

Corn Response to Soil Nitrogen and Foliar Inputs, Carrington, 2013

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The trial objective was to determine the combination of soil nitrogen (N) levels and foliar inputs to economically increase corn yield. The dryland field trial was established at the CREC on a conventionally-tilled Heimdal-Emrick loam soil. Spring soil analysis indicated 30 lbs nitrate N/ac, 9 ppm phosphorus, 295 ppm potassium, 0.62 ppm zinc, 3.5 percent organic matter, and 6.7 pH. Urea (46-0-0) was applied on May 16 to reach targeted N rates of 50, 100 and 150 lbs/ac, and was incorporated with 0.4 inches of rain on May 16 plus twice mechanically with a field cultivator plus harrow on May 17. DeKalb Roundup Ready 'DKC31-10' (81-day relative maturity) was planted at 37,000 seeds/ac in 30-inch row spacing on May 17 with band-applied 10-34-0 fertilizer at 3 gal/ac plus zinc at 1 qt/ac. POST foliar inputs were applied on July 5 to V6-stage corn: 1) zinc [9.5% N, 10% Zn, and 4% S (NW Chemical) at 1 qt/ac]; 2) zinc + fungicide [Headline (BASF) at 6 fl oz/ac]; 3) zinc + fungicide + growth regulator [Ascend (Winfield) at 4.5 fl oz/ac]. The trial was harvested with a plot combine on October 25. A field video showing and discussing the trial is available for viewing at the following website: www.youtube.com/user/NDSUCREC.

Averaged across foliar treatments, soil N at 100 lbs/ac improved grain yield 8.6 bu/ac (9%) compared to yield at 50 lbs/ac (Table). The high N rate did not improve yield compared to 100 lbs/ac, likely due to plant stress from deficient soil moisture during reproductive stages. Averaged across soil N levels, foliar zinc tended to improve yield compared to the untreated check. Additional foliar products mixed with zinc did not improve yield. Highest numerical yield (106.6 bu/ac) was obtained with N at 100 lbs/ac plus foliar zinc, and provided the highest net gain (\$44/ac) among treatments compared to yield (84.1 bu/ac) and income with N at 50 lbs/ac and no foliar inputs. Prices used for costs and income: N fertilizer = \$0.60/lb; zinc = \$3.25/ac; Headline = \$12.70/ac; Ascend = \$10.50/ac; field application cost = \$6/ac; and corn market price = \$3.70/bu.

Table 1. Corn grain yield among soil N levels and foliar inputs.

Foliar inputs ^a	Corn Yield (bu/acre)			Average across soil N
	Soil N (lb/acre)			
	50	100	150	
untreated check	84.1	87.2	96.4	89.2
Zinc	86.7	106.6	96.0	96.4
Zinc + fungicide	97.4	96.2	97.7	97.1
Zinc + fungicide + growth regulator	87.6	100.4	101.2	96.4
Average across foliar inputs	89.0	97.6	97.8	--

^aZinc = 9.5% N, 10% Zn, and 4% S (NW Chemical) at 1 qt/ac; fungicide = Headline (BASF) at 6 fl oz/ac; growth regulator = Ascend (Winfield) at 4.5 fl oz/ac. Applied at V6 stage.