Black and pinto bean response to row spacing and plant population, Carrington, 2018.
(Greg Endres and Mike Ostlie)

Field trials were conducted at the NDSU Carrington Research Extension Center with support from Northarvest Dry Bean Growers Association to examine the response of black and pinto bean to row spacing and planting rates. Experimental design was a randomized complete block with split plot arrangement (whole plot = row spacings, split plot = plant populations) with four replications. The dryland trials were planted on May 31on a conventionally-tilled Heimdal-Emrick loam soil. 'Eclipse' black was planted in 14-, 21- and 28-inch rows with planting rates of 95,000, 120,000 and 145,000 pure live seed (PLS)/acre to establish targeted stands of 90,000, 110,000 and 130,000 plants/acre, respectively. 'ND Palomino' pinto bean was planted in 21- and 28-inch rows with planting rates of 60,000, 85,000 and 110,000 PLS/acre to establish targeted stands of 50,000, 70,000 and 90,000 plants/acre, respectively. After maturity, plants were hand-pulled and placed in windrows: black = August 30 and pinto = September 5; and seed was harvested with a plot combine: black = August 30 and pinto = September 6.

Black bean: Averaged across planting rates, plant emergence (data not shown), flower and physiological maturity dates were similar among row spacings (Table 1). The highest plant density was with 21-inch rows. Canopy closure increased as rows narrowed. Seed yield was similar among rows while test weight increased as rows narrowed. Averaged across row spacings, stands were 93,080, 118,220 and 142,170 plants/A with low, medium and high planting rates, respectively. Canopy closure percentage generally increased slightly with increasing plant population. Yield, test weight, and seed count were similar among plant populations. Yield and test weight had statistical significance with row spacing and plant population interaction.

Table 1. Black bean response to row spacing and planting rates, Carrington, 2018.

Treatment	Plant[1]					Seed		
	Stand (June 15)	Flower	Canopy closure (July 31)	Physiological maturity	Pod height	Yield	Test weight	Count
	plt/A	DOY	%	DOY	cm	lb/A	lb/bu	no./lb
Row spacing (inches):								
14	116,800	197	87	233	5	1353	60.9	2580
21	131,380	197	72	233	4	1290	60.4	2540
28	105,290	197	58	234	4	1362	60.0	2470
LSD (0.05)	9,600	NS	5	NS	NS	NS	0.4	NS
CV (%)	10.3	0.2	8.6	0.8	62.7	15.4	0.7	5.6
Planting rate (pls/acre):								
95,000	93,080	197	70	234	4	1305	60.5	2470
120,000	118,220	197	71	234	4	1344	60.5	2530
145,000	142,170	197	75	233	4	1356	60.4	2590
LSD (0.05)	6,660	NS	2	1	NS	NS	NS	NS
CV (%)	8.0	0.2	3.4	0.2	52.5	10.3	0.5	4.9

[1]DOY: 196=July 15; 232=August 20.

Pinto bean: Averaged across planting rates, plant stand with 21-inch rows was greater than the stand with 28-inch rows (Table 2). Canopy closure generally was greater with narrow rows. Seed yield with narrow rows was 167 lb/A (11%) greater than with wide rows. Averaged across row spacings, stands were 52,650, 74,700 and 98,000 plants/A with low, medium and high planting rates, respectively. Canopy closure percentage increased slightly with increasing plant population. Yield was similar with medium and high plant populations, and was greater than yield with the low population. Factors having statistical significance with row spacing and plant population interaction were plant emergence and flower dates.

Table 2. Pinto bean response to row spacing and planting rates, Carrington, 2018.

Treatment	Plant[1]								Seed
				Canopy closure					
	Emerge	Stand (June 15)	Flower	Visual (July 31)	Canopeo (August 1)	Physiological maturity	Pod height	Lodging (Sept. 5)	Yield
	DOY	plt/A	DOY	%		DOY	cm	0-9	lb/A
Row spacing (inches):									
21	161	80,750	197	90	80	240	2	4	1534
28	162	69,485	197	78	72	241	1	5	1367
LSD (0.10)	NS	2,900	NS	4	NS	1	NS	NS	60
CV (%)	0.4	4.0	0.2	4.5	20.7	0.2	136.1	34.2	4.3
Planting rate (pls/acre):									
60,000	162	52,650	197	80	74	241	2	4	1318
85,000	162	74,700	197	85	76	241	2	5	1509
110,000	161	98,000	197	88	78	240	2	5	1525
LSD (0.10)	1	8,390	NS	2	3	1	NS	1	125
CV (%)	0.2	12.5	0.2	3.0	4.0	0.2	69.4	20.5	9.6

[1]DOY (day of year): 161=June 10; 197=July 16; 240=August 28. Lodging: 0=all stems vertical; 9=all stems horizontal.