Pinto Bean Planting Population for Direct Harvested Dry Beans

Study ID: 0812029201801
County: Chase
Soil Type: Valent loamy sand 3-9% slopes; Valent loamy sand 0-3% slope; Dailey loamy sand 0-3% slope
Planting Date: 6/5/18
Harvest Date: 9/21/18
Row Spacing (in): 30
Variety: Vibrant pinto bean
Reps: 4
Previous Crop: Corn
Tillage: Strip-Till
Herbicides: ***Pre:*** 12 oz/ac Outlook® on 6/6/18; 3 pt/ac Eptam® chemigated on 6/6/18
Seed Treatment: Dynasty®, Maxim®, Apron®, Vibrant, and Cruiser®

Foliar Fungicides: 1 lb/ac Copper on 7/14/18; 1 lb/ac Copper and 4 oz/ac Priaxor® on 7/24/18
Fertilizer: 50 lb/ac 11-52-0, 50 lb/ac 0-0-60, 5 lb/ac Hydra-Hume™, and 1 lb/ac Zinc on 5/31/18; 6 gal/ac 10-34-0 with planting in 2-by-2 placement on 6/5/18
Irrigation: Pivot, Total: 5
Rainfall (in):

Introduction: The purpose of this study was to compare several planting rates of dry edible beans (Vibrant variety pinto) planted in 30" row spacing. Target populations were 65,000, 85,000, and 105,000 plants/ac, however the planting equipment used resulted in seeding rates which differed from the indended rate. Actual populations were determined by early-season stand counts and were 68,789, 84,833, and 99,970 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 75,900, 93,500, and 110,000 seeds/ac, and assumes all treatments had similar emergence and germination. The plots were direct harvested on September 21 with a Case IH 8240 combine and MacDon® 40 foot flex draper head. Yield was evaluated using the combine yield monitor. 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.

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)
65,000	68,789 C*	72 A	3.2 A	0.3 A	0.3 B	0.2 A	0.4 B	14.7 A	61 A	1,123 A	61 B	743.11 A
85,000	84,833 B	63 AB	1.9 B	0.2 A	0.9 A	0.1 A	0.9 A	14.3 A	62 A	1,166 A	62 AB	738.90 A
105,000	99,970 A	49 B	2.3 AB	0.4 A	0.5 B	0.2 A	0.7 AB	14.4 A	62 A	1,145 A	63 A	745.45 A
P-Value	<0.0001	0.051	0.042	0.242	0.003	0.318	0.084	0.480	0.454	0.426	0.054	0.791

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 14% moisture and adjusted for clean yield (% splits, % small, and % foreign material removed).
‡Marginal net return based on $22/cwt ($13.20/bu at 60 lb/bu). Seed cost for the Vibrant pinto bean seed was $79/100,000 seeds. Seed costs for each treatment were: $59.96/ac for 75,900 seeds/ac, $73.87/ac for 93,500 seeds/ac, and $86.90/ac for 110,000 seeds/ac.

Summary:

- Actual stand counts were fairly close to the targeted population for all three treatments.
- The percent of pods greater than 2" above the soil was greater for the 65,000 seeds/ac treatment than for the 105,000 seeds/ac treatment. For the 105,000 seeds/ac treatment, only 49% of pods were greater than 2" above the ground.
- Harvest loss was highest for the 65,000 seeds/ac treatment despite having the greatest number of pods greater than 2" above the ground. Considering the percent of pods greater than 2" above the ground was low for all treatments (highest was 71%), the harvest losses of 1.9 to 3.1 bu/ac are very good.
- The 85,500 seeds/ac treatment had a higher percentage of splits than the other two seeding rates; however, all had splits of under 1%. Percent small, splits, and foreign material is deducted from the yield.
- Similarly, the 85,000 seeds/ac treatment had a higher percent damage than the 65,000 seeds/ac treatment; however, all treatments had damage under 1%. For pinto beans, damage ratings greater than 3% are docked.
- There were no differences in percent small, moisture, test weight, or seeds per lb.
- Yield for the highest seeding treatment of 105,000 seeds/ac was 2.2 bu/ac higher than the 65,000 seeds/ac treatment.
- There were no significant differences in net return among the three populations tested.

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