

Corn response to starter and post-applied fertilizer, Carrington, 2019.

(Greg Endres, Mike Ostlie and Sam Richter)

A field study continued at the NDSU Carrington Research Extension Center to examine the performance of corn with starter P and Zn, foliar S and Zn, and post N. Experimental design was a randomized complete block with four replications. The trial was established on conventionally tilled, Heimdal-Emrick loam soil with 3.8% organic matter, 7.7 (0-6 inches) and 8.2 (6-24 inches) pH, 0.20 mmho/cm (0-6 inches) and 0.23 mmho/cm (6-24 inches) soluble salts, 32 lb nitrate-N/acre, 7 ppm (low) P, 175 ppm K and 0.33 ppm (low) Zn. Soybean was the prior crop in 2018. Urea was preplant incorporated (PPI) at about 30 lb N/acre on May 3. PPI treatments were applied May 6 and lightly hand-raked for incorporation. DeKalb 'DKC33-78 RIB' (83-day relative maturity) Roundup Ready corn was planted with a John Deere 71 4-row flex planter on May 7 in 30-inch rows, and included in-furrow (IF) and surface-dribbled fertilizer treatments. Rain totaled 0.47 inch on May 13-18 to partially incorporate the surface-applied fertilizer. Foliar S and Zn were applied on June 18 at the V5 growth stage using a hand-boom sprayer delivering 17 gpa through 80015 flat-fan nozzles at 35 psi. Trial area was soil sampled for the pre-sidedress soil nitrate test (PSNT) and analysis was 72 lb nitrate-N/acre. UAN at 50 lb N/acre was side-dressed by coulter injection on June 28 at the V6 stage to two of four trial replications, providing a total of ≥ 150 lb N/acre (including previous crop N credit, residual soil N, PPI urea and N provided by fertilizer treatments). Plant potassium (K) deficiency symptoms were observed during the week of July 1 and 100 lb/acre of 0-0-60 was manually broadcast-applied on July 11 at V7-8 stages. Rain totaled 0.34 inch on July 12-13 to partially incorporate the K fertilizer. Grain was harvested with a plot combine on November 13.

Time from planting to plant emergence was similar among all fertilizer treatments, averaging 23 days after emergence (data not shown). Silk date was statistically similar among fertilizer treatments and the untreated check (Table 1). Early season plant stand was similar among treatments, averaging 34,900 plants/acre. Grain yield was similar among all treatments including the untreated check, despite low-testing soil for P and Zn, and above-normal season rainfall that may have leached soil S beyond corn root profile. Variability in soil characteristics, primarily K deficiency, likely contributed to inconsistency (high C.V.) in yield response among treatments. Grain harvest moisture, test weight, protein, oil and starch generally were similar among treatments.

Table 1. Corn response to in-furrow starter and foliar fertilizer, Carrington, 2019.										
Treatment					Seed					
Fertilizer ¹	Rate	Application method	Silk	Stand (6-Jun)	Yield	Test weight	Harvest moisture	Protein	Oil	Starch
	gpa		DOY ²	plt/A	bu/A	lb/bu	%			
untreated check	x	x	212	34,529	148.2	51.8	19.9	7.3	3.5	72.9
TSP+AS+ZnS/10-34-0	170 + 20 + 5.6 lb/3	PPI /in-furrow	211	37,849	149.7	51.6	19.3	7.6	3.6	72.7
MESZ/10-34-0	200 lb/3	PPI/in-furrow	212	36,521	147.2	51.0	20.5	7.7	3.7	72.5
10-34-0	3	in-furrow	212	29,217	134.1	50.2	21.1	7.7	3.9	72.4
10-34-0	3	dribble	214	35,193	133.7	50.4	19.7	7.6	3.8	72.5
10-34-0 + Zn	2.75 + 0.25	in-furrow	212	36,521	131.0	50.7	21.0	7.7	3.6	72.8
RizeR + water	2.5 + 0.5	in-furrow	213	34,529	161.7	51.3	20.0	7.6	3.6	72.7
10-34-0/Zn	3/0.25	in-furrow/ foliar	211	33,201	163.3	50.8	21.6	7.7	3.7	72.5
10-34-0/S	3/0.5	in-furrow/ foliar	213	36,521	156.2	51.0	19.9	7.4	3.6	72.8
mean			212	34,900	146.3	51.0	20.3	7.6	3.6	72.6
C.V. (%)			1.0	13.5	24.5	1.9	8.6	5.4	4.0	0.5
LSD (0.10)			NS	NS	NS	NS	NS	NS	0.2	NS

¹TSP=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=Amend (8% N and 9% Zn; West Central); RizeR (7% N, 17% P, 3% K, 0.95% Zn, 0.2% Fe, 0.06% Mn, and 0.07% Cu; Loveland); S=MAX-IN S (0-0-19-13; Winfield).

²Day of Year: 212=July 31.

Grain yield, test weight, and harvest moisture statistically were similar with POST N compared to untreated (Table 2).

Table 2. Corn response to side-dressed N, Carrington, 2019.			
Treatment	Seed		
	Yield	Test weight	Harvest moisture
	bu/A	lb/bu	%
untreated check	134.4	50.7	20.3
post N ^a	157.4	51.2	20.3
mean	146.3	51.0	20.3
CV (%)	27.2	2.3	8.5
LSD (0.05)	NS	NS	NS

^aPost N side-dressed applied as UAN (28-0-0) at 50 lb nitrate-N/acre at V6 stage.