Black and navy bean response to row spacing and planting rates, Carrington, 2016.
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The field study was conducted at the NDSU Carrington Research Extension Center with support from Northarvest Dry Bean Growers Association to examine the response of black and navy bean to row spacing and planting rates. Experimental design was a randomized complete block with split-split plot arrangement (whole plot=2 market types, sub plot=3 row spacings, sub-sub plot=3 planting rates) with four replications. The dryland experiment was conducted on a conventionally-tilled Heimdal-Emrick loam soil. 'Eclipse' black and 'Avalanche' navy bean were planted on May 24 in 14-, 21- and 28-inch rows with planting rates of 100,000, 125,000 and 150,000 pure live seed (pls)/acre. Targeted stands with planting rates of 100,000, 125,000 and 150,000 pls/acre were 90,000, 110,000 and 130,000 plants/acre, respectively. Hail damage occurred on July 9 resulting in an estimated $\leq$10% leaf loss to plants nearing the first flower stage of growth. After maturity, plants were hand-pulled and placed in windrows on September 12 and 14, and seed was harvested with a plot combine on September 14.

With each market type, plant development, plant lodging, seed yield, test weight and seed count were similar among row spacing and planting rates (Tables 1 and 2). Black bean plant stands were highly variable while navy bean stands were more consistent among row spacings. Black bean canopy closure was most advanced on August 8 with 21-inch row spacing, likely due to having the highest plant density. Percent of navy bean canopy closure increased with decreasing row spacing. Navy bean seed yield tended to increase with decreasing row spacing.

Table 1. Black bean market class response to row spacing and planting rates, Carrington, 2016.

Treatment	Plant[1]						Seed		
	Emerge	Flower	Stand (June 13)	Canopy closure (August 8)	Physiological maturity	Lodging	Yield	Test weight	Count
	Jday		plt/A	%	Jday	0-9	lb/A	lb/bu	no./lb
Row spacing (inches):									
14	154	198	148,456	56	233	0	2356	60.8	2472
21	146	198	160,550	88	239	0	3162	60.9	2246
28	154	198	124,373	68	236	0	2618	60.9	2333
LSD (0.05)	NS	NS	10,829	5	NS	NS	NS	NS	NS
CV (%)	7.6	0.2	9.1	11.1	2.7	160.1	26.0	1.1	12.4
Planting rate (pls/acre):									
100,000	154	198	119,313	69	236	0	2629	60.9	2345
125,000	154	198	145,953	71	237	0	2803	60.8	2316
150,000	146	198	168,113	72	235	0	2702	60.8	2390
LSD (0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV (%)	7.7	0.2	8.3	3.2	0.7	80.9	8.5	0.6	3.3

[1]Jday: 154=June 3; 198=July 17; 236=August 24.

Table 2. Navy bean market class response to row spacing and planting rates, Carrington, 2016.

Treatment	Plant[1]						Seed		
	Emerge	Flower	Stand (June 13)	Canopy closure (August 8)	Physiological maturity	Lodging	Yield	Test weight	Count
	Jday		plt/A	%	Jday	0-9	lb/A	lb/bu	no./lb
Row spacing (inches):									
14	154	196	114,780	88	242	1	3043	62.7	2212
21	154	196	128,273	75	241	1	2974	63.1	2256
28	154	196	123,555	69	239	1	2480	62.5	2380
LSD (0.05)	NS	NS	10,829	7	NS	NS	NS	NS	NS
CV (%)	7.6	0.2	9.1	11.1	2.7	160.1	26.0	1.1	12.4
Planting rate (pls/acre):									
100,000	154	196	94,307	77	241	1	2787	62.8	2252
125,000	154	196	125,835	78	241	1	2850	62.7	2283
150,000	154	196	146,467	77	240	1	2861	62.8	2312
LSD (0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV (%)	7.7	0.2	8.3	3.2	0.7	80.9	8.5	0.6	3.3

[1]Jday: 154=June 3; 200=July 15; 241=August 29.

Averaged across market types and planting rates, seed yield was statistically (LSD 0.05) similar with 14-, 21- and 28-inch rows at 2698, 3068 and 2549 lb/acre, respectively (data not shown). Averaged across market types and row spacings, plant stands were 106,810, 135,890 and 157,290 plants/acre with the low, medium and high planting rates, respectively. Seed yield was similar with 100,000, 125,000 and 150,000 pls/acre at 2708, 2827 and 2781 lb/acre, respectively.

No factors had statistical significance with the interaction of row spacing and planting rates. Seed count was statistically significant with the interaction of market types, row spacing and planting rates (data not shown).