Yield Response to Corn Characteristics and Nitrogen Strategy

Trial Objective

- Many new corn products are developed each year as research and development pipelines aim to improve the corn portfolio and farmer choice. Farmers have a short time to become familiar with the nitrogen (N) efficiency of new corn products.
- Flex-ear corn products can adjust yield components and set more rows around on the cob, more kernels per row, or increase kernel depth if conditions are favorable. Increasing seeding rates to increase yield are recommended for fixed-ear corn products as the yield components do not change much.
- Agronomists make recommendations for corn products with high or low late-season plant health and ear flexibility. These corn characteristics may affect N uptake and allocation and impact corn yield potential. Additional information about N application can help farmers improve their N management system for individual corn products.
- The objective of this study was to evaluate corn characteristics: (1) late season plant health and (2) corn ear flex and their influence on corn yield potential with different N application strategies.

Research Site Details

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (bu/acre)	Seeding Rate (seeds/acre)
Gothenburg, NE	Silt loam	Soybean	Strip-till	4/28/20	10/23/20	270	36K

- A soil test report on April 14, 2020 indicated 187 lb N/acre was recommended (33 lb N/acre in the top 2 ft of soil plus 40 lb N/acre legume credit) for a yield goal of 270 bu/acre.
- The study design was a split-plot with fertilizer as the whole plot and corn characteristics as the subplot with four replications.
  - Fertilizer Treatments:
    - Up-front N – Strip-tilled 27.5 lb N/acre on 4/8/2020 and applied 160 lb N/acre with a streamer bar (nozzles attached to a regular 30-ft sprayer) on 4/29/2020.
    - Split N - Strip-tilled 27.5 lb N/acre on 4/8/2020 and applied 40 lb N/acre with the streamer bar on 4/29/2020, followed by 120 lb N/acre applied by fertigation. The fertigation was split into 8 to 15 lb N/acre increments with applications on 7/11, 7/17, 7/21, 7/26, 7/30, 8/2, 8/6, and 8/10.
    - The study area also received 70 lb P/acre and 15 lb S/acre.
  - Corn Characteristic Treatments:
    - Late-season plant health
      - High – 105-day relative maturity (RM), 111RM, and 113RM
      - Low – 110RM, 111RM, and 113RM
    - Ear Flex
      - High – 104RM, 113RM, and 113RM
      - Low – 108RM, 109RM, and 113RM

Yield Response to Corn Characteristics and Nitrogen Strategy

- Weeds were uniformly controlled and no insecticides or fungicides were applied.
- A sub-surface drip irrigation system was used to meet the evapotranspiration demands of the crop.
- Plots were harvested with a small plot combine and total plot weight, percent moisture, and test weight were recorded.
- Average corn yields were calculated and bushel difference between split N and up-front N treatments were also reported. The average corn yield was 256 bu/acre across all treatments.

Understanding the Results

- The difference in how corn that was classified as either 'high' or 'low' for late season plant health responded to a split N or the up-front N treatments is detailed in Figure 1.
  - Corn products with "high" late-season plant health had greater yields from the split N treatment compared to the up-front N treatment. Corn products with "low" late-season plant health had no yield difference between the two N strategies.

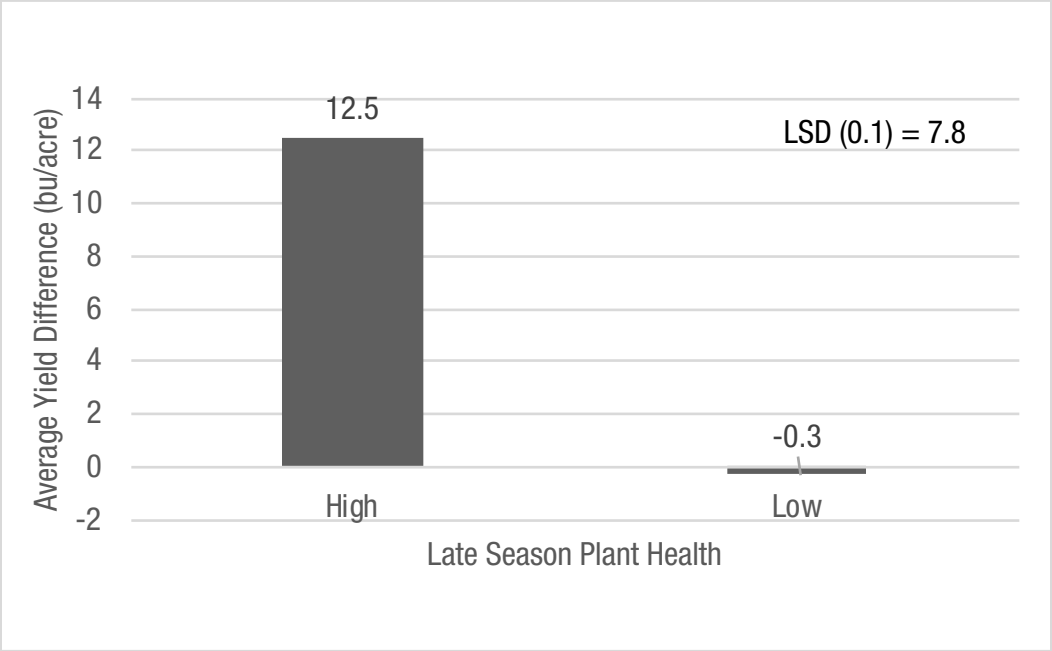

Figure 1. Response to nitrogen strategy and late season plant health: split N average yield minus up-front average yield.

- Corn was classified as a 'high' or 'low' ear flex based on its response to the split N or the up-front N treatments (Figure 2).
- Corn rated either high or low for ear flex responded similarly to N strategy with both groups having greater yields with the split N application treatment.
- On average, corn had higher average yields with split N application strategy compared to the up-front N application strategy.

Yield Response to Corn Characteristics and Nitrogen Strategy

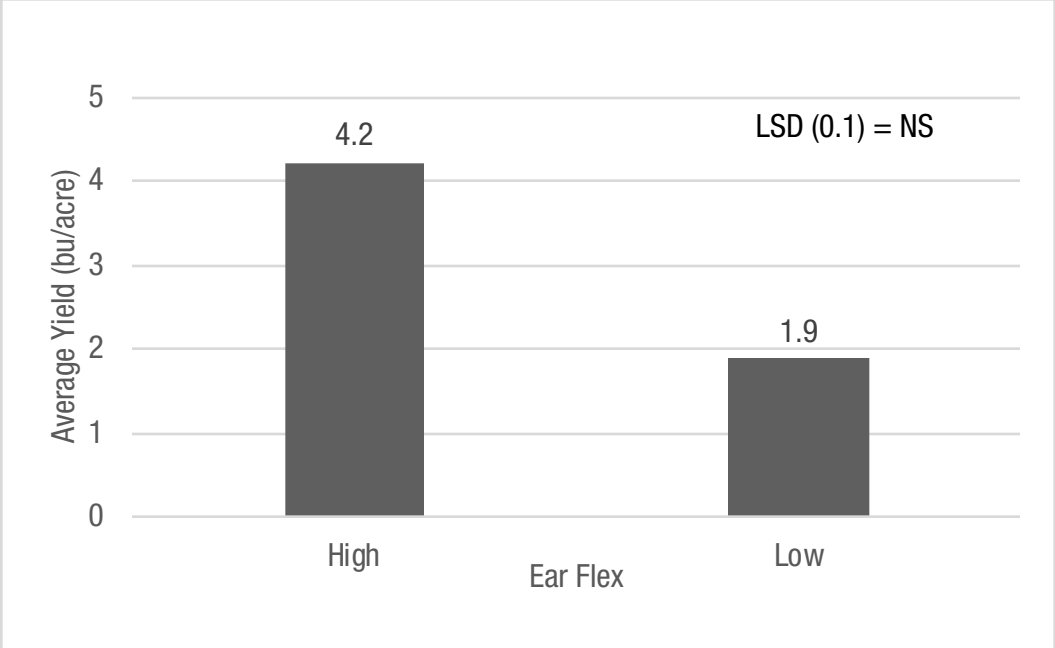

Figure 2. Response to nitrogen strategy and ear flex: split N average yield minus up-front average yield.

Key Learnings

- Corn tended to yield greater with a split N application strategy compared to N applied up-front at planting.
- This is the first year of this study so more research is needed to confirm how corn characteristics influenced yield. In the meantime, farmers may consider the following-
  - Corn with a 'high' late-season plant health score may have greater yield potential from a split N strategy compared to an up-front N strategy while there was no difference in how corn responded to N strategy with a 'low' late- season plant health score.
  - Corn yielding high with split N application had the same N strategy response regardless of ear flex rating.

Legal Statements

The information discussed in this report is from a single site, replicated demonstration. This informational piece is designed to report the results of this demonstration and is not intended to infer any confirmed trends. Please use this information accordingly.

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.