

Strip-Till, Corn on Soybean, Nitrogen Rate Study

Walt Albus, Leonard Besemann and Heidi Eslinger

Materials and Methods

- Soil:** Embden sandy loam, Hecla sandy loam and Maddock sandy loam; soil-P and soil-K were very high; soil-S was very low.
- Previous crop:** 2007 – soybean; 2006 – field corn; 2005 – pumpkin and watermelon.
- Seedbed Preparation:** Strip-tilled on November 16, 2007, with a shank machine with leading coulters, row cleaners, anhydrous knives and closing disks.
- Planting:** Planted Midwest 69575 BT3 on April 30 at 33,000 seeds per acre in 30-inch rows.
- Plots:** Plots were 37 ft. long by 15 ft. (6 rows) wide. There were four replications.
- Fertilizer:** November 2007, during the strip-till operation applied 10 lbs. N/acre and 35 lbs. P₂O₅/acre as 10-34-0. May 15 applied 40 lbs. N/acre as 32-0-0 to all plots except the 10-pound N-rate plots. June 18 applied N as 32-0-0 in 50 lb./acre increments for a total of 100, 150 and 200 lbs. total N/acre on the respective N-rate treatments (0, 50, 100, 150 and 200 lbs. N/acre). Apply MZB micronutrient (1 qt/acre) on June 24.
- Irrigation:** Overhead sprinkler irrigation as needed.
- Pest control:** Applied Buccaneer Plus (40 oz/acre) + NIS (0.5% v/v) + AMS (8.5 lb/50 gal) on May 12, Lumax (3 pt/acre) + Buccaneer Plus (32 oz/acre) + NIS (0.5% v/v) + AMS (9.5 lbs/100 gal) on May 31.
- Harvest:** Hand harvested October 27. A ten-foot section from the two center rows from each plot (twenty feet of total row).

Results

Grain yield, test weight, chlorophyll meter readings, stalk nitrate-N, and grain protein increased with increased N rate. Grain moisture decreased with increasing N rate. Corn silking dates were earlier as N rate increased. Lower grain moisture and earlier silking dates at higher N rates, suggested N was deficient in the 50, 100, 150 and 200 lbs. N/ac N-rate prior to the side-dress application.

All plots except the low-N checks received a broadcast application of UAN (32-0-0) at a rate to provide 50 lbs. N/ac shortly after planting. It's apparent in our no-till studies on irrigated sandy soils that this placement may be biasing our results to the higher rates. We believe this broadcast N is being tied up in the heavy no-till residue resulting in young corn plants becoming N stressed prior to the side-dress application. The higher concentrations of ammonium and nitrate-N at higher rates of side-dressed UAN allowed a faster recovery, resulting in higher yields. Under this scenario, N rates required to produce optimum yield may be higher than if the fertilizer N was properly placed at planting. To eliminate this potential bias in subsequent years, we will place our pre-emerge N treatment in a band 10 inches or less over the seed row on black soil created by the previous fall's strip-till operation. Planter row cleaners will remove remaining residue. In studies with conventional tillage at this site, 150 lbs. N/ac has been more than enough to maximize yield on corn planted on soybean ground.

Table 1. Strip-till, corn on soybean, nitrogen rate study at the Oakes Irrigation Research Site in 2008.

Fertilizer N Rate lb/ac	Grain Yield bu/ac	Harvest Moisture %	Test Weight lb/bu	Fall Nitrate-N		Chlorophyll Meter Reading		
				2007 0-24"	2008 0-24"	1-Aug	15-Aug	5-Sep
11	75.6	27.0	56.5	26	8	27.9	26.0	19.2
50	95.2	25.4	56.5	26	8	32.3	28.2	20.7
100	152.0	24.0	57.0	26	8	47.1	44.9	33.9
150	178.7	24.2	58.8	26	9	54.0	52.6	43.2
200	200.0	24.7	59.8	26	8	56.3	56.8	51.6
Mean	140.3	25.0	57.7	26.0	8.2	43.5	41.7	33.7
LSD 0.05	18.6	2.6	1.3	NS	NS	3.5	2.3	2.3
C.V. (%)	8.6	6.7	1.5	0.0	10.9	5.2	3.6	4.4

Fertilizer N Rate lb/ac	Stalk Nitrate-N ppm	Grain Oil %	Grain Protein %	Grain Starch %	Silk Date	Mature Date
50	173	2.9	5.2	74.3	7/29	9/29
100	185	2.5	5.5	74.8	7/27	9/30
150	314	2.4	6.4	74.7	7/26	9/29
200	1438	2.7	7.5	73.5	7/25	9/29
Mean	456.1	2.7	6.0	74.2	--	--
LSD 0.05	888	0.2	0.7	0.6	--	--
C.V. (%)	126.4	5.3	7.9	0.5	--	--