

Oakes Irrigation Research Site

Carrington Research Extension Center * North Dakota State University
P.O. Box 531, Oakes, ND 58474-0531, Phone: (701) 742-2744, FAX: (701) 742-2700,
E-mail: Blaine.Schatz@ndsu.edu
Leonard.Besemann@ndsu.edu

Strip-Till, Corn on Corn, Nitrogen Rate Study

L. Besemann and H. Eslinger

MATERIALS AND METHODS

- Soil: Embden sandy loam and Hecla sandy loam; pH=6.9; 2.1% organic matter; soil N average 8 lbs/acre; soil-P and soil-K was very high; soil-S was low.
- Previous crop: 2013 - field corn.
- Seedbed preparation: Strip-till May 7 with an Orthman strip-till machine.
- Hybrid: Pioneer P9917 AMI.
- Planting: Planted May 10 in 30-inch rows @ 33,000 seeds/acre.
- Plots: Plots were 140 ft long by 20 ft (8 rows) wide. There were four replications.
- Fertilizer: All plots received 12 lbs N/acre and 40 lbs P₂O₅/acre as 10-34-0 via strip-till May 7. Stream-bar all plots 10 lbs N/acre and 23 lbs S/acre as 12-0-0-26 May 22. Stream-bar 78 lbs N/acre as 28-0-0 to the 100 and 150 lb treatments and 44 lbs N/acre as 28-0-0 to the 150d and 200 lb treatments May 22. Sidedress N treatments as 28-0-0 (three inches deep) June 13; the 150 lb treatments received 50 lbs N/acre, the 150d received 85 lbs N/acre and the 200 lb treatments received 135 lbs N/acre.
- Irrigation: Hand move sprinkler irrigation as needed.
- Pest control: Harness (2 pt/acre) May 22, Laudis (3 oz/acre) + AAtrex 9-O (0.5 lb ai/acre) + Destiny (0.05% v/v) + AMS (1½ lbs/acre) June 3.
- Remote sensing: Sensing was achieved with an Opti-Sciences CCM 200 Plus chlorophyll meter and a Holland Crop Circle ACS active canopy sensor (normalized difference red edge - NDRE).
- Harvest: October 24 with a JD 4400 combine. Harvest area was the middle four rows of each plot, 133 feet long.

RESULTS

Determining nitrogen sufficiency in time is important to achieve N efficiency. Remote sensing utilizing a Holland Crop Circle ACS 430 active canopy sensor (normalized difference red edge – NDRE) and an Opti-Science CCM 200 chlorophyll meter were tested to determine ability to measure N sufficiency.

Increasing nitrogen rates (N) increased grain yield, chlorophyll meter readings and normalized difference red edge (NDRE). Remote sensing by chlorophyll meter and the Crop Circle Sensor did well in predicting corn N status.

Table 1. Strip-till, corn on corn nitrogen rate study at the Oakes Irrigation Research Site in 2014.

Fertilizer N Rate lb/acre	Grain		Chlorophyll				Nitrate-N		Seed	Seed	Seed	Emerge	Silk	Mature
	Grain Yield ¹ bu/ac	Yield 2009-14	Harvest Moisture %	Test Weight lb/bu	Meter Reading ² 4-Aug	NDRE ³ 4-Aug	Stalk ppm	Fall Soil lbs/ac	Protein -----%	Starch	Oil	Date	Date	Date
22	80.0	83.4	15.1	54.3	13.4	0.2128	16	8	6.8	75.1	2.8	25-May	24-Jul	21-Sep
100	157.5	170.5	15.0	54.9	38.1	0.2927	56	12	7.3	75.0	2.6	25-May	23-Jul	20-Sep
150	184.1	190.0	15.3	55.2	51.0	0.3141	51	13	8.2	74.2	2.7	26-May	23-Jul	19-Sep
150d	194.6	202.4	15.5	55.3	50.6	0.2913	83	13	8.3	74.2	2.7	26-May	23-Jul	20-Sep
200	197.0	212.6	15.7	55.7	57.9	0.3277	1420	49	9.0	73.8	2.5	27-May	23-Jul	20-Sep
Mean	162.6		15.3	55.1	42.2	0.3	325.1	19.0	7.9	74.4	2.7	25-May	23-Jul	20-Sep
C.V. (%)	4.8		5.7	0.6	3.9	6.6	50.0	31.5	4.1	0.5	3.9	0	0	0.4
LSD 0.10	9.8		NS	0.4	2.1	0.0240	205	7.6	0.4	0.4	0.1	0.73	0.6	0.7
LSD 0.05	12.0		NS	0.5	2.6	0.0293	250	9.2	0.5	0.5	0.2	0.74	0.9	0.8

Planting Date = May 10; Harvest Date = October 24; Previous Crop = Corn

¹ Yield adjusted to 15.5% moisture.

² Opti-Science CCM 200.

³ Holland Crop Circle ACS active canopy sensor (normalized difference red edge) - NDRE.

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