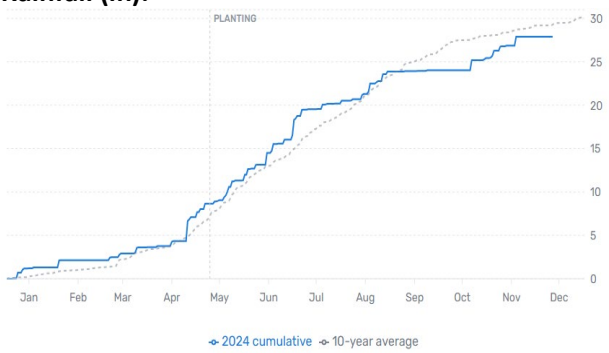
Compost Extract Starter with Varied Nitrogen Rates

Study ID: 0916185202401
County: York
Soil Type: Hastings silt loam
Planting Date: 5/9/24
Harvest Date: 9/30/24
Seeding Rate: 32,000
Row Spacing (in): 36”
Hybrid: Channel® 214-22
Reps: 4
Previous Crop: Corn
Tillage: Ridge-till. No tillage passes.
Herbicides: ***Pre:*** 4 oz/ac Anthem Maxx® applied 4/30/24.
VE: 22 oz/ac glufosinate 12 oz/ac Outlook® applied 5/14/24.
Seed Treatment: Channel® seed treatment SB500 + compost extract seed treatment

Fertilizer: 5.5 Gallons 32% + 8% Thiosol (50# N) applied through fertigation 7/9/24
Irrigation: Pivot, Total 8”
Rainfall (in):



Introduction: This grower had seen an organic matter increase in his interseeded cover crop study when he had combined cover crops with soil applied biology via homemade compost extract. The goal of this study was to determine if he could replicate that organic matter increase on a different field. When adding biology, cover crops may aid in retaining carbon so the microbes don’t burn excess carbon. To aid in offsetting carbon loss, the entire field was interseeded with dutch white clover (8 lb/ac) on April 4, 2023. The clover was maintained in the field for a second year between the ridges. Glufosinate was sprayed pre-emerge on April 30, 2024, to "turn it brown" so it didn't compete with emerging corn. The clover eventually regrew but was not as dense as prior to the glufosinate application.

In Year 1, the grower saw no yield reduction between the Full Nitrogen Check Treatment of 170 lb N/ac vs. 110 lb N/ac plus his homemade compost extract. With no yield difference, he and other peers using compost extracts wondered if they were still over-applying nitrogen when using the extracts.

For a 7 gallon/ac homemade compost extract in-furrow at planting, this grower uses: 2 lb of compost in 7 gallons of water, ¼ lb dry fish amino acid, 8 oz of 12% humic acid, 12 oz SEA-CROP®.

In Year 2, the grower wanted to test nitrogen ramps with his homemade compost extract in order to determine any yield and economic differences. The yield goal was 240 bu/ac. Pre-plant nitrogen rates ranged from 0 to 140 lb N/ac. applied as UAN 32% via coulter injection. All fertilizer was mixed with 8% thiosol and 64oz/100gal of humic acid. On July 9, 2024, 50 lb N/ac was applied via fertigation through the pivot with 8% Thiosol. This resulted in the following treatments:

Check: *190 lb N/ac (140 + 50), no compost extract in furrow*
Reduced N Check: *120 lb N/ac (70 + 50), no compost extract in furrow*
Reduced N + Extract: *120 lb N/ac (70 + 50) with compost extract starter in furrow*
Reduced N + Extract: *100 lb N/ac (50 +50) with compost extract starter in furrow*
Reduced N + Extract: *80 lb N/ac (30 + 50) with compost extract starter in furrow*

Results:

	Stand Counts (plants/ac)	Stalk Rot (%)	Moisture (%)	Yield (bu/ac)†	Nitrogen Use Efficiency (NUE)	Marginal Net Return‡ ($/ac)
80 lb N/ac + Extract	30,000 A	88.8 A	18.1 A	204 B	0.39 D	1,153 A
100 lb N/ac + Extract	29,833 A	87.5 A	17.7 A	202 B	0.50 C	1,132 A
120 lb N/ac + Extract	30,167 A	81.7 A	17.7 A	215 AB	0.56 B	1,200 A
120 lb N/ac	29,000 A	83.8 A	17.9 A	209 AB	0.57 B	1,172 A
190 lb N/ac	29,000 A	83.8 A	17.8 A	217 A	0.87 A	1,182 A
P-Value:	0.12	0.24	0.2	0.04	<0.001	0.2

*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 $4.35/bu corn, $7.50/ac for homemade compost extract and $0.53/lb N.

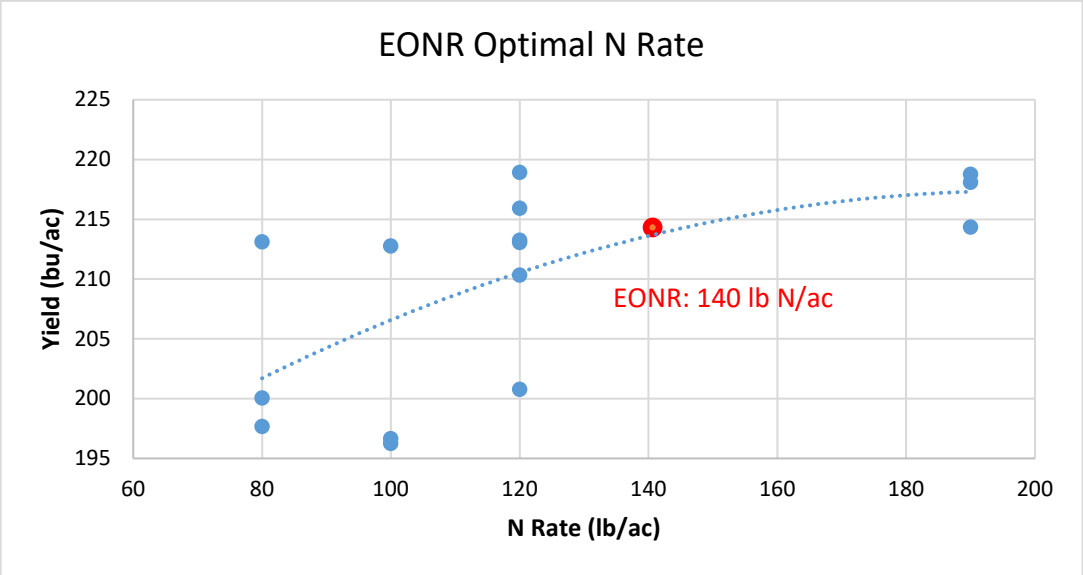


Figure 1: Economically Optimal N Rate

Summary:

- There was a significant difference in yield between applying 190 lb N/ac (217 bu/ac) compared to a reduction of N in either 100 lb N/ac + extract (201.9 bu/ac) or 80 lb N/ac + extract (203.6 bu/ac).
- The calculated EONR (140 lb N/ac) was lower than the growers traditional full rate of N (170 lb N/ac).
- The addition of Extract did result in a higher yield when applying 120 lb N/ac (P:0.09).
- The hybrid in this field was impacted by Fusarium crown rot and had high levels of stalk rot in spite of the standing plants prior to harvest. This most likely impacted overall yields in the field.
- A 50 lb N/ac rate (0 lb N/ac at planting + 50 lb N/ac via fertigation) had one replication and yielded 180.7 bu/ac with a nitrogen use efficiency of 0.28.

Year 1 (2023):

Introduction: With increasing nitrogen costs prompting producers to look at alternatives, this study evaluated two biological products at different nitrogen rates to determine any impacts on yield and economics. No noticeable differences were observed throughout the growing season between treatments. With the goal of increasing soil microbes, there is also the realization they may increase decomposition of

soil carbon. To aid in offsetting carbon loss, the entire field was interseeded with dutch white clover (8 lb/ac) on April 4, 2023. The treatments in the study are:

1) Check which received 170 lb N/ac as anhydrous ammonia on March 25, 2023.

2) 7 gallons/ac homemade compost extract in-furrow at planting (2 lb of compost in 7 gallons of water, ¼ lb dry fish amino acid, 8 oz humic acid, 12 oz SEA-CROP®), which received 110 lb N/ac as anhydrous ammonia on March 25, 2023.

3) 6 gallons/ac HyprGrow by Elevate Ag in-furrow at planting (1.5 gallons HyprGrow, ¼ lb dry fish amino acid, 4.5 gal water), which received 110 lb N/ac as anhydrous ammonia on March 25, 2023.

The anhydrous ammonia application was made 10" from the planting row. Yield and net return were evaluated.

Background Haney Soil Tests 0-8" (March 2023):

pH	OM LOI %	Soil Respiration CO_2-C ppm C	Total Nitrogen ppm N	Organic Nitrogen ppm N	Total Organic Carbon ppm C	Soil Health Calculation
7.3	3.9	95.5	37.3	28.0	227	16.89

Photos: (Top left): Dutch white clover emerging (May 9, 2023); (top middle) Good clover growth between corn rows (July 19, 2023); (top right) Clover matted down late in season. A few waterhemp were observed in the corn row but otherwise the field was fairly weed-free (September 6, 2023). (lower left): In ridge-till

systems, black nightshade can be problematic. The field was not ridged in 2023, however, enough seed was present in the seedbank to have heavier nightshade pressure in portions of the field.

While this is a biological study, no differences were observed amongst the treatments in the corn. However, biomass samples of the clover taken Sept. 11, 2023, resulted in 160 lb/ac biomass, 38 lb/ac carbon, and 3 lb/ac nitrogen.

Results:

	Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
Check	249 A*	1,345 A
Elevate Ag HyprGrow	246 A	1,361 A
Homemade Compost Extract	246 A	1,369 A
P-Value	0.548	0.228

*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 $5.91/bu corn, $7.13/ac for homemade compost extract, $14.65/ac for Elevate Ag HyprGrow, and $0.73/lb N.

Summary: There were no differences in yield or net return among the treatments evaluated. This study will continue on the same strips for a few years.