Benchmarking cornstalk nitrogen, soil phosphorus and health attributes on diverse cropping systems

Michigan State University Extension is seeking cooperating farmers in sampling 85-100 corn fields throughout Michigan looking at end of season cornstalk nitrogen and soil health characteristics in 2019-2021.

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Nitrogen (N) and phosphorus (P) fertilizer use in agriculture is contributing to environmental quality risk. End of season stalk nitrate is a well-understood but underutilized diagnostic indicator of nitrogen use efficiency. It is especially useful for identifying excessive nitrogen availability, and thus potential environmental risk. However, the relationship between applied nitrogen, stalk nitrogen and corn yield may be modified by baseline soil health and nitrogen mineralization potential.

Michigan State University Extension is conducting an on-farm research project monitoring nitrogen fertilizer use, stalk nitrate, corn yield and several soil health parameters in corn across Michigan in 2019-2021. A survey approach will allow us to begin benchmarking and characterizing relationships among these variables across different agroecosystems. The purpose of this project funded by the Michigan Department of Agriculture and Rural Development (MDARD) Fertilizer Grant is to improve nitrogen management practices in corn consistent with the economic, agronomic and environmental goals of Michigan farmers, MDARD and the public.

We are seeking 85-100 corn fields throughout Michigan. Field history (rotation, fertilization, manure use, cover crops, etc.) will be collected from growers using a survey. Stalk nitrate and corn yield will be sampled directly to determine if the nitrogen applied was deficient, adequate or excessive. Soil will be collected from the same fields near harvest and again the following spring for a soil health analysis panel to identify any correlation between soil carbon, nitrogen mineralization potential and nitrogen use efficiency. Plant available phosphorus will also be determined through soil analysis to gauge environmental risk. These data will be summarized and presented back to participating growers and a wider Extension audience in an aggregate, anonymized format.

The impact of this project is that educators, farmers and consultants can use the data to evaluate nutrient management strategies for farms throughout the state regardless of their location and soil

type. This project will also help farms to become economically and environmentally sustainable by ensuring their nitrogen needs are being met, but not exceeded. Growers will be encouraged to replicate the study on their other fields, comparing their results with ours from similar field and management conditions to expand the impact of this work.

For more information about how to participate, contact Eric Anderson at 269-467-5510 or eander32@msu.edu, or your local MSU Extension field crops educator. Due to logistics, we will not be able to sample some fields depending on location in the state.

Project details

Desired fields

- Corn fields with a history of manure applications, legume forage or legume cover crops are preferred.
- Other corn fields (different rotations and tillage practices, organic, irrigated, etc.) also welcome.

Sampling

- Soil samples will be collected fall 2019/2020 and spring 2020/2021 and analyzed for traditional soil and soil health parameters.
- Stalk samples will be taken prior to harvest 2019/2020 and analyzed for nitrate concentration.

Cooperator input

- Provide a field history for each field in the study, including rotation, fertilization and tillage practices.
- Allow access to field at both sample timings.
- Provide whole-field corn yield data.

Cooperator benefits

- Receive copies of all soil and corn stalk analyses free of charge.
- All data will be reported in aggregate for privacy.