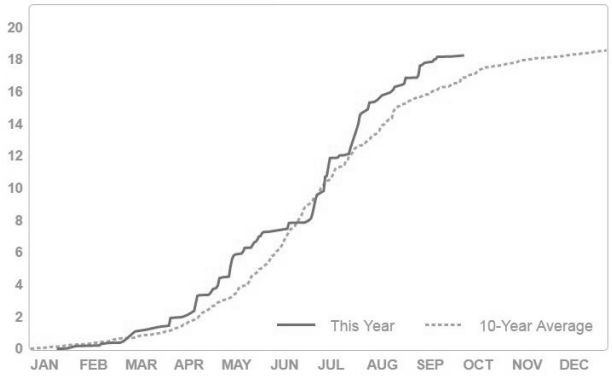
Dry Bean Row Spacing and Population for Direct Harvest

Study ID: 601161201601
County: Sheridan
Soil Type: Johnstown loam 0-2% slope; Keith loam gravelly substratum, 1-3% slope
Planting Date: 6/7/16
Harvest Date: 9/29/16
Hybrid: Sinaloa pinto beans
Reps: 6
Previous Crop: Oat and turnip cover crop
Tillage: Deep rip/disk, then field cultivator with vertical tillage on 6/2/16
Herbicides: ***Pre:*** 14 oz/acre Outlook® and 32 oz/acre Sonalan® on 6/8/16 ***Post:*** 21 oz/acre Varisto™ (Raptor® and Basagran®), 9.6 oz/acre non-ionic surfactant, and 2.5 lb/acre AMS
Seed Treatment: None
Foliar Insecticides: None
Foliar Fungicides: 2 lb/acre copper on 8/13/16

Fertilizer: 30 lb/acre N, 55 lb/acre P, 5 lb/acre S, 2 lb/acre Zn, 2 lb/acre Mn on 6/5/16;
25 lb/acre N, 3 lb/acre K, 5 lb/acre S chemigated on 7/20/16
Irrigation: Pivot, Total: 8"
Rainfall (in):



Introduction: The purpose of this study was to compare dry edible beans (Sinaloa variety) planted in 30 inch rows with a target population of 90,000 plants per acre with beans drilled in 7.5 inch rows with a target population of 120,000 plants per acre. These are two common planting scenarios for growers in western Nebraska. The two planting treatments were evaluated in a direct harvest bean production system looking at yield, harvest loss, pod height and other agronomic characteristics.

The treatments were replicated six times in plots 1240 feet by 48 feet (1.37 acres). The plots were planted in a randomized complete block design on June 7. The drilled treatment went in with a 30 foot Landoll 5531 drill (2 passes) to achieve a 60 foot width. The planted 30 inch row treatment went in with a 60 foot White Model 8824 Planter with 2020 Precision Plant seed meters.

The plots were harvested on September 29 using a Case IH 2388 combine equipped with a Case IH 1020 24 foot flex auger header. The field was treated with 2 pints of Gramoxone® and 2 gal of 32% N on September 20th as a harvest aid. One round was taken to harvest the center 48 feet of the 60 foot plots. Each harvested plot was weighed across the scales at Kelley Bean, Mirage Flats. Samples from each plot were analyzed for bean quality parameters. Pod height measurements were taken on Sept. 23 to determine the percent of pods two inches or greater above the soil surface. Harvest loss estimates were determined by taking counts in 12 one square foot frames randomly chosen in the harvested area but equally representing left side of header, center of header and right side of the header area behind the combine.

Results:

	Early Season Stand Count	Pods >2" above ground (%)	Harvest Loss (bu/ac)	Split (%)	Small (%)	Moisture (%)	Density (lb/bu)	Seeds per lb	Yield (bu/ac) †	Marginal Net Return‡ ($/ac)
7.5" row spacing at 120,000 plants/ac	122,169 A*	95 A	5.0 B	0.6 B	4.8 A	11.9 A	62.6 A	1,400 A	51 A	835.00
30" row spacing at 90,000 plants/ac	94,310 B	92 B	6.0 A	1.2 A	1.6 B	11.1 B	61.7 B	1,307 B	44 B	727.88
P-Value	0.0001	0.014	0.045	0.0001	0.001	0.001	0.019	0.005	0.0005	-

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 14% moisture and is adjusted for clean yield (% splits, % small, and % foreign material removed).
‡Marginal net return based on $30/cwt ($18/bu at 60lb/bu) and input costs of $83.00/ac for the 7.5 inch, 120,000 seeds/ac and $64.12/ac for the 30 inch, 90,000 seeds/ac. Costs are adjusted for actual stand counts.

Summary:

1) Actual stand counts based on live plant counts were above but fairly close to the target populations of 90,000 and 120,000 plants per acre.
2) 95% of the pods in the 7.5 inch row spacing and 120,000 plants/acre treatment were two inches or more above the soil as compared to 91.6% in the 30 inch row spacing and 90,000 plants/acre treatment.
3) Harvest loss was significantly higher (6 bu/acre) in the 30 inch row spacing and 90,000 plants/acre treatment probably due to pod height. The beans in the 30 inch row spacing and 90,000 plants/acre treatment were also drier by 0.8 percentage points, which can contribute to greater harvest loss. Generally speaking, the harvest losses of 5 and 6 bu/acre are high. There was some longitudinal soil ridging in the field of 1 to 2 inches which will hold the header up contributing to greater harvest loss. This ridging may have been due to a pre-plant cultivation.
4) Percent splits were significantly higher in the 30 inch row spacing at 90,000 plants/acre treatment. This may be due to lower moisture and less plant material moving through the combine while harvesting this treatment.
5) Percent small beans were significantly higher in the 7.5 inch row spacing with 120,000 plants/acre treatment. This may be due in part to closer plants and more competition.
6) The percent moisture was significantly higher in the 7.5 inch rows with a higher population. The grower observed that the beans planted in 7.5 inch rows at the higher population matured 5 or 6 days later than the lower population in 30 inch rows.
7) The seed size was significantly smaller and the bushel weight was significantly heavier in the beans harvested from the 7.5 inch plots.
8) Beans harvested in the higher population, 7.5 inch rows yielded significantly more (7 bu/acre) than the beans planted at lower populations in the 30 inch rows. Yields were based on clean beans after splits, percent small beans, and foreign material were subtracted.
9) The marginal net return was about $107.00 per acre more for beans planted in 7.5 inch rows at a population of 120,000 plants/acre as compared with 30 inch rows at 90,000 plants/acre.

Sponsored by: University of Nebraska Lincoln; Nebraska Corn Board

In Partnership with: Nebraska Soybean Checkoff; Nebraska Corn Growers Association; Nebraska Dry Bean Commission