

## Data-Intensive Farm Management: Soybean Seeding Rate

**Study ID:** 0409109201901

**County:** Lancaster

**Soil Type:** Wymore silty clay loam, 3-6% slopes, eroded; Aksarben silty clay loam 2-6% slopes

**Planting Date:** 5/5/19 and 5/10/19

**Harvest Date:** 10/17-18/19

**Row Spacing (in):** 15

**Variety:** Pioneer® P37A69X

**Reps:** 12

**Previous Crop:** Corn (average >200 bu/ac)

**Tillage:** No-Till

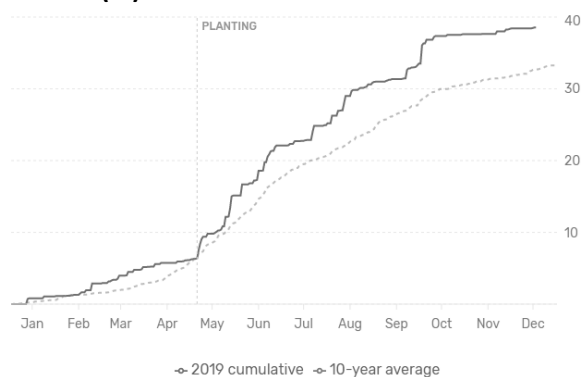
**Herbicides:** **Pre:** 6.4 oz/ac Engenia®, 4 oz/ac Sonic®, and 4 oz/ac TriCor® **Post:** 1.5 qt/ac Buccaneer Plus®, 1 pt/ac Metalica, and 4 oz/ac clethodim

**Seed Treatment:** EverGol® Energy, Lumisena™, Gaucho®, PPST 2030, PPST 120+

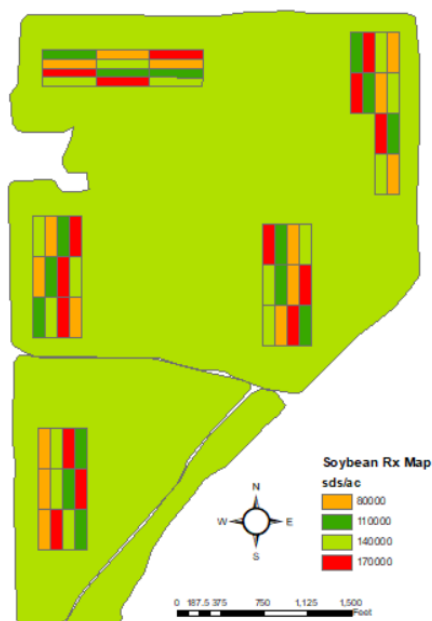
**Foliar Insecticides:** 1.5 oz/ac Midash Forte and 3.2 oz/ac Lambda-Cyhalothrin 1 EC

**Irrigation:** None

**Rainfall (in):**



**Introduction:** This study is part of the Data-Intensive Farm Management Project, a multi-university collaboration led by the University of Illinois at Urbana-Champaign. The goal of these research studies is to utilize precision agriculture technology for conducting on-farm research. This study tested four soybean planting rates: 80,000 seeds/ac, 110,000 seeds/ac, 140,000 seeds/ac, and 170,000 seeds/ac. Treatments were randomized and replicated in 80' wide by 350' long blocks across the field (Figure 1). Variable-rate prescription maps for the study were developed and uploaded to the in-cab monitor. The planter utilized hydraulic downforce on row units; row cleaners were not used. Geospatial yield monitor data were collected at the end of the growing season and post-processed to remove errors with Yield Editor software from the USDA. The as-planted data were evaluated and only areas that achieved planting rates within 10% of the target seeding rates were included for yield analysis; 12 of the 15 originally planned blocks shown in Figure 1 were used in the yield analysis. Stand counts were taken on June 6 and 7 for four of the replications; these stand counts were used to determine percent emergence. There was interest in determining if larger soybean stem diameters would lead to lower *Dectes* stem borer infestations. In field measurements were made to determine stem diameter and *Dectes* stem borer infestation on October 3 for four of the replications.



**Figure 1.** Soybean seeding rate prescription map for 2019 field site.

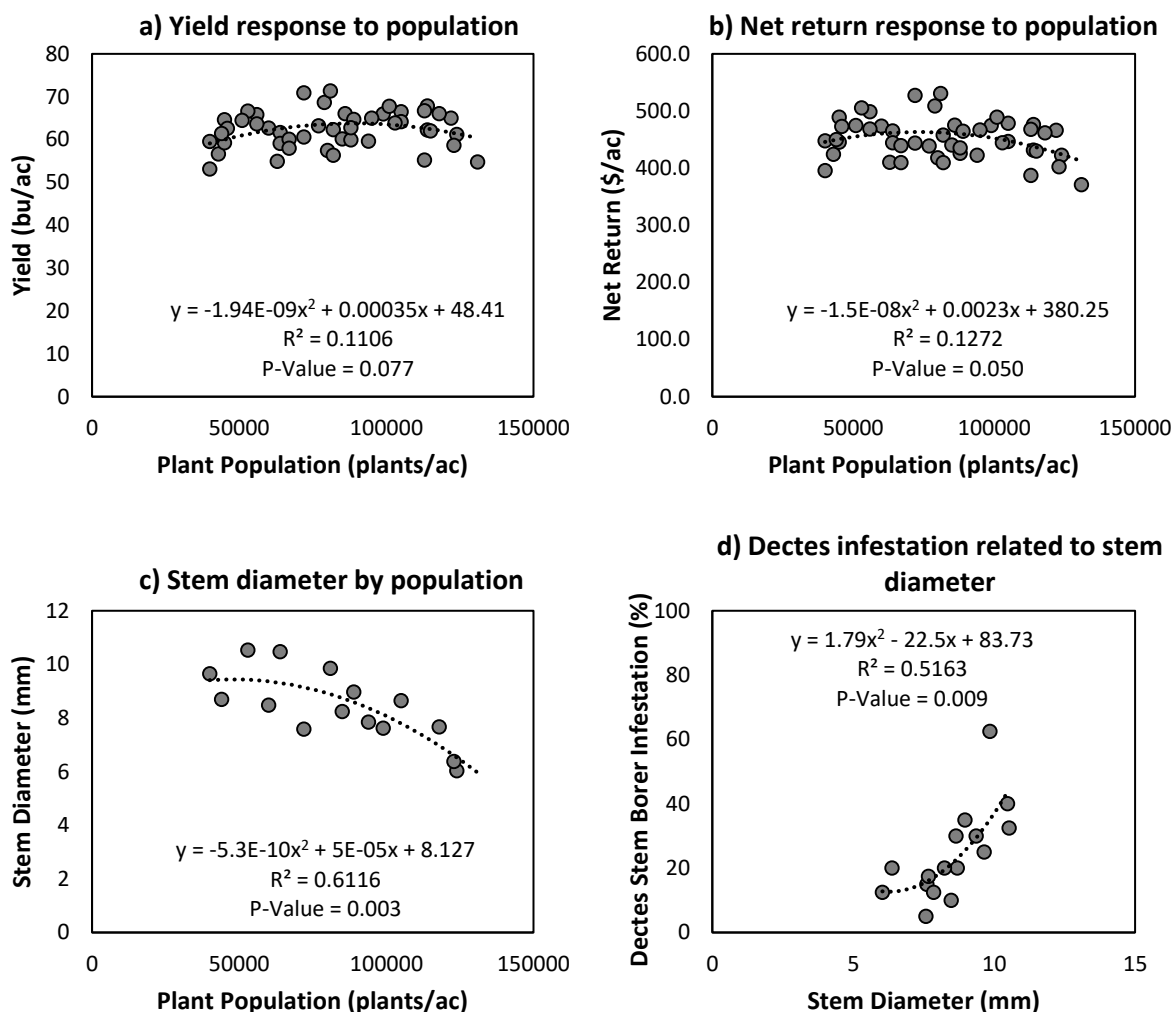
**Results:**

Planting rate (seeds/ac)	Stand Count (plants/ac)	Emergence (%)	Stem Diameter (mm)	Decetes Stem Borer Infestation %	Moisture Yield (%)	Yield (bu/ac)†	Marginal Net Return‡ (\$/ac)
80,000	51,583 D*	65 A	10 A	27 A	9.1 AB	60.5 B	455.92 A
110,000	70,917 C	65 A	9 AB	27 A	9.0 B	63.1 A	463.89 A
140,000	97,457 B	63 A	9 AB	23 A	9.1 AB	62.7 AB	447.76 AB
170,000	110,417 A	63 A	7 B	20 A	9.2 A	62.8 AB	435.52 B
P-Value	<0.0001	0.9851	0.007	0.874	0.118	0.046	0.007

\*Values with the same letter are not significantly different at a 90% confidence level.

†Yield values are from cleaned yield monitor data. Bushels per acre adjusted to 13% moisture.

‡Marginal net return based on \$8.10/bu soybean and \$60/unit of 140,000 seeds.



**Figure 2.** a) Yield response to plant population (determined by stand count), b) net return response to population (determined by stand counts), c) stem diameter by plant population (determined by stand counts), and d) Decetes stem borer infestation as related to stem diameter. Regression lines were fit and displayed if the relationship was statistically significant.

### Summary:

- Plant populations at this site were notably lower than target seeding rates ranging from 63% to 64% of the seeding rates.
- Stem diameter was related to seeding rate and plant population, with lower seeding rates having larger stem diameters.
- Decates stem borer counts ranged from 20% to 27% of plants infested. Decates stem borer infestation was related to stem diameter, with larger stem diameters having a higher infestation (Figure 2d).
- Yield was lower for the 80,000 seeds/ac treatment, which had stands of 52,000 plants/ac. There was no yield difference for the 110,000 through 170,000 seeds/ac treatments, which had stands ranging from 71,000 to 110,000 plants/ac.
- Net return was related to plant population and was optimized at approximately 72,000 plants/ac.

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