

Comparing Row-Applied Phosphorus Materials in Corn

Harold D. Watters, Ohio State University Extension, Field Specialist Agronomic Systems

Objective

To determine if planter applied phosphorus may increase yield in low phosphorus testing soils.

Background

Crop Year: 2013

Location: Western Agricultural Research Station

County/Town: Clark/ South Charleston

Soil Type: Strawn-Crosby complex SiCilo

Drainage: Random tiled

Previous Crop: soybean

Tillage: No till

Soil Test: pH 6.0, BpH 6.9, CEC 11.4, OM 2.0%,
Bray P1 14 ppm, K 96 ppm

Planting Date: May 30

Seeding Rate: 32,097 seed/A

Harvest Date: November 4

Methods

The trial was established as a randomized complete block with hybrid as a split plot, replicated four times. The row-placed materials were applied through a 6-row John Deere 1750 planter approximately three inches to the side of the seed and three inches below the surface. Each source of fertilizer was calibrated by weight through the planter fertilizer boxes. The rate of applied phosphorus fertilizer (diammonium phosphate or DAP; 18-46-0) was chosen for crop removal of phosphorus for a yield goal of a 180 bu/A. The lower Sustane organic fertilizer rate was set to a volume equal to the DAP. Two corn hybrids were used, Seed Consultants SCS 11HQ42 and SCS 11HQ19 with three rows of each hybrid splitting the planter. All treatments received a nitrogen sidedress application of 180 lb N/A as 28% UAN solution on June 25. Harvest was accomplished with a Massey 8XP plot combine with on-board scales and moisture meter. Two rows were harvested from each plot. Yield was calculated in bushels/acre at 15.5% moisture.

- Products used and description:
 - Untreated check – no row fertilizer
 - DAP (diammonium phosphate; 18-46-0) – at 145 lbs/A of material or 67 lb/A P₂O₅ through the dry fertilizer system
 - DAP plus sulfur and zinc – 145 lb/A of DAP (67 lb/A P₂O₅) through the planter plus Tiger Micro S+Zn as 84% S plus 4% Zn at a 25 lb/A rate of material for 21 pounds of sulfur and 1 pound of zinc.
 - Sustane 3-7-4 organic fertilizer (pelleted turkey manure) at 145 lb. material per acre.
 - Sustane 3-7-4 organic fertilizer (pelleted turkey manure) at 250 lb. material per acre.

Results

An ANOVA (analysis of variance) was conducted to determine treatment differences. An LSD (least significant difference) was calculated to indicate mean differences. Results for corn yield as affected by fertilizer use are shown in Table 1. Hybrid differences are shown in Table 2.

Table 1. Affects of row-applied fertilizer treatments on corn yield at planting, So. Charleston, Ohio 2013.

Fertilizer treatment	Yield (bu/A)
Untreated check	188.0
DAP 145 lb/A	192.0
DAP 145 + S, Zn	190.4
Sustane organic 145 lb/A	180.9
Sustane organic 250 lb/A	159.0
LSD (0.10)	7.1

Table 2. Corn yield effects by hybrid, So. Charleston, Ohio 2013.

Hybrid	Yield (bu/A)
Seed Consultants SCS 11HQ19	172.6
Seed Consultants SCS 11HQ42	191.6
LSD (0.10)	4.5

Summary

With the low soil phosphorus level (Bray P1 at 14 ppm) it was assumed there would be a yield response to row-applied fertilizer. As shown in Table 1, there was no response for row-applied DAP or DAP plus S+Zn as compared to the unfertilized check. Significant differences are noted in the trial ($Pr > F = 0.0224$), but are due to a reduced yield for the two Sustane applied organic fertilizer treatments. No reason is known for the Sustane treatments yield reduction as the material was pelleted, composted, handled well and the crop generally appeared similar to other treatments throughout the season.

Significant differences by hybrid were found ($Pr > F = 0.0078$). Clearly the SCS11HQ42 was a higher yielding hybrid. The question may be whether by yield capability or by a difference in phosphorus uptake. There were no interactions ($Pr > F = 0.7601$) between fertilizer treatment and hybrid however, indicating the differences were due to hybrid yield capability only.

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For more information, contact:
 Harold D. Watters
 OSU Extension
 1100 S. Detroit St.
 Bellefontaine, Ohio 43311
 Insert watters.35@osu.edu



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 COLLEGE OF FOOD, AGRICULTURAL,
 AND ENVIRONMENTAL SCIENCES