Black and Navy Bean Seed Yield with Row Spacing and Plant Population

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A field study, partially funded by Northarvest Bean Growers Association, was conducted to examine the response of black and navy bean to row spacing and plant population. 'Eclipse' black and 'Avalanche' navy bean were planted in 14-, 21- and 28-inch rows at 100,000, 125,000 and 150,000 pure live seeds (PLS)/acre at Carrington in 2014 and 2016-17. The research continued with black bean in 2018 with slightly lower planting rates. In addition, the two dry bean market classes were planted at the three planting rates at Park River in 2014, and Prosper in 2014 and 2016-17. Averaged across four years and plant populations at Carrington, black bean yield was statistically similar among row spacings (Table 1). Yield tended to improve with 21-inch rows compared to the 14- and 28-inch rows.

Table 1. Black bean seed yield with row spacing[1], Carrington, 2014 and 2016-18.

Row Spacing	Seed Yield (4-year average)
inch	lb/ac
14	1,880
21	2,150
28	1,980
LSD (0.10)	NS

[1]Variety = 'Eclipse'. Averaged across three plant populations.

Averaged across eight site-years and three rows spacings, black bean planted at the low, medium and high rates produced 99,100, 118,500 and 140,700 plants/acre, respectively (Table 2). Yield increased three percent with the high- versus low-plant population. The intermediate plant population was statistically similar to the high plant population.

Table 2. Black bean seed yield with plant population, North Dakota, 2014, 2016-18 (8 site-years)[1].

Planting Rate	Plant Population	Seed Yield
PLS/acre (x1000)[2]	number/acre	lb/acre
95-100	99,100	2,290b
120-125	118,500	**2,330a**b
145-150	140,700	**2,360a**
LSD (0.15)	x	55

[1]Variety = 'Eclipse'. Trial locations: Carrington (2014, 2016-18); Prosper (2014, 2016-17); and Park River (2014). Averaged across three row spacings at

[2]PLS = pure live seed.

[ab] Values followed by different letters are signficantly different at $P<0.05$.

Averaged across three years and row spacings at Carrington, navy bean planted at the low, medium and high rates produced an average of 92,600, 116,800 and 139,800 plants/acre, respectively. Navy bean seed yield differed statistically among row spacings and plant populations (Table 3). The greatest yield was achieved with 14-inch rows plus the intermediate and high plant populations.

Table 3. Navy bean seed yield with row spacing and planting rate, Carrington, 2014, 2016-17 (3 site-years)[1].

Row Spacing	Planting Rate (PLSx1000/acre)[2]		
	100	125	150
Inches	Seed Yield (lb/acre)		
14	2580bc	**2660a**b	**2790a**
21	2470cd	2340d	2340d
28	2010e	2070e	2120e
LSD (0.10)		160	

[1]Variety = 'Avalanche'.

[2]PLS = pure live seed.

[ab] Values followed by different letters are signficantly different at P<0.05.

In summary, study results indicate that black bean seed yield improved with plant populations greater than 115,000 plants/acre. Narrow (14 inch) rows plus plant population greater than 115,000 plants/acre provided the highest navy bean yield.

Dry bean planting and in-furrow application of fertilizer (left).