

Seed Yield Effects Associated With Soybean and Dry Bean Plant Establishment Factors

Greg Endres, Extension Cropping Systems Specialist, Carrington Research Extension Center

The following tables are results from North Dakota State University Agricultural Experiment Station and Extension field research trials conducted across the state during the past 25 years. The research was partially supported by the North Dakota Soybean Council and Northharvest Bean Growers Association.

Soybean and dry bean plant establishment factors are listed as improved practices compared to traditional practices based on average percent yield increase with improved practices. The far right column shows the total number of trials conducted that support yield information. Footnotes describe selected factors. Further refinement of the improved practices is suggested based on field production history, soil characteristics, cultivar grown, weather, etc.

NDSU research summary of soybean plant establishment factors: Seed yield increase with improved vs. traditional practices

Factor	Improved Practice (IP)	Yield Increase IP vs. TP (%)	Traditional Practice (TP)	Number of Trials
Tillage system	reduced till ²	4	conventional till	37
Previous crop	wheat	5	soybean	6
Variety maturity group	0.1 later ³	1.5–2	normal	4
Planting date	early May ⁴	8	mid-May	10
Planting rate (pure live seed/acre)	150,000–175,000	6	100,000–130,000	44
Row spacing (inches)	14–21	4	28–30	24
Seed fungicide	yes	6	no	29
Rhizobia bacteria seed inoculation with soybean production history	yes ⁵	2	no	16
Phosphorus fertilizer application method ¹	broadcast	0.5	band (away from seed)	7
Timing of initial weed control	at planting	5	early post (2- to 4-inch weeds)	8

¹Broadcast at NDSU recommended rates and band rates reduced by one-third. Note minimal yield improvement with broadcast application.

²Reduced till includes direct-planted in previous crop stubble, strip-till or no-till.

³Additional yield gain may occur with longer maturing varieties but risk is involved due to plant death from freezing temperatures prior to plant maturity.

⁴Risks are associated with early planted soybean into cold soils and with frost occurring after plant emergence.

⁵Seed inoculation generally is not required if soybean is planted in a field with a prior history of soybean within 3-4 years.

NDSU research summary of dry bean plant establishment factors: Seed yield increase with improved vs. traditional practices

Factor ¹	Improved Practice (IP)	Yield Increase IP vs. TP (%)	Traditional Practice (TP)	Number of Trials
Variety selection	above trial average	4	trial average	9
Tillage system	strip-till	similar ⁴	conventional	5
Planting date	early (May 11–24)	similar ⁵	normal	6
• pinto, black and navy	late (June 5–18)		(May 22–June 5)	
Plant stand (plants per acre)	87,000	5	72,000	3
Row spacing	Intermediate (14–22 inches)	20	wide	11
• pinto				
• black				
• navy	22	3		
Seed inoculation with rhizobia bacteria	yes ²	2	no	10
Phosphorus fertilizer application	in-furrow or band ³	16	broadcast	3

¹Pinto bean unless other market classes identified.

²Surveys indicate majority of growers do not inoculate seed.

³10-34-0 at 3-6 gpa (two-third of broadcast rate); band = 2 inches from seed.

⁴No yield advantage with strip-till but benefits include reduced soil erosion, weed suppression, long-term improvement of soil health, etc.

⁵Risks are associated with early planted dry bean into cold soils and with frost occurring after plant emergence.