Impact of Selected Establishment Factors on Soybean Production, Carrington

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The field study was initiated in 2011 and continued in 2014 at the NDSU Carrington Research Extension Center to examine soybean response to individual and combinations of selected establishment factors that may increase net return for producers. Experimental design was a randomized complete block with split-plot arrangement with four replications. Whole plots were planting dates; split plots were varieties with contrasting maturity groups (Mycogen 5B024R2 = 0.2 and 5B080R2 = 0.8) and starter fertilizer (untreated check, broadcast applied, and 0x2-inch band). The study was established on a loam soil with spring wheat as the previous crop. Spring soil analysis: 7 ppm phosphorus (P), 184 ppm potassium, 3.7% organic matter and 5.9 pH. Conventional-till plots were tilled on May 1 with a field cultivator. Gavilon liquid 6-24-6 was preplant broadcast applied and mechanically incorporated at 11.6 gpa on May 3, and band applied at 8 gpa during planting. Inoculated, fungicide-treated seed was planted on May 5 and 23 in 22-inch rows. The trial was harvested with a plot combine on October 6.

According to the National Ag Statistics Service, no soybean was planted in North Dakota based on the May 12 report and 5% planted as reported on May 19. Trial soybean planted on May 5 required 23 days for plant emergence compared to 11 days required for emergence with the May 23 planting date (Table 1). According to NDAWN, bare soil temperatures at 4 inches ranged from 34 to 43 degrees F during May 5-7 compared to 55 to 60 degrees F during May 23-25. The early planted soybean emerged 6 days earlier; reached first flower, canopy closure and maturity 3 to 4 days earlier; but had only 3 additional days from planting to maturity (111 days) compared to the later planted soybean. Plant stand was similar among planting dates and lodging was absent. Early planted soybean had higher yield (2.7 bu/A) and larger seed, but lower test weight compared to the later planting date. The later maturing variety had a 4.9 bu/A yield advantage over the early maturing variety, likely due to a significantly greater plant stand. Yield with preplant-incorporated broadcast fertilizer tended to be higher than band-applied starter fertilizer and increased 3.3 bu/A compared to the untreated check (with low soil P). Statistically significant interactions occurred for planting date by variety with dates for plant emergence and days to flower, plant stand and test weight; and for variety by fertilizer placement with test weight (data not shown). Yield tended to increase similarly with both maturity groups planted early compared to planting later. Yield tended to be highest with early planting and broadcast fertilizer application.

Soybean Response to Main Factors in Establishment Study

		Plant					Seed				
Main Factor	Description	Emergence	Canopy Closure	Stand[a]	Flower	Physiological Maturity	Yield	Test Weight	Number /lb	Oil[b]	Protein[b]
		Jday	Jday	plt/A	Jday	Jday	bu/A	lb/bu		------%------	
Planting Date	May 5	**148**	**210**	146,045	**191**	**259**	**47.2**	57.2	**2668**	15.7	34.0
	May 23	154	214	142,575	195	262	44.5	**57.7**	2718	15.5	34.0
Variety	5B024R2	152	216	102,095	**188**	**259**	43.3	57.4	**2332**	15.6	34.3
	5B080R2	**150**	**208**	**168,525**	197	262	**48.4**	57.5	3053	15.6	33.7
Starter Fertilizer Placement	untreated check	151	214	145,065	193	261	44.3	57.5	2681	15.6	34.1
	broadcast	**150**	211	154,005	193	260	**47.6**	57.4	2687	15.6	34.1
	band	151	211	133,860	193	261	**45.5**	57.5	2710	15.7	33.9
Mean		151	212	144,310	193	260	45.8	57.4	2695	15.6	34.0
C.V. %		0.6	1.3	16.4	0.3	0.5	6.5	0.5	2.2	1.8	1.7

LSD (0.05): Bold-typed numbers are statistically different for each factor within column.

[a] Stand counts taken on June 11-12. b Values at 13% moisture.