## 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 Northarvest 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 <sup>2</sup>	4	conventional till	37
Previous crop	wheat	5	soybean	6
Variety maturity group	0.1 later <sup>3</sup>	1.5-2	normal	4
Planting date	early May <sup>4</sup>	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 <sup>5</sup>	2	no	16
Phosphorus fertilizer application method <sup>1</sup>	broadcast	0.5	band (away from seed)	7
Timing of initial weed control	at planting	5	early post (2- to 4-inch weeds)	8

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

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

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

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

<sup>5</sup>Seed 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 <sup>1</sup>	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 <sup>4</sup>	conventional	5
Planting date • pinto, black and navy	early (May 11–24)	similar <sup>5</sup>	normal (May 22–June 5)	6
	late (June 5–18)			0
Plant stand (plants per acre)	87,000	5	72,000	3
Row spacing	Intermediate (14–22 inches)		wide	
• pinto		20		11
• black		9		4
• navy		22		3
Seed inoculation with rhizobia bacteria	yes <sup>2</sup>	2	no	10
Phosphorus fertilizer application	in-furrow or band <sup>3</sup>	16	broadcast	3

<sup>1</sup>Pinto bean unless other market classes identified.

<sup>2</sup>Surveys indicate majority of growers do not inoculate seed.

 $^{3}$ 10-34-0 at 3-6 gpa (two-third of broadcast rate); band = 2 inches from seed.

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

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

County commissions, North Dakota State University and U.S. Department of Agriculture cooperating. NDSU does not discriminate in its programs and activities on the basis of age, color, gender expression/identity, genetic information, marital status, national origin, participation in lawful off-campus activity, physical or mental disability, pregnancy, public assistance status, race, religion, sex, sexual orientation, spousal relationship to current employee, or veteran status, as applicable. Direct inquiries to Vice Provost for Title IX/ADA Coordinator, Old Main 201, NDSU Main Campus, 701-231-7708, ndsu.eoaa@ndsu.edu. This publication will be made available in alternative formats for people with disabilities upon request, 701-231-7881. web-2-24

NDSU