OPTIMIZING NITROGEN IN SEED CORN

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- With approximately 20,000 acres, Southwestern Ontario is the only seed corn growing region in Canada
- Nitrogen (N) fertilizer is key and costly input for corn production
- N losses can be significant (i.e., only a 1/3 of applied N may be used by the corn plant)
- Losses are environmental concern (e.g., air and water pollution, climate change)
- Unlike grain corn there is no recommended fertilizer N rate for seed corn
- Therefore, our objective was to evaluate a novel approach of applying fertilizer N according to seed corn type (inbred)

How much N fertilizer does seed corn need for maximum yield and quality?

- COMPLEX PROCESS CAN PRODUCE POWERFUL RESULTS:
  - Our study is scientifically rigorous and complex, but the thinking behind our process is relatively simple. We collaborated with stakeholders of the seed corn industry and partnered with provincial and federal governments to create better solutions that benefit growers, consumers and the environment. Here’s our field approach to optimize N use in seed corn.

Can we optimize fertilizer N by optimizing rate based on seed corn types?

- SCIENTIFIC APPROACH
  - In 2015-2018, at 4 fields with different soil types
  - Four seed corn types (labelled SA, SB, WA, and WB) from four different seed corn companies
  - 6 preplant fertilizer N rates (0, 40, 80, 120, 160, and 200 lb per acre) with 4 replications
  - Randomized split block design
  - Yield data: grain yield, marketable seed size
  - Quality data: test weight, 100 kernel weight
  - Economic data: optimal fertilizer N rate
  - During growing season (at planting, sidedress, detasselling and maturity):
    - Sensor data: SPAD meter, Greenseeker
    - Environmental data: plant N uptake, soil mineral N content, nitrogen use efficiency and harvest index

- In 2017, grain yield and seed quality showing differences among of 4 different seed corn inbred types. Photos: Sayem 2017

Can we do it all? Grow quality seed corn, cut costs & protect the environment.

Over use of N fertilizer is always wasteful:
- Less $ return
- risk to human health and environment

PROTECTING FOOD GROWING SPACES:
- Ensure stable supply of high quality seed corn
- Adoption of best management practices
- Minimize negative impacts on environment
- Next: fertilizer tracer study ($^15$N) over 2 years

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