

Collecting Leaves or Petioles for Tissue Analysis of Fruit Crops

Leaf or petiole (leaf stem) analysis can be used to diagnose or confirm nutrient problems after symptoms are present. More importantly, it is a powerful management tool in determining the nutritional needs of the crop. This is achieved by identifying nutritional shortages or excesses before symptoms develop. Often, leaf or petiole analysis will reveal that certain fertilizers being applied are not needed, resulting in a more economical fertilizer program.

Leaf and petiole nutrient levels (“deficient”, “below normal”, “above normal”, and “excess”) have been established through numerous fertilizer experiments on various crops. Because nutrient levels in the leaves or petioles can vary throughout the growing season, from leaf to leaf on a plant, and from plant to plant in a field, the standards are valid only for leaves or petioles collected during the proper period and from the proper part of the plant. **For most fruit crops grown in the Midwest, leaf or petiole samples collected between mid-July and mid-August provide the most accurate information based upon established standards.**

Leaf or petiole samples collected from newly planted woody plants including all fruit trees, grapevines and blueberries often reflect the conditions the plants were grown under in the nursery. Therefore, it is best to wait until the second growing season to assess the nutritional needs of these crops through tissue analysis.

Rules to follow when collecting leaf or petiole samples:

The accuracy of tissue analysis depends upon the accuracy of the leaf or petiole sample collection procedure. The following are some general rules that apply to collecting leaves or petioles from any fruit crop:

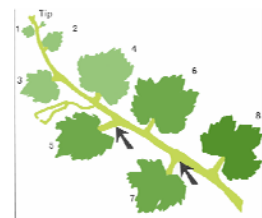
1. **Do not mix different species of fruit or cultivars into one sample!** Different fruit crops have different nutrient ranges that are considered normal, and within a fruit crop, different cultivars may take up different levels of certain nutrients, or perform better at different nutrient levels. Therefore, if different fruit crops or cultivars were mixed into one sample, the results of the analysis would not reflect the actual needs of the plants. Rootstocks can also influence the level of some nutrients taken up by the plants; therefore it is preferable to collect separate samples when a cultivar is grown on different rootstocks.
2. If a planting is located on a field with more than one soil type, separate samples should be collected for each soil type. Soil survey maps available through your County Extension Office can be used to identify your soil type(s) and the need for this procedure.
3. Plantings that have received different fertilizer applications in the current or previous years should not be combined into a common sample.
4. Avoid sampling from isolated abnormal, weak or unhealthy plants unless they are sampled separately and submitted with a sample collected from healthy plants that are more representative of the planting.

5. Unless specified elsewhere, a sample should consist of **100 leaves / petioles** collected randomly from representative plants in the designated sampling area as identified in Rules 1 through 3. Select leaves / petioles that are free from insect, disease and mechanical damage.
6. Remove the leaves with a downward pull away from the bud located in the leaf axil so that the petiole remains attached to the leaf. For crops calling for a petiole sample, remove the leaf blade.
7. During the entire sampling and cleaning process, avoid contact with any metal surfaces or tools.
8. Place the collected leaves / petioles in a **paper bag** or bag provided by the tissue analysis laboratory, and identify the samples with your name and address, crop, cultivar, field (or sample number) for your reference when you receive the results of the test. Some laboratories may request information on soil type and texture classification, plant growth and yield, current and past fertilizer practices, and spray materials used (some fungicides contain micro-nutrients) or if foliar feeding has been practiced. Such information aids in the interpretation of the results, and allows the interpreter to make better recommendations. **It is always a good policy to contact the laboratory prior to collecting and submitting a sample to determine if it has any specific requirements.**
9. Map and identify each sampling area for your future reference.
10. Nutrients to request for testing: “Total nitrogen” (N), phosphorous (P), potassium (K), magnesium (Mg), calcium (Ca), sulfur (S), manganese (Mn), boron (B), copper (Cu), iron (Fe), zinc (Zn), and if available, molybdenum (Mo).

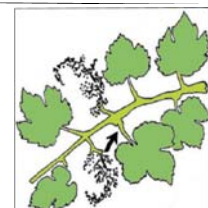
Specific leaf/petiole sampling procedures for different fruit crops:

Apples and Other Fruit Trees: Select all leaves from the exterior portion of the trees at shoulder height or higher. The leaves should be collected from the mid-section of terminal shoots located on different sides of the trees. Collect no more than two leaves from any one shoot.

Grapes: Petioles are used to determine the nutritional status of grapes. For cultivars with short or small petioles, such as Marechal Foch, collect a sample of 150 to 200 petioles. For a mid-July to mid-August sample, select the most recently fully-expanded leaves from fruit-bearing shoots. From the tip of the shoot, this would generally be the fifth to seventh expanded leaf. Collect no more than one leaf per shoot. Remove the leaf blade and submit the petiole for analysis.



An alternative sampling period for grapes is at full bloom. At this time, petioles from leaves located opposite from the basal (first) flower cluster are collected. Sampling at full bloom can be a suitable assay for nitrogen and boron, but mid-July to mid-August sampling is more reliable for all the other nutrients.



June-bearing Strawberries: Select the most recently fully-expanded leaves, collecting no more than one leaf per plant following renovation and prior to fruit bud initiation (usually begins in early to mid-August). Detach the leaf blades from the petioles and submit the leaf blades only.

Raspberries & Blackberries: Select the most recently fully-expanded leaves on randomly selected primocanes, collecting no more than one leaf per cane in mid-summer (mid-July to mid-August).

Blueberries: Collect leaves from the middle of current season shoots just before or during harvest.

Cleaning the Sample:

During the leaf/petiole sampling period, it is generally best to allow nature to clean the leaves by collecting them following a heavy rain and before the next pesticide application. However, if the leaves are dirty, or if sprays containing nutrients have been recently applied, the leaves/petioles should be rinsed in a mild detergent solution (liquid dish washing detergents or non-ionic spreaders work well) followed by two distilled or deionized water rinses. The leaves/petioles should be washed while still fresh, and the whole procedure should be completed in less than a minute to minimize the loss of any mineral nutrients. After rinsing, excess water should be shaken off the leaves, pat the leaves/petioles dry with clean paper towels, and place in a clean paper bag for shipment to the tissue testing laboratory. Some laboratories will wash leaves if requested while others do not, so it is always a good policy to contact the laboratory prior to collecting the sample.

Plant & Soil Analysis Laboratories:*

Iowa:

A & L Heartland Laboratories
P.O. Box 455
111 Linn Street
Atlantic, IA 50022
Ph: (712) 243-6933
<http://www.allabs.com/>

Belmond Labs, Inc.
P.O. Box 203
Belmond, IA 50421
Ph: (515) 444-3384
<http://www.bellabsinc.com/>

Minnesota Valley Testing Laboratories
35 L Avenue
Nevada, IA 50201
Ph: (515) 382-5486 or (800) 362-0855
<http://www.mvttl.com/>

Illinois:

Soil Tech, Inc.
Rt.1, Box 147
Arlington, IL 61312
Ph: (815) 638-2522

Key Agricultural Services, Inc.
114 Shady Lane
Macomb, IL 61455
Ph: (309) 833-1313
<http://www.keyaginc.com/>

Mowers Soil Testing Plus, Inc.
117 E. Main Street
P.O. Box 540
Toulon, IL 61483-0540
Ph: (309) 286-2761 or (800) 354-8197
<http://www.mowersplus.com/index.html>

Indiana:

A & L Great Lakes Laboratories
3505 Conestoga Dr.
Fort Wayne, IN 46808
Ph: (219) 483-4759
<http://www.allabs.com/>

Minnesota:

AGVISE Laboratories
902 13th Street
P.O. Box 187
Benson, MN 56215
Ph: (302) 843-4109
<http://www.agvise.com/>

International Ag Labs
800 W. Lake Avenue
Fairmont, MN 56031
Ph: (507) 235-6909
<http://www.aglabs.com/>

Minnesota Valley Testing Laboratories
1126 N. Front Street
New Ulm, MN 56073
Ph: (507) 8517 or (800) 782-3557
<http://www.mvttl.com/>

U of MN Research Analytical Lab
135 Crops Research Building
1902 Dudley Avenue
St. Paul, MN 55108
Ph: (612) 625-3101
<http://ral.coafes.umn.edu/index.htm>

Nebraska:

MDS Harris Laboratories
624 Peach Street
P.O. Box 80837
Lincoln, NE 68501
Ph: (402) 476-2811
<http://www.ag.mdsharris.com/>

Midwest Laboratories
13611 B Street
Omaha, NE 68114-3693
Ph: (402) 334-7770
<https://www.midwestlabs.com/index3.html>

Ward Laboratories, Inc.
4007 Cherry Ave.
P.O. Box 788
Kearny, NE 68848-0788
Ph: 800-887-7645
<http://www.wardlab.com>

Wisconsin:

Agsources Soil & Forage Laboratory
106 N. Cecil Street
Bonduel, WI 54107
Ph: (715) 758-2178
<http://www.crinet.com/soilhome.htm>

Dairyland Laboratories
217 E. Main Street
Arcadia, WI 54612
Ph: (608) 323-2123
<http://www.dairylandlabs.com/>

U of WI Soil & Plant Analysis Lab
5711 Mineral Point Rd.
Madison, WI 53705
Ph: (608) 262-4364
<http://uwlab.soils.wisc.edu/madison/>

* **Disclaimer Clause:** Listing of soil and plant analysis laboratories is not intended to be an endorsement to the exclusion of other laboratories that may offer similar services.

Many of the commercial laboratories will do an interpretation of the results, but I have observed discrepancies in the sufficiency ranges compared to those used for fruit crops at ISU, or the use of inappropriate ranges based upon the time of sampling. Because of this situation, it is a good idea to have your Extension fruit specialist or mineral nutrition specialist look over the results of your tests. Additional information that will assist them would be information on your soil type, texture and internal drainage classifications; a record of your current and previous fertilizer practices, a listing of list of spray materials applied in the current year prior to collecting the leaf/petiole sample; and any explanation pertaining to the condition of the plants from which the samples were collected.

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