

Corn response to preplant, starter and post-applied fertilizer, Carrington, 2022

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A field study continued at the NDSU Carrington Research Extension Center, and supported by the ND Corn Utilization Council, to examine the performance of corn with preplant incorporated (PPI), in-furrow (IF) or post-emergence (POST) applied zinc (Zn) and sulfur (S) fertilizer, plus two specialty fertilizer additives. Experimental design was a randomized complete block with four replications. The trial was established on conventionally tilled, Heimdal-Emrick loam soil with 2.8% organic matter, 7.9 (0-6 inches) and 8.3 (6-24 inches) pH, 0.35 mmho/cm (0-6 inches) and 0.48 mmho/cm (6-24 inches) soluble salts, 41 lb nitrate-N/acre, 2 ppm (low) P, 119 ppm (med) K and 0.26 ppm (low) Zn. Barley was the prior crop in 2021. Urea (80 lb N/acre) + 0-0-60 (67 lb K₂O/acre) were PPI on May 6. PPI treatments were applied May 18 and incorporated with a field cultivator plus harrow. DeKalb 'DKC32-12RIB' (82-day relative maturity) Roundup Ready corn was planted with a John Deere 71 4-row flex planter on May 18 in 30-inch rows, and included IF fertilizer treatments. Foliar treatments were applied on June 28 at the V6-7 growth stages. NDAWN monthly rain (inches): May=6.7; June=2.9; July=1.5; August=1.2; September=0.6; October=0.15; and 6-month total=13.1. Grain was harvested with a plot combine on November 8.

Time from corn planting to plant emergence was similar (June 2) among treatments (data not shown). However, silk dates were extended 3-5 days among fertilizer treatments compared to the untreated check (Table). Early season plant stand (measured at V2 growth stage) averaged 26,165 plants/acre and was similar among treatments including untreated check. Plant height was 4-10 inches greater among fertilizer treatments compared to the untreated check. Grain yield with PPI treatments increased 24-47% compared to the untreated check. IF treatments generally tended to increase yield compared to the untreated check. Test weight was 1.8-1.9 lb/bu greater with PPI treatments that were followed with IF 10-34-0 compared to the untreated check. Grain harvest moisture and seed quality factors were similar among treatments.

Table. Corn response to PPI, IF and POST application of fertilizer, Carrington, 2022.

Treatment			Plant			Seed					
Fertilizer ¹	Rate gpa	Application method	Silk	Stand	Height	Yield	Test	Harvest	Protein	Oil	Starch
			DOY ²	(9-Jun) plt/A	(8-Jul) cm		weight lb/bu	moisture			
untreated check	x	x	212	24,901	78	109.4	56.0	11.6	8.5	3.7	70.7
TSP+AS+ZnS	174 + 83 + 5.6 lb	PPI	208	26,561	99	136.1	56.9	11.2	8.6	3.8	70.5
TSP+AS+ZnS/ 10-34-0	174 + 83 + 5.6 lb/3	PPI /in- furrow	208	26,893	101	158.1	57.8	11.3	8.7	3.8	69.8
MESZ/ 10- 34-0	200 lb/3	PPI/in- furrow	207	27,889	103	160.4	57.8	11.3	8.6	3.9	70.1
10-34-0	3	in-furrow	208	27,225	87	116.7	56.3	11.3	8.6	3.7	70.9
10-34-0 + Zn	2.75 + 0.25	in-furrow	208	26,561	94	129.4	56.6	11.3	8.5	3.8	70.7
10-34-0/Zn	3/0.25	in-furrow/ foliar	208	25,233	92	117.8	56.0	11.0	8.6	3.8	70.7
10-34-0 + Zn/S	2.75 + 0.25/0.5	in-furrow/ foliar	208	25,233	95	116.8	56.3	11.0	8.5	3.7	70.9
Agrolution pHLow + water	12 lb +3	in-furrow	209	27,889	90	105.3	56.4	11.1	8.4	3.8	69.5
Torgue + 10- 34-0	1 fl oz + 3	in-furrow	208	24,569	90	119.2	56.6	11.2	8.2	3.8	71.3
10-34-0/ Torgue	3/1 fl oz	in-furrow/ foliar	208	26,229	88	113.5	56.7	11.0	8.3	3.8	70.6
mean			209	26,165	91	124.1	56.6	11.2	8.5	4	70.5
C.V. (%)			0.2	8.2	5.8	13.0	1.5	3.0	5.3	3.3	1.3
LSD (0.10)			1	NS	6	19.3	1.0	NS	NS	NS	NS

¹Average of two untreated checks. TSP=triple superphosphate (0-46-0); AS=Ammonium sulfate (21-0-0-24); ZnS=zinc sulfate (35.5% Zn and 17.5% S); MESZ=Microessentials SZ (12-40-0 10S 1Zn); chelated Zn=Ammend (8% N and 9% Zn; CHS); S=MAX-IN S (0-0-19-13; Winfield); Agrolution pHLow (11-45-11 Plus Zinc Starter; ICL); Torgue (Novozymes).

²Day of Year: 209=July 28.