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Impact of Planting Dates on Dry Edible Bean

(Photo by Greg Endres, NDSU)

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Crop seasons in North Dakota occasionally begin early, providing the opportunity to plant crops in a timely manner and plant some crops, including dry edible bean (*Phaseolus vulgaris* L.), earlier than normal. This prompted North Dakota State University researchers to conduct field trials to explore if dry bean seed yield and quality can be increased with early planting, compared with the normal planting period (the last 10 days of May through the first 10 days of June) or a late period.

If so, early planting would provide the opportunity to increase profitability without additional input costs. This publication will summarize results of NDSU dry bean planting date trials conducted during 2012 through 2015.

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Materials and Methods

Six planting date trials were conducted by NDSU during 2012-15 at the Carrington Research Extension Center (CREC) and in 2012 at Prosper with pinto ('Lariat'), black ('Eclipse') and navy ('Avalanche') market classes of dry bean. **Table 1** lists trial locations, market types, planting dates by year and seed yield. During the early planting seasons in 2012 (including two trials at the CREC) and 2015, the first planting dates were May 11 to 17, while with later starts to the planting season in 2013 and 2014, the early planting dates were May 23 to 24. The second, or normal, planting dates for the trials ranged from May 22 to June 5, and the third, or late, planting dates ranged from June 5 to June 18.

Best management practices were used for dry bean production during the trials.

Results and Discussion

Among years, yield with early planting tended to be greater than with normal planting dates in five of six trials **(Table 1)**. However, yield generally was statistically similar with early and normal planting dates.

Yield with the early planting date was reduced in 2015 due to low plant density (44,160 plants per acre average across market types), compared with plant density (62,970 to 72,930 plants per acre) with later planting. The reduced plant stand resulted from cold and wet soil conditions (including snow) following planting, plus soil crusting that increased stress during seed germination and seedling emergence.

Averaged across the six trials, yield was statistically similar among planting periods but tended to be highest with early planting. Averaged across trials for each market type, yield was statistically similar for each market type with early, normal and late planting **(Table 2)**. When averaged among trials and market types, yield also was similar among planting periods.

The crop seasons of 2012 and 2015 were "early" (cool-season crop planting generally beginning in April) while 2013 and 2014 seasons were "late" (crop planting beginning in May). **Table 3** summarizes dry bean seed yield during the early growing seasons.

Averaged across trials, yield was statistically similar for each market type with early, normal and late planting. When averaged among trials and market types, yield was statistically similar but tended to be highest with the normal planting period.

Table 4 displays plant density and development, and yield by planting periods averaged across market types for three Carrington trials. Plant density tended to be greater with normal planting, compared with other planting periods.

Days from planting to plant emergence were delayed with early planting, generally due to cooler soil temperatures, compared with normal and late planting periods. Days from plant emergence to maturity averaged three days less with the normal planting period, compared with early or late planting. In 2014, plant lodging was slightly less with the normal planting period, compared with early or late planting (data not shown). Yield tended to increase with later planting.

Seed quality data with planting dates averaged across market types are displayed from trials conducted at Carrington in 2014 and 2015 **(Table 5)**. Test weight increased with normal and late planting dates in 2014 and tended to increase in 2015, compared with the early planting dates. Seed size was largest with early planting in the 2015 trial. Seed quality based on visual evaluation was variable among plant dates.

Table 1. Dry bean yield response to planting dates across market types, Carrington, 2012-15, and Prosper, 2012[1].

Carrington										Prosper		6-trial average
2012a	Seed yield	2012b	Seed yield	2013	Seed yield	2014	Seed yield	2015	Seed yield	2012	Seed yield	Seed yield
	cwt/acre		cwt/acre		cwt/acre		cwt/acre		cwt/acre		cwt/acre	cwt/acre
17-May	26.0	16-May	15.4	24-May	17.2	23-May	18.6	13-May	14.4	11-May	25.7	19.6
30-May	25.7	25-May	13.3	3-Jun	16.2	5-Jun	18.0	27-May	17.5	22-May	23.4	19.0
13-Jun	25.9	6-Jun	10.4	13-Jun	17.1	18-Jun	19.2	12-Jun	16.9	5-Jun	25.0	19.1
LSD (0.05)[2]	NS		3.0		NA		NS		1.6		NS	NS

[1] Carrington: 2012a = pinto and black; 2012b and 2013 = pinto; 2014-15 = pinto, black and navy. Prosper: pinto.
[2] NS = not statistically significant; NA = not available.

Table 2. Dry bean market type yield response to planting periods, Carrington and Prosper, 2012-15.

Market type (variety)	Trial number[1]	Seed yield (cwt/acre) — Planting period[2] — Early	Normal	Late	LSD (0.05)
Pinto (Lariat)	6	19.6	19.5	20.5	NS
Black (Eclipse)	3	19.8	20.3	18.2	NS
Navy (Avalanche)	2	16.1	16.5	17.4	NS
Average		19.0	19.1	19.3	NS

[1] Pinto: Carrington = 2012 (2 trials), 2013-2015; Prosper = 2012.
Black: Carrington = 2012, 2014-15; Navy: Carrington = 2014-15.
[2] Early: May 11-24; Normal: May 22-June 5; Late: June 5-18.

Table 3. Dry bean market type yield response to planting dates during early crop seasons, Carrington and Prosper, 2012 and 2015.

Market type (variety)	Trial number[1]	Seed yield (cwt/acre) — Planting period[2] — Early	Normal	Late	LSD (0.05)
Pinto (Lariat)	4	20.1	20.4	21.3	NS
Black (Eclipse)	2	21.9	21.4	18.7	NS
Navy (Avalanche)	1	12.2	16.1	15.5	NS
Average		19.5	20.1	19.7	NS

[1] Pinto: Carrington = 2012 (2 trials) and 2015, and Prosper = 2012.
Black: Carrington = 2012 and 2015; Navy: Carrington = 2015.
[2] Early: May 11-17; Normal: May 22-30; Late: June 5-13.

Table 4. Dry bean response to planting dates across market types, Carrington, 2012a and 2014-15[1].

Planting period	Plant density	Plant development — Planting to emergence	Emergence to physiological maturity	Seed yield
	plants/acre	days		cwt/acre
May 13 to 23	70,670	20.1	20.4	18.9
May 27 to June 5	79,350	21.9	21.4	19.7
June 12 to 18	73,190	12.2	16.1	20.0
LSD (0.05) Average		19.5	20.1	NS

[1] Carrington: 2012a = pinto and black; 2014-15 = pinto, black and navy.

Table 5. Dry bean seed quality with planting dates across market types, Carrington, 2014-15[1].

2014					2015			
Planting date	Test weight	Seed count	Seed quality[2] — 26-Nov	10-Dec	Planting date	Test weight	Seed count	Seed quality[3]
	lb/bu	no./lb				lb/bu	no./lb	0-5
23-May	61.5	2,140	3.5	3	13-May	60.8	1,970	2
5-Jun	62.6	1,970	3.0	4	27-May	61.2	2,090	3
18-Jun	62.6	2,370	4.5	3	12-Jun	61.2	2,250	3
LSD (0.05)	0.4	NS	0.5	1		NS	80	1

[1] Market types = pinto, black and navy.
[2] Brightness visually evaluated on Nov. 26 and Dec. 10 using a scale of 0 = dark and 5 = light for pinto and navy, and 0 = dull and 5 = bright for color of black bean. Ratings also included general seed quality.
[3] Visually evaluated on Nov. 24. Pinto: 0 = light and 5 = dark seed coat color;
Navy: 0 = no wrinkled seed coats and 5 = all seed coats wrinkled; no evaluation of black bean.

Summary

The dry bean research consisted of six site-years of data with three market types planted during early, normal and late planting dates. The data collected indicate the planting period of late May through early June, normally used by farmers, remains appropriate.

- **Seed yield:** The early planting period shows potential for increasing yield but with increased risks. However, yield with early planting was statistically similar to the normal planting period, including during "early" planting seasons. Also, these data indicate if planting is delayed until mid-June, yield will be maintained.
- **Seed quality:** Test weight tended to increase with normal vs. early planting periods, with generally no consistent impact on seed size or appearance.

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For more information on this and other topics, see www.ag.ndsu.edu

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