

Tissue Sampling For Vineyards

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Grapevine nutrition plays a major role in the vineyard, including vegetative vigor, yield, fruit quality, cold hardiness and longevity, therefore the nutrients in the soil and plant must be monitored and controlled for optimal efficiency. Since this is a constantly changing situation, it is best to set up a regular program of soil and petiole sampling and analysis, so that appropriate amendments can be made to keep the vineyard in vegetative and reproductive balance. The interpretation from the analysis of the samples, combined with vigor observations made in the vineyard and yield and pruning weight data, can also be used to create your own nutrient management program.

Soil samples. Since the soil serves as a “reservoir” of nutrients, the soil test measures how much of each of the elements are present in that reservoir. The test will also give you information on other factors such as organic matter, pH and cation exchange capacity that are important when making management decisions. Deficiencies that are seen in these tests can then be dealt with by supplementing your soil with different materials. Soil tests are recommended prior to planting new blocks, after large applications of fertilizer and overall, every 3 years.

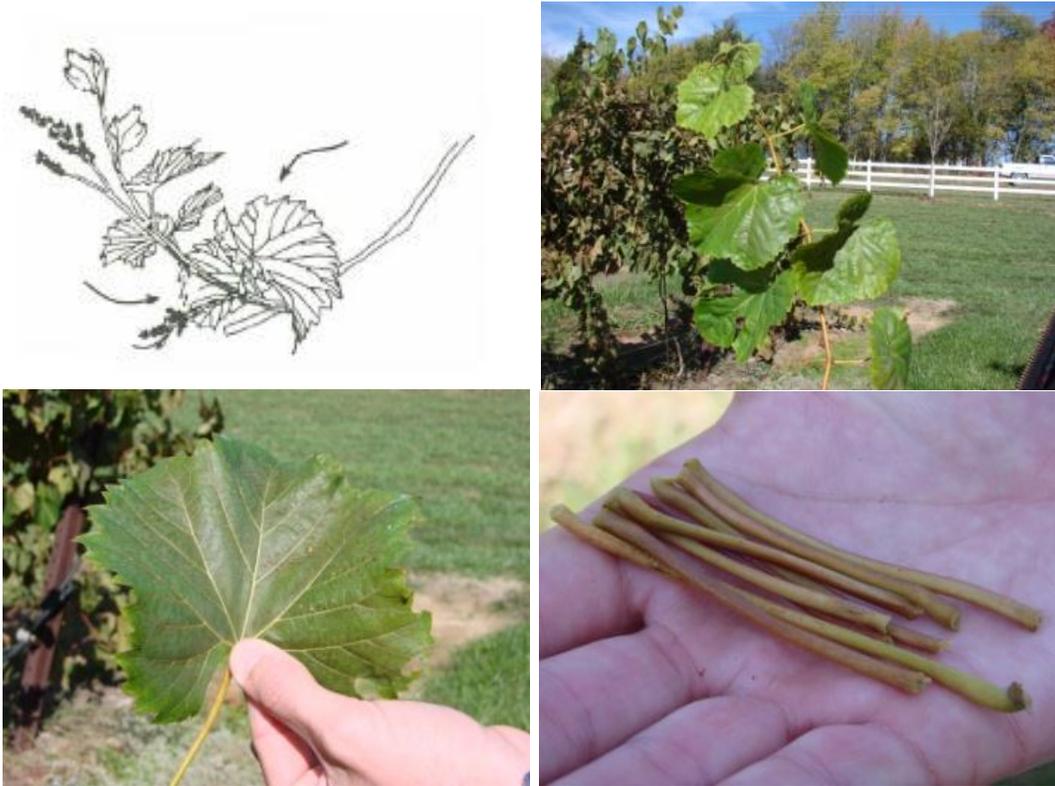
Tissue Samples. Tissue samples are used to determine what nutrients are being absorbed by the roots and utilized by the vine. For grapevines, the petiole, which is the stem that holds the leaf blade to the shoot, is the tissue that is sampled. Research has determined the desirable ranges of each nutrient at each stage development of the grapevine during the growing season. By comparing the results of the samples from your vine to the standards, a nutrient profile can be developed and recommendations can be made on what nutrients are needed. The critical interactions between various nutrients can also be determined.

Simultaneous soil and tissue sampling. It is helpful to sample both the petioles and the soil beneath the plants from which you take the tissue samples. This will tell what nutrients are in the soil and what nutrients are being absorbed and utilized by the plant. By correlating what is in the soil to what gets into the plant, one can discern if nutrient imbalances in the plant are due to lack of availability or lack of uptake of available nutrients, possibly signifying a problem with the root system. This information can be used to decide the best method of application of nutrients to correct any deficiencies. If there is a good correlation, application of nutrients to the soil is typically the most efficient and economical means of application. However if there is a problem with the root system, applying nutrients to the soil may not be effective and foliar treatment may be necessary.

Considerations for sampling the vineyard.

- *Sampling frequency.* For tissue samples it is generally recommended to be on a three year cycle in the vineyard. You can divide the vineyard into three blocks and rotate the samples, which means you would sample each block every three years.
- *Vine age.* For young vines just coming into bearing, sample every year for a few years. For nonbearing vines or lightly cropped vines, samples may not be useful unless distinct visual symptoms or obvious problems appear. Without crop stress, most nonbearing and lightly cropped vines have higher levels of nutrients. Production generally changes rapidly during the first few years and fertilizer needs also change.
- *Diagnosing problems.* For problem areas in vineyards collect two samples – one in the area showing the problem and one in a ‘normal’ area. Doing so and comparing samples will allow you to diagnose whether or not the problem is related to nutrient status of the vine.
- *Monitoring management program.* If high rates of fertilizers were made over the past few years to improve the nutrient status of the vines, collect samples yearly to track changes in the vines, and to determine if additional amendments are needed.
- Accuracy of the recommendations depends on the representative sample. The size of the block that constitutes a representative sample depends on the uniformity (soil, slope, etc.) of the block.
 - Generally one sample should not be expected to provide useful information from more than 5 acres.
 - Sample different cultivars separately. Samples should represent plants that are planted on the same soil type and are of the same age, cultivar and rootstock.
 - Sample at the same time of day, consistently, preferably in the morning.
 - Vines should represent that portion of a block that is maintained under the same cultural practices, i.e. fertilizer, irrigation and vigor control practices. For example irrigation blocks are not to be combined with non-irrigated blocks even if they are on the same soil type.
 - Do not sample vines on the border of the block or near dusty roads.
- *Sample timing.*
 - ***The recommended time for sampling is during full-bloom***
 - To follow up with problem discovered at bloom, a 10-100 day post bloom (mid-late-August) sample can be taken.
 - Early bud-break samples can also be used to diagnose problems
- *Tissue to sample.* For the bloom-sampling period, sample the petiole of the leaf petiole OPPOSITE the 1st blossom/cluster.
- For the 70-100 day post-bloom sampling period, sample the petiole across from the most recent- FULLY EXPANDED leaf.

- *Number of petioles.* About 50-75 petioles are need from cultivars with large petioles and about 75-100 petioles are need from cultivars with small petioles.



- *Handling petioles.* Gently wash petioles with water and gentle detergent to remove any residual pesticide that may influence results. Pat dry and place in OPEN paper bag (lunch, #6 size) to dry for a few days before closing bag and shipping to lab for analysis.
- *Where to send.* There are many labs that can analyze tissue samples. Call the laboratory to determine current pricing and submission information. There is usually a sheet to fill out to give vineyard and sample background information.
- *Interpretation.* Results of analysis will be presented and compared to industry stands for that crop. There is some variation from lab to lab in the ranges used.