Corn Yield Response to Starter Phosphorus-Delta

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Objective

To evaluate corn yield response to starter phosphorus.

Background

Crop Year: 2016
County: Fulton
Location: Delta, OH
Drainage: Systematic
Previous Crop: Soybeans
Varieties: Pioneer 0157, Pioneer 0506
Population: 33,000 seeds per acre
Planting Date: April 25, 2016
Harvest Date: October 6, 2016

Herbicide: Cinch ATZ f.b. glyphosate
Soil Type: Bixler, Mermill
Tillage: Conventional
Soil Test (grid avg): pH 6.4
P 33 ppm (Bray-P1)
K 107 ppm
O.M. 2.7%
CEC 7.6 meq/100g
Rainfall (May-August): 14.1”

Methods

Two varieties of corn (A and B) were used in independent randomized complete block designs. Within each randomized block, three corn phosphorus starter rates were replicated four times. Plots were 8 rows wide (20 feet) by 1200 feet long. The trial was planted, sprayed, sidedressed and harvested with commercial farm equipment. The yield goal on this farm was 200 bushels per acre. In order to ensure nitrogen rates and timing was consistent, the starter mixtures were nitrogen-balanced at planting so that all treatments began with 24 lbs N/ac. The base for starter was 11-25-0 liquid and additional N was added to dilute treatment 2. Only 28% UAN was used in treatment 1. All treatments received 165 lbs N/acre at sidedress (V3-V4), for a total nitrogen rate of 189 lbs/acre. Yields and moistures were measured using a calibrated yield monitor and shrunk to 15% moisture. Rainfall data was sourced from the Wauseon Water Treatment Plant.

Treatments

1) 0% Starter Rate – 0 gal/ac (Net: 24-0-0 per acre)
    a. Recipe: 8 gal 28-0-0 plus 12 gal water

2) 50% Starter Rate – 10 gals/ac (Net: 24-28-0 per acre)
    a. Recipe: 10 gal 11-25-0 plus 4 gal 28-0-0 plus 6 gal water

3) 100% Starter Rate – 20 gals/ac (Net: 24-56-0 per acre)
    a. Recipe: 20 gal 11-25-0

Results

Table 1 - Corn Yield Response to Starter Phosphorus - Delta

Starter P Rate – Trial A, P0157 (lbs P/ac)	Starter P Rate (gal/ac of 11-25-0)	Yield (bu/ac)	Return Minus P Cost* ($/ac)
0	-	181.2 a	$634
28	10	179.1 a	$608
56	20	184.2 a	$608
LSD (P<.05, CV 3.75)		11.79	
Starter P Rate – Trial B, P0506 (lbs P/ac)	Starter P Rate (gal/ac of 11-25-0)	Yield (bu/ac)	Return Minus P Cost* ($/ac)
0	-	192.1 a	$672
28	10	199.8 a	$681
56	20	193.7 a	$641
LSD (P<.05, CV 4.41)		14.9	

*Based on $3.50/bu corn and $.66/lb P (Source: OSUE 2016 Corn Budget)

Discussion

There was no statistically significant difference in grain yield among all rates across either Trial A or B in 2016. This site received lower than average rainfall through July and the month of May was generally cooler and wetter than average. As such, these weather conditions could have had an impact on yield results.

Standard economic calculations show that reduced rates of starter phosphorus can produce maximum economic returns. Further research in the form of multi-year replications would add to the validity of these results.

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