Evaluating Corn Growth and Yield Response to Non-Uniform Dry Fertilizer Application: A Case Study

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Introduction

- **Proper nutrient management** – one of the most important aspects in corn production for attaining higher yields.

- **4R’s of nutrient management** – consideration for right source, rate, time and place.

- **Granular Fertilizer** – single or blended products (N-P-K) are commonly applied to meet (pre-plant) nutrient requirements.
SPINNER-DISC BROADCAST SPREADERS

- Common application equipment to broadcast apply dry granular fertilizer and lime.
  - Application issues are very common (requires proper setup and calibration)
  - Material properties influence application rate and uniformity
Considering high fertilizer prices and application inaccuracies associated with spinner-disc spreaders, it is important to understand non-uniform rate and distribution effects of pre-plant fertilizer on corn growth and yield.

**OBJECTIVE**

To evaluate how non-uniform (dry pre-plant) fertilizer application affects corn growth and yield
Locations:

▪ UGA Tifton Campus Farms, Tifton, GA

▪ Southeast Research and Education Center, Midville, GA

Equipment:

▪ Chandler Pull-behind Spinner-disc spreader (Model: 9-PT)

Application:

▪ Pre-plant broadcast (N-P-K) [+ starter (N-P) + side-dress (N)]
DATA COLLECTION

During Pre-plant Broadcast Application:

- Pans (36.8 cm x 26.8 cm) placed within the swath at 1.8 m spacing intervals (ASABE S341.5)
- Material from each pan was weighed and used to compute applied rate (kg/ha) and distribution uniformity (CV%)

In-season:

- Growth stages and tissues samples bi-weekly through the season (at each pan location)

End of the season:

- Yield by harvesting 2-rows (either side of the pan)
**RESULTS**

Field 1: N-P-K : 10-17-24 (%)

- Mean Application Rate: 572 kg/ha
- CV = 54%
Field 2: Midville
N-P-K: 13-23-20 (%)

- Mean Application Rate: 611 kg/ha
- CV = 46%
Field 1: Tifton
Percent of the plants in each growth stage
Field 2: Midville
Percent of the plants in each growth stage
Field 1: Tifton

![Graph of Applied Rate vs. Pan# for Field 1: Tifton]

- **Plant N**: Graph showing the percentage of N by dry mass across different pan numbers. The bars indicate the % N by dry mass for each pan.
- **Plant P**: Graph showing the % P by dry mass across different pan numbers. The bars indicate the % P by dry mass for each pan.
- **Plant K**: Graph showing the % K by dry mass across different pan numbers. The bars indicate the % K by dry mass for each pan.
Field 1 - Tifton

Mean Yield: 12,075 kg/ha
CV = 13%
YIELD

Field 2 - Midville

Mean Yield: 15,397 kg/ha
CV = 5.3%

y = 0.44x + 15126
R² = 0.023
Considerable amount of variability in applied fertilizer rate and distribution was observed in the field at both locations.

Plant nutrient levels differed more among the applied rates in the field in Tifton than in Midville.

Differences in corn yield were observed in Tifton but did not follow the same trend as applied fertilizer rate.
Thanks!

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