Evaluation of Effects of Plant Population and Nitrogen Rate on Corn Yields

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Objective

To compare corn yield response to plant population and nitrogen rate and to establish economic thresholds for seed and nitrogen use.

Background

Crop Year:	2012	Soil Test:	December 2009
Location:	Milan, OH		pH 6.9 K 255 lbs/ac P 48 lbs/ac
County:	Erie County		
Soil Type:	Kibbie silt loam	Planting Date:	4/30/2012
Drainage:	Clay tile on 60 foot centers	Seeding Rate:	36,300 and 40,200 respectively
	0 – 2% slope	Variety:	Pioneer P1184R
Previous Crop:	Soybeans	Harvest Date:	October 5, 2012
Tillage:	Chisel		

Methods

This study was designed with four treatments replicated four times in a randomized complete block design. Treatment plots were 40 feet in width and roughly 1000 feet in length. Plots were planted in 30 inch row spacing using an eight row JD 7200 Planter. 16 rows were planted for each replication with the center eight being harvested for test purposes. Proposed treatments were:

	Harvest Population	Added N
1. 34,000 seeding rate/ 200 lbs added N	35,100	200 lbs
2. 34,000 seeding rate/ 260 lbs added N	35,300	260 lbs
3. 38,000 seeding rate/ 200 lbs added N	37,700	200 lbs
4. 38,000 seeding rate/ 260 lbs added N	37,800	260 lbs

Pioneer P1184R was the hybrid used for all replications. All of the seed used was out of the same seed lot.

Peripheral information and observations: Planting conditions were nearly ideal. Emergence was within seven day and was even across the plots. Weed control was also nearly ideal. It was accomplished using Glyphosate, atrazine and Resolve Q when the crop was 3 inches tall. Moisture was adequate for the first 50 days after planting. Then moisture could have been a limiting factor, although this field never appeared to be under severe stress. High temperatures caused pollination problems in area fields, but again, this plot did not experience pollination problems. In all, this plot received 8.1 inches of rain from planting until August 31 by which time the crop was made. On average, 6 rows of kernels were lost (aborted) on each ear

presumably due to water limitations. Given the stress conditions that this area experienced, the yield of this plot was extraordinary.

Fertilization: The entire plot received 100 lbs/acre of 0-0-61 and 100 lbs/acre 46-0-0 broadcast and incorporated with light tillage. 16 gals of liquid 28-0-0 was applied with the planter (2X2 placement). Remaining Nitrogen was sidedressed using 82-0-0 on June 12th.

Results

Corn Yield (bu/A) Response to Population and Nitrogen Rate

	Yield (bu/A)	Harvest Moisture
Treatment 1 34,000 seeding rate / 200 lbs added N	244	22.5%
Treatment 2 34,000 seeding rate / 260 lbs added N	243	22.5%
Treatment 3 38,000 seeding rate/ 200 lbs added N	242	22.3%
Treatment 4 38,000 seeding rate/ 260 lbs added N	244	22.3%

Population / N Rate Corn Trial				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
N	1	3	0.16	0.7175
Pop	1	3	0.04	0.8501
Pop*N	1	3	0.25	0.6533

No significant difference for any of the treatments.

Summary: No significant difference between treatments was measured. Assuming the cost of seed was $3.00 per 1,000 kernels and N cost $0.60 /unit, the cost of increasing seeding rate 4,000 seeds per acre increased production cost by $0.05 per bushel. Moreover, increasing N rate by 60# per acre increased production cost by $0.15 per bushel. Higher seeding rates did not adversely affect yield even under moderate drought conditions. Aborted rows of kernels in all treatments suggest that yield may have been limited by water.

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