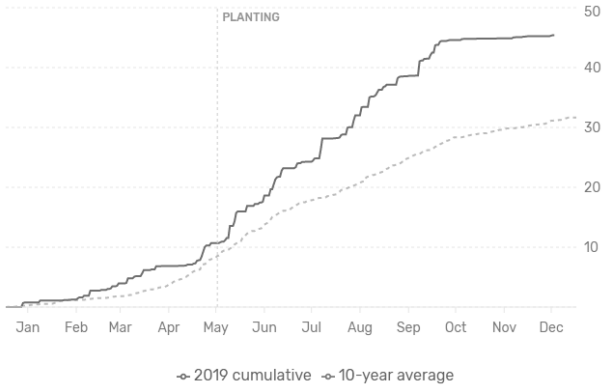
In-season Nitrogen Application on Corn Following Rye Cover Crop

Study ID: 0710067201901
County: Gage
Soil Type: Kennebec silt loam, occasionally flooded
Planting Date: 5/16/19
Harvest Date: 10/21/19
Seeding Rate: 24,000
Row Spacing (in): 30
Variety: Pioneer® P1751AMT™ and Channel® 216-36STXRIB
Reps: 5
Previous Crop: Corn
Tillage: No-Till
Herbicides: ***Pre:*** 32 oz/ac Roundup Ultra® MAX, 9 oz/ac Verdict®, and 9 oz/ac metolachlor with 1 pt/ac methylated soybean oil, 17 lb AMS/100 gal solution, and 0.5 lb citric acid/100 gal solution applied at 8 gal/ac solution on 5/23/19 ***Post:*** 1.5 qt/ac mesotrione and 32 oz/ac Roundup Ultra® with 17 lb AMS/100 gal solution, 0.5 lb citric acid/100 gal solution and 1 gal crop oil/100 gal solution applied at 15 gal/ac

Foliar Insecticides: None
Foliar Fungicides: None
Fertilizer: 45 gal/ac 32% UAN (153 lb N/ac) on 4/28/19, 5 gal/ac 10-34-0 (5.8 lb N/ac) at planting 5/16/19
Irrigation: None
Rainfall (in):



Soil Tests (May 2019 - 1 sample in study area):

pH	BpH	CEC	1:1 S Salts	OM	Nitrate-N (lb N/ac)		K	S	Zn	Fe	Mn	Cu	Ca	Mg	Na	H	K	Ca	Mg	Na	Mehlich P-III
		meq/100g	mmho/cm	%	0-8 in	8-26 in	----------ppm----------									----------%----------					---ppm--
5.7	6.5	17.1	0.14	2.9	10	31	136	16.6	1.08	79.5	26.8	1.32	1914	277	12	28	2	56	14	0	14

Introduction: This study evaluated in-season nitrogen requirements for corn planted into cereal rye cover crop. The study site is non-irrigated with no-till residue management. The Elbon cereal rye cover crop was drilled in 7.5" spacing in October 2018 after corn harvest at a rate of 55 lb/ac. The field was grazed by cattle for 30 days in November and December 2019 and 45 days from April 1 to May 15. Corn was planted into the green cereal rye regrowth. Preplant fertilizer (153 lb N/ac) was knifed into the green cereal rye before planting and 5 gal/ac 10-34-0 (5.8 lb N/ac) was applied as starter with planting. The total fertilizer application to all plots before in-season application was 159 lb N/ac. The rye was 2' tall at planting and was terminated soon after planting.

The study tested in-season nitrogen sidedress applied as ammonium sulfate (21% N, 24% S) and urea (46% N) and rates of 50 lb N/ac and 100 lb N/ac. In-season applications were made on June 10 on V4 corn. For yield analysis, two rows of 15-foot length were hand harvested, shelled, and weighed. After sidedressing and several rain events it was observed that the plots that received ammonium sulfate looked greener compared to the urea plots.

Figure 1. Corn growing in terminated rye cover crop at time of hand application of nitrogen (June 10).

Results:

Two hybrids were planted in the study area. Yield was analyzed to test for interactions between hybrid and nitrogen treatment with the GLIMMIX procedure in SAS® 9.4 (SAS Institute Inc., Cary, NC). No interaction was present; therefore, both hybrids were included in the analysis and the analysis was conducted for nitrogen treatment as the only factor.

	Stand Count (plants/ac)	Ear Count (ears/ac)	Test Weight (lb/bu)	Moisture (%)	Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
Preplant N only	23,000 A*	22,884 A	59 A	12.9 A	185 B	707.11 A
50 lb N/ac Urea	22,767 A	23,000 A	59 A	13.2 A	191 AB	700.09 A
100 lb N/ac Urea	23,116 A	23,232 A	59 A	12.9 A	194 AB	689.97 A
50 lb N/ac AMS	24,045 A	24,394 A	59 A	13.5 A	211 A	760.16 A
100 lb N/ac AMS	23,348 A	23,929 A	59 A	12.9 A	203 AB	688.26 A
P-Value	0.491	0.436	0.784	0.829	0.089	0.292

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre adjusted to 15.5% moisture.
‡Marginal net return based on $3.83/bu corn, $345/ton AMS ($0.82/lb N), $430/ton urea ($0.47/lb N), and $6.43/ac broadcast application.

Summary:

- There was no difference in harvest stand counts, ear counts, test weight, or grain moisture for the fertilizer rates and sources evaluated.
- Yield for the 50 lb N/ac ammonium sulfate treatment was higher than the preplant only treatment.
- There was no difference in net return between the nitrogen rates and sources evaluated.

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