

**Soybean response to prior year application of phosphorus, Carrington, 2020-21.**

(Greg Endres and Mike Ostlie)

The field study was initiated at the NDSU Carrington Research Extension Center to examine soybean response to phosphorus (P) preplant applied the prior year for corn plus soybean versus each year of corn and soybean production. Experimental design was a randomized complete block and four replications. Treatments: 1) untreated check, 2) P preplant applied, based on soil analysis and NDSU fertilizer rate recommendations, for corn; followed by P application the following year for soybean, 3) P preplant applied the initial year for corn plus soybean. The dryland trial was established on conventionally tilled Heimdal-Emrick loam soil with 3.2% organic matter, 7.9 pH (0-6 inch depth), 7 ppm P (Olsen; low), 153 ppm K, and 0.85 mmho/cm soluble salts (0-6 inch depth). The recommended P fertilizer rate with low-testing soil for corn=78 lb/A and soybean=26 lb/A. In 2020, triple super phosphate (TSP; 0-46-0) was preplant broadcast applied at 67 lb P<sub>2</sub>O<sub>5</sub>/A for trt 2 and 93 lb P<sub>2</sub>O<sub>5</sub>/A for trt 3 on May 22 and incorporated with a field cultivator plus harrow. 'DKC32-12RIB' corn was planted May 26 in 30-inch rows with an in-furrow application of 10-34-0 at 2.75 gpa plus chelated Zn at 0.25 gpa to trts 2 and 3. Corn was harvested October 7. In 2021, TSP was broadcast applied at 15 lb P<sub>2</sub>O<sub>5</sub>/A for trt 2 on May 6 and lightly incorporated with a harrow. 'AG03X7' soybean was direct-planted into corn residue in 30-inch rows on May 18. NDAWN monthly rain (inches) in 2021: May=1.4; June=1.8; July=0.1; August=2.6; September (1-23) =1.7; and 5-month total=7.6. Soybean seed was harvested with a plot combine on September 23.

Soybean plant development, stand and canopy ground cover was similar among treatments (Table). Soybean seed yield, test weight, and seed oil and protein also were similar among treatments.

Treatment		Plant <sup>a</sup>					Seed			
		Emergence (VE)	Stand (1-Jul; V3)	Flower (R1)	Canopy (17-Aug; R5-6) <sup>b</sup>	Physiological maturity (R8)	Yield	Test weight	Oil	Protein
No.	Description	DOY	plt/A	DOY	%	DOY	bu/A	lb/bu	%	
1	untreated check	156	122,850	185	62	253	18.1	56.9	20.3	33.7
2	P corn/P soybean	156	124,170	186	63	254	18.7	56.8	20.8	32.9
3	P corn + soybean	156	123,510	185	61	254	18.3	57.1	20.7	32.9
Mean		156	123,510	185	62	254	18.4	57.0	20.6	33.2
CV (%)		0.4	12.3	0.3	9.7	0.6	13.5	0.5	2.9	3.8
LSD (0.10)		NS	NS	NS	NS	NS	NS	NS	NS	NS

<sup>a</sup>DOY=Day of year; 156=June 5; 185=July 4; 254=Sept. 11.

<sup>b</sup>Canopeo app used to measure ground cover.