

Corn response to nitrogen and timing of weed control, Carrington, 2010.

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Trial objective was to determine the combination of soil N and timing of weed control to economically increase corn yield and quality. The dryland field trial was established at the NDSU Carrington Research Extension Center on a conventionally-tilled Heimdal-Emrick loam soil. Experimental design was split plot [main plot=N (3 treatments targeted at 50, 100, 150 lb soil N/acre) and subplots=timing of weed control (4 treatments targeted at PRE=initial season, early POST=2- to 4-inch weed height, late POST=8- to 12-inch weed height, and untreated check)] with four replications. Spring soil analysis indicated 25 lb nitrate-N/A, 9 ppm phosphorus, 182 ppm potassium, 0.97 ppm zinc, 4.2% organic matter, and 6.1 pH. Nitrogen as urea (46-0-0) was applied and incorporated on April 27 at 25, 75, and 125 lb nitrate-N/A to low-, medium-, and high-N plots, respectively. DeKalb Roundup Ready 'DKC33-53' (83-day relative maturity) was planted at 26,000 seeds/A in 30-inch row spacing on May 4. Starter liquid fertilizer 10-34-0 was in-furrow applied at 5 gal/A. Herbicides were applied using a CO₂ hand-boom sprayer with 8001 flat fan nozzles delivering 12 gal/A at 35 psi. SureStart (acetochlor&clopyralid&flumetsulam&dichlormid safener) at 28 fl oz/A was PRE applied on May 5 with 38 degrees F, 94% RH, and 10 mph wind to a moist soil surface. Corn emerged on May 23. Cornerstone Plus (3 lb ae/gal glyphosate) at 32 fl oz/A + AMS (N-Pak) at 64 fl oz/A were applied POST. POST1 was applied to the PRE and early POST plots on June 7 with 77 degrees F, 31% RH, and 10 mph wind to 4-collar stage corn. POST2 was applied to the early and late POST plots on June 28 with 61 degrees F, 81% RH, and 6 mph wind to 6- to 7-collar corn. A second application of glyphosate was not required for the late POST treatments due to low weed density and large corn. Table 1 lists weed species, size, and density during application of POST herbicides. The trial was hand harvested on October 8 and ears threshed with a plot combine on October 29.

Table 1.

Species ¹	Weed			
	POST1		POST2	
	Size (inches in height)	Density (plt/ft ²)	Size (inches in height)	Density (plt/ft ²)
Annual grass	1 to 4	31	2 to 18	21
Common lambsquarters	1 to 4	13	2 to 15	12
Prostrate and redroot pigweed	1 to 3	1	1 to 6	4

¹Annual grass= barnyardgrass, green and yellow foxtail, and volunteer wheat.

Leaf tissue analysis for samples taken on June 30 from the high N and initial-season weed control treatments indicated high levels of N (data not shown). The basal stalk nitrate test indicated nitrate-N levels were optimum (700 to 2000 ppm = yield was not limited by a shortage of N) for the medium and high N treatments (Table 2). Among soil N levels, plant height and chlorosis, and silk dates generally were similar. Seed yield and moisture tended to increase with higher N levels. High N reduced test weight compared to low N.

Corn plants with PRE or early-POST weed control were generally taller and green compared to the late-POST weed control or untreated check. Silk dates were delayed as weed control was delayed. Nitrate-N levels indicated by the basal stalk test were optimum among timings of weed control. Initial-season and early-POST weed control resulted in greater seed yield and test weight compared to the late-POST weed control or untreated check. Also, seed moisture was less with

timely weed control. No statistically significant interactions were present for corn seed yield and moisture, and test weight among N levels and timing for control of weeds.

Table 2. Corn response to N and timing of weed control, Carrington, 2010.										
Treatment	Plant ¹							Seed		
Factor	Height (inches)		Chlorosis (0-9)			Silk date	Basal stalk nitrate-N	Yield	Test weight	Moisture
	25-Jun	23-Jul	25-Jun	23-Jul	9-Aug	Jday	ppm	bu/A	lb/bu	%
soil N level (lb/A)										
50	16	54	3.5	3	3	210	NA	82.7	53.0	17.2
100	16	56	4	3	2.5	210	1179	92.3	52.6	17.5
150	15	54	4	3	2.5	209	1379	91.9	52.1	17.8
LSD (0.05)	NS	NS	NS	NS	0.5	NS	172	NS	0.7	NS
Weed control ²										
untreated check	14	32	6	6.5	6.5	NA	NA	12.2	51.3	19.1
PRE/POST1	20	73	1	1	1.5	207	1157	123.0	54.2	15.8
POST1/POST2	15	69	2.5	1.5	1	208	1420	130.7	53.4	16.8
POST2	14	45	5.5	3.5	1	213	1261	89.9	51.4	18.3
LSD (0.05)	2	5	0.5	0.5	0.5	1	199	13.6	0.8	1.1
mean	16	55	4	3	2.5	210	1279	89.0	52.6	17.5
CV (%)	11.1	9.7	18.1	15.8	23.3	0.5	16.2	19.5	1.6	6.7
¹ Chlorosis: 0=dark green, 9=yellow; Basal stalk nitrate-N samples taken on October 6.										
² PRE=May 5; POST1=June 7; POST2=June 28.										