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Effect of Starter Phosphorus Fertilizer on Corn Yield

Objective

To evaluate the agronomic and economic impacts of phosphorus fertilizer applications.

Background

Crop Year: 2023 corn	Herbicides: Resicore, Glyphosate, 2,4-D
Location: Wauseon	Planting Date: 5-14-23
County: Fulton	Variety: Pioneer P0995AM
Soil Type: Fulton silty clay loam	Seeding Rate: 34,000
Drainage: Pattern	Fertilizers: see below
Tillage: No-till	Harvest Date: November 5, 2023
Previous crop: soybeans	
Soil test : pH 6.3, P 21 ppm M3, K 98 ppm, CEC 11.2 , O.M. 2.8 %	

Methods

Phosphorus starter fertilizer was compared to no phosphorus applied. Treatments were replicated ten times in a random block design. Treatments are 20 feet wide by 585 feet long. All treatments received the same inputs except for starter phosphorus fertilizer. On September 15, 2022, cereal rye cover crop was flown on at a rate of 60 lbs./acre before soybean harvest. On November 12, 2023, soil samples were collected at 0–6-inch depth. Soil probes were taken every 3 inches from row middle to row middle. Yields and moistures were obtained by using a weigh wagon. Yields were adjusted to 15.5% moisture.

Fertilizers

28% UAN ; 81# at planting 2 x 2
12-0-0-26 thiosul ; 3 gal/acre at planting
10-34-0 ; 5 gallon/acre (58.2#) for treated area only at planting 2x2

28% UAN ; 96# at sidedress on June 12, 2023
12-0-0-26 thiosul ; 3 gal/acre on June 12, 2023

Treatments

1. 28% UAN & thiosul
2. Phosphorus starter fertilizer (10-34-0 and 28%) & thiosul

Results

Table 1. Impact of Phosphorus (P) Fertilizer

Starter P Rate (gal/ac of 10-34-0)	Corn Yield (bu/ac)	Value of Corn (\$/ac)	Cost of Phosphorus (\$/ac)	Return Minus P Cost (\$/ac)
0	185.7 a	\$835.65	0	\$835.65
5	195.3 b	\$878.85	\$23.25	\$855.60

LSD (6.38) Significant Difference in yield. CV 3.57; P<.05.
Based on \$4.50/bu corn and \$800/ton 10-34-0 P (\$4.65/gal.)

Table 2 Weather Data

	2023 Local Rainfall Weather Link (Frank's field)	Wauseon Historic Rainfall www.weather-us.com
May	1.04 in.	2.8 in.
June	2.19 in.	2.99 in.
July	5.04 in.	2.8 in.
August	2.97 in.	2.68 in.
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Total	11.24 in.	11.27 in.

Table 3 Standard Soil Test (A & L lab) post harvest

	No P Fertilizer	Phosphorus Applied	CV	LSD (P<.05)
OM %	2.8	3.0	17.44	NS
Phosphorus P-M3 (ppm)	330.	30.3	43.94	NS
Potassium (ppm)	113	126	29.17	NS
pH	6.2	6.5	5.89	NS
CEC	12.0	12.1	13.62	NS
Ca %	62.3	65.5	7.26	NS
Mg %	20.6	21.6	11.13	NS

Summary

Corn yield was influenced by the addition of starter fertilizer phosphorus 10-34-0. A gain of \$19.95 per acre was incurred when phosphorus fertilizer was applied (table 1). Soil testing showed no significant difference with phosphorus fertilization (table 3).

Acknowledgement

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For More Information Contact:

Alan Sundermeier
Coordinator - Conservation Action Project
alansundermeier@gmail.com
cell 419-261-0625
<http://capofohio.org>