STARTER FERTILIZER FOR CORN ON LAKEBED SOILS

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Many producers use starter fertilizers because cold and wet conditions may occur after planting. In addition, starter fertilizers may improve the efficiency of nutrient uptake by the crop in a sidedress system. Historically, producers in Northwest Ohio consider phosphorus the most important component of a starter fertilizer, even though research has shown that nitrogen provides most of the yield benefit. However, many fields in Northwest Ohio have more than adequate levels of phosphorus for corn production. It is a common practice to add more P to these fields as a starter. The objectives of this corn study were 1) to evaluate the importance of starter nitrogen and phosphorus on soils with adequate soil test phosphorus, 2) to evaluate different starter rates, and 3) to evaluate the role of starter fertilizer for fields using different crop rotations.

Methods

Corn was planted the first week of May in 1999 and 2000 at the Northwest Branch of the Ohio Agricultural Research and Development Center near Custar, OH. A medium maturity (approximately 105-108 day) Bt hybrid was planted at 32,000 plants per acre. Two sites were planted each year to represent the rotational and tillage practices used in the region. For site one, corn followed wheat on ground that was moldboard/chisel-plowed and leveled after wheat harvest (corn-soybean-wheat rotation). Site two followed soybeans on ground that was disked and field cultivated after soybean harvest (corn-soybean rotation). Neither site received additional tillage in the Spring. Soil test P levels were above 35 ppm on these sites. Experimental design was a completely randomized block with four replications. Each replication included nine treatments: three nitrogen sources (urea, ammonium sulfate, and diammonium phosphate) applied at two nitrogen rates (20 and 45 lb N per acre); triple phosphate applied to equal the phosphorus rates of diammonium phosphate; and a zero application of starter fertilizer. All starter fertilizer was applied in bands approximately two inches to the side and below the seed. Harvest grain moisture and yield were determined in 1999 and 2000. Plant height, weight, and nutrient uptake were measured in 2000 at growth stage V6.

After plant samples were collected, all plots received additional nitrogen so that total nitrogen for each plot was 150 lb N per acre. Urea-ammonium nitrate (28% solution) was injected for sidedress applications. Harvest populations were determined one week before harvest. The two center rows of four row plots were harvested for grain yield. Plots were 10 feet wide and 75 feet long.

Results

Early spring weather conditions often determine the response of a crop to starter fertilizers. In 1999, the previous winter was mild with above normal temperatures followed by a warm spring. Timely rains occurred throughout the growing season. In 2000, planting conditions were good, but May was cool and June wet. Most of August was dry. Stalk rots were quite common.

Because of the early above normal temperatures in 1999, no yield benefit was observed from starter fertilizer for either site. The warm fall in 1998 and mild winter allowed earlier nitrogen mineralization, which would have allowed more available nitrogen from the soil, possibly masking starter benefits. No yield benefit was observed from the corn following wheat site in 2000. However, all nitrogen treatments for the corn following soybean plot had significantly higher yields than the zero check and triple phosphate treatments in 2000. These treatments also had more growth. Even though yields were not increased for the corn following wheat site in 2000, the higher rates of phosphorus had taller plants, but not more weight.

Nitrogen was the most important for a yield response. The 45 lb N treatments did not give any more yield than the 20 lb rates. Differences were not detected among the N sources. Where yield responses occurred, the triple phosphate treatments were similar to the zero check, suggesting little benefit from additional phosphorus. Phosphorus uptake was similar among all treatments. Adding sulfur did not increase yields.

In summary, phosphorus or sulfur in starter fertilizer did not affect grain yields on soils with adequate soil test P levels. In some cases, P increased plant heights without a yield response. When yield responses occurred, differences were not detected between the 20 and 45 lb N rate. Treatments with significantly larger yields also had increased early growth. A third year of data is being collected in 2001 with the same measurements and treatments as 2000.

PROCEEDINGS OF THE

THIRTY-FIRST NORTH CENTRAL EXTENSION-INDUSTRY SOIL FERTILITY CONFERENCE

Volume 17

November 14-15, 2001
Holiday Inn University Park
Des Moines, IA

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Published by:
Potash & Phosphate Institute
772 – 22nd Avenue South
Brookings, SD 57006
605/692-6280