



Using Mid-Season Tissue Testing to Enhance Stalk Quality and Disease Protection

Tissue testing is a valuable diagnostic tool that can aid in managing soil fertility and, consequently, corn plant health.

- Mid-season tissue testing is usually done to determine whether the corn crop has a sufficient nutrient supply to reach full yield potential.
- The objective is usually to find any nutrient problems that might not have been detected otherwise. Tissue testing is also particularly useful for assessing if the crop has sufficient levels of nitrogen, sulfur, and most of the micronutrients, such as iron, zinc, manganese, boron, and copper, for which soil tests are not as reliable.
- During harvest, corn stalk quality is the result of the season-long management of disease, nutrients, and producer-controlled stresses. Standing stalks are the foundation of a successful harvest, and are related both to foliar health and to nutrient uptake by the roots.

1) What is the value of conducting a mid-season tissue test?

- Profitable yields are the bottom line. Bushels are a direct measure of profit at the end of the year, but in some years profit is left on the table because of an unseen nutrient deficiency.
- A nutrient-stressed crop remobilizes carbohydrates to developing kernels during grain fill. This carbohydrate remobilization may result in decreased stalk and root health, which may further develop into harvest losses because of poor standability.
- Nutrient deficiencies can result in kernel abortion, lower grain weight, and poor kernel quality. Deficiencies of some nutrients, particularly potassium and phosphorus, can affect plant health.
- There may be increased value in mid-season tissue testing during years when early crop growth is delayed, or when nitrogen was lost early in the season, since stalk health issues may not be present until September if growth was delayed in the spring.

2) You advised me on the right corn product and population. Why are standability and stalk health still concerns?

- Our breeding program evaluates plants for stalk strength and disease susceptibility or resistance. However, plant nutrition can still affect both stalk integrity and disease tolerance.
- Recommended populations are based on years of data collected from multiple locations, but the specific environmental conditions and soil nutrient availability of your fields this year may affect the growth of corn products.
- Stalk health is extremely important in not only obtaining maximum yield potential, but also in retaining the maximum yield with good standability to harvest. Therefore, a mid-season tissue test to confirm the status of essential plant nutrients can be a wise investment.

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3) *If there's so much value in mid-season tissue testing, why aren't my neighbors doing it?*

- What matters are your goals for your operation. If your goal is to maximize yield potential, then mid-season tissue tests can determine if the limiting factor for your harvest is a hidden nutrient deficiency.
- If no obvious stalk breakage occurs, it may seem as though stalk health and nutrient stresses were not issues. Compromised stalks may go unnoticed until an October storm passes through or until there is high disease pressure. Premature black layer formation is another effect of late-season stress. Early black layer formation can mean lower grain yield and lower test-weight grain. When these late-season or 'harvest' issues are occurring, the chance to correct them has passed.
- Mid-season tissue testing is still a new practice. Fertilizer recommendations—right source, right rate, right time, and right place—are starting to be redefined by uptake timing and partitioning of modern, high-yielding corn products. Consult with your local Land-Grant University or soil test laboratory for up-to-date recommendations.

4) *I've never had issues with standability and stalk health in the past, so should I pass on tissue testing this time because my corn looks green?*

- Tissue samples allow farmers to see if inputs such as micronutrients are still needed. The best formula for applied nutrients for a specific a corn product can be tested by:
 1. Taking a series of tissue samples year after year on the same combination of crop and field.
 2. Sampling at the same stage in the same season to compare different management practices, soils, or seed products.
 3. Taking early-tissue and late-tissue samples on the same field to determine crop response to sidedressing or to an early-season stress.
 4. Comparing a tissue analysis to soil tests to see if soil-released nutrients are being taken up by the crop.

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5) Isn't it too late to correct a nutrient problem this season if I'm reacting to test results mid-season?

- By mid-season, it is too late to apply some nutrients. Most potassium uptake is completed soon after silking. However, phosphorus, sulfur, and zinc accumulation are greater during grain fill than during vegetative growth.³ Optimum nitrogen uptake leads to higher percentages of total plant phosphorus, potassium, and sulfur in corn grain at harvest. A season-long supply of these nutrients is vital to achieving corn yield potential.
- A high-clearance sprayer equipped with drop nozzles can be used to apply nitrogen mid-season, if needed. Some farmers can apply post-tassel nitrogen through fertigation. An additional 20 to 30 lb of nitrogen can be applied if yield conditions are especially good after pollination.¹ Nitrogen is the nutrient most likely to diminish throughout grain fill, and modern corn products (newer than 1990) take up more nitrogen post-tassel compared to older corn products.² Corn plants are taking up 7.8 lb nitrogen per day during corn growth stages V10 to V14 and may appear nutrient deficient during this rapid uptake stage.³
- Tissue testing can also be used as a diagnostic tool when plants appear to show nutrient deficiency symptoms but are actually stressed in some other way. For example, purpling corn leaves early in the season could be a phosphorus deficiency, perhaps due to restricted root growth from cold, compacted soils, or very wet soil conditions. As leaf edges and veins become fired or yellow, several diseases or other conditions could be the cause of the symptoms, one such condition being a nutrient deficiency. Diagnosis is the first step towards action, whether that action is supplemental fertilization, pesticide application, or further monitoring during grain fill and harvest.

Sources:

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Legal Statement

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. Performance may vary, from location to location and from year to year, as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on the grower's fields.

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