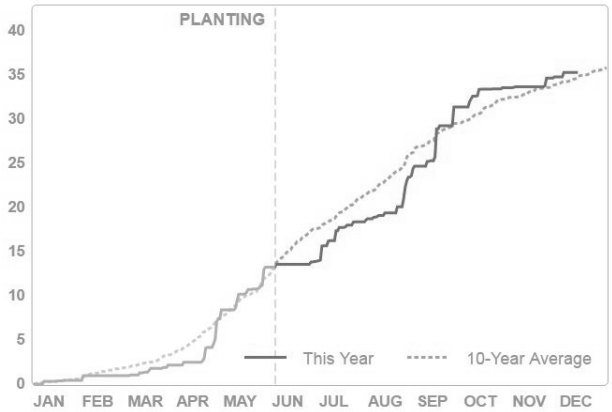
Rainfed Soybean Population Study

Study ID: 416147201601
County: Richardson
Soil Type: Nodaway silt loam occasionally flooded; Zook silty clay loam occasionally flooded; Wabash silty clay loam occasionally flooded
Planting Date: 6/3/16
Harvest Date: 10/25/16
Row Spacing (in): 15
Hybrid: P36T86R
Reps: 4
Previous Crop: Corn
Tillage: Disk
Seed Treatment: PPST120+, PPST 2030, Gaucho®, EverGol™ Energy, Allegiance®, ILeVO® (1/2 rate)
Foliar Insecticides: 4 oz/ac Hero®
Foliar Fungicides: 4 oz/ac Priaxor®
Fertilizer: 61 lb/ac of 11-52-0, 114 lb/ac of 0-0-60
Irrigation: None
Rainfall (in):



Soil Samples: Six soil samples were taken within the study area.

Sample	O.M.	pH	C.E.C.	P Bray 1	K	Mg	Ca	S	Zn	Mn	Fe	Cu	B
	--%--			----------ppm----------									
1	2.60	7.0	12.5	39	120	221	2043	10	2.0	108.0	154.0	1.8	0.4
2	2.60	6.6	12.6	59	117	191	1965	8	5.2	88.0	138.0	1.6	0.5
3	2.50	6.5	14.9	53	118	219	2321	9	4.2	98.0	142.0	1.8	0.4
4	1.80	6.6	14.5	28	125	234	2245	11	2.7	111.0	143.0	1.9	0.4
5	2.40	6.6	13.3	31	107	217	2073	11	2.3	95.0	147.0	1.7	0.4
6	2.00	6.9	14.9	45	129	223	2493	11	2.4	106.0	156.0	1.9	0.5

Introduction: Previous research has demonstrated that planting rates of 80,000 to 120,000 seeds/acre resulted in the highest profitability. Most of this research was conducted under irrigation with 30" row spacing. The purpose of this study was to determine the optimal planting rate in non-irrigated conditions with 15" row spacing. Target treatment rates were 116,000, 130,000, 160,000, and 185,000 seeds/acre. The actual planting rate for each treatment (rate indicated in the as-planted file) is shown in table below. The actual planting rate was used for comparison for the percent of plants emerged and present at harvest.

Results: Stand count locations were marked with flags so that the same area was counted for the early stand counts (July 1, 2016) and harvest stands counts (Oct. 25, 2016). These stand counts were compared to planting rate *(Figure 1)*. The highest planting population had the lowest percent of planted stand at harvest. An aerial image on August 21, 2016 showed greater lodging in the higher 2 planting populations *(Figure 2)*. Imagery was collected again 10 days later on August 31, 2016. False color imagery and NDVI from this second flight showed increased plant lodging with more lodging in the northern and southeastern part of the study *(Figure 3).*

Treatment (seeds/ac)	Actual Planting Rate	Early Season Stand Count (plants/ac)	% of Planted Seeds Emerged	Harvest Stand Count (plants/ac)	% of Planted Seeds Present at Harvest	Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
116,000	116,645	96,167 D*	82 AB	87,667 D	75 A	66 B	560.96
130,000	129,600	109,417 C	84 A	99,417 C	77 A	67 AB	557.15
160,000	158,544	128,167 B	81 AB	113,667 B	72 AB	68 AB	553.83
185,000	185,112	147,833 A	80 B	126,333 A	68 B	68 A	544.94
P-Value		<0.0001	0.0914	<0.0001	0.0358	0.0425	N/A

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $9.25/bu soybean and $64.10/unit seed cost (140,000 seeds/unit).

Figure 1. Early and harvest stand counts compared to planting rate.

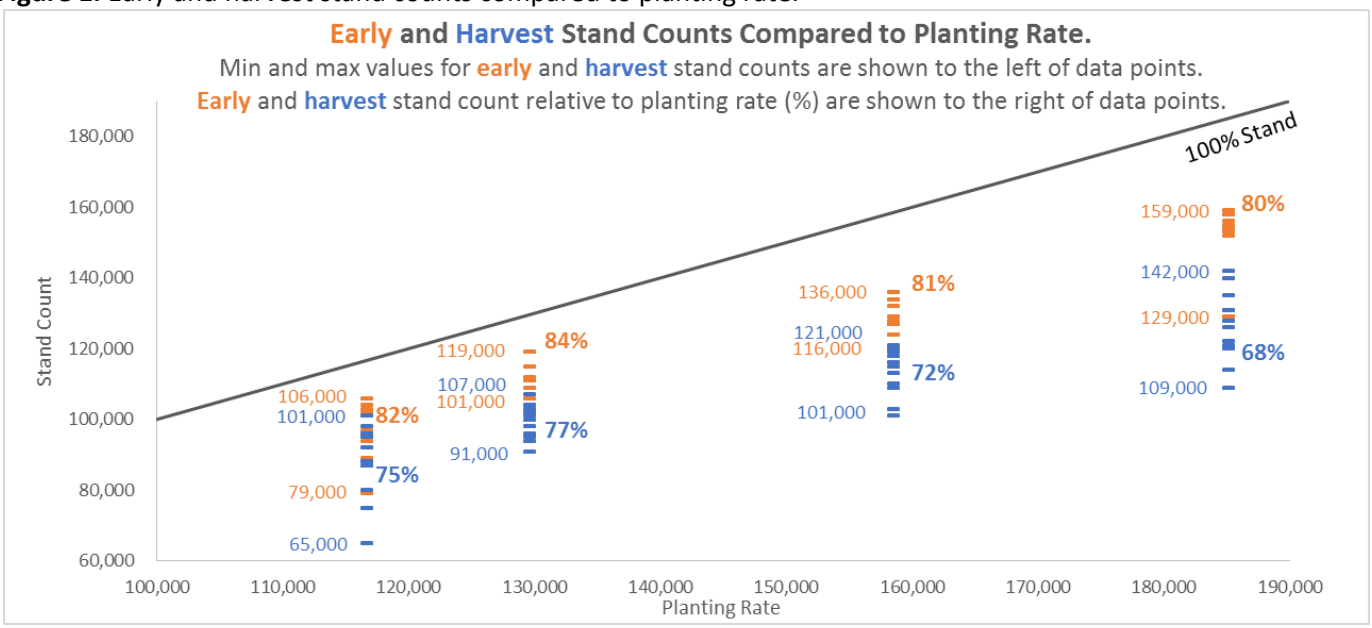


Figure 2. Aerial image from August 21, 2016 showing lodging in the 160,000 and 185,000 seeds/acre treatments.

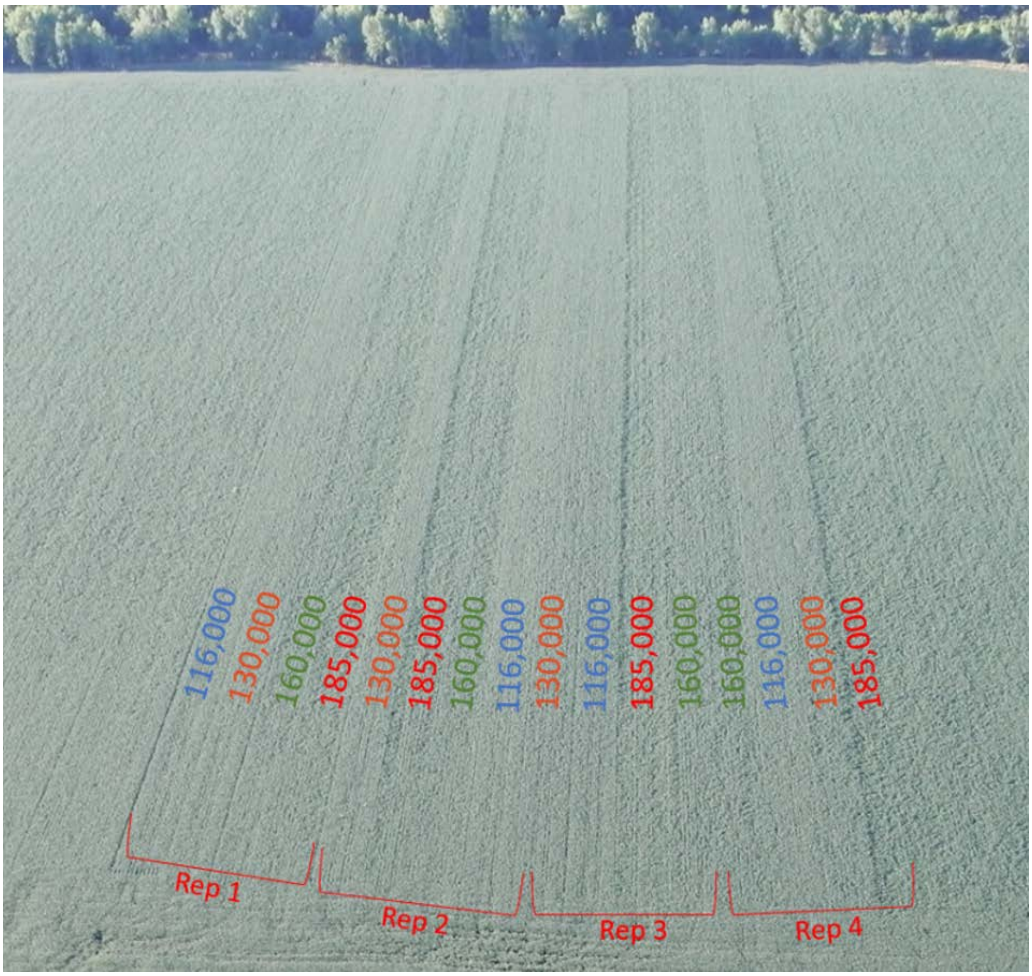
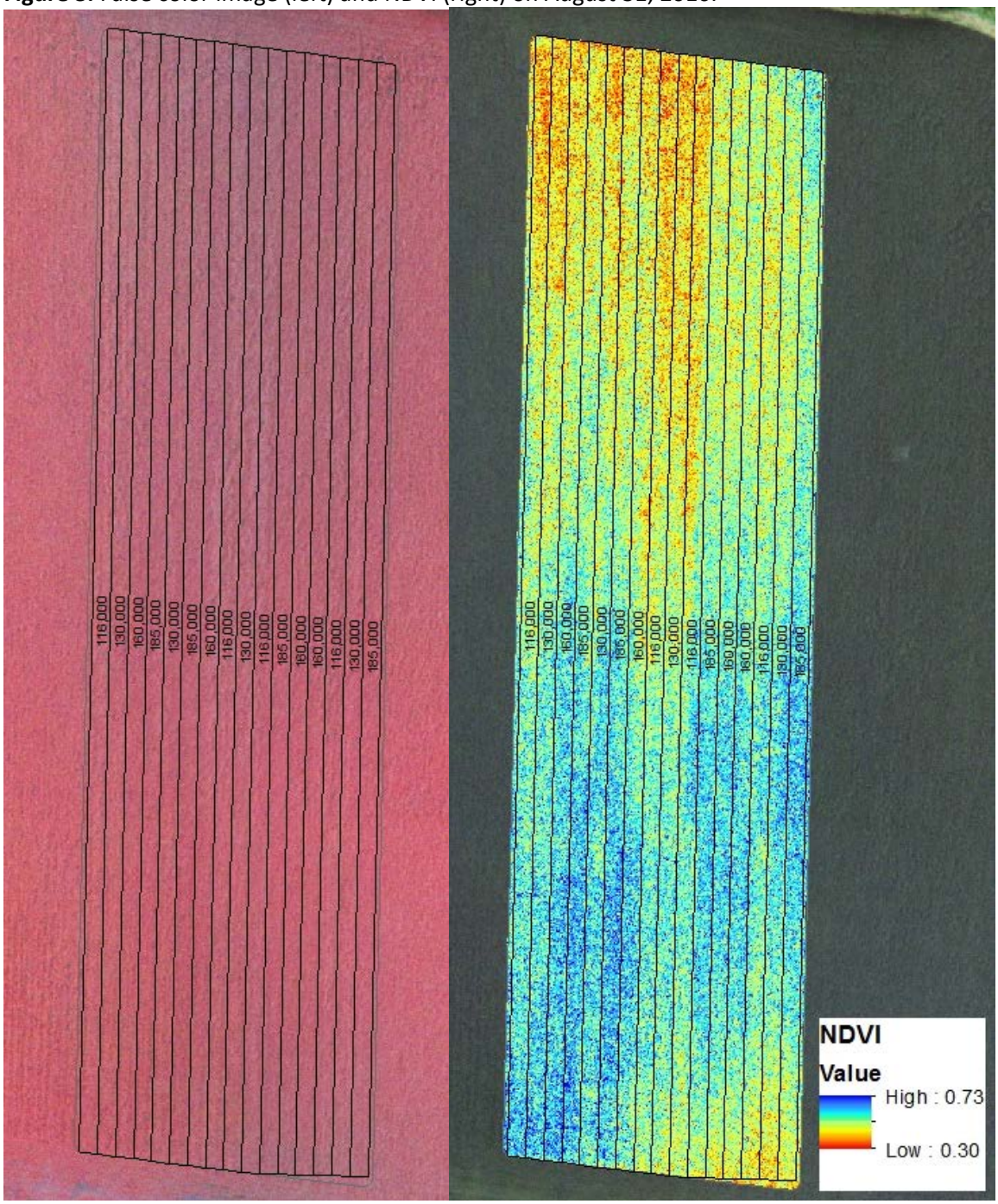


Figure 3. False color image (left) and NDVI (right) on August 31, 2016.



Summary: Yield increased 2 bu/acre from the lowest (116,000 seeds/acre) to the highest (185,000 seeds/acre) seeding rate. This 2 bu/acre increase is not enough to offset the additional seed cost. The 116,000 seeds/acre treatment with a final stand count of 87,667 plants/acre maximized net return. This is consistent with previous research findings. With the given soybean seed price and yields in this study, a soybean selling price greater than $15.80/bu would be needed for the 185,000 seed/acre treatment to provide a higher net return than the 116,000 seed/acre treatment. There was a greater percentage of plants present at harvest for the lowest two seeding rates compared to the highest seeding rate. Greater stand decreases for higher seeding rates have been observed in the past studies.

Sponsored by:

University of Nebraska Lincoln

Nebraska Corn Board

In Partnership with:

Nebraska Soybean Checkoff

Nebraska Corn Growers Association

Nebraska Dry Bean Commission