

TAKING A PROPER TISSUE SAMPLE FOR MINERAL ANALYSIS

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Tissue analysis is a powerful tool in assessing the mineral nutrition status of crops. Chemically analyzing the concentration of nutrients in the leaves of growing crops can more precisely define the nutrient status than an examination of deficiency symptoms or soil testing alone. This method is based on collecting samples of tissues in the field and measuring the amounts of mineral elements in the tissue. Tissue analysis provides a “snapshot” picture of the nutrient status of a crop at a particular point in time resulting from all factors that affect plant growth and nutrient uptake. In addition to confirming suspected deficiencies, plant analysis can also detect toxicities or hidden deficiencies before visual symptoms appear. Experimentation has shown the amounts of the various minerals that should be present in plants to provide optimal growth. These amounts are shown in Table 1.

The most important part of tissue analysis is taking a proper sample. You must consider three factors when collecting samples:

1. sample the correct plant part,
2. sample at the correct time,
3. collect a sample that is representative of the bed.

What to collect.

The proper plant part to sample for tissue analysis in cranberry is new upright growth. If you collect both current season growth and one-year-old growth your samples may show a deficiency since nutrient levels tend to be lower in one-year-old growth.. The age of tissue can have a profound effect on the results obtained and on the interpretation of the results. You need to exercise caution in collecting samples and it may be prudent to examine samples collected by consultants or others who may be collecting samples for tissue analysis so the results can be interpreted accurately.

When to collect.

In order to make comparisons to standards set by University research it is necessary to collect samples at the correct time of the year. The concentrations of mineral elements in plants changes over time. We recommend taking samples during August each year. At this time the concentration of most elements is stable. If you take a sample in late spring the concentrations of the various elements may be changing rapidly. In this case the date you collect a sample may have more influence than the actual tissue concentration.

One exception to this rule is when samples are collected in early spring before bud break. If the tops of uprights are collected at this time the same tissue will be sampled as if you took the sample in August of the previous year. However, I still recommend August sampling and cautious interpretation of early spring samples.

How to collect.

Only a few handfuls of uprights are taken as samples for tissue analysis. At the laboratory only about of teaspoon of dried and ground tissue is actually analyzed. The sample must be representative of the entire bed. Don't take samples only from one corner or along one edge of a bed. It is best to start in one corner and walk to the opposite corner collecting 4 or 5 samples along the way. Alternatively, you could walk in a zigzag pattern across a bed. Try to sample uprights that represent the bed. The uprights you collect should look like the remaining uprights in the bed. Don't sample overly vigorous or sickly vines. If you are sampling for a particular problem, also collect normal vines for comparison.

Once the tissue sample has been collected it should be prepared for shipment or delivery to the lab. Any soil or foreign material should be dusted off the sample. **DO NOT WASH** the uprights as this will remove soluble nutrients and will give a false analysis. Place the sample in a small paper bag or paper envelope. If the sample is to be mailed, allow the sample to air dry for one day to prevent mold from forming during shipment. Place the dry sample in a paper envelope for shipping. Do not use plastic or cellophane bags since these retain moisture and promote molding. Try to ship samples early in the week (Wednesday at the latest) to avoid samples deteriorating in warm post offices over the weekend. Plant samples that are delivered to the lab do not need to be air dried if they are delivered within a day after sampling. Please submit an information sheet with each sample describing the crop type, date sampled, and other information necessary to make the best interpretation of the lab results. Plant analysis information sheets are available from the laboratory or your County Extension office.

Conclusions

Plant tissue analysis is a powerful tool that can be used in concert with visual symptoms and soil sampling to measure the effectiveness of your fertilizer program and to monitor for mineral deficiencies. However, the results you get are no better than the sample you submit. Taking an appropriate sample and preparing it properly for delivery to the lab will assure correct results.

Table 1. Proposed concentrations of cranberry tissue samples for determining the nutritional status of cranberry.

<i>MACRONUTRIENTS</i>			
	Low	Sufficient	High
	----- %-----		
Nitrogen	<0.90	0.90 to 1.00	>1.00
Phosphorus	<0.13	0.13 to 0.18	>0.19
Potassium	<0.50	0.50 to 0.90	>0.91
Calcium	<0.30	0.31 to 0.60	>0.60
Magnesium	<0.15	0.15 to 0.20	>0.20
Sulfur	<0.07	0.08 to 0.20	>0.20

<i>MICRONUTRIENTS</i>			
	----- ppm-----		
Iron	<40	40-80	>80
Boron	<10	10-20	>20
Copper	<5	6-10	>10
Zinc	<15	15-30	>30
Manganese	<10	10-200	>200

From: Lloyd Peterson, Department of Horticulture, University of Wisconsin-Madison.