

# IOWA STATE UNIVERSITY

## Extension and Outreach

Integrated Crop Management

# Thinking of Plant Tissue Testing this Season? Beware of Drought or Excess Moisture Effects

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Corn tassels began showing in some Iowa fields this past week and in the next week corn in most fields will be at the R1 stage (silking). Most soybean fields are at R2 or will be at the R2 to R3 growth stage soon. Nutrient concentrations vary greatly with crop growth stage and plant part sampled. Calibrations of tissue tests based on field response trials for corn and soybean in Iowa and other states have been for leaves at the R1 growth stage in corn and the R2 to R3 growth stage in soybean. While the crops are at the recommended growth stage for tissue testing, be aware of how environmental conditions common this growing season — drought in some regions and excessive rainfall in others — may impact the tissue testing results.

## **Existing tissue test interpretations based on yield response research**

Iowa State University Extension and Outreach (ISUE) has research-based interpretations for in-season tissue testing only for phosphorus (P) and potassium (K) in corn and soybean and for sulfur (S) in alfalfa. For corn and soybean these are in publication CROP 3153 [Phosphorus and Potassium Tissue Testing in Corn and Soybean](#) and for alfalfa CROP 3072 [Sulfur Management for Iowa Crop Production](#). There are no in-season tissue test interpretations for other nutrients or crops due to lack of research, infrequent deficiency that precludes meaningful tests calibration, or research results showing that tissue testing is an unreliable diagnostic tool. There are interpretations and guidelines for using the end-of-season cornstalk nitrate test, but apply only from about a week before black layer until harvest and information is CROP 3154 [Use of the End of Season Corn Stalk Nitrate Test in Iowa Corn Production](#).

## Precautions to take this season

Extra thought is needed for interpreting tissue test results this year due to the prevalent drought conditions in most of Iowa or the higher than normal rainfall in areas of southern and southeast Iowa. Effects of drought or plant diseases on plant growth and nutrient uptake often result in nutrient accumulation (increase) or dilution in dry matter (decrease) in tested plant material.

Potassium deficiencies in corn and soybean have been seen in droughty areas in the state, mainly in older leaves. These symptoms may indicate a deficient soil K level, but they may also be drought induced deficiency in the plant since K uptake is very sensitive to limited soil moisture. Potassium fertilization to the soil or to the foliage during drought will not improve K uptake or alleviate these symptoms. With rain, however, and if soil-test K is optimum or higher, deficiency symptoms will not appear in newer leaves, and yield may not be greatly affected, unless the induced deficiency was severe and prolonged. In these cases, fertilization is unlikely to improve yield and be cost-effective.

Soybean iron deficiency chlorosis (IDC) has been observed as usual in high-pH calcareous soils in low-laying areas of central to north-central Iowa, and also in field borders along some gravel roads due to windblown limestone. Iowa research has shown that tissue testing and in-season management practices such as foliar fertilization with iron products may green-up leaves a bit but seldom will alleviate the deficiency and the yield loss. Selecting tolerant soybean varieties is the most cost-effective way to minimize IDC yield losses.

Pale green or yellow corn or soybean plants have been seen in areas with excess rainfall in some low-laying field areas with moderately poor or poor drainage of fields, mainly in some southern and southeast Iowa fields that received higher than normal rainfall this spring and summer. These symptoms likely are due to poor soil aeration, which can cause reduced plant photosynthesis and/or nitrogen deficiency due to poor nodulation or reduced atmospheric nitrogen fixation by the microbes in the nodules. Tissue sampling and testing in these conditions may give misleading results, even when sampling the right plant parts at the right growth stage. Drought may also result in misleading tissue tests for sulfur in alfalfa.

The detailed 2019 tissue testing article [Tissue Testing for Field Crops Requires Cautious Use and Interpretation](#) is still current and provides tissue testing basic concepts and advise concerning sampling and interpretations with normal and drought conditions for several nutrients and crops. Also, the north-central region publication CROP 3135 [Micronutrients](#)

[for Soybean Production in the North Central Region](#) provides useful information about tissue testing for micronutrients, including iron.

## Sampling both plant tissue and soil may help

Be aware that tissue testing alone can provide misleading results not only due to drought or excess soil moisture but also due to effects of pests, diseases, and plant injury due to herbicides or other causes. The best way of using tissue testing and better interpret results is when there are areas within a field with normal growth and areas with poor growth and/or nutrient deficiency symptoms. In these situations, collect and analyze both soil and plant tissue samples from both normal and poor areas, even if not at recommended sampling times, and compare results for both areas and to previous published information about soil and plant tissue interpretations.

See additional online resources in the [Soil Fertility website](#).

**Category:** [Crop Production](#) [Soils](#) [Soil Fertility](#)

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**Crop:**

[Corn](#)

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