Petiole Sample Results – What Do They Mean?

Many grape growers that have grape vines producing fruit take petiole samples to evaluate the nutrient status of their vines. Some growers will take petiole samples at flowering while others will take petiole samples at veraison. The most important thing to consider when selecting when to sample is that you are consistent in your sampling time from year to year. This will allow you to track your vines over time. I would suggest that when taking petiole samples that you also take a soil sample which will provide you more data and help you in determining your vineyard’s nutrient needs. The Soil Testing Laboratories of UW-Madison will do the petiole analysis and soil analysis for $25.00 per sample. [http://uwlab.soils.wisc.edu/plant-tissue/](http://uwlab.soils.wisc.edu/plant-tissue/)

Once you receive the results, look them over and try to determine why some nutrients are out of range. As an example, I have included a recent petiole analysis from a vineyard. What strikes me from this analysis is that nitrogen is very low (0.48%). According to the Wine Grape Production Guide for Eastern North America, nitrogen should be 1.2 to 2.2%. The other numbers that stand out on this report are the other two macro-nutrients potassium (K) and phosphorous (P). Both of these nutrients are very high. Phosphorous should be in the range of 0.17 to 0.3% and potassium 1.5 to 2.5%. Without soil data and past fertilizer records in hand it is very difficult to make any conclusions as to why nitrogen is so low in the petiole analysis. Some growers may consider foliar applications of nitrogen or applying nitrogen through fertigation if they had these test results. Before doing anything, put as much information together as possible about the nutrient status of your vines. Are the vines growing vigorously, are the leaves a deep green or do some of the leaves look washed out? Remember that the petiole sample that you sent in is just a very small snapshot in time and you need to consider that other factors may be playing a role in your results. If nothing else, remember the basics of a nutrient program. The macro-nutrients N, P, and K should be soil applied to correct deficiencies. These nutrients are used by the grape vine in greater amounts than the micro-nutrients. Micro-nutrients can be amended by foliar applications simply because they are used in such small amounts by the plant. Also consider that you may have some nutrient antagonism problems. For example, in the petiole analysis report, the K levels are very high in the plant which suggests that levels may be high in the soil. High K levels reduce magnesium (mg) uptake by the plant and vice versa. Other nutrient antagonism problems include, excess P can result in reduced zinc uptake and excess calcium can cause boron and mg deficiencies.
Getting back to low nitrogen in the petiole test results. Are there risks applying nitrogen later in the growing season? Some studies have applied foliar nitrogen at veraison to increase yeast assimilable nitrogen (YAN). Studies at Cornell have demonstrated that nitrogen applications after harvest result in reserve nitrogen levels that improve vine growth and fruiting the following growing season. Most of the research on foliar nitrogen applications to grapes has been done on non-French American hybrids and in more moderate climates than those in Wisconsin. What impact would late season nitrogen applications have on hybrid cultivars growing in Wisconsin? This is a question that needs some research. For now stick to the basics—and apply nitrogen between bud break and veraison.

References


Late-season foliar urea applications can increase berry yeast-assimilable nitrogen in winegrapes (Vitis vinifera L.). 2013. http://www.ajevonline.org/content/early/2013/11/05/ajev.2013.13092.abstract

Anthracnose is Rampant

This growing season I have come across anthracnose more than other years. I have even observed anthracnose on Louise Swenson which I thought was “bullet proof” to most of the common grape diseases. For those of you that are experiencing anthracnose in your vineyard, start to think about how you are going to manage the problem going forward. If berries are infected with anthracnose and you want to save the crop, consider removing individual berries that have deep lesions. Berries that have small anthracnose freckles in which disease development has been halted by fungicides should produce a crop with some reduced quality.

Below is article that I wrote in 2012 on anthracnose that will help you in managing anthracnose.

Anthracnose

Symptoms

Most all green tissue of the grape plant is susceptible, including leaves, petioles, tendrils, young shoots and berries. At this time of year focus, should be on protecting young shoots and leaves. Early symptoms on shoots appear as small, round, reddish spots. Over time these spots enlarge and become lesions with angular edges. The center of the lesions become depressed and the edges of the lesion become raised. If a number of lesions appear on a shoot, these may coalesce over time, resulting in girdling the developing shoot. Shoot lesions of anthracnose have a similar appearance to phomopsis lesions.

Anthracnose or Phomopsis?

The symptomology of both anthracnose and phomopsis on shoots and leaves is similar in appearance. On shoots, phomopsis lesions are often found within the first four nodes of the shoot, but lesions from phomopsis may be found anywhere on the shoot. Anthracnose lesions, similar to phomopsis, may be found anywhere on the length of the shoot. The main difference between phomopsis and anthracnose lesions on shoots is the overall appearance. Typically, early anthracnose lesions begin as round and then develop angular edges, whereas phomopsis lesions are typically elongated. Both anthracnose and phomopsis lesions have tan/gray centers and raised black borders.
Determining an anthracnose lesion from a phomopsis lesion on leaves is a bit more difficult. Early disease symptomology on leaves by anthracnose and phomopsis can appear similar. Lesions on leaves caused by anthracnose typically results in small necrotic lesions that lack a yellow halo, whereas phomopsis lesions typically have a yellow halo surrounding the lesion. Both anthracnose and phomopsis can cause numerous small (1-5 mm across) dark lesions. Also both diseases can cause lesions in which the center falls out resulting in “shot-holes”.

The symptomology on berries caused by phomopsis or anthracnose also differs. Anthracnose causes “birds eye rot” with initial symptoms being small, reddish circular spots that over time enlarge and become sunken. The lesions centers take on a white or grey color with the lesion margin becoming reddish-brown to black. These symptoms can begin to appear as early as fruit set. In contrast, phomopsis symptoms on berries occur later in the growing season as sugars begin to increase quickly as the berries attain maturity.

**Anthracnose Biology**

_Elsinoe ampelina_ is the fungal pathogen causing anthracnose of grape. Anthracnose survives from season to season within lesions on infected shoots. Within these lesions are sclerotia which during long wet periods and temperatures above 36° F germinate to produce spores (conidia). These conidia are the primary inoculum in the springtime and are transferred to growing tissues by splashing rain.

The conidia need free water on the tissue surface in order to germinate and infect the tissue. Anthracnose is unique compared to other early season grape diseases as it can infect tissues at relatively cool temperatures (36° F). Also, anthracnose has a broad temperature range in which infections can occur (36 to 90° F). Infection rates are hastened by warmer temperatures. Disease symptom progression is also temperature dependent and symptoms of disease will appear faster at 90° F compared to 36° F. In short, warm wet weather hastens disease development and results in increased infections.

The disease cycle continues during the growing season as lesions formed during the current season produce secondary inoculum of conidial spores. Besides conidia, anthracnose can produce another type of spore (ascospore). Ascopores are produced on infected canes or berries from the previous season that may be present on the vineyard floor or trellis system.
Anthracnose Management

Site Sanitation
Since anthracnose inoculum can be produced from last season’s infected shoots, these infected shoots should be removed during dormant pruning. Also remove infected berries and prunings from the vineyard floor or trellis system.

Varietal Selection
In general, *Vitis vinifera* varieties are more susceptible to anthracnose than French-American hybrids. Little research has focused on the susceptibility of French-American grape varieties to anthracnose. In Wisconsin, I have seen anthracnose on La Crosse, La Crescent, Frontenac, and Valient as well as on wild grapes. Since wild grapes are susceptible to anthracnose these plants can be a refuge for the disease. Therefore, removing wild grapes in the vicinity of your vineyard should help reduce primary inoculum.

Chemical Management
Before undertaking a management program for anthracnose consider the vineyard’s past exposure to the disease. If you have had past outbreaks of anthracnose in the vineyard then take an aggressive approach to management. This should include an application of lime sulfur just prior to bud break to reduce primary inoculum. Michigan State Trials have identified fungicides that provide the best control of anthracnose. For cane infections; Dithane Rainshield, Sovran, Elite, and Endura provided the best control. On fruit, Dithane, Pristine, Sovran, Endura, and Captec provided the best control. Be aware that many of these products do not list anthracnose on the label. For more information on MSU Trial see http://www.michiganwines.com/docs/Research/05schilder1.pdf

References
eXtension, Anthracnose on Grapes
http://www.extension.org/pages/31136/anthracnose-on-grapes

Smigell, C. Comparison of symptoms of anthracnose and phomopsis on grapes. Kentucky Department of Agriculture
http://www.kyagr.com/marketing/plantmktg/kygrapedisease.htm

http://apsjournals.apsnet.org/doi/abs/10.1094/PD-89-1011A

This website is helpful to look up plant pathology terms that are unfamiliar
Cornell University On-line Glossary of Technical Terms in Plant Pathology
http://www.plantpath.cornell.edu/glossary/Glossary.htm

http://ohioline.osu.edu/hyg-fact/3000/pdf/HYG_3208_08.pdf
**Degree Day**$^1$ (base 50) Accumulation from April 1 to August 9, 2014 at Peninsular Agricultural Research Station in Sturgeon Bay, WI

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$^1$Modified method.
$^2$Average from 2009 to 2013.

**Degree Day**$^1$ (base 50) Accumulation from April 1 to July 28, 2014 at West Madison

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$^1$Modified method.
$^2$Average from 2009 to 2013.

**Accumulated degree days**$^1$ (base 50) for the month of March in Sturgeon Bay and Madison, WI.

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$^1$Modified method.
$^2$Data from http://www.doa.state.wi.us/degreedays/

Please scout your vineyards on a regularly scheduled basis in an effort to manage problem pests. This report contains information on scouting reports from specific locations and may not reflect pest problems in your vineyard. If you would like more information on IPM in grapes, please contact Dean Volenberg at (920)746-2260 or dean.volenberg@ces.uwex.edu