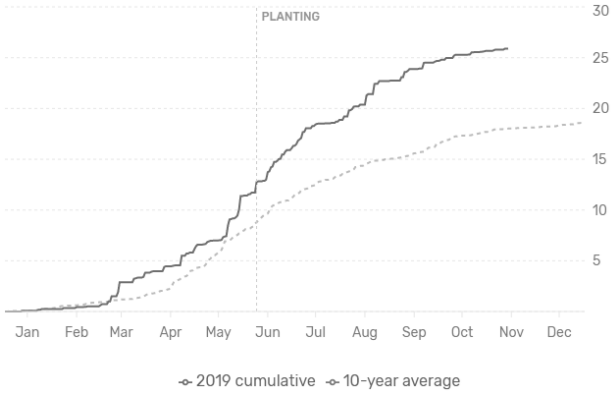
Pinto Bean Planting Population for Direct Harvested Dry Beans

Study ID: 0809013201901
County: Box Butte
Soil Type: Valentine loamy fine sand 0-3% slope
Planting Date: 6/8/19
Harvest Date: 9/24/19
Row Spacing (in): 20
Variety: Radiant
Reps: 4
Previous Crop: Corn
Tillage: Vertical-Till; rolled field after planting, rotary hoe after planting
Herbicides: ***Pre:*** 2 pt/ac Prowl®, 14 oz/ac Outlook®, 22 oz/ac Roundup PowerMAX® ***Post:*** 21 oz/ac Varisto®, 8 oz/ac Basagran®, and 7 oz/ac Outlook®
Desiccant: 2 oz/ac Sharpen® and 2 pt/ac Gramoxone® on 9/15/19
Seed Treatment: Maxim®, Apron®, Dynasty®, Cruiser®, and Vibrance®
Foliar Insecticides: None
Foliar Fungicides: 12 oz/ac Aproach® and 1 application Champ® (copper hydroxide)

Fertilizer: 10 gal/ac 10-34-0 (banded), 5 gal/ac Thio-Sul®, 1 gal/ac Awaken® with coulter machine; 2 gal/ac 10-34-0, 4 gal/ac Riser® (7-17-3), and 4 oz/ac Radiate® (indolebutyric acid and cytokinin) in-furrow at planting
Note: Field was hailed
Irrigation: Pivot, Total: 9-10"
Rainfall (in):



Soil Test (Dec. 2018) – 1 sample taken in the study area:

Soil pH 1:1	Soluble Salts 1:1 mmho/cm	Excess Lime Rating	Organic Matter LOI %	Nitrate-N 0-8" ppm	Nitrate-N 8-36" ppm	Bray P1 ppm	Bray P2 ppm	M-3 Sulfate ppm S	Zn ppm	Mn ppm	Fe ppm	Cu ppm	B ppm	Ammonium Acetate ppm K	Ammonium Acetate ppm Ca	Ammonium Acetate ppm Mg	Ammonium Acetate ppm Na	CEC me/100g	% Base Saturation K	% Base Saturation Ca	% Base Saturation Mg	% Base Saturation Na
6.9	0.2	L	1.3	12	7	40	65	7	2.7	9	32	1	0.6	196	1214	150	34	8	6.3	76.3	15.6	1.8

Introduction: The purpose of this study was to compare several planting rates of dry edible beans (Radiant pinto variety) planted in 20" row spacing. Target populations were 60,000, 100,000, and 130,000 plants/ac; however, the planting equipment used resulted in seeding rates that differed from the intended rate. Actual populations were determined by early season stand counts and were 52,369, 87,699, and 108,603 plants/ac, respectively. To estimate the treatment seeding rate and subsequent seed costs, 10% was added to the stand count values; this resulted in treatment seeding rates of approximately 57,600, 96,470, and 119,460 seeds/ac, and assumes all treatments had similar emergence and germination. The plots were direct harvested on September 24 with a John Deere® S680 combine and MacDon® FD75 FlexDraper® 35-foot head.

Samples from each plot were analyzed for bean quality parameters. Pod height measurements were taken to determine the percent of pods 2" or greater above the soil surface. Harvest loss estimates were determined by taking counts in one-square-foot frames randomly chosen in the harvested area, but equally representing the left side of header, center of header, and right side of header area behind the combine. The field experienced some damaging hail with an estimated 15 bu/ac loss. Plants remained small on this study location probably due to a historical nematode infestation on this field.

Results:

Treatment (seeds/ac)	Stand Count (plants/ac)	Pods > 2" above-ground (%)	Harvest Loss (bu/ac)	Small (%)	Split (%)	Foreign Material (%)	Damaged (%)	Moisture (%)	Density (lb/bu)	Seeds per lb	Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
60,000	52,369 C*	66 B	11 A	4 A	3 A	1 A	4.3 A	9.6 A	60.7 A	1,329 A	16 B	200.41 A
100,000	87,699 B	76 A	8.4 B	4 A	2 A	1 A	4.4 A	9.6 A	59.8 A	1,328 A	21 A	242.66 A
130,000	108,603 A	75 AB	7.5 B	4 A	2 A	1 A	3.4 A	9.5 A	60.3 A	1,362 A	20 AB	208.04 A
P-Value	<0.0001	0.033	0.011	0.926	0.243	0.997	0.378	0.670	0.156	0.414	0.084	0.321

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre adjusted to 14% moisture and adjusted for clean yield (% splits, % small, and % foreign material removed).
‡Marginal net return based on $25/cwt ($15/bu at 60lb/bu). Seed cost for the bean seed was $73/100,000 seeds. Seed costs for each treatment were adjusted to represent the estimated actual seeding rate based on field stand counts: $42.08/ac for 60,000 seeds/ac, $70.42/ac for 100,000 seeds/ac, and $87.21/ac for 130,000 seeds/ac.

Summary:

- Plants didn't grow very tall, so many pods were near the ground. The percent of pods greater than 2" above the soil was greater for the 100,000 and 130,000 seeds/ac treatment. For the 60,000 seeds/ac treatment, only 66% of pods were greater than 2" above the ground.
- Harvest loss was highest for the 60,000 seeds/ac treatment. This is expected as the 60,000 seeds/ac treatment had a greater percentage of pods lower than 2" above the ground. Harvest loss for all treatments was higher than desired, with the lowest harvest loss at 7.5 bu/ac.
- There were no differences in percent small, percent split, percent foreign material, percent damage, moisture, density, and seeds per lb.
- Yields for all treatments were lower than desired due to a nematode infestation and 15-20% hail loss. The 100,000 seeds/ac treatment resulted in a higher yield than the 60,000 seeds/ac treatment. Increasing the seeding rate to 130,000 seeds/ac did not result in additional yield gains.
- There was no difference in net return among the three populations tested.
- Market value for net return was adjusted for beans having more than 3% damage in pinto beans.
- The surrounding field was planted to Radiant variety pintos and the overall average yield was 19.6 bu/ac.

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