Refinement of Soybean Planting Recommendations for Central and Western North Dakota
(Planting Date, Row Spacing, Seeding Rate, and Variety)

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ABSTRACT

The North Dakota State University Research Extension Centers in Carrington, Minot, and Hettinger were test locations for a soybean trial that evaluated production issues important to central and western North Dakota. These field studies were developed to evaluate the effects of soybean planting strategies and the impact they have on soybean performance. Two planting dates (normal and early at Carrington and Hettinger, normal and late at Minot) and combinations of two varieties (Walsh, maturity group 0.0, and Barnes, maturity group 0.3), two row spacings (6-7" and 12-14"), and two seeding rates (175,000 and 225,000 live seeds / acre) were evaluated at each location. At Carrington, plots planted on 10 May reached physiological maturity only one day earlier than those sown on 20 May, with no significant differences in seed yield or quality. Later planting resulted in higher pods and a better stand. However, poor growing conditions in June may have masked differences which would occur in a more normal year. Barnes out-yielded Walsh by 5 bushels / acre and 7" out-yielded 14" rows by approximately 5 bushels / acre. In Minot, normal (20 May) planting increased yield by 8 bushels / acre compared to late (6 June) planting. The higher seeding rate and narrower row spacing also produced the best yields. Yield of Walsh was significantly higher than that of Barnes, due to frost affecting the longer-maturity variety. Extreme drought at Hettinger resulted in very low yields (8-9 bushels / acre) and inconclusive results.

INTRODUCTION

North Dakota soybean acreage has more than quadrupled over the past decade and the crop is steadily moving north and westward. Acreage has increased due to economics, disease (i.e. scab) and insect problems in traditional crops, and soil fertility and rotational benefits of growing soybean. Phase I of this project (1999-2001) investigated planting recommendations for soybean in these new production regions. Phase II began in 2002 and looks to refine these recommendations and evaluate the benefits and risks of very early planting.

OBJECTIVE

The objective of this project was to study management factors to foster the expansion of profitable soybean production in central and western North Dakota. Planting date, variety, seeding rate, and row spacing options were evaluated at three contrasting locations which represent the typically drier growing conditions in the regions where soybean acreage is expanding.

MATERIALS AND METHODS

The trial was conducted at the NDSU Research Extension Centers in Carrington, Minot, and Hettinger in 2002. Plots of 5-10' by 22-25' were planted in a randomized complete block experimental design with a split-plot arrangement and 4 replicates. In Carrington, early planting (10 May) was compared to a normally date (20 May). Due to the late spring in Minot, a normal (20 May) planting date was compared to delayed planting (6 June). Subplots at all 3 sites consisted of varieties Walsh (Maturity Group 0.0) and Barnes (Maturity Group 0.3) planted in all combinations of 2 row spacings (6-7" and 12-14") and 2 seeding rates (175,000 and 225,000 live seeds / acre).

Table 1. Influence of planting date on soybean development, Carrington, 2002.

Planting Date	Emergence	Stand	Canopy Closure	Flowering	Physiological Maturity	Pod Height	Grain Yield	Grain Protein
		(plants/ac)				(inches)	(bu/acre)	(%)
10 May	29 May	115,000	18 July	8 July	8 Sept.	2.2	37.1	34.9
20 May	3 June	133,000	18 July	10 July	9 Sept.	2.4	38.4	34.7
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Figure 1. Planting Date x Variety Interaction, Carrington, 2002

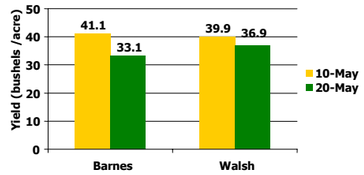

Figure 2. Varietal Effect on Soybean Seed Yield

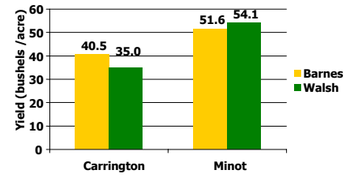

Figure 3. Row spacing effect on soybean seed yield.

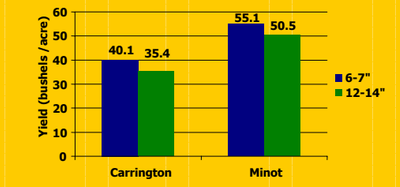

Figure 4. Seeding Rate Effect on Soybean Seed Yield, Minot.

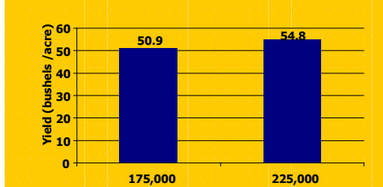

Table 2. Effect of planting date and row spacing on yield, Minot, 2002.

Planting Date	Row Spacing 6"	Row Spacing 12"
	(bushels/acre)	
20 May	61.2	52.6
6 June	49.1	48.5

RESULTS AND DISCUSSION

Planting Date: Averaged across all other factors at Carrington, plots planted on 10 May emerged 5 days earlier and reached physiological maturity only one day earlier than those sown on 20 May (Table 1). Later planting resulted in higher pods and a better stand. However, poor growing conditions in June may have masked differences which would occur in a more normal year. Yield of Barnes increased with the early planting, but yield of Walsh was unaffected (Fig. 1). In Minot, delaying planting from 20 May until 6 June reduced yield from 56.9 to 48.8 bushels / acre. This reduction was especially pronounced in the higher-yielding environment with 6" rows (Table 2).

Variety: At Carrington, the longer-season variety, Barnes, out-yielded Walsh by 5.5 bushels / acre (Fig. 2), indicating the benefit of planting a full-season variety. However, at Minot the yield of Walsh was significantly higher than that of Barnes, due to a killing frost before Barnes completed maturity. This points out the importance of matching varietal maturity with the growing season and the risk involved.

Row Spacing: Row spacing had a minimal effect on height to the lowest pod, plant height, and lodging, but solid-seeding (6-7") improved yield over narrow rows (12-14") by almost 5 bushels / acre at both sites (Fig. 3). Above-average August rainfall at both locations resulted in the yield benefit of narrower rows. In Minot, conditions were obviously very favorable during podfill, as evidenced by the spectacular yields.

Seeding Rate: At Carrington, relatively poor stands were observed, with no obvious explanation (data not shown). The higher plant stand resulted in faster canopy closure, increased height of the lowest pods, and reduced lodging. In Minot, the 225,000 live seeds / acre seeding rate yielded 3.9 bushel / acre higher than the 175,000 rate (Fig. 4).

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