Waypoint ANALYTICAL

End of Season Corn Stalk Nitrate Test

Studies conducted at Iowa State University show that nitrogen (N) status of a corn crop can be assessed by measuring the nitrate concentrations in the lower portions of the cornstalks at the end of the growing season.

WHY TEST?

- To evaluate how well nitrogen fertilizer was utilized by the corn plant.
- To allow the producer to distinguish between over fertilization and fertilizing to maximize profits.

BASIS FOR TEST

- A relationship between stalk nitrate concentrations and yields was developed from trials having rates of N fertilizer applied ranging from 0 – 300 lb N/acre.
- Corn plants with inadequate available nitrogen remove N from lower cornstalks and leaves during the grain filling period.
- Corn plants with excess N accumulate nitrate in their lower stalks at the end of the season.

This relationship indicates that stalk N concentration can be divided into four distinct categories.

Lower Category: Indicates high probability that greater availability of N would have resulted in higher yields. Visual signs of N deficiency are usually observed in this range.

Marginal Category: Producers should not be concerned with results in this range. N availability was close to the minimum amount needed for maximum yields but should not be the target for good nutritional management.

Optimal Category: Indicates that N supplies were sufficient for maximum yields.

Excess Category: Indicates that N supplies were above levels to maximize profits.

Nitrate Nitrogen Concentration Categories	
Low	Less than 250 ppm
Marginal	250 - 700 ppm
Optimal	700 – 2000 ppm
Excess	Greater than 2000 ppm

Murdock and Schwab, 2004

WHO SHOULD TEST

- All corn producers, testing some fields each year.
- Producers growing corn on fields that have received manure applications.
- Producers growing corn after alfalfa.

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INTERPRETING RESULTS

The concentration of nitrate in the stalk at the end of the season reflects all factors that influenced N availability and N needs during the growing season. A high rainfall season will likely result in lower concentrations, while a low rainfall season will likely result in higher concentrations. After consideration is given for weather conditions, fertilization rates should be increased for areas that usually test in the low range and decreased on areas that usually test in the excess range. When you have concentrations consistently in the "Excess" category, most producers will profit by using the late spring nitrate soil test to guide N Fertilizer needs. The "End of Season" corn stalk test does not directly indicate the amount N rates should be increased or decreased but continued use will enable producers to fine tune their N management with profitability and yields optimized.

HOW TO SAMPLE

- **Time:** 1-3 weeks after black layers have formed on 80% of the kernels of most ears.
- **Where:** 8 inch segment of stalk found between 6 and 14 inches above the soil. Avoid damaged stalks and remove sheaths.
- **Amount:** Within an area not larger than 10 acres. Fifteen 8 inch segments should be collected at random to form one composite sample to be evaluated. Areas of differing soil types or management should be sampled separately.

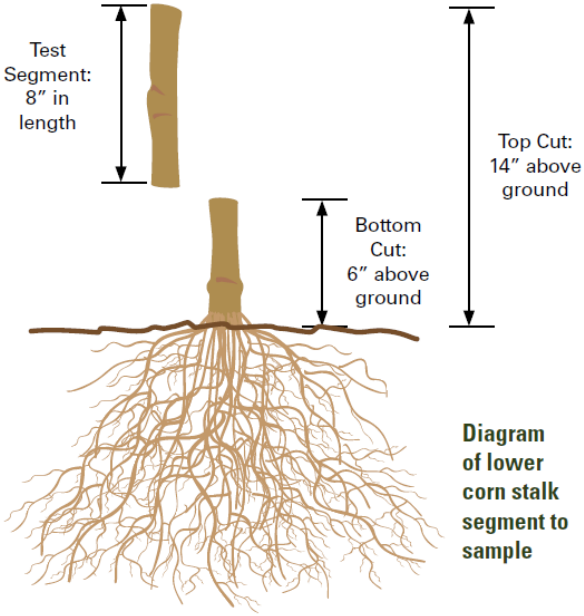

Diagram of lower corn stalk segment to sample

Sawyer, J. and A. Mallarino, 2018.

SHIPPING

- Place in paper bag (not plastic).
- Refrigerate if delay in shipping of 1 or more days.
- Do NOT freeze.

REFERENCES

Brouder, S.M. 2003. Cornstalk Testing to Evaluate the Nitrogen Status of Mature Corn: Nitrogen Management Assurance. AY-322-W. Purdue Univ. Coop. Ext. Service.

Murdock, L.W. and G.J. Schwab. 2004. Corn Stalk Nitrate Test. AGR-180. Univ. of KY. Coop. Ext Service

Sawyer, J. and A. Mallarino. 2018. Use of the End-of-Season Corn Stalk Nitrate Test in Iowa Corn Production. Crop 3154. Iowa St. Univ. Ext. and Outreach.