

Pinto bean response to Zn and S fertilizer, Carrington, 2022.

Greg Endres, Sam Richter and Mike Ostlie

The field trial was conducted at the NDSU Carrington Research Extension Center with support from Northharvest Dry Bean Growers Association to examine the performance of pinto bean with preplant incorporated (PPI), in-furrow (IF) and/or post emergence (POST) zinc (Zn) and sulfur (S) fertilizer. Experimental design was a randomized complete block with four replications. Previous crop in 2021 was barley. The dryland experiment was established on a conventional-tilled loam soil with 2.8% organic matter, 8.2 pH (0- to 6-inch depth), 5 ppm (Olsen = low) P, 146 ppm K and 0.54 ppm (low) Zn. The broadcast fertilizer treatments were PPI applied and shallow incorporated on May 26. Fungicide-treated 'ND Falcon' was planted with a 4-row JD Flex planter in 30-inch rows on June 8. Starter fertilizer was IF applied at planting. The POST foliar fertilizer treatment was applied on July 13 at the V5 growth stage with a hand-boom sprayer delivering 14 gpa through TeeJet AR 8001VS flat-fan nozzles at 35 psi. Plants were hand-pulled for field drying on September 27 and seed harvested with a plot combine on September 29.

Days from pinto bean planting to plant emergence, flowering, and maturity generally were similar among treatments (Table). Early season plant density about one month after emergence averaged 59,240 plants/acre across the trial. Compared to the untreated check (63,250 plants/A), crop stand with most fertilizer treatments (all included IF applications) tended or were statistically reduced. Canopy closure (August 15; R5 growth stage) evaluated with Canopeo was similar among treatments. Plant lodging evaluated Sept. 26 was similar among treatments. White mold was present in the trial at very low levels not impacting seed yield. Seed yield, test weight and protein were similar among treatments.

Table. Pinto bean response to Zn and S fertilizer, Carrington, 2022.

Fertilizer treatment ^a	Plant						Seed		
	Emerge DOY ^b	Stand (12-Jul) plt/A	Flower (R1) DOY	Canopy closure Canopeo ^c %	Lodge ^d (26-Sep) 0-9	Physiological maturity (R9) DOY	Yield lb/A	Test weight lb/bu	Protein %
untreated check	169	63,248	213	87	3	262	2109	58.1	20.4
IF 10-34-0 at 2.75 gpa + water at 0.25 gpa	169	64,078	212	89	3	261	2049	58	20.1
IF 10-34-0 at 2.75 + Ammend Zn at 0.25 gpa	170	52,548	212	88	3	259	2162	57.7	20.2
IF 10-34-0 at 2.75 + water at 0.25 gpa/POST Ammend Zn at 0.25 gpa	170	58,766	213	92	4	263	2047	58.1	20.3
PPI ZnS (2 lb Zn)/IF 10-34-0 2.75 gpa + water at 0.25 gpa	170	55,446	213	96	5	263	2097	58.5	20.1
PPI ZnS (2 lb Zn) + AmS (20 lb S)/IF 10-34- 0 2.75 gpa + water at 0.25 gpa	170	57,438	212	93	4	262	1997	58.4	20.2
mean	169	59,240	212	90	3	261	2082	58.1	20.2
CV (%)	0.2	9.1	0.2	6.8	24.5	0.7	10.8	1.0	1.8
LSD (0.10)	1	6,636	NS	NS	NS	NS	NS	NS	NS

^aAmmend EDTA Zn 9: 8.0% N and 9.0% Zn chelate (CHI).

^bDOY (day of year): 169=June 18; 212=July 31; 261= Sep 18.

^cApp for digital green cover estimation; measured 15-Aug (R5 growth stage).

^dPlant lodge:0-9 (all plants flat).