**Section 391.530 Plant Tissue Sampling and Analyses**

a) Plant tissue monitoring programs are sensitive to the care and standard techniques used in the sample collection, handling and analysis. This section presents recommended guidelines intended to minimize error in a plant tissue monitoring program. It is recommended that a professional agronomist or crop scientist be consulted when developing such a program.

b) Plant tissue sampling should include as many samples as possible. The same part of each plant should be sampled and samples should not include dead tissue. Usually it is adequate to sample only the portion of the plant that will be harvested. Collection of samples is not recommended when plants are under severe moisture or temperature stress. Leaf analysis for grain crops should be done on samples collected prior to pollination, especially if macro- and/or micro-nutrients will be analyzed.

c) Sample should be washed in a 0.1 to 0.3% detergent solution followed by 2 or 3 rinsings in deionized water. Washing should be performed quickly to avoid leaching water soluble constituents. Most household detergents are suitable for washing plant tissues.

d) Plant tissue samples should be dried as rapidly as possible after collection. Place the tissue samples in a clean muslin bag or tray and place inside a forced-draft oven at 65°C for 48 hours.

e) Plant tissues samples are normally ground after drying. Mechanical grinding mills are preferred and careful consideration should be given to sample contamination especially when micro-nutrient elements are to be determined. The recommended technique is to grind the sample to about 200 mesh in an all-agate mechanical ball mill. After grinding place the powdered plant tissue sample in a clean bottle and dry for an additional 24 hours at 65°C to remove moisture picked up during grinding.

f) After grinding and the second drying, a subsample can be weighed for analysis or the bottle sealed and stored under refrigerated conditions until the analysis can be performed.

g) It is recommended that samples be stored in sealed polyethylene bags in a refrigerator at -5°C until they can be washed and dried. Dried and ground plant tissue samples should not be stored on the shelf longer than 60 days prior to analysis. However, dried and ground samples can be stored indefinitely in a sterilized, sealed bottle in a refrigerator at -5°C.

h) There are numerous methods available for the analysis of plant tissue samples. Most procedures involve wet or dry ashing or the use of an extraction procedure followed by element analysis typically by atomic absorption, flame emission, or direct-reading emission spectroscopy. Wet ashing by the use of nitric and/or sulfuric acid is preferred to dry ashing in an oven to minimize volatile losses of metals. Boron can be determined only by dry ashing become because this element is volatilized during wet ashing.

i) For further information on this subject the Agency suggests the following reference: Soil Testing and Plant Analysis, Revised Edition, (1973). Edited by Leo M. Walsh and James D. Beaton, Soil Science Society of American, Inc., 677 South Segoe Road, Madison, Wisconsin 53711.