

Sampling for Corn Plant Tissue Analysis

W. O. Thom, University of Kentucky; J. R. Brown, University of Missouri, and C. O. Plank, University of Georgia

Reviewers

*K. Frank, University of Nebraska
J. B. Jones, University of Georgia
R. Large, A & L Laboratories, TN*

*R. Lockman, Agrico Laboratories, OH
W. I. Segars, University of Georgia
W. Wallingford, Potash & Phosphate Inst., OH*

How useful plant analysis results are to a corn grower depends on the samples he sends the laboratory to be analyzed. Mistakes or carelessness in selecting, collecting, handling, preparing, and shipping plant tissue for analysis can result in unreliable data, which, in turn, would lead to incorrect interpretations and recommendations.

Thus, anyone who plans to use the services of a plant analysis laboratory should become familiar with proper sampling and handling procedures. This publication deals with the "how-to" of sampling for plant analysis. Another NCH fact sheet discusses the "why and where" of getting an analysis.

Plant Sample Mailing Kits

Most plant analysis laboratories provide the following for submitting plant tissue to be tested: (1) instructions for collecting a plant sample and sending it to the laboratory, (2) an information sheet to be filled out by the grower, and (3) a special mailing envelope.

The information sheet, if carefully and accurately completed, is an extremely important communication between the grower and the laboratory. It allows the lab interpreter to properly evaluate the test results and make meaningful recommendations. An incomplete information sheet, on the other hand, can greatly limit the scope of evaluation and subsequent recommendations.

What and When to Sample

A reliable plant analysis requires sampling a certain plant part at a given stage of growth. The instructions included in the laboratory's mailing kit will specify plant part, growth stage, and number of plants that should be sampled.

To diagnose for possible nutritional problems, or to monitor plant nutrient concentrations for determining

what to supply through an irrigation system, samples are normally taken during the seedling stage or before tasseling. To monitor soil fertility management practices, sampling is done sometime after seedling stage but prior to or at tasseling.

Figures 1, 2 and 3 show what parts of the corn plant should be taken as samples for analysis at three different stages of growth. (Do not collect corn plant tissue for analysis after pollination. The nutrient concentration in the vegetative plant parts changes substantially when seed development begins, thus making interpretation of results difficult.)

The number of plants to sample depends on the general condition of the plants, soil homogeneity and purpose for the plant analysis. However, to minimize variations in nutrient concentrations from plant to plant, sampling should be from no less than 20 plants, randomly selected in the area or field to be represented by the analysis.

When a nutrient deficiency is suspected (even without visual symptoms), or there is a need to compare different areas in a field, it is recommended that similar plant parts (or samples) be collected separately from both the affected plants and adjacent normal plants that are at the same stage of growth. If either growth stage or sampled plant parts are not similar, comparative analysis between suspected vs. normal plant or between various field locations cannot be reliably made.

Knowing what not to sample is as important as knowing what should be sampled. Do not take samples from plants that—

- Are dead, diseased, or insect damaged.
- Are mechanically injured.
- Have been stressed by too much or too little moisture (i.e., flooding or drought).
- Have been stressed by abnormally high or

abnormally low temperature.

- Show nutrient stress symptoms (e.g., severe stunting), unless being comparatively sampled with more normal areas.

Also, do not collect samples during the hottest part of the day in summer.

Collecting, Preparing, and Mailing Plant Samples

When selecting samples in the field for analysis, avoid dusty or soil-covered plants and leaves, if possible. Soil-contaminated plant tissue is apt to test abnormally high for iron, manganese, and aluminum, leading to incorrect conclusions as to the plant's nutrient status.

Place the collected plant tissue in a clean, dry plastic pail or new, No. 12-25 size, brown kraft paper bag. Never use metal containers, polyethylene bags, or tightly sealed containers.

If the fresh plant tissue happens to be dusty or soiled, brush gently with a soft-bristled brush, wipe gently with a damp cloth, or give it a quick rinse with distilled water (not tap or well water). If the plant material had recently been sprayed with a pesticide or liquid fertilizer, gently dip it in a 2 percent mild detergent solution (2.5 ounce detergent per gallon of water), then rinse in clean running water followed by a quick rinse in distilled water, which will remove most attached substances.

Any necessary washing and rinsing should be done as soon as possible after the tissue is collected and should not be a prolonged operation. Never allow the plant material to stand in either the washing or rinsing baths.

A clean, No. 12-25 brown kraft bag is ideal for drying and mailing as well as for collecting the tissue samples. The tissue should be loose and remain loose in the bag for adequate drying. Do not wad or tie it into a bundle, since heating and molding may occur.

Leave the bag open, and place it in an area free of chemicals and dust so the plant material can air-dry for about 48 hours. When about as dry as cured hay, the sample is ready for mailing.

Break the larger pieces of tissue into sections, then fold the bag over one or two times to form a compact package. (Do not staple.) Place the folded bag into the envelop provided by the laboratory, and follow mailing instructions.

Taking Soil Samples—Why and How

To complete the interpretation of a plant analysis, the laboratory usually needs soil samples from the same area and taken at the same time as the plant samples. Soil samples are especially important when two or more plant samples are taken from a given field for diagnosis of visible growth differences.

Obtain soil cores adjacent to the plants from which tissue is taken; but being careful to avoid fertilizer bands. When collecting tissue samples from both normal and trouble areas in a field, also take soil samples from both areas. To avoid soil contamination of the plant tissues, wear cloth or plastic gloves while taking soil samples, then remove the gloves to take the plant samples.

Follow instructions for submitting the soil sample to the laboratory.

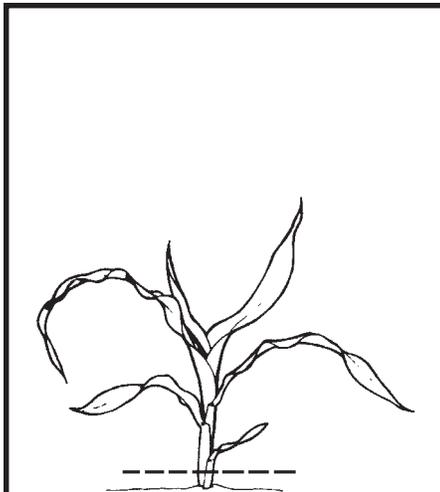


Figure 1. For plants less than 12 inches tall, submit all of the above-ground portion cut 1 inch above the soil surface.

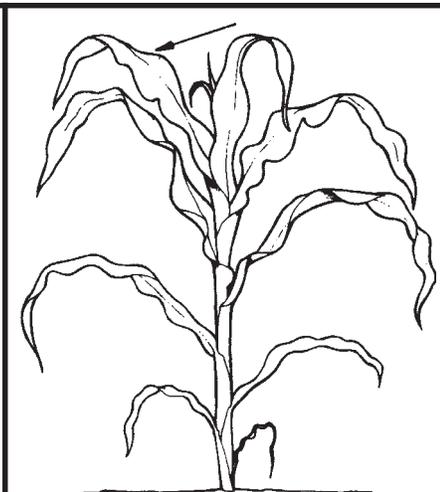


Figure 2. For plants taller than 12 inches but prior to tasseling, submit the entire first mature leaf below the whorl. A mature leaf is completely unrolled from the stalk and has a formed sheath (collar).

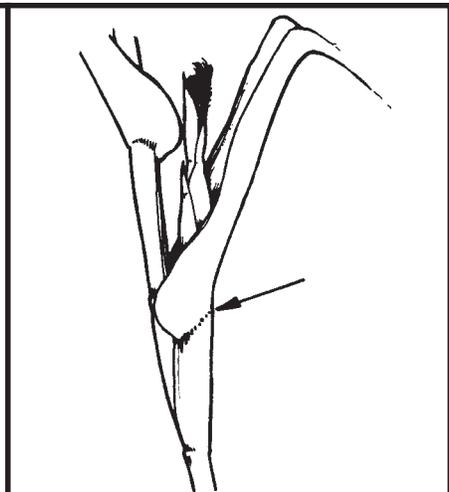


Figure 3. For plants with 50% of ears showing silks, submit the entire ear leaf. Break off at the base of the leaf, but do not include portions of the leaf sheath (collar). Sample before silks turn brown.

... and justice for all

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Many materials can be made available in alternative formats for ADA clients. To file a complaint of discrimination, write USDA, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Stanley R. Johnson, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.

File: Agronomy 2-2