Soybean response to intensive management, Carrington, 2010.

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An irrigated trial was conducted at the NDSU Carrington Research Extension Center to examine soybean seed yield and quality based on individual or combinations of selected management inputs that may increase net return for producers. Experimental design was a randomized complete block with split plot arrangement with four replications. Whole plots were row spacing (14 and 28 inches) and split plots consisted of a factorial combination of cultivars, planting rate (150,000 and 200,000 pure live seeds/A), and foliar inputs versus untreated check. The conventional-till study was established with soybean as the previous year's crop on a Heimdal-Emrick loam soil with 51 lb/A (0-24") nitrate-N, 12 ppm P, 224 ppm K, 1.1% carbonate, 0.30 mmho/cm (0-6") and 0.29 mmho/cm (6-24") soluble salts, 27.1 meq CEC, 3.2% organic matter, 7.9 pH. Secondary and micro nutrients were at medium to high soil levels, except chloride at very low level (12 lb/A). Inoculated Peterson Farm Seeds RR '1000' and '0806' were planted on May 14. Foliar treatments were applied with a CO_2-pressurized hand-boom sprayer delivering 14 gal/A at 35 psi with 8001 flat-fan nozzles. The V2-3 growth stage treatments (TJ Technologies 'Sunflower/Canola/Soybean Mix' at 48 fl oz/A plus an experimental EMD Crop BioScience 'LCO promoter' at 4 fl oz/A) were applied on June 23 and R3 growth stage treatment (Headline fungicide at 6 fl oz/A + NIS at 0.125% v/v) was applied on July 21. Plant disease was evaluated several times during the season but notes were not taken due to very low incidence. Rainfall totaled 13.6 inches (NDAWN) during May1 to September 30, plus center-pivot irrigation totaling 6.8 inches during June 13 to August 19. The trial was harvested with a plot combine on October 4.

The late-maturing variety started flowering five days later and reached physiological maturity (PM) eight days later than the early-maturing variety (Table 1). Seed yield was 4.6 bu/A greater with the late-maturing variety. The 14-inch row spacing provided canopy closure 19 days earlier compared to the wide rows. PM was two days earlier with the narrow vs. wide rows. The 150,000 pls/acre planting rate resulted in an average stand of 132,060 plants/acre and the 200,000 pls/acre planting rate resulted in an average stand of 167,150 plants/acre (88 and 84% stand establishment, respectively). The high planting rate resulted in a 1.4 bu/A yield advantage. Plant maturity was shortened by two days and yield was increased 3.3 bu/A with the special foliar inputs compared to the untreated check.

Economic analysis was applied to main factors that had statistical yield differences. Assumptions include soybean market price of $11/bushel, seed costs of $40/50 lb unit, seed count of 2800/lb and germination of 95%, and $20/acre foliar input cost plus $5/acre application cost. Although the high planting rate provided a yield advantage, net return was $0.35/A compared to the lower planting rate. The yield increase with the special foliar input provided a net return of $11.30/A.

Analysis of variance (AOV) P values with statistical significance (LSD 0.05) for factor interactions are identified in Table 2. Factor interactions will be discussed at completion of the four-year study.

Table 1. Soybean response to main factors in intensive management study, CREC, 2010.

Main factor	Sub factor	Plant								Seed				
		Emergence	Stand	Canopy closure	Flowering	PM[1]	Height	Lodge	Pod height	Yield	Test weight	Number /lb	Oil	Protein
		Jday[2]	plt/A	——— Jday ———			inches	0-9	cm	bu/A	lb/bu		%	%
Variety	PFS1000	**148**	**145421**	204	**184**	**259**	**29**	0	**5**	**68.0**	**57.4**	**2994**	**20.8**	**30.9**
	PFS0806	**147**	**154920**	204	**189**	**267**	**33**	0	**8**	**72.6**	**57.6**	**3189**	**19.6**	**31.5**
Row spacing (inches)	14	31	155863	**194**	187	**262**	31	0	7	71.2	57.5	3125	20.2	31.1
	28	31	144833	**213**	187	**264**	30	0	7	69.4	57.5	3060	20.2	31.3
Planting rate (x1000 pls/acre)	150	148	**132059**	204	187	263	31	0	6	**69.6**	57.5	3090	20.2	31.1
	200	147	**167149**	203	187	263	31	0	7	**71.0**	57.5	3093	20.2	31.3
Special inputs	Foliar	148	148789	204	187	**262**	31	0	**7**	**71.9**	57.6	**3150**	20.1	31.2
	UC	148	151643	204	187	**264**	31	0	**6**	**68.6**	57.4	**3036**	20.2	31.2
Mean		148	150170	204	187	263	31	0.1	7	70.3	57.5	3091	20.2	31.2
CV %		0.4	10.0	0.8	0.2	0.4	5.6	187.4	22.9	3.9	0.6	3.3	0.8	0.9

LSD (0.05): pairs of data with bold type = significantly different.

[1]PM=physiological maturity.

[2]Jday=Julian calendar.

[3]Foliar=V2 stage aplication of micro-nutrient blend + LCO promoter; followed by R2 application of Headline fungicide; UC=untreated check.

Table 2. AOV P values of factor interactions for soybean intensive management study, CREC, 2010[1].

	Plant								Seed				
Factors[2]	Emergence	Stand	Canopy closure	Flowering	PM[3]	Height	Lodge	Pod height	Yield	Test weight	Number /lb	Oil	Protein
	Jday	plt/A	——— Jday ———			inches		cm	bu/A	lb/bu		%	%
rep					*			*		*		*	
ROW			*		*								
rep*ROW													
VAR		*											
SEED		*											
MGMT													
ROW*VAR													*
ROW*SEED			*										
ROW*MGMT					*								
VAR*SEED		*											
VAR*MGMT													
SEED*MGMT			*		*								
ROW*VAR*SEED													
ROW*VAR*MGMT													
ROW*SEED*MGMT								*					
VAR*SEED*MGMT													

[1]*=statistically significant using LSD 0.05.

[2]VAR=varieties; ROW=row spacings; SEED=planting rates; and MGMT=special foliar inputs.

[3]PM=physiological maturity.