

# Plant Tissue Sampling for Determining Fertilizer Needs of Fruit Crops

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The nutritional health of orchard crops, grapes and blueberries is best assessed by measuring the concentrations of nutrients in plant parts. Nutrient concentrations in plant tissues are a direct measure of the nutritional status of the crop. In contrast, soil tests only estimate the ability of soils to supply nutrients and may not predict nutrient levels in the crop with certainty.

Tissue analysis enables growers to identify nutrients that are approaching deficient levels before yields or growth are reduced, or symptoms appear. Any deficiencies present then can be accurately diagnosed and corrected. Tissue analysis also can save money because excessive rates and unnecessary nutrient applications are avoided. Often 5-10 acres can be monitored with just one sample, so the cost per acre is usually less than \$4.

Michigan State University offers a tissue analysis service through the Soil Testing Laboratory. Tissue samples can be analyzed for nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), boron (B), copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo), zinc (Zn) and aluminum (Al). Growers can request an analysis for all 12 elements, N only, or all elements except N. Analysis results and fertilizer recommendations are reviewed by District Horticulture and Marketing Agents and returned to growers through local MSU Extension offices. The service is available for all Michigan tree fruit crops, grapes and blueberries. Strawberry and raspberry leaf samples may be submitted to diagnose particular nutritional problems, but soil tests are often adequate for these crops.

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## How often should fruit plantings be sampled?

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For routine monitoring, sample young plantings every 2-4 years, and mature plantings every 3-5 years. The nutrient status of young plantings can change from year to year, so monitor more frequently. The nutrient status of older, mature plantings changes gradually, so less frequent sampling is required. On larger farms, consider sampling a portion of the plantings each year on a rotational basis.

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## Which areas should be sampled?

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Divide the farm into uniform sampling areas, and collect separate samples from each area. Collect separate samples from areas with different soil types. Sample from young and old blocks separately. Never combine samples of different crops (e.g., apples with peaches). If several varieties are interplanted, select one variety to represent the area. If soil type, plant age and variety are the same, collect one sample to represent each 10 acres.

To diagnose a specific problem, collect one sample from several severely affected plants and another from healthy plants in the same area. Time of sampling is not critical as long as each sample is collected at the same time.

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## How to sample

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### **Tree Fruits**

- Each sample should contain about 100 leaves, collected during July in southern Michigan and late July to early August in northern areas. Use only fully expanded leaves from the middle of the current season's growth (Figure 1). Do not sample spur leaves or leaves damaged by insects, diseases, wind or machinery. Remove leaves by pulling down (toward the shoot base) so that the stem (petiole) remains with the leaf. If a strip of bark remains attached to the leaves, it is too early, and sampling should be done one or two weeks later.
- Collect leaves from as many different plants as possible throughout the sampling area. Use leaves that can be reached from the ground from all sides of the plants.
- Wash leaves before they dry to remove spray residues and dust. Swirl leaves for a few seconds in soapy water, then rinse in tap water and blot dry. Place leaves in a paper sample bag. Let them dry for one or two days at room temperature.

### **Blueberries**

- Collect 100 entire leaves/sample between July 15 and August 15. Use fully expanded leaves from the middle of current season's growth (Figure 2). Avoid leaves close to fruit clusters or leaves on very vigorous first-year canes growing from the base of the bush. Collect leaves from as many different bushes as possible throughout the sampling area.
- Wash and dry leaves as described for tree fruit samples.

### **Grapes**

- Only the petioles or stems of grape leaves are used. Samples should contain about 100 petioles collected in July in southern Michigan or early August in northern areas.
- Remove the most recently matured leaves from near the middle of shoots. In many varieties, the undersides of leaves turn darker when they mature. Avoid damaged leaves and leaves adjacent to fruit clusters.
- Cut or pick leaves close to the shoot (Figure 3). Remove and discard the leaf blade (Figure 4), and keep the petioles (Figure 5).
- Place petioles in paper bags (washing is not needed), and allow them to dry for several days at room temperature.

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## How to submit samples

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Obtain sample bags, information forms and current prices from your county MSU Extension office or the MSU Soil Testing Laboratory, Plant and Soil Science Building, Michigan State University, East Lansing, MI 48824. Place the completed information form in the sample bag. Submit a check or money order made payable to Michigan State University with your samples. Sample bags are pre-addressed, and can be mailed separately, or several bags may be packaged and mailed together. Send to:

MSU Soil Testing Laboratory, Plant and Soil Science Building, Michigan State University, East Lansing, MI 48824. Samples taken to some county MSU Extension offices will be delivered to MSU for you.

## How results are reported

Results are provided in a computer-generated report that includes the concentrations of mineral elements in the tissue, a chart showing how results compare with optimum levels, and fertilizer recommendations based on sample results.

Reports are usually forwarded to the local district Extension horticulture agent, who examines the report and may modify recommendations. One copy is then sent to the grower, and additional copies are retained by the district Extension horticulture agent and the local county Extension office.

Figure 1



Figure 2



Figure 3

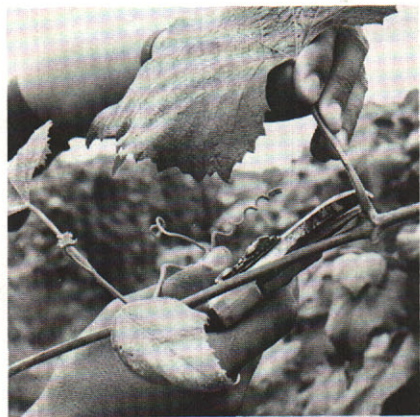


Figure 4



Figure 5



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