

## **Pinto bean response to starter and foliar fertilizer, Carrington, 2021.**

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The field trial was conducted at the NDSU Carrington Research Extension Center with support from Northarvest Dry Bean Growers Association to examine the performance of pinto bean with selected treatments of phosphorus (P), zinc (Zn), and sulfur (S) starter and post-applied fertilizer. Experimental design was a randomized complete block with four replications. Previous crop in 2020 was barley for hay. The dryland experiment was established on a conventional-tilled loam soil with 3.9% organic matter, 7.6 pH (0- to 6-inch depth), 5 ppm (Olsen - low) P, 208 ppm K and 0.66 ppm (low) Zn. The broadcast fertilizer treatments were preplant (PPI) applied and shallow incorporated on May 26. Fungicide-treated 'ND Palomino' was planted at 94,000 seeds/A with a 4-row JD Flex planter in 30-inch rows on May 28. Starter fertilizer was in-furrow (IF) applied at planting. Post-emergence (POST) foliar fertilizer treatments were applied on July 9 at the V5 to bud growth stages with a hand-boom sprayer delivering 14 gpa through TeeJet 8001VS flat-fan nozzles at 35 psi. The trial was not harvested for seed yield due to: 1) very low and variable plant density, caused by low soil moisture and high air temperatures during plant establishment and until late August; and 2) variable plant development among and within plots, caused by late-season moisture. NDAWN monthly rain (inches): May=1.4; June=1.8; July=0.1; August=2.6; September=2.0; October=3.7; and 6-month total=11.6.

Two untreated checks were included in the trial and data averaged in Table. Pinto bean plant emergence was delayed 3-5 days with IF fertilizer. Early season plant stand about 3 weeks after emergence averaged only 17,760 plants/acre across the trial. IF fertilizer generally reduced plant stand compared to the untreated check: 31-34% stand reduction with 10-34-0, and 66% stand reduction with 10-34-0 plus Zn. Flowering dates were essentially similar while plant maturity was variable among treatments. Canopy ground cover, evaluated visually and with Canopeo during mid-August (R7-8 growth stages), was minimal and generally similar among treatments.

Table.

Fertilizer treatment <sup>a</sup>	Plant					
	Emerge DOY	Stand (2-Jul) plt/A	Flower (R1) DOY	Canopy ground cover (17-Aug)		Physiological maturity (R9) DOY
				visual	Canopeo %	
untreated check	160	21,250	195	33	19	257
IF 10-34-0 at 2.75 + water at 0.25 gpa	163	14,610	195	28	20	252
IF 10-34-0 at 2.75 + Ammend Zn at 0.25 gpa	165	7,300	194	16	16	265
IF 10-34-0 at 2.75 + water at 0.25 gpa/POST Ammend Zn at 0.25 gpa	163	13,950	196	28	20	264
PPI ZnS at 2 lb Zn + AmS at 20 lb S per acre/IF 10-34-0 at 2.75 + water at 0.25 gpa	163	17,270	196	29	24	283
PPI ZnS at 2 lb Zn + AmS at 20 lb S per acre	160	20,590	196	30	22	276
PPI ZnS at 2 lb Zn per acre	159	25,900	196	35	22	251
mean	161	17,760	195	29	20	263
CV (%)	1.1	19.0	0.4	23.3	26.0	4.8
LSD (0.10)	2	4,100	1	8	NS	15

<sup>a</sup>Ammend EDTA Zn 9: 8.0% N and 9.0% Zn chelate (West Central).

<sup>b</sup>DOY (day of year): 161=June 10; 195=July 14; 263=Sep 20.