

Grape Petiole Sampling Protocol at Veraison

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VINE NUTRIENT STATUS: WHY PETIOLE SAMPLING?

A poor relationship exists between soil test results and tissue nutrient levels. While a soil may be high for a specific nutrient, the same nutrient may be deficient in the vine tissue. Alternatively, the vine tissue may show adequate levels of another nutrient while the soil test indicates a deficiency. This difference may be explained by several factors: plant stress (crop levels, pest injury, winter injury, etc.). Soil properties (e.g., soil pH, compaction), and environmental conditions (e.g., excessive rainfall, drought) may also affect results.

For these reasons, petiole analysis is generally more useful and reliable for judging vine nutrient status than soil tests alone.



Figure 1: Vine shoot, arrows indicating sample petioles. Leaves 1 to 4 are immature expanding leaves. Leaves 5 or 6 are mature leaves (Petioles from them may be used). Leaves 7 and 8 are too old for good sample results

TIMING: AT VERAISON

Initiation of fruit ripening corresponds to around 60 days following bloom in Nova Scotia and is the ideal time for petiole sampling.



Veraison has greater stability of nutrient concentrations relative to bloom. For example, veraison sampling gives a better measure of Potassium (K) levels, which are especially critical for wine grapes since they are related to wine quality and sugar uptake (e.g., excess K may lead to high pH and unstable wines).

PETIOLE SAMPLING PROTOCOL

Collect the grape petiole only. No need to submit the whole leaf. Collect samples in brown paper bags. Plastic zip-lock bags become humid and result in the sample rotting.

Timing: August

Correct leaf selection: Select the first fully expanded, mature leaf (Figure 1) from the shoot tip, or a full mature leaf at least halfway from the base of the shoot to the tip. Very old and very young leaves often provide irregular test results.

Hedging: Where hedging has taken place, select the leaf from the bearing cane; not lateral shoots.

Number of petioles to collect:

Hybrids: Collect at least 100 petioles/leaves

Vinifera: Collect 150 petioles/leaves

Procedure

Number of vines: Take leaves from at least 20 or more plants distributed throughout the area chosen for sampling. Maximum 10 petioles/leaves per vine.

- A single sample must be from a single cultivar.
- Do not mix multiple cultivars into the same bag.
- Suspected nutrient deficiency: if you suspect a plant or area within a block is nutrient deficient, sample it separately. Take tissue samples from the problem area, not the entire vineyard.
- Collect and submit a separate sample from an adjacent, non-affected part of the field for comparison purposes.
- Avoid contaminating the sample with soil. Even a small amount of soil will cause the results to be invalid, especially for micronutrients.

Labeling: On the submission bag and forms, include farm, block, cultivar and sample number.

Storage: Allow samples to dry by air in open bags overnight (24-48hrs) at room temperature (house room temp before shipping).

Shipping: Avoid shipping on Fridays. Samples may remain untested over the weekend or remain in storage.

Sources

(<https://ohioline.osu.edu/factsheet/hyg-1438>). Special thanks to Dr. Kevin Ker for providing additional information.

NORMAL SUGGESTED NUTRIENT RANGES FOR GRAPE PETIOLES

Element	Bloom	Veraison Deficient	Veraison Adequate	Veraison High/Excess
Nitrogen N	1.2 – 2.2%	<0.6%	0.8 – 1.3%	>1.4%
Calcium Ca	1– 3%	<0.7%	0.8 – 3.0%	>3.1%
Potassium K	1.5 – 2.5%	<0.7%	0.8 – 2.5%	>2.6%
Magnesium Mg	0.3 – 0.5%	<0.4%	0.35 – 1.5%	>1.6%
Phosphorus P	0.17 – 0.30%	<0.14%	0.15 – 0.4%	>0.5%
Boron B	25 – 50 PPM	< 20 PPM	20 – m60 PPM	>61 PPM >100 PPM toxic
Copper Cu	5 – 15 PPM	< 1.9 PPM	2.0 – 16 PPM	>17 PPM
Iron Fe	30 – 100 PPM	< 15 PPM	15 – 100 PPM	>101 PPM
Manganese Mn	25 – 100 PPM	<20 PPM	20 – 200 PPM	>201 PPM
Zinc Zn	30 – 60 PPM	< 15 PPM	15 – 100 PPM	>101 PPM

Figure 2: Updated version of the guideline for petiole results interpretation, "Perennia Grape Production Guide 2022", page 35, 4.2.3 Grapevine Nutrients, Figure 2. Changes have been made to reflect Nova Scotia Laboratory Analysis results and target values applicable to Nova Scotia conditions. Last updated February 2024.

The values above are derived from soils and vine response in vineyards in Ontario and Northeastern United States. Be aware of the differences in the acceptable ranges depending on samples taken at bloom or at veraison. Note the adequate ranges for nutrients at veraison. Veraison sampling results are more reliable and consistent allowing for more accurate overall nutrient applications. Visual signs of specific nutrient deficiencies in season can often be adequately treated with foliar applications.

NORMAL SUGGESTED SOIL NUTRIENT RANGES

	Ontario	Northeast US
pH	6.0 – 7.4	5.5 – 6.0 Labrusca (American) 6.0 – 6.5 Hybrids 6.5 – 7.5 Vinifera > 7.5 TOO HIGH
OM %	1.7 – 4.3%	3 – 5%
Phosphorus P	21 108 PPM	20 – 50 PPM
Potassium K	3.6 – 6.4% 20 – 109 PPM	75 – 100 PPM
Calcium Ca	66 – 84% 1,000 – 2000 PPM	1,000 – 2,000 PPM
Magnesium Mg	11 – 18% 50 – 100 PPM	100 – 250 PPM
Boron B	0.3 – 0.7 PPM	0.3 – 2.0 PPM
Copper Cu	1.1 – 21.8 PPM	0.5 PPM
Iron Fe	20 – 55 PPM	20 PPM
Manganese Mn	4.1 – 21.8 PPM	20 PPM
Zinc Zn	1.1 – 1.9 PPM	2 PPM

Figure 3: Summarization of target ranges for soil pH and soil nutrient elements likely to be most applicable for Nova Scotia soils and vineyards. Last updated February 2024.

The chart is derived from research and extension trials in Ontario and Northeastern United States grape growing regions. Be aware that excessive amounts of some macronutrients (Potassium, Calcium, Magnesium) can cause plant imbalance and poor growth/cropping, and some micronutrients can be toxic to grapes (e.g., Boron). pH levels below 5.5 or higher than 7.5 can lead to some nutrients being unavailable for plant uptake though the values in soil test results may show they are adequate.