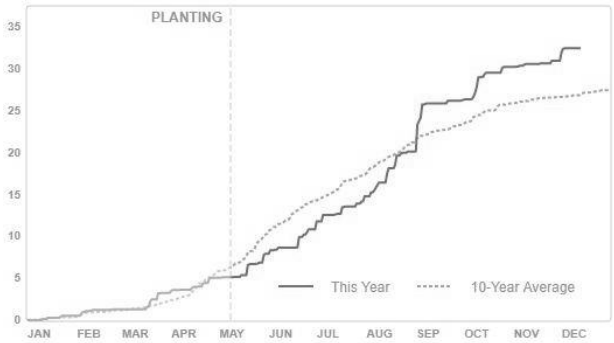
Nitrogen Application to Corn Following Cover Crops

Study ID: 0731061201801
County: Franklin
Soil Type: Kenesaw silt loam 1-3% slope
Planting Date: 5/8/18
Harvest Date: 11/1/18
Population: 30,000
Row Spacing (in): 30
Hybrid: Curry®
Reps: 4
Previous Crop: Soybean
Tillage: No-Till
Herbicides: ***Pre:*** Roundup® for burn down ***Post:*** Impact® and Status® on 6/25/18
Seed Treatment: Poncho®

Foliar Insecticides: None
Foliar Fungicides: None
Irrigation: Pivot, Total: 4”
Rainfall (in):



Introduction: The purpose of this study was to better understand N management of corn following cover crops. Nitrogen was applied as urea broadcast at V6 at four rates: 0, 100, 175, and 250 lb N/ac. Additionally, the 0 lb N/ac treatment was split so that half had a cover crop preceding it, and half did not (therefore the 0 lb N/ac treatment with no cover crop was not randomized). Plots were 80 foot wide and 200 foot long, with the exception of the 0 lb N/ac treatments, which were only 40 foot wide.

For treatments that had cover crops preceeding the corn, the cover crop mix included 40 lb/ac cereal rye, 10 lb/ac winter wheat, 5 lb/ac winter pea, 1 lb/ac rapeseed, 2 lb/ac spring barley, and 2 lb/ac Crimson clover. They were established by drilling in the fall following harvest and were grazed in the spring. The cover crops were terminated on April 20; cover crops were approximately 12" tall at termination. Yield was collected for each plot by hand harvesting. Soil samples were taken for each plot in June 2018.

Results:

								---------Ammonium Acetate----------					--% Base Saturation--				
Rep	**Treatment**	**Soil pH (1:1)**	**Soluble Salts 1:1 (mmho/cm)**	**OM (%)**	**Nitrate (ppm)**	**Nitrate lb (0-8”)**	**MP3 (ppm)**	**K (ppm)**	**Ca (ppm)**	**Mg (ppm)**	**Na (ppm)**	**Sulfate (ppm)**	**H**	**K**	**Ca**	**Mg**	**Na**
1	0 (no cover crop)	5.9	0.17	1.8	10.3	25	25	341	1550	253	20	11.7	5	8	68	18	1
1	0	5.8	0.14	2.0	6.9	17	21	366	1596	277	25	13.7	20	7	56	16	1
1	100	5.7	0.12	1.5	8.3	20	18	228	1252	192	15	11.0	12	6	64	16	1
1	250	5.8	0.13	1.7	7.0	17	14	284	1743	306	22	12.0	8	6	65	20	1
1	175	5.8	0.14	1.5	7.5	18	31	300	1645	295	24	13.2	7	6	66	20	1
2	0 (no cover crop)	5.2	0.15	1.7	12.7	30	27	226	1362	249	21	15.3	19	5	57	18	1
2	0	5.9	0.25	3.6	20.9	50	44	307	1717	267	27	17.4	13	6	64	16	1
2	175	5.7	0.1	1.6	13.1	31	26	297	1346	232	18	10.8	19	7	57	17	1
2	100	5.8	0.09	1.5	7.4	18	18	380	1470	261	18	13.7	17	8	57	17	1
2	250	5.9	0.16	2.5	17.0	41	54	443	1704	266	17	14.2	14	8	61	16	1
3	0 (no cover crop)	5.8	0.21	2.3	11.3	27	43	373	1947	345	29	14.6	21	6	55	17	1
3	0	6.0	0.17	2.8	11.0	26	50	380	2107	362	28	14.6	9	6	65	19	1
3	250	6.0	0.16	2.3	7.2	17	19	293	1743	306	22	12.0	13	5	63	18	1
3	175	6.0	0.17	2.1	13.4	32	8	230	1608	275	25	12.7	8	5	67	19	1
3	100	5.8	0.16	2.0	9.1	22	26	292	1710	302	24	13.4	14	5	62	18	1
4	0 (no cover crop)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	0	5.5	0.19	3.1	13.2	32	52	318	1529	233	23	16.3	24	6	55	14	1
4	100	6.0	0.1	2.3	12.5	30	28	259	1427	219	20	11.7	7	6	68	18	1
4	250	6.2	0.17	2.8	13.5	32	45	367	1925	323	24	13.4	7	7	66	19	1
4	175	5.6	0.17	2.8	17.1	41	111	441	2109	379	41	14.2	22	6	55	16	1

	Yield† (bu/acre)	Marginal Net Return‡ ($/ac)
0 lb N/ac Following No Cover Crop	188 B*	606.34 C
0 lb N/ac Following Cover Crop	210 B	677.78 BC
100 lb N/ac Following Cover Crop	254 A	785.00 AB
175 lb N/ac Following Cover Crop	272 A	815.78 A
250 lb N/ac Following Cover Crop	275 A	799.30 A
P-Value	0.0001	0.001

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $3.23/bu corn and $0.35/lb N. This analysis does not account for cover crop costs.

For the four nitrogen rates that all had a cover crop, a regression with economic optimum nitrogen rates was calculated (Figure 1). All N rates included in the analysis in Figure 1 had cover crops preceding them, therefore the cover crop cost is the same for all treatments and is therefore not included.

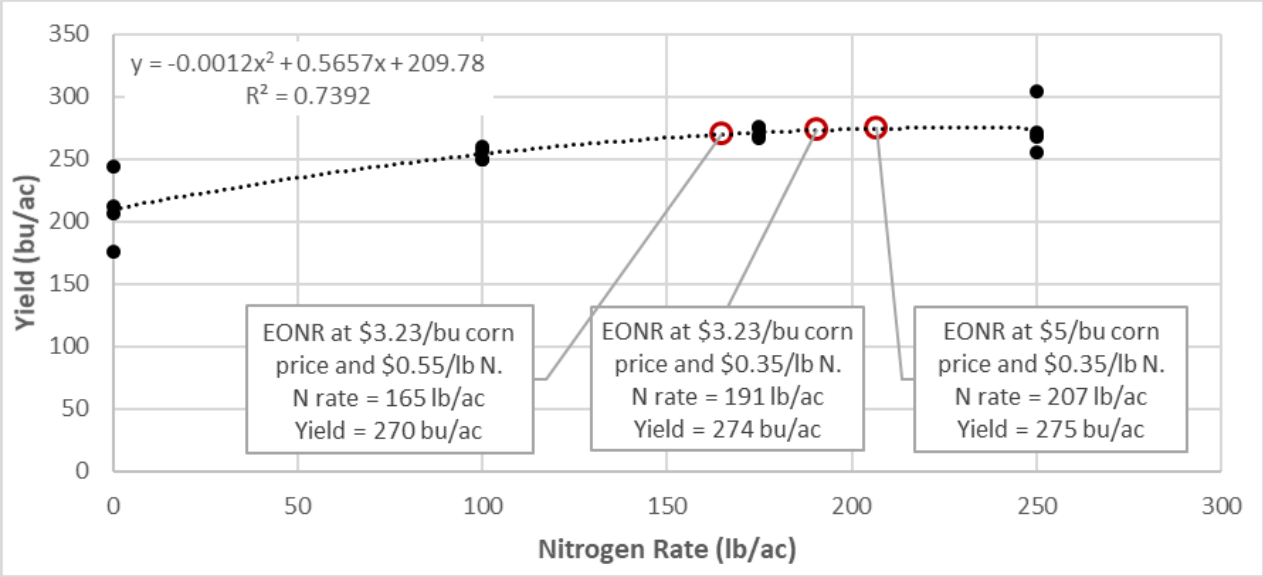


Figure 1. Yield versus nitrogen rate based on the four cover crop nitrogen rate treatments. Economic optimum nitrogen rates (EONR) for several price scenarios are indicated.

Summary:

- At a corn price of $3.23/bu and N price of $0.35/lb, the optimum N rate was 191 lb/ac.
- There was no yield difference between the 0 lb N/ac rate that was preceded by cover crops and the 0 lb N/ac rate that did not have cover crops.

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