

## PROCEDURES FOR PETIOLE SAMPLING TO DETERMINE GRAPEVINE NUTRITIONAL STATUS

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A good fertility program is essential for efficient and profitable vineyard management. Proper monitoring of vine nutritional status allows the grower to add nutrients in the correct amount to meet but not exceed vine requirements. Nutrients may be supplied by application of inorganic fertilizer, application of organic fertilizer, or use of leguminous cover crops. Nutrients can be broadcast, banded, injected through the drip irrigation system (fertigation), or sprayed on the foliage (foliar feeding).

Vine nutritional status can be estimated by soil or plant tissue analysis. Soil analysis has proven to be less reliable for determining vine nutritional status than plant tissue analysis. This is because soil analysis provides information on the nutrients found in the soil but does not tell us whether nutrients are being removed from the soil and utilized by grapevines. For this reason, soil samples need only be collected from mature vineyards every two or three years unless a soil amendment program is being used (soil pH modifications, gypsum application, etc.). Plant tissues used for analysis of nutrients in grapevines include the leaf petiole, leaf blade, fruit (analysis of juice), or dormant canes.

Many eastern USA production areas (Arkansas, Missouri, Illinois, Ohio, Oklahoma, etc.) utilize petiole samples collected at veraison to determine vine nutritional status. Samples should be collected during mid-late July. In areas where *Vitis vinifera* varieties predominate, such as California, Virginia, and North Carolina, bloom time petiole samples are used for analysis of nutrients.

Samples should be collected from uniform areas of the vineyard and should not represent more than ten acres. If the vineyard is not uniform (different soil types, uneven irrigation, presence of soil pests, etc.) more samples should be taken and sent to the laboratory. A change in variety or rootstock within an otherwise uniform ten acre block would require collection of more petiole samples.

The size of the sample should be approximately 100 petioles. Samples can be collected from a select group of vines (reference plot) or by using a consistent pattern across the uniform vineyard block such as sampling from every 10<sup>th</sup> vine in every 5<sup>th</sup> or 10<sup>th</sup> row depending on block size. It is critical that the sample be representative of the vineyard block. Also, sampling from the same vines each year allows the grower to discern seasonal trends in vine nutritional status which could be difficult to identify if the variability in sampling is large.



Petioles used for analysis should come from the youngest fully mature leaf near the shoot apex (shoot tip) (left). The leaf blade should be removed immediately and discarded (below). Petioles are then placed in a clean, labeled paper bag (small lunch size). A record of all information regarding the sample should be retained by the grower to allow for sample identification and interpretation of results from the laboratory.

Petiole samples should be sent to the laboratory immediately. A delay in this process will reduce the accuracy of results. Samples should be kept in a dry and well-ventilated location until they are delivered to the laboratory. Sample analysis can be performed by a number of commercial laboratories.

Other items which should be considered by the grower desiring accurate petiole analysis and interpretation of results are: 1) critical values for nutritional status of grapevines in most eastern USA viticulture regions have been primarily developed from research on the Concord variety. Other varieties may have somewhat different nutritional requirements; 2) application of certain fungicides and nutrient sprays can influence petiole sample results. Collection of samples following rainfall or washing of samples with distilled water may help alleviate this concern but careful assessment of lab results should include knowledge of prior spray applications.



Critical nutrient concentrations for grapevine petioles sampled at veraison are given in Table 1. The utilization of a well-planned and consistent petiole sampling program will yield important information on vine nutritional status. This information along with proper timing of application can maximize fertilizer use efficiency, vine performance, environmental protection, and vineyard profitability.

<b>Table. 1. Specific Element Recommendations for Grapes from Petioles</b>					
<b>Element<sup>a</sup></b>	<b>Deficient</b>	<b>Below Normal</b>	<b>Normal</b>	<b>Above Normal</b>	<b>Excessive</b>
N (%)	0.3 - 0.7	0.7 - 0.9	0.9 – 1.3	1.4 – 2.0	2.1+
P (%)	0.12	0.13 - 0.15	0.16 – 0.29	0.30 – 0.50	0.51+
K (%)	0.5 - 1.0	1.1 - 1.4	1.5 – 2.5	2.6 – 4.5	4.6+
Ca (%)	0.5 - 0.8	0.8 - 1.1	1.2 – 1.8	1.9 – 3.0	3.1+
Mg (%)	0.14	0.15 - 0.25	0.26 – 0.45	0.46 – 0.80	0.81+
Mn (ppm)	10 - 24	25 - 30	31 – 150	150 – 700	700+
Fe (ppm)	10 - 20	21 - 30	31 – 50	51 – 200	200+
Cu (ppm)	0 - 2	3 - 4	5 – 15	15 – 30	31+
B (ppm)	14 - 19	20 - 25	25 – 50	51 – 100	100+
Zn (ppm)	0 - 15	16 - 29	30 - 50	51 – 80	80+
<sup>a</sup> Values may differ among species for optimal growth. Values from leaves will vary significantly. For petioles taken between July 15 to August 15.					
Source: Midwest Small Fruit Pest Management Handbook. Ohio State Bul. 861.					

Regional grape growers can send petiole samples to the University of Missouri Soil and Plant Testing Lab in Columbia, MO. Their contact information is:

University of Missouri  
 Soil and Plant Testing Laboratory  
 23 Mumford Hall  
 Columbia, MO 65211  
 Phone: 573-882-0623  
 Fax: 573-884-4288  
<http://soilplantlab.missouri.edu/soil/>