation, where the more sour malic acid is converted by bacteria into the less harsh lactic acid. There are many tools available to winemakers during the winemaking process that enables a finished wine to have the optimal acid balance if vineyard conditions or weather did not promote ideal levels.

By considering all the factors that influence the acid content of fruit in the vineyard, including climate, vineyard management, and variety characteristics, grape growers can understand how acids affect their fruit and wine quality.



Pictured: Ripening curves for Carignane

As sugars accumulate after the start of veraison, acid content of grape berries will decline. Malic acid will be consumed faster than tartaric acid. A grower must balance the goals of reaching the desired sugar content with declining acid content to produce the best quality grapes.

Sample data sourced from General Viticulture *(Winkler et al. 1972)*

Upcoming Events

Fall 2015 Continuing Education Vineyard Pest Update
October 13, 2015 at 10 AM
At the UCCE Merced Office
2145 Wardrobe Avenue in Merced, CA
Part of the series hosted by UC Cooperative Extension and Merced County Agricultural Commissioner.
Full schedule available at
http://cemerced.ucanr.edu/files/154077.pdf
For more information and special needs accommodation, contact laburrow@ucdavis.edu
Or call (209)385-7403

San Joaquin Valley Grape Symposium
January 6, 2016
At the C.P.D.E.S Hall
Easton, CA
Agenda is available at
http://cefresno.ucanr.edu/files/221405.pdf
For information and special needs accommodation, contact gzhuang@ucanr.edu

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Contact your local viticulture farm advisor or UCCE county office to be added to the e-mailing list or if you wish to receive a mailed copy.

Our programs are open to all potential participants. Please contact your local UCCE county office (two weeks prior to the scheduled activity) and/or the event organizer listed if you have any barriers to participation regarding accommodation.

Contact Us

Questions? Concerns? Follow up? Please feel free to contact us.

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