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

Stalk quality during harvest is the result of season-long management of disease and nutrients. Standing stalks are the foundation of a successful harvest and are related to foliar health and nutrient uptake by roots.

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. The possibility of decreased stalk and root health may 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.
- Stalk health issues may not be present until September if growth was delayed in the spring.
- There may be increased value in mid-season tissue testing during years when early growth is delayed, or nitrogen was lost early in the season.

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

- Corn products are not armed to defeat every environmental stress presented by Mother Nature. While our breeding program evaluates plants for stalk strength and disease susceptibility or resistance, plant nutrition can affect both stalk integrity and disease tolerance.
- Recommended populations are based on years of data and locations; however, the environmental conditions and soil nutrient availability of your fields this year may affect the response of corn products.
- Stalk health is extremely important in not only obtaining maximum yield potential, but retaining the maximum yield with good standability through harvest. Therefore, a mid-season tissue test to confirm the status of essential plant nutrients can be a wise investment.

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

- What matters are goals for your operation, and if the goal is to maximize yield potential, mid-season tissue tests can determine if the limiting factor is a hidden nutrient deficiency.
- If no obvious stalk breakage occurs, it may seem as though stalk and nutrient stresses were not issues. Compromised stalks may go unnoticed until an October storm passes through or there is high disease pressure. Premature formation of black layer 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 defined by uptake timing and partitioning of modern, high-yielding corn products.

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I've never had issues with standability and stalk health in the past, so should I pass 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 combined with 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 comparing different management practices, soils, or seed products.
    3. Taking early- and late-tissue samples on the same field to determine crop response to sidedressing or an early-season stress.
    4. Comparing tissue analysis to soil tests to see if soil-released nutrients are being taken up by the crop.

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

- 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 store 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/day during corn growth stages V10 to V14 and may appear deficient during this rapid uptake stage.[3]
- Optimum nitrogen uptake leads to higher percentages of total plant phosphorus, potassium, and sulfur in corn grain at harvest. At this point, 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 vegetative growth.[3] A season-long supply of these nutrients is vital to achieving corn yield potential.
- Tissue testing can also be used as a diagnosis tool when plants appear to show nutrient deficiency symptoms but are stressed in some other way.

  For example, purpling corn leaves early in the season could be a phosphorus deficiency, sometimes as a result of restricted root growth from cold, compacted soils, or very wet soil conditions. As leaf edges and veins become fired or yellow, several diseases or conditions could be the cause, one of them being a nutrient deficiency. Diagnosis is the first step towards action, whether it is supplemental fertilizer, pesticide, or further monitoring during grain fill and harvest.

Sources (web sources verified 7/3/19)

[1] Franzen, D.W. 2017. Soil fertility recommendations for corn. North Dakota State University. SF722.

[2] Vyn, T. 2013. Nitrogen key to uptake of other corn nutrients, study shows. Purdue University. https://www.purdue.edu/newsroom/releases/2013/Q2/nitrogen-key-to-uptake-of-other-corn-nutrients,-study-shows.html.

[3] Bender, R.R., Haegele, J.W., Ruffo, M.L., and Below, F.E. 2013. Modern corn hybrids' nutrient uptake patterns. Better Crops. Vol. 97.

Battel, R. 2018. Plant tissue analysis: an important part of nutrient management. Michigan State University.

Nielsen, R.L. 2017. Stress during grain fill: corn stalk health problems? No-till Farmer. https://www.no-tillfarmer.com/articles/7012-stress-during-grain-fill-corn-stalk-health-problems.

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