EnSoil Algae

Total Acre Trials

Mike Jenks - Aurora, IA

In summary, EnSoil Algae™ demonstrated a positive effect on function and efficiency of both soil microbes and plants. Short term nutrient cycling improved as shown by increases in nitrification and phosphorus acquisition (figure 1, 2). The fertility values from the total nutrient digest and the increase in biomass indicate an improvement in long term fertility storage and an opportunity for future savings on fertility costs (figure 3). Overall, treatment 2 (50% N reduction + EnSoil Algae™) demonstrated a better functioning soil with improved cycling and microbial activity.

229 Acres Corn:

- planted 5/17/24
- harvested 10/17/24

Three Treatments:

- Control - standard fertility - 50lbs planting, 50 lbs mid season
- Treatment 1- standard fertility + EnSoil Algae™ x 4 applications
- Treatment 2 - planting N only (50% N reduction) + EnSoil Algae™ x 4 applications

EnSoil Algae™ applications applied In furrow, Y-drop (V3-6), 2x Sprayer Broadcast (V8-10 & VT-R1)

Short Term Nutrient Cycling

Improved Nitrification: Between the control and treatment 2 (50% N reduction + algae), there was relatively the same amount of nitrogen available to the microbial population, and an increase in bioavailable organic nitrogen, which plants prefer over inorganic nitrogen. This improvement is likely due to the algae cells changing the microbial structure and improving plant efficiency.

8/5/24	H2O Total N (ppm)	H2O Organic N (ppm)	Available N (lbs/A)
Control	35.7	18.7	65
Treatment 1	28.4	18.5	51.4
Treatment 2	34.8	20.4	62.4

Figure 1. Haney test results from 8/5/24.

"The algae are making the plants more efficient at feeding the microbes, harvesting them, and sucking the nutrients out. You're getting more function from the microbes. We would expect that to happen if you're not over supplying nitrogen." -Dr. Liz Haney

Improved Phosphorus Acquisition:

- Arbuscular mycorrhizae increase likely led to improved phosphorus acquisition. Arbuscular mycorrhizae attach to roots, expand the root systems, and move phosphorus.
- Plants are known to release acids to solubilize phosphorus when needed. Figure 2 indicates improved plant function and soil function in the reduced nitrogen treatment, as well as the right recruitment of soil microbes, and an overall increase in nutrient uptake efficiency. In treatment 1 (100% N applied + EnSoil Algae™), the naturally occurring nitrogen cycle was interrupted, leading to less efficient cycling of other nutrients (phosphorus, etc.) Whereas, in treatment 2 (50% N reduction + EnSoil Algae™) there was significantly more nitrogen and phosphorus available.

8/5/24	H3A Total Phosphorus (ppm)	Available P (lbs/A)	Arbuscular Mycorrhizae (ng/g)
Control	32.6	75	30.51
Treatment 1	36.6	84.2	323.02
Treatment 2	47.2	108.5	253.89

Figure 2. Haney and PLFA test results from 8/5/24.

Long Term Fertility Storage & Yield

Yield (bu/A): *Control: 220 | Treatment 1: 223.22 | Treatment 2: 216.92*

8/5/24	N (lbs/A)	P (lbs/A)	K (lbs/A)	Ca (lbs/A)	Mg (lbs/A)	S (lbs/A)	Zn (lbs/A)	Fe (lbs/A)
control	6462	1404	2412	11592	4986	684	85.1	27226
treatment 1	8712	1836	2484	15804	5634	864	91.3	29020
treatment 2	9180	1872	2484	12724	5346	918	91	28058

Figure 3. Total Nutrient Digest test results from 8/5/24. Yields are maintained & soil nutrients are replenished.

Soil Health and Biomass

EnSoil Algae™ increased biomass and soil microbial activity in both treatment 1 and treatment 2.

- Protozoa, the major recyclers of the soil microbes, increased from 0 (control) to 15.8 (treatment 1) to 3.08 (treatment 2) indicating improved microbial recruitment, especially in treatment 1.
- Increased biomass also indicates an opportunity to improve residue breakdown and delayed nutrient release.
- The soil health calculation (SHC) is a general indicator of healthy soil, taking into account respiration, organic carbon, and organic nitrogen. SHC increased treatment 2 (50% N reduction + algae).

8/5/24	SHC	Soil OM (%LOI)	Soil Resp. (ppm CO2-C)	H2O extract Org. C (ppm)	Biomass (ng/g)	Protozoa (ng/g)
Control	24.92	7.2	260.8	221	876.2	0
Treatment 1	23.65	8.9	243.7	220	7383.69	15.8
Treatment 2	26.03	9.2	272	228	6981.66	3.08

Figure 4. Haney and PLFA test results from 8/5/24.

Total Acre Trials

Evan Schattler - Paulding, OH

"Unfortunately, this plot incurred a projected yield loss of around 40% due to drought. In summary, the standard N rate with EnSoil Algae™ applications yielded less than the grower's standard N rate without EnSoil Algae™ applications (-5.15 bu/ac). On the other hand, the reduced N rate with EnSoil Algae™ applications showed a positive response of around +3.43 bu/ac. Alongside the yield gain, the reduction in nitrogen saved the grower an additional $51.43/ac (with an overall reduction of 27.5 gal/ac of UAN28% applied at the V10 growth stage). This makes for a very nice ROI during a tough year."

77 Acres Corn
Planted 6/11/24; Harvested 11/22/24

Three Treatments:

- Control - standard fertility - 232 units N
- Treatment 1- standard fertility + EnSoil Algae™ x 4 applications
- Treatment 2 - planting N only (47% N reduction) + EnSoil Algae™ x 4 applications

EnSoil Algae™ applications applied In furrow, Sprayer Broadcast (V3-6), Y-Drop (V8-10), Sprayer Broadcast (VT-R1)

Soil Health and Biomass

- Increased biomass indicates an opportunity to improve residue breakdown and delayed nutrient release.
- The soil health calculation (SHC) is a general indicator of healthy soil, taking into account respiration, organic carbon, and organic nitrogen.

9/5/24	Soil Resp. (ppm CO2-C)	H2O Org. C (ppm)	%MAC	SHC	Biomass (ng/g)	Protozoa (ng/g)
Control	63.9	220	29	12.39	941.29	0
Treatment 2	85.4	247	34.6	15.01	1340.46	7.28

Figure 2. Haney Soil Test and PLFA Results from 9/5/24.

Long Term Fertility Storage

9/5/24	N (lbs/A)	P (lbs/A)	K (lbs/A)	Ca (lbs/A)	Mg (lbs/A)	S (lbs/A)	Zn (lbs/A)	Fe (lbs/A)	Mn (lbs/A)	Cu (lbs/A)	Al (lbs/A)
control	3798	1260	4680	12600	7560	360	117	38637	512	34.9	23842
treatment 2	4050	1440	5940	14400	9720	360	143.1	52131	630	45.7	31631

Figure 3. TND Results from 9/5/24. Soil nutrients are replenished, not extracted.

Return on Investment

	yield (bu/A)	Applied Nitrogen (lbs/A)	$ savings for applied N @ 100 acres	Commodity Pricing $4.75/ bu @ 100 acres difference from Grower Standard	Total ROI on 100 acres	Total ROI on 100 acres w/ Cost of EnSoil @ $9/acre
Control	137.86	232	0	0	0	0
treatment 1	132.71	232	0	-$2446	-$2446	-$5146
treatment 2	141.29	125	$5143	$1629	$6772	$4072