EnSoil Algae

GROWERS REPORT

2022, 2023, 2024

Biostimulation, Soil Health, Fertility, & Rhizophagy

Reduce Expensive, Synthetic, NPK Inputs

Increase Return on Investment & Improve Crop Yield

ENLIGHTENED SOIL CORP | A SOUTH CAROLINA PUBLIC BENEFIT CORPORATION

EnSoil Algae

- (KS) A large cattle feeding operation produced an extra 1/5 tons of sorghum per acre with a 30% reduction in fertilizer in year 1 of using EnSoil Algae™, and repeated the outcome in year 2 with a 45% reduction. Further, they have experienced obvious benefits in the cover crops planted for grazing behind the sorghum.
- (MO) A large commodity grower achieved an 11.6 bushel gain in his soybeans, outperforming historical production numbers in a year that saw significant moisture stress. The analysis of microbial community improvement and research into field nutrient cycling will enable a 60% reduction of applied phosphorous and a 30% reduction in potassium. Further, the research will inform a more focused micro nutrient, foliar program in 2025.
- (GA) An organic vegetable operation used EnSoil Algae™ on sweet peppers and recognized significant development of the microbial community resulting in a 5,908 lb/acre increase in production and an ROI of more than $4,000/acre.

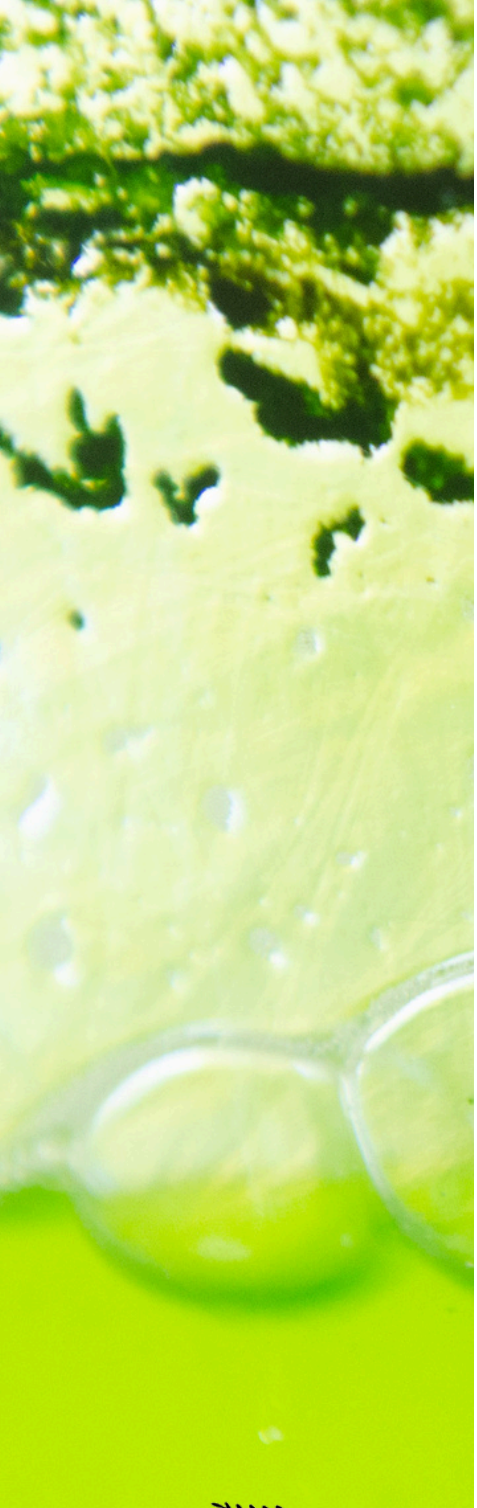
How does the live algae work? EnSoil Algae™ on foliage and soil produces growth signaling compounds (auxins, cytokinin, gibberellins and others). These stimulate plant growth, and also promote microbial growth and diversity; that is to say, EnSoil Algae™ boosts fertility. Soil microbes supply macronutrients; they fix atmospheric nitrogen and solubilize phosphorous. Other biostimulants—many of them algae extracts—provide a single dose of these compounds, so frequent application is needed. Living algae continue to produce them over time, and for most crops 2-3 applications during the growing season is adequate. (An expanded discussion of the science is found on this website.)

Our goals

- Enable farmers and ranchers to increase ROI
- Remove chemicals from the ground wherever possible
- Boost soil fertility
- Grow healthier food

Live algae biostimulants never developed commercially because of no shelf life. The green algae depended on photosynthesis and could not be stored in the dark. Enlightened Soil Corp's breakthrough has been developing a method for growing algae that maintains its viability when in dark storage. We have algae that has been in storage for as long as two years, and is still alive and able to reproduce. For convenience and a feeling that fresh is best (testing showing efficacy was done with algae less than a year old), the recommended use-by date for EnSoil Algae™ is 6 months.

George Taylor



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Made in USA

EnSoil Algae

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EnSoil Algae

The Science Behind EnSoil Algae™

EnSoil Algae™ is a liquid concentration of living *Chlorella vulgaris*. Producers in 47 states, 15 countries, and 4 continents are using EnSoil Algae™ and consistently report that it boosts plant health, increases yield, and thus raises the grower's ROI.

How it Works: Biostimulation, Soil Function & Fertility, Live Cells & Rhizophagy, Photosynthesis & Chlorophyll

Biostimulation

By definition, biostimulants are compounds or organisms that stimulate natural processes. Live algae were the original biostimulants but did not develop as a commercial product because they could not be stored. Like other green plants, green algae depend on photosynthesis, so they die in dark storage. We solved this problem with a novel growing method so that in dark storage, EnSoil Algae™ lives by consuming organic material in the growth medium (heterotrophic feeding). It works by releasing signaling molecules (termed phytohormones in botany, including auxins, cytokinins, gibberellins, and others) that directly stimulate both plant growth and soil microbial activity. The effect on soil is critical because microbes in the rhizosphere–the area around the roots–fix atmospheric nitrogen and solubilize soil bound nutrients such as phosphorus and potassium (among others), making these essential nutrients bioavailable to plants.

Soil Function and Fertility

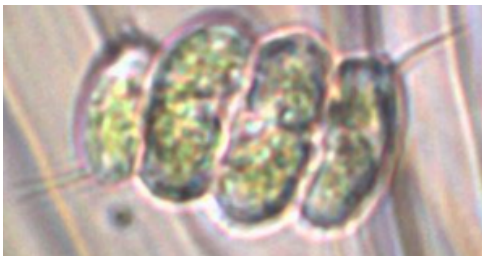
There are as many as 10 billion microorganisms in one gram of healthy soil. Fertility is synonymous with a functioning soil biome, and live cell algae biostimulation boosts fertility. Haney testing after EnSoil Algae™ use has shown available excess nitrogen after harvest into the next growing season. Genomic studies confirm the fertility effect, with an increase in soil's biomass including bacteria, fungi, protozoa, and others. Because of live algae's fertility effect, growers have been able to decrease their use of synthetic NPK, without a loss in yield. Cell-free biostimulants do not make that claim.

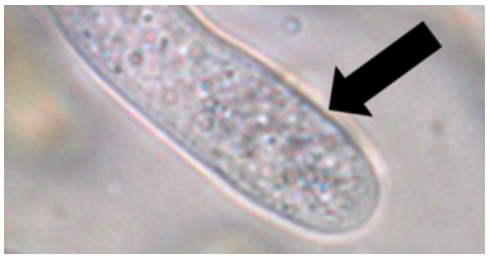
Because of live algae's fertility effect, growers have been able to decrease their use of synthetic NPK, without a loss in yield.

Live cells, sustained release of phytohormones, and rhizophagy

While algae extracts and broths provide a single dose of signaling molecules (phytohormones) to the soil biome and require frequent application, live cells release phytohormones over time and thus are effective just with three applications per growing season. Enlightened Soil Corp sponsored research at Rutgers University with Dr. James White who tested whether EnSoil Algae™ (*Chlorella vulgaris*) could become endophytic, what the live cell mechanism is, and how EnSoil Algae™ differs from commercial broths and generic *Chlorella vulgaris*.

Endophytes are symbiotic organisms that live in plant tissue and have beneficial roles including nutrient cycling and delivery, among others. Dr. White discovered a previously unknown symbiotic interaction between plants, bacteria, and algae which he has called "rhizophagy". With light microscopy, he observed algae filled with bacteria in the rhizosphere (top). The loaded algae penetrated plant root hairs and then appeared to 'explode', releasing these beneficial bacteria into the root hairs (bottom). Since the healthier EnSoil Algae™-treated plants had greater root length and mass, he postulated that endophytic bacteria transported by living algae cells have a favorable effect on the host plant. The transport mechanism ascribed to live algae is a novel finding.





Clover growth and germination (day 12)

A Pure Growth Study

Apart from the rhizophagy observation, Dr. White's laboratory also did a plant growth study comparing EnSoil Algae™ with a commercial biostimulant ("algae broth") and Chlorella vulgaris that was not grown using the EnSoil Algae™ growing method ("generic chlorella"). It was a pure experiment in the sense that plants were grown on agar; the results were not influenced by weather or soil type. EnSoil Algae™ produced increased seed germination rates, root and root hair development, and leaf expansion when compared with algae broth and generic chlorella (and generic chlorella out-performed algae broth.)

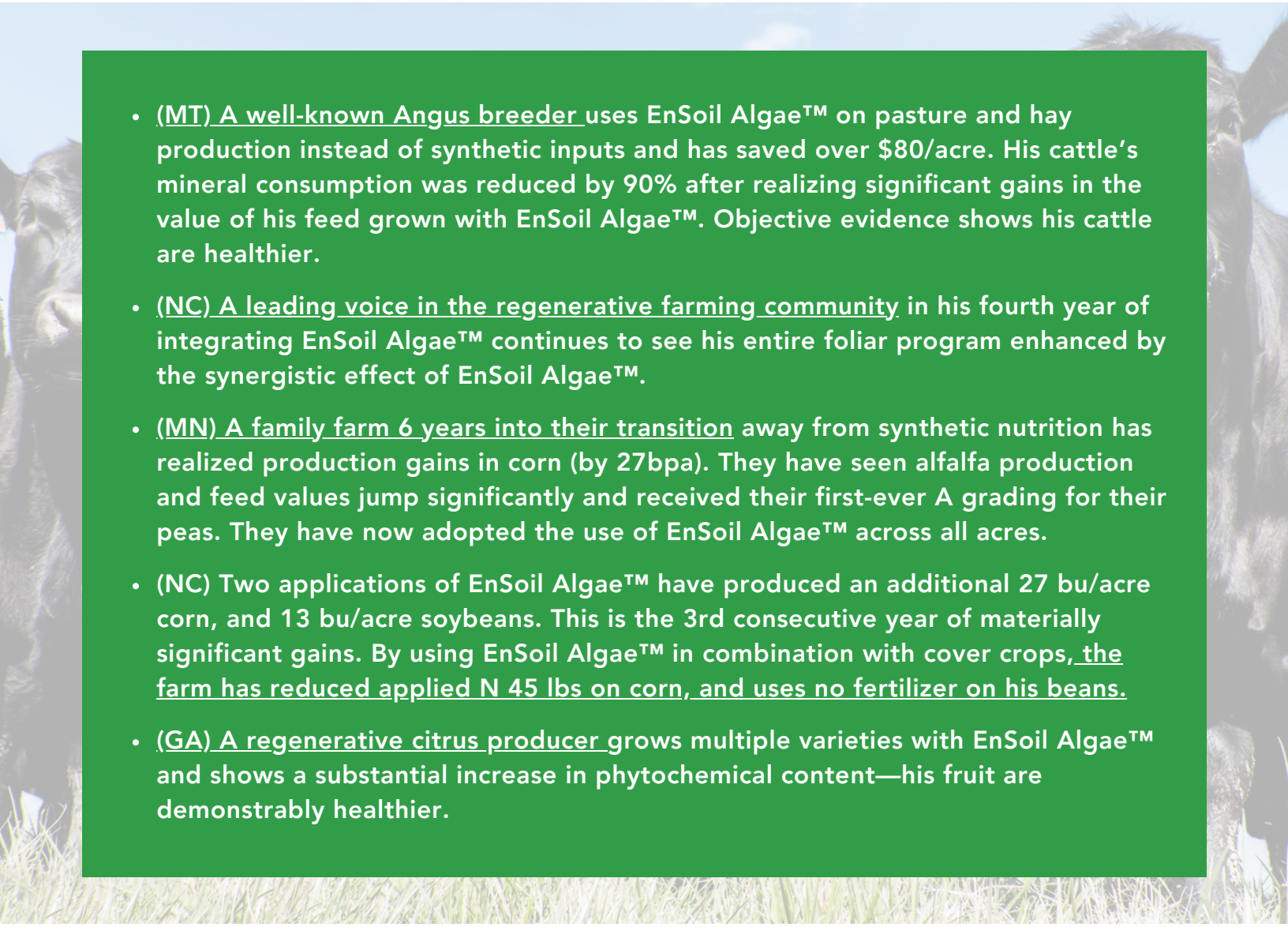
EnSoil Algae

Farmer Forward

By Dr. George Taylor, Founder

The USDA defines biostimulants as compounds or organisms that stimulate natural processes, favorably affecting growth and crop yield. EnSoil Algae™ is a live algae biostimulant (Chlorella vulgaris). Live green algae were the original biostimulants, applied to rice 2,000 years ago, and the subject of university research since the 1970s. The live algae research documented these benefits: healthier plants, higher yield, increased leaf chlorophyll, resistance to abiotic stress, and improved soil fertility.

This growers' report provides real-world confirmation of the research findings. In it, growers from across the US relay their positive experience with a variety of crops. Generally, first-time users of EnSoil Algae™ add it to their current input program to boost yield. With experience and further testing, many have found that algae use makes it possible to reduce the input of synthetic NPK. Because EnSoil Algae™ is less expensive, this leads to an increase in ROI. This report details our findings, including the following examples:



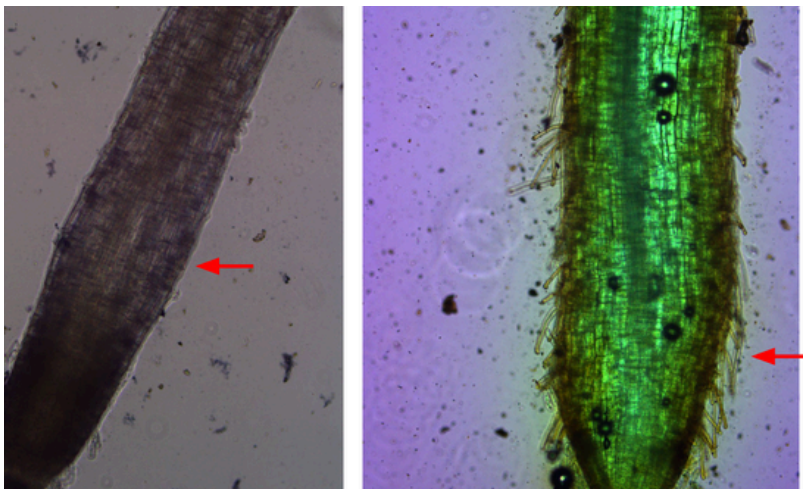
- **(MT) A well-known Angus breeder uses EnSoil Algae™ on pasture and hay production instead of synthetic inputs and has saved over $80/acre. His cattle's mineral consumption was reduced by 90% after realizing significant gains in the value of his feed grown with EnSoil Algae™. Objective evidence shows his cattle are healthier.**
- **(NC) A leading voice in the regenerative farming community in his fourth year of integrating EnSoil Algae™ continues to see his entire foliar program enhanced by the synergistic effect of EnSoil Algae™.**
- **(MN) A family farm 6 years into their transition away from synthetic nutrition has realized production gains in corn (by 27bpa). They have seen alfalfa production and feed values jump significantly and received their first-ever A grading for their peas. They have now adopted the use of EnSoil Algae™ across all acres.**
- **(NC) Two applications of EnSoil Algae™ have produced an additional 27 bu/acre corn, and 13 bu/acre soybeans. This is the 3rd consecutive year of materially significant gains. By using EnSoil Algae™ in combination with cover crops, the farm has reduced applied N 45 lbs on corn, and uses no fertilizer on his beans.**
- **(GA) A regenerative citrus producer grows multiple varieties with EnSoil Algae™ and shows a substantial increase in phytochemical content—his fruit are demonstrably healthier.**

Photosynthesis and Chlorophyll

Photosynthesis is the engine that drives ecosystems, producing glucose using the sun's energy–light.

$$6\ CO_2 + 6\ H_2O + \text{sunlight (energy)} \qquad C_6H_{12}O_6 \text{ (glucose)} + 6\ O_2$$

Glucose is ultimately converted to complex carbohydrates, proteins and fats to build plants. Chlorophyll is the compound that processes light energy. University trials have recorded higher leaf chlorophyll levels in plants treated with live Chlorella vulgaris and growers note a more intense green in treated areas. Higher chlorophyll means increased photosynthetic capacity. The mechanism of the chlorophyll increase is unknown, but it contributes to the positive effect of EnSoil Algae™ on growth and yield.



From Rutgers University | (left) control group. (right) EnSoil Algae™ - treated group showing increased root length growth and increased plant absorbtion of chlorophyll.

Stress Resistance

Biotic: Live algae and other biostimulants are not herbicidal, fungicidal or pesticidal. However, genomic testing after EnSoil Algae™ treatment has shown increases in bactericidal, fungicidal, and nematicidal compounds, naturally produced by plants. In addition, more vigorous plants are naturally more resistant to disease and pests. While anecdotal, growers consistently observe lower biotic pressure.

Abiotic: Drought and salinity are referred to as abiotic stress, and *Chlorella vulgaris* has been shown to mitigate their effects. In controlled experiments, progressive reduction of water input (or rise in salt levels) is better tolerated by treated plants. Abiotic stress leads to accumulation of oxidative compounds including peroxide and the oxygen free-radical, which are toxic. Plants normally produce antioxidants in response (peroxidase and superoxide dismutase). With EnSoil Algae™ treatment in response to stress, the level of the antioxidant enzymes in plant tissue is higher.

Carbon Sequestration

Plants remove carbon dioxide from air through photosynthesis and use the carbon to build sugars for tissue growth. Carbon-containing field residue is decomposed and incorporated into soil as organic matter. Over a period of years, with continued practice, this carbon is buried in the soil, where it can be stable for one hundred years. EnSoil Algae™ enhances this process by stimulating both plant growth and soil microbial activity that breaks down this plant residue. Soil testing has documented the increase in soil organic matter with the use of EnSoil Algae™.

Connecting Biodiversity and Profitability

Plants grown with EnSoil Algae™ have more nutritional value than plants grown with synthetic fertilizer. Macronutrients–N P & K– generate the caloric content of crops, carbohydrates, protein and fat. Added nutritional value comes from phytochemicals, micronutrients that include polyphenols and flavonoids which have antioxidant and anti-inflammatory activity. These are generated by soil microbials, their level rises with increased microbial biomass and species diversity, and soil testing has shown that EnSoil Algae™ promotes this effect. There is emerging evidence that crops with elevated phytochemical levels will have premium pricing.

At the same time, expansion of microbial mass can allow reduced input of macronutrients, N P & K. After all, they are the source of macronutrients in nature. In the rhizosphere, microbes fix nitrogen and solubilize phosphorus. As documented in this report, yields can be maintained when chemical NPK is reduced. For a number of crops–pasture, hay, sweet potatoes–, EnSoil Algae™ has been adequate without additional fertilizer. University and real-world farm studies have found that adding EnSoil Algae™ consistently supports growers in reducing nitrogen inputs up to 40% (this can vary with geography and soil composition). Given the rise in the cost of synthetic NPK, the largest ROI gains will come from using the live cell algae biostimulant to reduce or replace more expensive chemicals.

The 2024 growing season presented significant challenges for agriculture including extreme and unpredictable weather patterns, changing commodity prices, and rising production costs. Over the last five years, we have not seen the challenges get easier, rather they have highlighted the urgent need for adaptive strategies, risk management, and community support. Essential steps forward include measuring efficacy of land management practices to prioritize soil function and restore ecosystems.

Improved soil health significantly reduces risk for growers by enhancing a crop's resilience to environmental stressors like drought, floods, extreme temperatures, pests, and diseases. This work leads to more stable yields, reduced reliance on costly chemical inputs, and overall improved profitability. Our greatest opportunity is in supporting our growers and the system at large through testing programs, education, and consultative application plans. We believe in being active participants in land stewardship and support our growers in this mission.

- Enlightened Soil Corp Grower Support

Production

Growing EnSoil Algae™ is a regenerative, carbon-neutral process. It is grown in photobioreactors with artificial light, and our production facilities use about as much electricity as a 3,200 sq ft home. They produce no industrial waste. The only byproduct of production is oxygen, and carbon dioxide is drawn down in the process. It is sold as an algal concentrate and has a minimum of 10 million live Chlorella vulgaris cells per mL. Eight ounces of EnSoil Algae™ concentrate is diluted to treat 1 acre (0.4 hectares,) so shipping costs are low. EnSoil Algae™ is OMRI listed for use in organic production in the US, Canada and Mexico.

EnSoil Algae™ is grown in photobioreactors with LED grow lights. Photosynthesis draws down carbon and releases oxygen, the only byproduct of production.

Shelf Life

Live algae biostimulant commercialization has been limited due to the shelf life challenge. Algae and plants are autotrophic—they generate their own food through photosynthesis. When placed in the dark, photosynthesis stops and they die. Enlightened Soil Corp's breakthrough has been the development of a method for growing algae that stimulates heterotrophic metabolism, the ability to consume other organic material; animals and bacteria are heterotrophs. This allows survival in dark storage. When in the light, EnSoil Algae™ cells grow using photosynthesis. When in the dark they are heterotrophic and survive by consuming other organic material that is in the growth medium. In our lab, EnSoil Algae™ in dark storage for 18 months had no decline in cell count or viability. The product label's conservative use-by date is 6 months, ensuring live algae cells for the length of a growing season. In addition, laboratory and real-world research has been done with algae less than 6-months post harvest.

Non toxic

EnSoil Algae™ is non-toxic and safe for human and animal contact. EnSoil Algae™ is a proprietary blend of benign microalgae, ubiquitous in freshwater environments all over the world. It produces no compounds harmful to humans or animals and is a common constituent in drinking water in very low concentrations. While EnSoil Algae™ is not meant for human or animal consumption, its pH and other contents pose no health risks to either humans or animals. It is completely safe to leave children and/or animals outside on grass where EnSoil Algae™ is being applied.

A Note on Algae Bloom

Only 30% of chemical nitrogen is taken up by plants. Synthetic NPK is soluble, so N and P not used by plants follows ground water. From Iowa, this nutrient load reaches the Mississippi River, then the Gulf of Mexico. Because it is fertilizer, it can fertilize wild algae and cyanobacteria. Synthetic NPK in waterways provokes algae bloom. Somewhat paradoxically, live Chlorella vulgaris in place of NPK is a solution to wild algae bloom because it does not dissolve in solution. Being particulate, cells do not penetrate deeply into soil, so they do not reach ground water. There is no fertilization of wild algae bloom, and as a replacement for chemical NPK, using EnSoil Algae™ is preventative. Furthermore, most algae bloom is cyanobacteria; it is called blue-green algae although it is technically a bacterium. Green algae including all chlorella species do not cause algae bloom.

EnSoil Algae

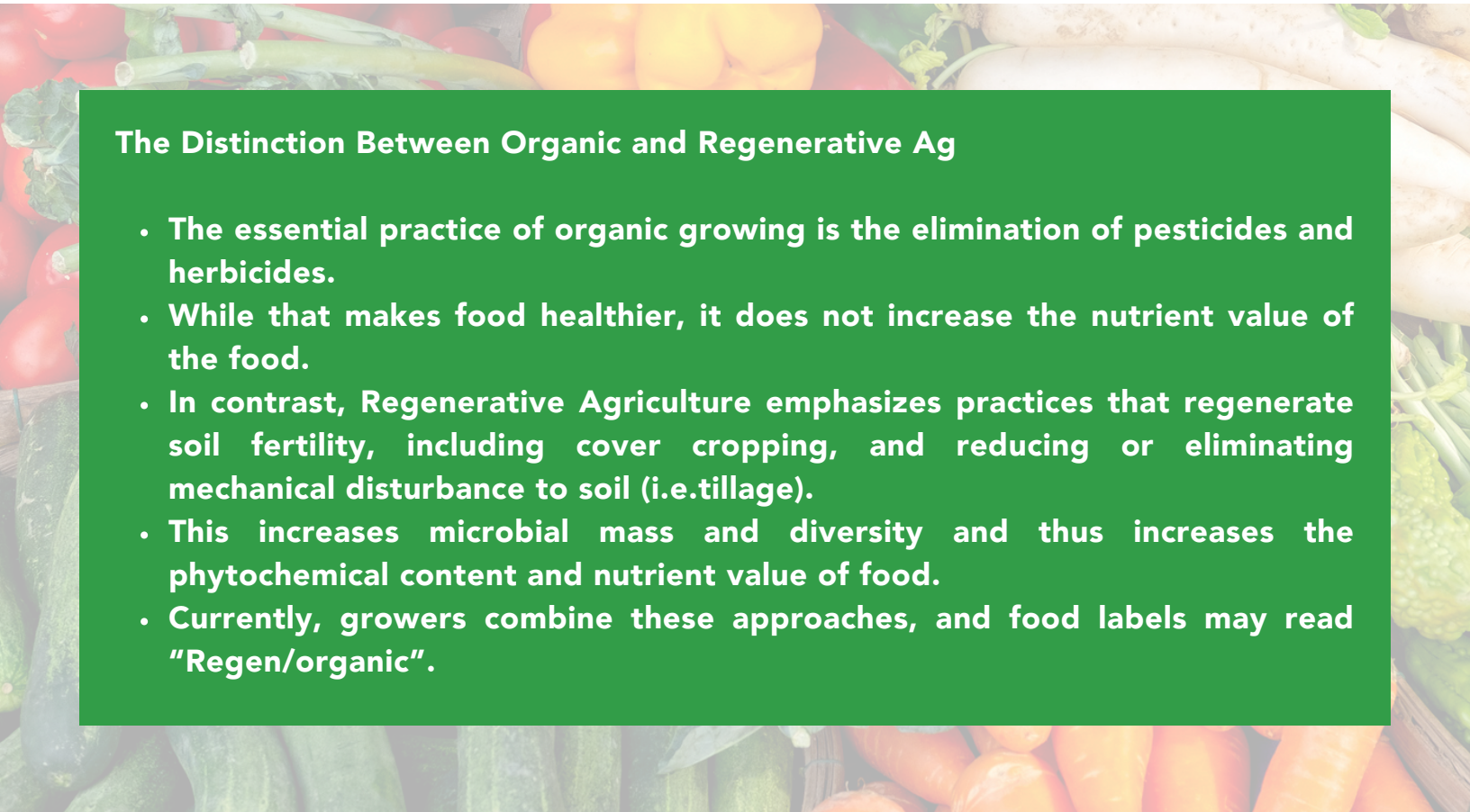
Food as Medicine

By Dr. George Taylor, Founder

Population studies indicate that a diet rich in fresh fruits and vegetables can lower the risk of common chronic illnesses such as cardiovascular disease, diabetes, some cancers, and neurodegenerative diseases. Oxidative and inflammatory events are steps in their development. A correlation between food and medicine is biologically plausible because these foods contain micronutrients that have antioxidant and anti-inflammatory actions. The organic health food industry has been built on the premise that organic, and now regenerative agriculture (regen-ag) practices translate these actions to improved health.

The addition of EnSoil Algae™ is synchronistic in all farming systems: organic, regenerative, and conventional, with the purpose of raising microbial mass and diversity, thus boosting the nutrient value of food.

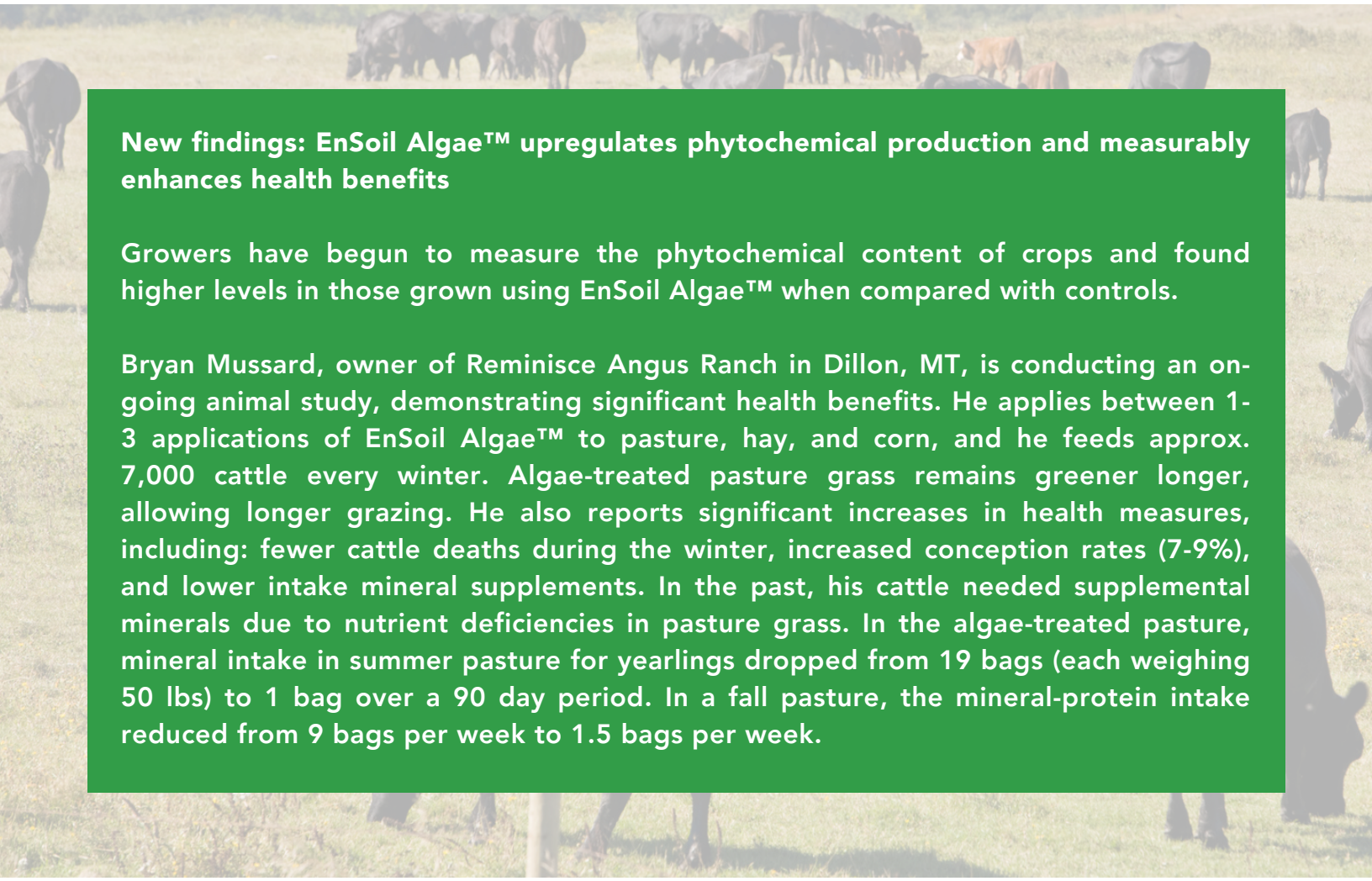
Here is the problem: 1) there is little scientific evidence proving micronutrient differences between foods grown using conventional vs organic or regen-Ag methods, and 2) there has been no study that has prospectively documented a special health benefit of organic/regen-ag grown food for animals or humans. Just the population studies.



The Distinction Between Organic and Regenerative Ag

- **The essential practice of organic growing is the elimination of pesticides and herbicides.**
- **While that makes food healthier, it does not increase the nutrient value of the food.**
- **In contrast, Regenerative Agriculture emphasizes practices that regenerate soil fertility, including cover cropping, and reducing or eliminating mechanical disturbance to soil (i.e.tillage).**
- **This increases microbial mass and diversity and thus increases the phytochemical content and nutrient value of food.**
- **Currently, growers combine these approaches, and food labels may read "Regen/organic".**

EnSoil Algae™ boosts soil fertility by immediately increasing soil microbial diversity, activity, and biomass. Soil microorganisms either produce or stimulate the production of micronutrients, including the phytochemicals (polyphenols, flavonoids, carotenoids, etc.) responsible for antioxidant and anti-inflammatory actions. It is believed that combinations of large numbers of phytochemicals in fresh food work synergistically to produce health benefits, so packaging a small number of them in a pill doesn't work.



New findings: EnSoil Algae™ upregulates phytochemical production and measurably enhances health benefits

Growers have begun to measure the phytochemical content of crops and found higher levels in those grown using EnSoil Algae™ when compared with controls.

Bryan Mussard, owner of Reminisce Angus Ranch in Dillon, MT, is conducting an on-going animal study, demonstrating significant health benefits. He applies between 1-3 applications of EnSoil Algae™ to pasture, hay, and corn, and he feeds approx. 7,000 cattle every winter. Algae-treated pasture grass remains greener longer, allowing longer grazing. He also reports significant increases in health measures, including: fewer cattle deaths during the winter, increased conception rates (7-9%), and lower intake mineral supplements. In the past, his cattle needed supplemental minerals due to nutrient deficiencies in pasture grass. In the algae-treated pasture, mineral intake in summer pasture for yearlings dropped from 19 bags (each weighing 50 lbs) to 1 bag over a 90 day period. In a fall pasture, the mineral-protein intake reduced from 9 bags per week to 1.5 bags per week.

An important feature of the Montana cattle result is that it reflects the action of just EnSoil Algae™. No other regen-ag or organic soil amendments were used to cultivate the pastures or hayfields. To feed approx. 7,000 cattle, Mr. Mussard purchases hay and feed from multiple local providers. He now requires that his suppliers grow this feed using EnSoil Algae™.

These findings will be validated with research involving other crops and different animal models. EnSoil Algae™ is used by growers to reduce costs, improve fertility and raise ROI. In the future, the value of their crops may also be higher because of their "nutraceutical" actions: **food as medicine**.

Independent and University-Based Research

Support for EnSoil Algae™ from Dr. Liz Haney

Early soil tests show that using live algae can boost soil health in several ways. Many fields treated with algae have seen an increase in microbial activity, measured through soil respiration on the Haney test. This increased biological activity plays a big role in improving nutrient cycling, leading to better plant vigor and stronger overall crop health.

We've also seen increases in available phosphorus (P) and potassium (K) in some soils, along with improvements in water-soluble and total organic matter. Since water-soluble organic carbon is a key food source for microbes, this means a healthier and more active soil biology, which directly supports nutrient availability for crops. Higher organic matter also improves water-holding capacity and contributes to long-term carbon storage in the soil.

In many cases, algae-treated soils show greater microbial diversity and total living biomass, including beneficial fungi, protozoa, and actinomycetes. Fungi help extend plant root networks and improve nutrient transport, while actinomycetes break down organic material, suppress plant diseases, and release enzymes that support crop growth. Protozoa play a key role in mineralizing nutrients, making them more available to plants.

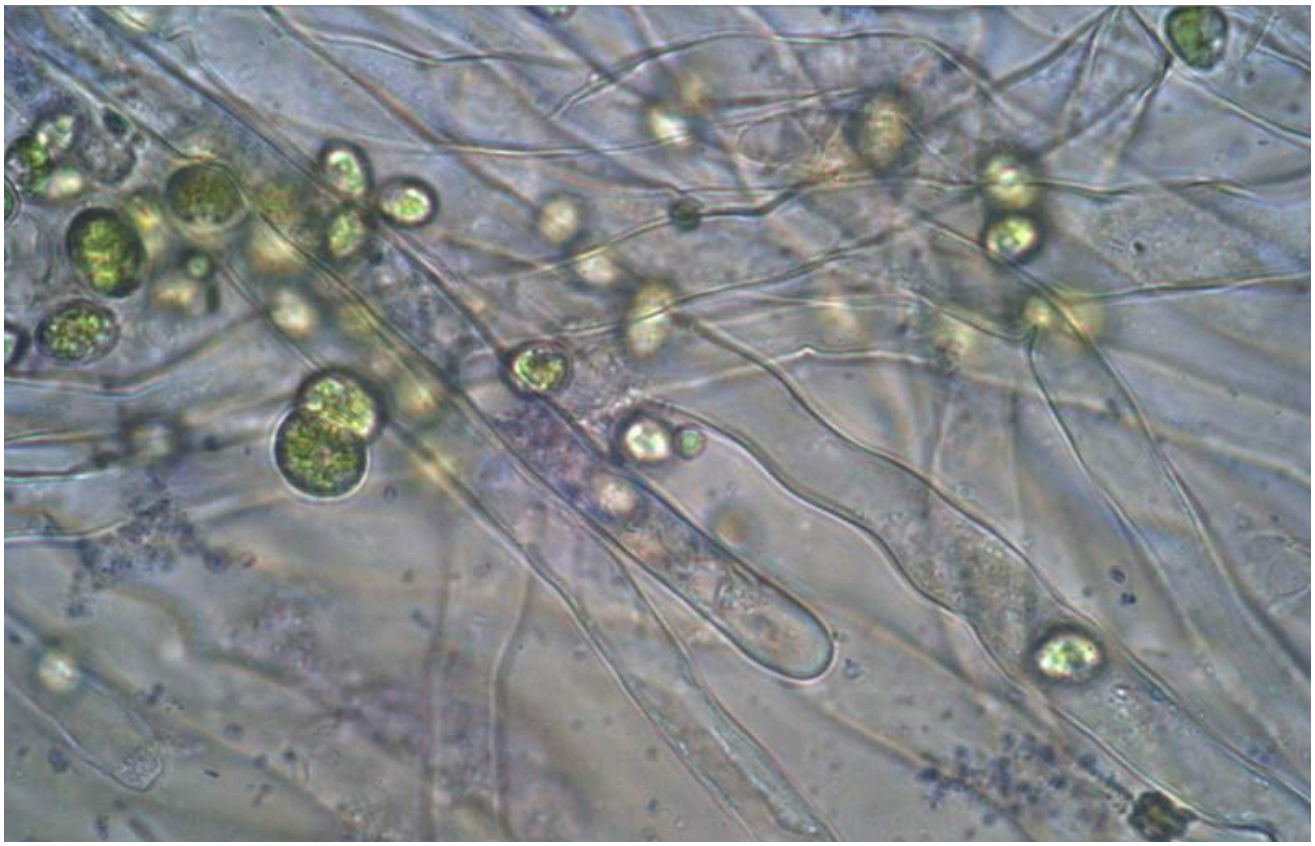
We've also observed increases in nitrogen cycling and, in some cases, a boost in the overall nutrient storehouse of the soil, as confirmed through total nutrient digest testing. These improvements suggest that adding algae to the soil can enhance the efficiency of natural nutrient cycles, leading to healthier crops and more resilient soils over time.

Liz Haney, PhD

EnSoil Algae

Rutgers University

Laboratory Tests Using EnSoil Algae™ product in Creeping Bluegrass (*Poa reptans*), Clover (*Trifolium repens*) and Soybean (*Glycine max*)



Link to the Full Study Here

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Methodology

- Seeds of Poa reptans were subjected to surface disinfection by shaking in a 3% sodium hypochlorite solution for 1 hr.
- Seeds of Clover (Trifolium repens) were surface disinfected for 1 hr by shaking in 3% sodium hypochlorite.
- Seeds of soybean were surface disinfected by sequentially treating with 70% ethanol for 2 minutes, followed by a 4% sodium hypochlorite solution for 2 minutes, and soaking in a 200 ug/mL streptomycin solution for 10 minutes.
- Seeds were subsequently placed onto agarose culture medium supplemented with varying concentrations of Algal product (0.01, 0.1, 1 and 5%). We used 3 or 4 replicates per treatment.
- Seeds on agarose were germinated and grown in lab ambient conditions for 8-10 days depending on the plant being tested.
- Nitro blue tetrazolium (for superoxide) and potassium permanganate (for ethylene) staining was done to visualize endophytic bacteria in plant cells.

Table 1. Stimulation of Root and Root Hair Growth in *Poa reptans* Through Application of Ensoil Algal Product at Various Concentrations in agarose-based 8-day seedling assays

	Germination Rate	Gravitropic Response	Lateral Root Number per plant	Root Length	Root hairs	Root Exudates
Control	80%	2	0.77	+	-	No
0.01%	90%	5	0.77	++	+	No
0.1%	87%	5	0.90	++	++	No
1%	80%	9	1.00	++	++	Yes
5%	90%	5	0.90	+++	++	Yes

Results

EnSoil Algae™ product application promoted seedling growth, exhibiting 6 positive growth promotional characters – germination, lateral root number, root length, root hair growth, root exudates and gravitropic response.

Table 2. Stimulation of Root and Root Hair Growth in Clover (Trifolium repens) Through Application of Ensoil Algae Product at Various Concentrations in agarose-based 8-day seedling assays

	Germination Rate	Gravitropic Response	Lateral Root Number per plant	Root Length	Root hairs
Control	83%	1	0.07	+	-
0.01%	90%	1	0.10	+	+
0.1%	90%	1	0.04	++	+
1%	87%	1	0.20	++	+
5%	97%	3	0.27	++	++

Results

EnSoil Algae™ product application promoted seedling growth, exhibiting 5 positive growth promotional characters – germination, lateral root number, root length, root hair growth, and gravitropic response. 5% product application performed best in seedling growth promotion.

Table 3. Stimulation of Root and Root Hair Growth in *Soybean* Through Application of Ensoil Algal Product at Various Concentrations in agarose-based 8-day seedling assays

	Germination Rate	Gravitropic Response	Root Length	Root hairs
Control	83%	5	+	+
0.01%	94%	14	+	+
0.1%	83%	6	+	+
1%	83%	8	++	++
5%	83%	6	++	++

Results

EnSoil Algae™ product application promoted seedling growth, exhibiting 4 positive growth promotional characters – germination, root length, root hair growth, and gravitropic response.

Conclusion

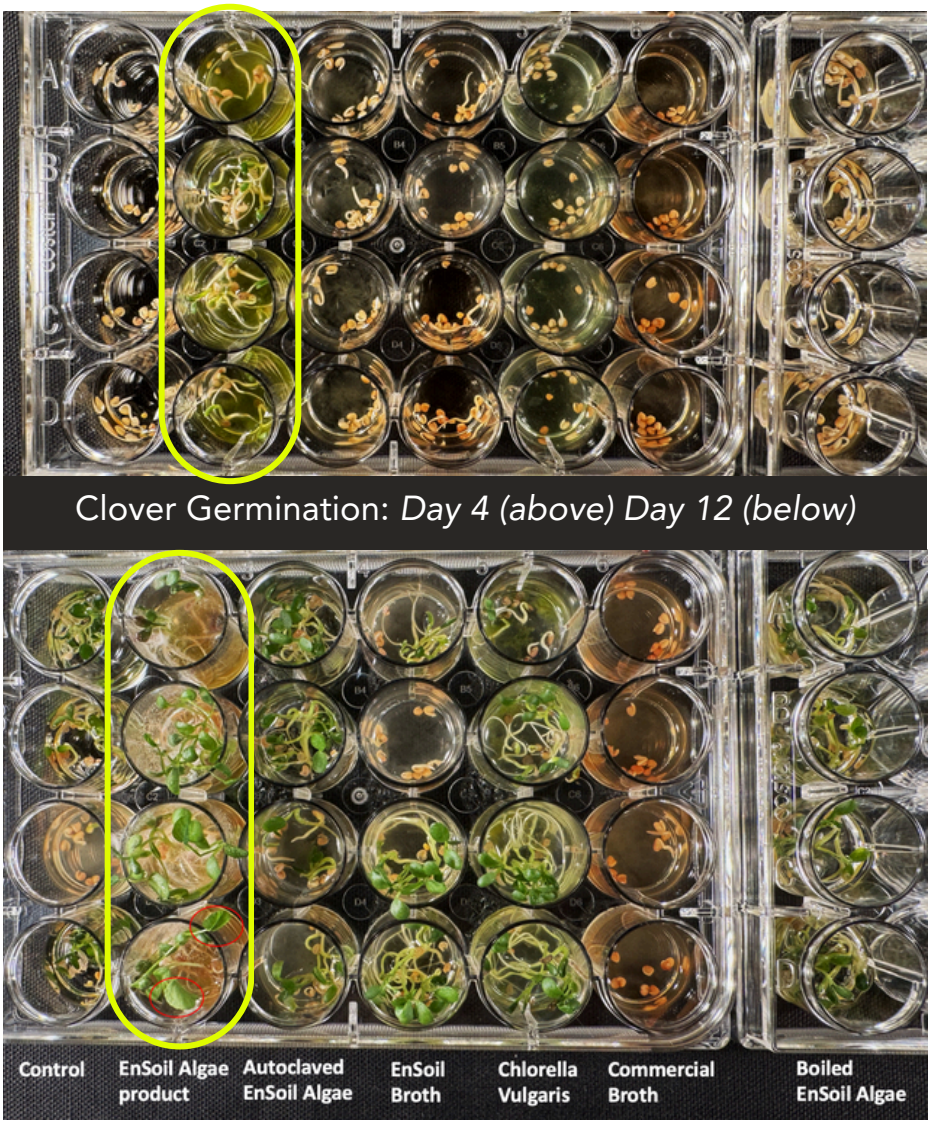
Based on the experimental results, the application of algae improves the growth of creeping bluegrass, clover, and soybean. The mechanism behind this phenomenon is attributed to the symbiotic interaction between algae and endophytic bacteria and plants, whereby the algae eject or release bacteria and facilitate the colonization of the plant roots. This, in turn, promotes the growth of root hairs, ultimately leading to an overall enhancement of plant growth.

Algal application promoted the growth of root hairs.

EnSoil Algae

Rutgers University

Laboratory Tests Using EnSoil Algae™ product in Creeping Bluegrass (Poa reptans), Clover (Trifolium repens) and Tomato (Solanum lycopersicum)



Clover Germination: *Day 4 (above) Day 12 (below)*

Link to the Full Study Here

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Methodology

Treatments

- Control, EnSoil Algae™ product, EnSoil Algae™ only Boiled for 1 minute to kill algae, EnSoil Algae™ only autoclaved for 20 minutes to kill both algae and bacteria, EnSoil Algae™ Broth only, (Chlorella Vulgaris) product, and Commercial Broth.

Plant Growth

- Seeds of Poa reptans grass were subjected to surface disinfection by shaking in a 3% sodium hypochlorite solution for 1 hr. 10 Seeds were subsequently placed onto agarose culture medium and then inoculated with 5% algae production suspension. 3 replicates per treatment.
- Seeds of tomato were subjected to surface disinfection by sequentially treating with 70% ethanol for 1 minute, followed by a 7.5% sodium hypochlorite solution shaking for 1 hr. 8 Seeds were placed onto agarose culture medium and then inoculated with 100% algae production suspension. 3 replicates per treatment.
- Seeds of Clover were surface disinfected for 1 hr by shaking in 4% sodium hypochlorite. 10 Seeds were placed onto agarose culture medium and then inoculated with 100% algae production suspension, or placed into algae production suspension directly. 3 or 4 replicates per treatment.
- Seeds on agarose were germinated and grown in lab ambient conditions for 7-13 days depending on the plant being tested. Plant growth promotional characters were assessed, including – germination, lateral root number, root length, root hair growth and Gravitropic Response.

Microscopy

- Diphenylamine sulfate stain was used to visualize endophytic bacteria and nitrate, purple.

Table 1. Stimulation of Root and Root Hair Growth in *Poa reptans* After Inoculation of Algae Product in agarose-based 7-day seedling assays (November)

	Germination Rate	Gravitropic Response	Ave. Lateral Root per plant	Root Length	Root hairs
Control	93.3%	0	0.82 ± 0.55	1.78 ± 0.51	+
EnSoil Product	100%	0	1.10 ± 0.71	1.89 ± 0.49	+++
Boiled EnSoil Algae	83.3%	0	1.00 ± 0.71	1.74 ± 0.49	+++
EnSoil Broth	76.7%	2	1.04 ± 0.77	1.77 ± 0.60	+
Chlorella Vulgaris	76.7%	0	1.00 ± 0.60	1.91 ± 0.42	++
Commercial Broth	86.7%	0	0.96 ± 0.92	1.85 ± 0.41	++

Results

- After inoculation of EnSoil Algae™ Product , Poa plants exhibited increased lateral root and root hair formation, longer root length, as well as a higher proportion of plants displaying gravitropic responses.
- Among these three treatment, the effect of plant growth promotional effect was: EnSoil Algae™ Product > Boiled EnSoil Algae™ > (Chlorella Vulgaris)> Commercial Broth and EnSoil Algae™ Broth > control.

Table 2. Stimulation of Root and Root Hair Growth in Tomato (*Solanum lycopersicum*)After Inoculation of Algae Product in agarose-based 13-day seedling assays (Jan.)

	Germination Rate	Ave. Lateral Root per plant	Root Length (cm)	Root Hairs	GR
Control	49%	0.50	0.94 ± 0.78	+	0
EnSoil Algae Product	50%	2.17	1.91 ± 0.41	++	2
Autoclaved EnSoil Algae	54%	2.54	1.78 ± 0.83	++	1
Boiled EnSoil Algae	42%	1.40	1.72 ± 1.03	++	1
EnSoil Broth	63%	1.41	1.96 ± 1.11	++	0
Chlorella Vulgaris	58%	1.47	1.65 ± 0.72	++	1
Commercial Broth	42%	2.43	1.52 ± 0.52	+	1

Results

- After inoculation of EnSoil Algae™ Product , Poa plants exhibited increased lateral root and root hair formation, longer root length, as well as a higher proportion of plants displaying gravitropic responses.
- Among these three treatment, the effect of plant growth promotional effect: EnSoil Algae™ Product and Autoclaved EnSoil Algae™ > Boiled EnSoil Algae™ > EnSoil Algae™ Broth > (Chlorella Vulgaris)> Commercial Broth > control.

Table 3. Stimulation of Root and Root Hair Growth in Clover (Trifolium repens) After Inoculation of Algae Product in agarose-based 12-day seedling assays (March)

	Germination Rate	Ave. Lateral Root per plant	Root Hairs	Expanding Leaf
Control	85%	1.03	-	0
EnSoil Algae Product	93%	1.36	+	11
Autoclaved EnSoil Algae	77%	1.26	+	2
Boiled EnSoil Algae	93%	1.21	+	0
EnSoil Broth	87%	0.81	+	3
Chlorella Vulgaris	87%	1.25	-	2
Commercial Broth	87%	0.69	+	1

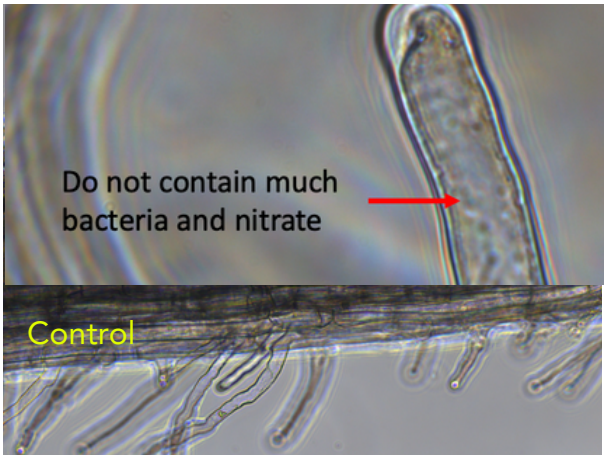
* Due to fungi killed EnSoil Product treatment in agarose plate experiment, the data of EnSoil Product treatment came from production suspension experiment.

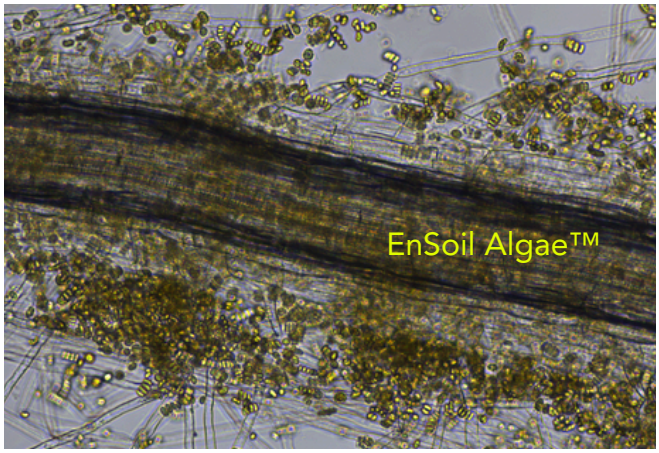
Results

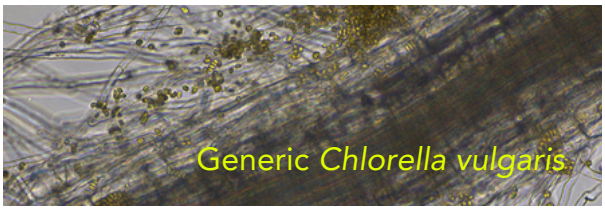
- Among these three treatment, the effect of plant growth promotional effect: EnSoil Algae™ Product > Autoclaved EnSoil Algae™, Boiled EnSoil Algae™, (Chlorella Vulgaris), and EnSoil Algae™ Broth > Commercial Broth and control.

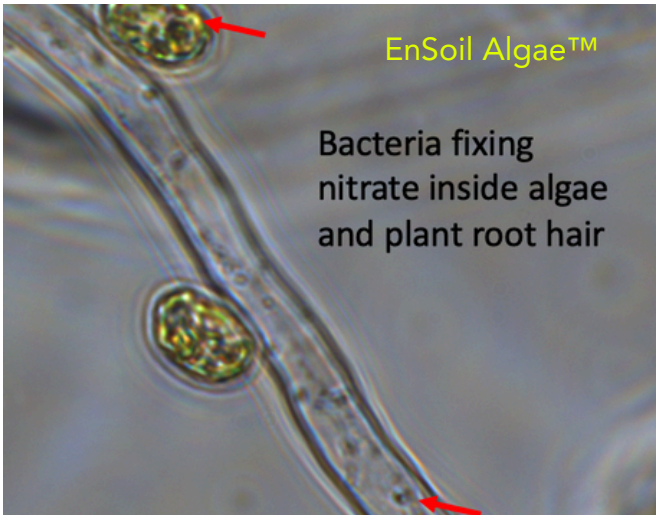
Conclusion

- For promoting growth in Creeping bluegrass ,Clover, and Tomato, EnSoil Algae™ Product is better than (Chlorella Vulgaris). Additionally, EnSoil Algae™ broth is superior to commercial broth.
- EnSoil Algae™ Product demonstrated the best performance among the tested three plant species. Its growth-promoting effect stems from both algae and broth. Algae aid in plant branching and root hair growth, while broth supports primary root elongation.
- Dead algae provide nutrients to sustain plants and promote the growth of endophytic bacteria. It's possible that dead algae may be absorbed into plant cells entirely.
- Overtime, the growth-promoting effect of EnSoil Algae™ broth improved, possibly due to the secretion of secondary metabolites by algae.









EnSoil Algae

University of Hawaii

Dr. Amjad Ahmad - Oahu, HI

Materials & Methods

Field Trial Locations:

Hawaii-Kai Honolulu (top)
Walmanalo (bottom)

Sweet Corn Varieties:

Venture, Inspiration, Patriarch
(from Stoked seeds company)

Fertilizer and Algae Application:

- Treatments Phase 1:
  - Control - 200 lb/acre N
  - 75% + Algae
  - 50% + Algae
- Treatments Phase 2:
  - Control - 200 lb/acre N
  - 100% + algae
  - 75%+Algae
  - 70%+Algae
  - 65%+Algae
  - 60%+Algae

- **EnSoil Algae: 3 Applications**
  - **V3, V7, V10**

Feather meal (12-0-0) was used as the nitrogen source for both sites. The nitrogen application was split into two-halves. Half application pre-plant and 2nd half a month after sweet corn germination. EnSoil Algae™ was applied as a soil drench after seed germination (V3) and after the 2nd fertilizer application through drip irrigation (V7). The 3rd application was applied as a foliar spray 2-weeks after the 2nd application (V10). EnSoil Algae™ was applied at a rate of 8 oz. / acre.

Data Collection:

- On 5 randomly selected plants from each replication we collected the following data: plant height (in), SPAD leaf chlorophyll, corn ears with husk weight (ounce), corn ears husked weight (ounce), sweetness (BRIX), and individual plant yield.
- The entire plot yield was used to measure the total yield (presented in bushels).

Results

- Reduction in nitrogen up to 35%+Algae produced similar corn ear yields compared to 100% N application.
- Chlorophyll content was sufficient for healthy/optimum crop growth with the N-reduction to 35%, then went below the optimum rate with 40% N-reduction. There was no significant effect on sweet corn ear length or BRIX level.
- There was no significant change in corn ears with husk weight and husked corn ear weight when nitrogen was reduced down to 35% and with EnSoil Algae™ applied for all three sweet corn varieties. However, the reduction of 40% in nitrogen application rate caused a significant decline in sweet corn ear weight.

Discussion

It is clear that the EnSoil Algae™ application helped keep the soil nitrogen at the necessary level for optimum sweet corn growth. Specifically, the improvement in soil microbiology with the EnSoil Algae™ application has improved nitrogen availability to a sufficient level to reduce nitrogen application up to 35% (65% of the total nitrogen rate applied). It is known that soil microbiology and nutrient release/availability for crop uptake are highly and significantly correlated. It's also known that sweet corn is a heavy nutrient feeder. An available N decline is normal with reducing the N application. However, in this case, the reduction of N by 35% did not reach a significant level to affect the growth or yield of the sweet corn.It is clear from the results that EnSoil Algae™reduced the impact by increasing nitrogen availability for the sweet corn.

Conclusion

The results suggest that the increased diversity of soil microbiology (from EnSoil Algae™ application) lead to improved nitrogen availability (Mineralization) for crop uptake. Regardless of soil properties (two study sites), the application of EnSoil Algae™ benefitted the sweet corn when there was a reduction in the nitrogen application down to 65% of the total recommended rate. We believe that cutting down nitrogen application by 25% with EnSoil Algae™ application will lead to many benefits, including: improving farmers net profitability, protecting the environment by reducing nitrogen leaching, while keeping the crop healthy and at its optimum yield.

A Citrus Farmer and Field Researcher's Support for EnSoil Algae™

After 25 years of working in field research

for Bayer Crop Science, I am currently operating a commercial citrus grove and research farm. I have had the opportunity to evaluate the EnSoil Algae™ product in a replicated field trial. We have looked at impacts on the soil microbiology and subsequent fertility by using the most detailed testing methods available: BeCrop DNA analysis, the Haney soil health test, and PLFA. Results have been significant in terms of microbiology changes, nutrient availability in the soil, and tree growth. *Chlorella vulgaris* algae is proving to be a very unique organism that can address plant growth and fertility.

In the last 10 years, regenerative soil research has clearly proven the impact of the soil microbiome on fertility. I am a clear example of growing a high demand crop (particularly micro-nutrients) solely with bio-stimulants and organic fertility. Enlightened Soil could play a significant part in this rapidly expanding segment of the crop nutritional industry.

I whole-heartedly endorse and support their efforts to expand their production facilities which would enable them to supply a wider range of the agricultural industry in the U.S. and do it economically. Production of *Chlorella vulgaris* supports every one of the USDA's objectives for the advancement of American agriculture. Sustainability, climate change, carbon sequestration, and, ultimately, support of the American farmer, are all the result of a movement towards this regenerative practice.

As the evidence is being compiled that human health is unequivocally linked to soil health, companies like Enlightened Soil will emerge as leaders in the evolution of modern agriculture.

Herb Young

Herb Young | Squeeze Citrus LLC

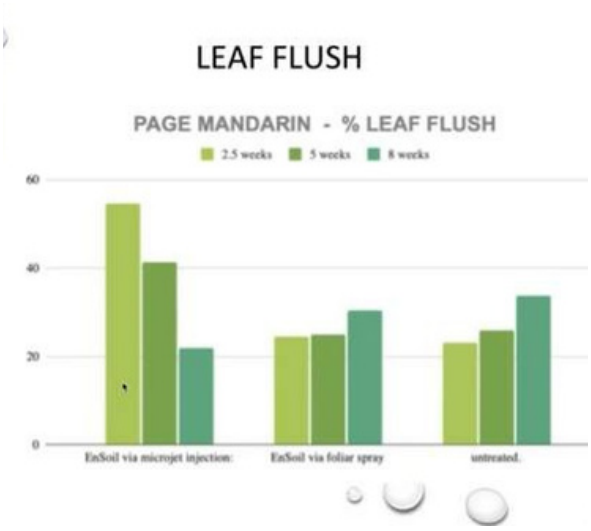
Squeeze Citrus

Herb Young - Thomasville, GA

Herb Young (Squeeze Citrus) is a small, regenerative citrus grower and researcher from Thomasville, GA that has transformed his land by using cover crops and a pure biological nutrition system. Herb recognized tremendous plant and soil response with application of EnSoil Algae™, confirmed by BeCrop test results.

"For the last two seasons, I've used EnSoil Algae™ as a foundation treatment on my citrus grove. The work we did proved conclusively that it jumpstarts microbial activity. I'm convinced microbes are absolutely a key component of the nutrient burst in my fruit. The Haney test proved that.

I realized the value when on one of my varieties EnSoil Algae™ applied through irrigation stimulated a leaf flush 5 weeks earlier – extremely valuable in citrus where we hope for five flushes a year. This was in a replicated trial. The application is a simple injection through microjet irrigation, monthly between March and October."



"The most significant result from my total regenerative organic practices is nutrient dense fruit. For the first harvest (year three), I selected Page Mandarins and Pink Frost Grapefruit from my grove and picked fruit of the exact variety from a conventional grove. I matched the varieties and the date of picking. I sent samples to a USDA Certified lab for nutrient analysis. The results were beyond anything I could imagine. Across 35 direct comparisons, the average nutrient increase of my citrus was 8 times higher! Eight-fold. These were carotenoids, flavonoids, and vitamins responsible for every healthy function and disease prevention imaginable. The flavonoid hesperidin contributing to brain function and memory was 39X higher in my fruit. While EnSoil Algae™ was not the only contributing factor, it is a part of my program to restore the soil ecosystem and grow incredibly nutritious fruit."

EnSoil Algae

	NUTRIENT	HEALTH BENEFIT	CONVENTIONAL	SQUEEEZE REGENERATIVE
Flavonoids:	TANGERETIN	Cardio health, lower cholesterol	X = none	
	NARINGIN	Antioxidant		
	NOBILETIN	Anti-inflammatory	X	
	NARIRUTIN	Suppresses Cancers, Heart health, Liver health, detox	X	8X
	NEOHESPERIDIN	Anti-inflammatory	X	
	HESPERIDIN	Blood flow, brain cognition, memory, reduce heart disease		39X
Carotenoids:	CIS-LYCOPENE	Cancer prevention, antioxidant		
	TRANS-LYCOPENE	Antioxidant, highly bioavailable, Heart health		2X
	CIS-BETA-CAROTENE	Eye health and unique antioxidant		3X
	TRANS-BETA-CAROTENE	Most stable form of beta-Carotene		3X
	BETA-CAROTENE	Eye health		5X
	CRYPTOXANTHIN	Boosts Immune system		11X
Vitamins:	RIBOFLAVIN (VITAMIN B2)	Converts food to energy		4X
	THIAMIN (VITAMIN B1)	Healthy nerve function, cognition		
	VITAMIN C	Immune function		

SQUEEZE

"Through a Haney Soil test, we could clearly see a soil microbe shift as all the available N was converted to amino acids and proteins, the carbon increased, and we got explosive growth. The soil DNA test showed exactly what I saw above ground. It revealed EnSoil Algae™ application opened N, P, and K pathways (increased those microbes,) improved soil quality, and biodiversity. These results convinced me to regularly include EnSoil Algae™."

- Herb Young

EnSoil Algae

BECROP

	Untreated	EnSoil Foliar	EnSoil Irrigation injection
Number of microbe Species	626	671	652
Soil Quality			+
Biodiversity			+
N Pathway		+	+
P Pathway		++	++
K Pathway		++	++

EnSoil Algae

BECROP

Overall Microbial Nutrient Cycle Metrics from BeCrop Tests

Not detected
Very Low
Low
Medium
High
Very High

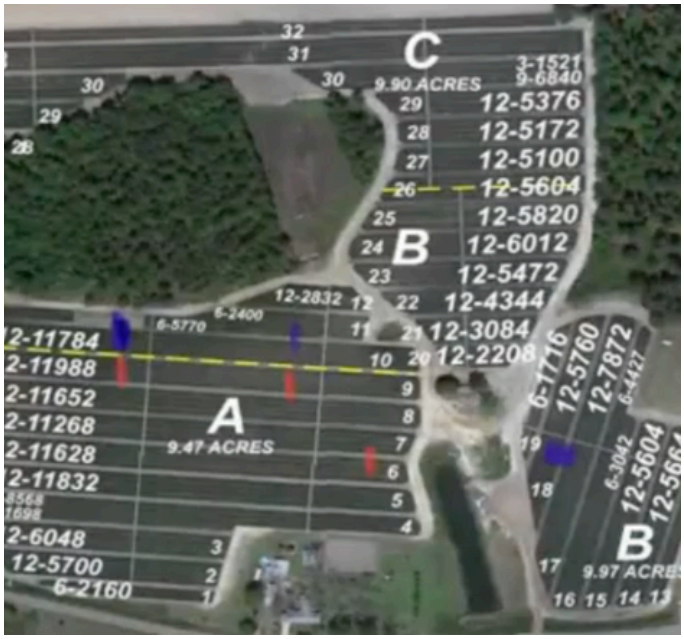
EnSoil Algae

Southern Valley Farms

Austin Hamilton - Thomasville, GA

"We've been impressed with EnSoil Algae™. This is our second year using the algae and it has improved yields everywhere we have incorporated it into our program. We started on peppers and we are expanding our use of it across the operation. We try a lot of things on the farm. This is one that is delivering a healthy return and it has proven to be very easy to add to our program."

2023 Pepper Results with Herb Young



Southern Valley is one of Georgia's largest and most successful vegetable farms. A test was conducted with EnSoil Algae™ on two adjacent 10-acre pepper blocks. Three applications of EnSoil Algae™ *Chlorella vulgaris* were made to one block between transplant and first harvest (of ten). The impact of the EnSoil Algae™ applications was measured by taking replicated BeCrop DNA and Haney Soil Health tests within each block. Analysis of the microbial changes using BeCrop indicated striking changes through the season. Systems were "turned on" as the season progressed. Block A was supplemented with 3 EnSoil Algae™ treatments and block B was used as the untreated control. (Sample locations = red dots)

Combining the Haney Test with BeCrop gives a chemical analysis that substantiates what the changing microbial systems are doing. Highly statistically significant (**) increases occurred in microbial populations that activated N, P, S and Fe in the EnSoil Algae™ treated block:

- Inorganic nitrogen release + 9.54% **
- Organic P assimilation + 3.95% **
- Iron assimilation + 7.22% **
- Sulfur cycle equilibrium + 10.25%**

Similarly, significant changes in microbial hormonal activity were documented in the EnSoil Algae™ block:

- Gibberellin production (GA) + 39.7% * (* = statistically significant)
- Heavy metal resistance + 76.8% **
- Abscisic acid (ABA) + 69.6%
- Siderophore production + 38.3%* (scavenges iron)

All of the microbes responsible for fighting pathogens and nematodes were turned on by the EnSoil Algae™ treatment:

- Fungicide agents + 280.9%**
- Bactericide agents + 20,599%** (indicates a low starting point)
- Nematicide agents + 109.8%

These powerful changes in the soil, chemically and biologically, were confirmed by a yield increase in the EnSoil Algae™ block of 13% over the ten harvest timings. This translated to nearly six thousand lbs per acre increase in yield (5,908) which at the average price of $0.68/lbs is a return of over $4,000 per acre. While not a guarantee and there is some variability in large block comparisons, documentation of the soil biology changes and the corresponding chemical changes proved a tremendous positive change in the "life in the soil" that can make nutrients more available and heighten defense against pests that would apply to any crop.

Note: The loamy sand Georgia soils at this site had a pH of 7.0 and organic matter content of 1.1%. Because other pepper fields on the farm had severe infestations of Phytophthora earlier this fall, seven applications of biological inoculants were applied to both of these fields during the growing season ranging from multiple Bacillus sp. to Trichoderma.

Trial conducted by Herb Young.

EnSoil Algae

Clemson University

Dr. Brian Ward - Charleston, SC

Methods

The study used standard field-trial methods with six replicates of each treatment group randomly situated in the test garden. Rows were covered with black plastic mulch, and there was drip irrigation. Granular organic fertilizer (PGF) was applied before placement of mulch and planting. Soil application of algae and/or liquid fertilizer was done through drip irrigation. Foliar application of algae was done with a backpack sprayer. Inputs, fertilizer, or algae were applied at 2-week intervals. The application rate of algae was 50,000 cells per sq. ft. of garden whether applied to foliage, ground, or both. There were 14 treatment groups including various combinations of PGF, liquid chemical fertilizer and algae with foliar or ground application (Table). The results from each treatment combination were compared with control replicates that received no fertilizer or algae input. During the growing season, the control (including 6 replicates) yielded 409 squashes with a total weight of 186 lbs. (Table). The table presents number of squashes harvested and their total weight for each treatment group. Since produce is sold 'by the pound' the latter is perhaps more important.

Treatment assignments were designed to answer specific questions:

- Does EnSoil Algae™ work at a dose of 50,000 cells per square foot?
- Is it as effective as synthetic fertilizer?
- Farmers are reluctant to jettison synthetic fertilizers altogether. Is there a benefit with adding algae to fertilizer, perhaps with a lower fertilizer dose? Could that allow reduction of costs?
- What is the most cost-effective approach?

Table: Squash yield comparing EnSoil Algae™ alone or in combination with other fertilizers.

Treatment	# Harvested	(%of control)*	Weight (lbs)	(%of control)*
Control (no input)	409 squashes	0	186 lbs.	0
100% PGF (granular fertilizer)	546 squashes	+ 33%*	249 lbs.	+ 33%*
Algae (Alg)—soil application (app.)	498	22%	260	40%
Alg—foliar app.	451	10%	214	27%
Alg—soil + foliar app.	429	5%	206	11%
100% PGF + Alg—soil app.	499	22%	246	32%
100% PGF + Alg—foliar app.	491	20%	226	22%
100% PGF + Alg—soil + foliar app	540	32%	260	39%
25% PGF + Alg—soil app.	480	17%	232	25%
25%PGF + Alga—foliar app.	568	39%	271	46%
25%PGF + Alg—soil + foliar app.	465	14%	225	21%
25% PGF + Alg—soil app. + 75% drip Irrigation fertilizer**	540	32%	274	49%
25%PGF + Alg—foliar app. + 75% drip Irrigation fertilizer	514	26%	252	35%
25%PGF + Alg—soil + foliar app. + 75% drip Irrigation fertilizer	448	10%	224.8	20%

PGF = Preplant granular fertilizer.
**75% drip irrigation fertilizer = 75% of the nitrogen input for the season divided and applied at 2-week intervals with drip irrigation (this + the 25% PGF = the season's total calculated nitrogen input).
*Percent of control: A sample calculation for number of harvested squashes with 100% PGF: (546 – 409) / 409 = 33%

Discussion

A consistent result is that EnSoil Algae™—when compared with the control—effectively promoted squash yield when measured by number of fruits or total weight of the crop. This was true when it was used alone or in combination with synthetic fertilizer. When algae alone were compared with the usual fertilizer dose (100% PGF), the result is uncertain. Soil application of algae looked better, and foliar application somewhat worse, but these results were close.

Another issue is whether there is a benefit to adding algae to synthetic fertilizers. Combining algae with the usual dose of fertilizer (100% PGF) was of no benefit. If a grower wants to continue input with synthetic nitrogen—a slow wean of the farm from synthetic fertilizer—the dose can be reduced. A winning combination was 25% of the usual fertilizer input plus foliar application of algae (a 46% increase in crop weight). However, soil application of algae alone looked quite good as well (a 40% increase). Of interest, adding a massive dose of fertilizer—granular at the beginning of the season, plus the remainder of a 100% dose in combination with irrigation water plus soil application of algae —boosted the yield by 49%. These differences among treatment combinations are uncertain and await statistical analysis.

A reasonable interpretation at this time is that (1) EnSoil Algae™ works at a dose of 50,000 cells per sq foot of garden, (2) it can work in combination with fertilizer, and (3) full dose fertilizer isn't needed when algae is used in combination.

The bottom line for a grower is the return on investment. Given the high cost of fertilizer relative to the cost of algae and these results, we anticipate algae will prove to be cost- effective.

Link to the full Clemson Study Here

EnSoil Algae

RHIZE BIO Roots to Shoots Trial

Background

RhizeBio uses shotgun metagenomics, a method for studying microbial communities in soil by sequencing all DNA present, and providing a comprehensive view of soil biodiversity. The testing program in the Roots to Shoots trial included Haney, M-III, and TND soil testing, Rhizosphere metagenomics, and plant tissue and sap analysis.

RhizeBio combines shotgun metagenomic sequencing with patented bioinformatics to assess the structure, health, and functional capacity of the root-associated microbial communities (the rhizosphere) which play a central and important role in crop growth, nutrient availability and uptake, resistance to diseases and pests, and ultimately crop yield.

The purpose of this study was to use soil chemistry data, rhizosphere metagenomics data, and plant tissue nutrient data together to evaluate the effect of treatment with EnSoil Algae™, a live cell biostimulant (Chlorella vulgaris). This analysis was conducted to assess row-cropping systems across different crop growth stages and field conditions, and to evaluate nutrient uptake efficiency, soil carbon, plant stress, and overall crop health.

Results Summary

- **Nitrogen Cycling Improvement**
  - **Nitrogen cycling metrics (nodulating bacteria, denitrification, and organic nitrogen breakdown,) potassium solubilization, plant stress adaptation, and soil oxygenation improved in corn, soybean, and milo crops with EnSoil Algae™ application.**
- **Increase in Nutrient Movement**
  - **Data combined from the Haney test and plant tissue analyses showed an increase in nutrient movement into the treated crops.**
- **Increase in Carbon Cycling Potential**
  - **Carbon cycling potential increased mid-season in treated corn, suggesting a more active microbial community response to crop demands during active growth.**
- **Increase in Total Organic Carbon**
  - **Total organic carbon increased in corn at silking, revealing improved carbon sequestration and overall soil health.**

Corn V4 - V6: JRH Grain Farms | Janski Farms | Purdue University

- Improved microbial respiration, oxygen availability, carbon fixation (12%), and nitrogen cycling (18% increase in nitrogen fixation genes,) and iron acquisition (6%)
- Significant increases in available soil N (17.6%), P (8%), and K (35%), particularly nitrate (32% increase) and inorganic P (13% increase). As peak N and P demand will not occur until later, these increases represent "storage" of inorganic nutrients in soil for later consumption by plants.
- High levels of Cu, Fe, and Al in the untreated plant were decreased by 34%, 73%, and 25%, respectively, reducing the potential for toxicity.

Corn V7 - V9: Purdue

Corn at Silking: Purdue | 7 Gen Ag

- Improved soil organic matter, microbial respiration (39%), oxygen availability, and plant stress adaptation (microbial production of phytohormones)
- Higher levels of P (13%), K (25%), and S (29%) cycling in the microbiome
- Higher levels of N, P, and K in the tissue than untreated plants, and sufficient or high levels of all other nutrients tested

Soybeans: Schwindt | Byrdland

- Significantly improved microbial respiration, oxygen availability, carbon fixation, and nitrogen cycling
- Slightly decreased Organic Carbon (13%), but significantly increased proportion of Microbially Available Carbon (90%)
- Higher levels of N, S, Ca, Zn, Mn, and B in the plant tissue
- High levels of Fe and Al in the untreated plants were decreased by 55% and 65% respectively, reducing the potential for toxicity

Milo: Stegman

Key Takeaways: Nutrient Uptake, Uptake Efficiency, and Reduced Toxicity

- Increased microbiological activity in soils treated with EnSoil Algae™ is leading to improved nutrient uptake and improved nutrients in plant tissue.
- The table below shows P and K cycling in corn at silking. Reductions in soil nutrients correspond to increased nutrient levels in plant tissue, and to increased levels of microbial cycling.
- Increased microbial cycling of P and K in the root rhizosphere (13% and 7% respectively) corroborate this trend, indicating improved microbial nutrient acquisition in response to treatment with EnSoil Algae™ is leading to the increase in plant tissue nutrients

Sample Type	Untreated			Treated			% Change		
	Haney	Rhize	Tissue	Haney	Rhize	Tissue	Haney	Rhize	Tissue
Phosphorus	23.9	42%	0.18	16.7	56%	0.21	-30.2%	13.2%	17.1%
Phosphorus Solubilization		42%			56%			31.1%	
H3A Total Phosphorus	10.4			7.3			-30.2%		
H3A Inorganic Phosphorus	7.5			5.2			-31.7%		
H3A Organic Phosphorus	2.9			2.1			-26.3%		
Organic P Release	2.9			2.1			-26.3%		
Organic P Reserve	0.0			0.0					
Available P	23.9			16.7			-30.2%		
Phosphorus, % P			0.18			0.21			17.1%
Potassium	47.6	25%	1.31	47.4	32%	1.52	-0.6%	6.5%	16.3%
Potassium Solubilization		25%			32%			25.7%	
H3A ICAP Potassium	39.7			39.5			-0.6%		
Available K	47.6			47.4			-0.6%		
Potassium, % K			1.31			1.52			16.3%

- In some cases, a key benefit of EnSoil Algae™ application is improved nutrient uptake efficiency, rather than high overall nutrient levels in plant tissue
- In Corn (V4 - V6), plant tissue nutrients in the untreated samples were already close to desired levels. However, pH levels in these soils were low (5.6, 5.7) leading to increased chemical mobility of Fe, Cu, and Al, and decreased solubility of N, P, K, S, Ca, and Mg. This likely led to elevated Fe, Cu, and Al levels in untreated plant tissue, above desired level and possibility leading to toxicity.
- The treated samples showed significant decreases in Fe, Cu, and Al below potential toxicity. Meanwhile N, P, K, Na, S, Ca, Nn, B, and Mg saw only minor changes, and all remained in sufficiency range.

Sample Type	Untreated			Treated			% Change		
	Haney	Rhize	Tissue	Haney	Rhize	Tissue	Haney	Rhize	Tissue
Health Overview	12.2	58%	27	10.6	60%	61	-13%	3%	34.51
Community Structure	12.2	64%		10.6	65%		-12.7%	2.2%	
Respiration	93.2	76%		78.2	79%		-16.1%	4.4%	
Environmental Stressors		38%			37%			-2.8%	
Carbon	122.0	66%		119.7	71%		-1.8%	7.7%	
Nitrogen	66.8	65%	4.50	78.6	67%	4.48	17.6%	1.8%	0.4%
Phosphorus	32.2	59%	0.44	35.0	58%	0.41	8.6%	-0.9%	8.0%
Potassium	40.5	47%	3.55	54.7	46%	3.00	35.0%	-1.6%	15.6%
Sulfur	5.0	45%	0.27	4.9	44%	0.22	-1.6%	-1.4%	20.3%
Calcium	319.7	32%	0.45	333.9	35%	0.42	4.4%	9.8%	6.8%
Iron	67.3	66%	428.30	68.4	72%	279.94	1.6%	9.4%	34.6%
Zinc	0.9		36.59	0.6		36.81	-36.7%		-0.6%
Manganese	7.3		70.17	6.7		67.05	-7.5%		4.4%
Magnesium	102.3		0.28	111.3		0.31	8.9%		-8.7%
Sodium	7.6		0.020	7.2		0.016	-5.7%		-19.7%
Copper	0.2		45.64	0.2		12.14	-4.2%		73.4%
Aluminum	155.0		221.53	149.7		166.21	-3.4%		-25.0%
Molybdenum			0.24			0.24			2.7%
Boron			11.09			10.17			8.3%

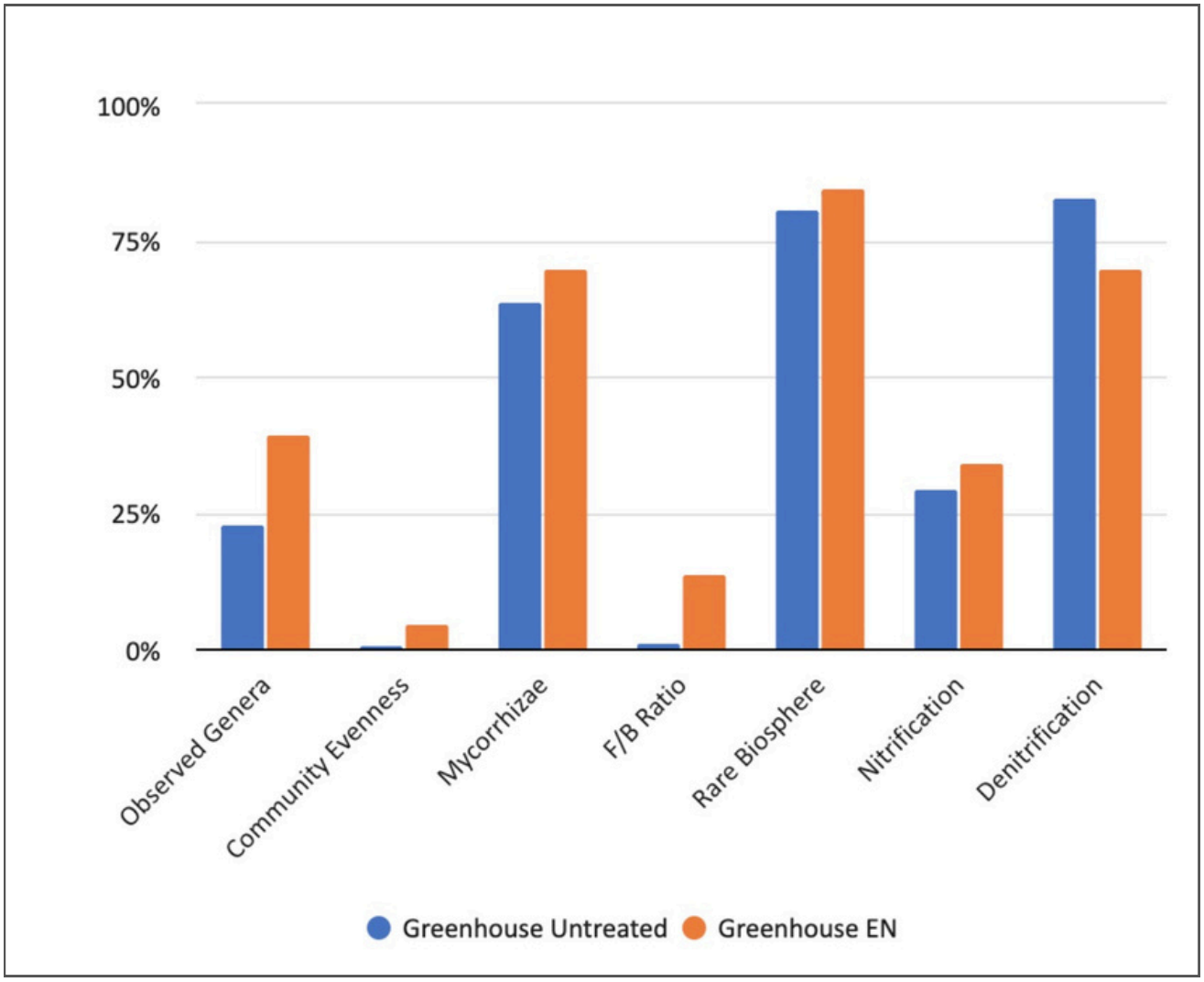
RhizeBio Seed Treatment Testing on Corn

I had the wonderful opportunity of running into the EnSoil Algae™ team at the Southern Farm Show in Raleigh, NC. It is refreshing to work alongside folks who are truly making a tangible difference in the agricultural space. After interacting with this team, it is clear that something special is occurring in the industry and there is a communal feeling of excitement towards a better, healthier agricultural future – starting at the roots.Shortly after meeting Tucker, I was introduced to the famous Russell Hedrick who is a huge advocate of the EnSoil Algae™ product. I had to learn more! RhizeBio specializes in DNA sequencing and bioinformatics, and we have a unique soil test that allows us to look under the hood at the microbial interactions in the rhizosphere of crops (root associated microbes).

We conducted a trial with Russell and Merideth in 2023 to look at how *Chlorella vulgaris* improves soil productivity and crop performance. When it comes to seed development, establishing a robust community structure in the early seed germination is crucial. We gauge this through variables such as observed genera (biodiversity), community evenness (competitive environment), mycorrhizae, fungi/bacteria ratio, etc. Across the board, EnSoil Algae™ improved all of these genetic functions on Russell's soil (see graph on next page). Additionally, nutrient cycling pathways were improved – allowing for more nutrients to become readily available to the crops, especially as it relates to nitrogen cycling. We were able to glean these insights with a single sample. It was a pleasure working with Merideth, Tucker, Andrew, Camille, and Yazzy. We look forward to continuing our research and learning more about the revolutionary impact Enlightened Soil is having out in the field!

Josh Toal

Josh Toal
Co-Founder, RhizeBio



RhizeBio Graph referred to in Josh Toal's letter on previous page.
The untreated trial (blue) had a bare corn seed in Russell's soil, as a control. EnSoil Algae™ is represented in orange. This graph only shows results from the seed stage of this plant's growth. All five of the community structure values (observed genera, community evenness, mycorrhizae, fungal/bacteria ratio, and rare biosphere) showed either a clear increase or a negligible increase, in favor of EnSoil Algae™ use. Additionally, a decrease in denitrification is desirable to prevent additional nitrogen from leaving the soil and returning to the atmosphere as a gas.

WHAT IS REGENERATIVE AGRICULTURE?

“Regenerative Agriculture is a relationship-based journey to emulate nature's intelligent design, principles, and patterns that heal biological processes and communities, ultimately yielding nutrient-dense food for humans.” This type of farming is a "system approach" that will increase soil function and reduce costly chemical inputs which will improve the bottom line.

The correct approach is everything! Nature wants to be approached with the proper biochemistry, such as her natural molecules, not man-made molecules. EnSoil Algae™ is a product that improves soil function, promotes plant health, and improves yield. EnSoil Algae™ is the correct approach! Russell Hedrick from Hickory, NC, became the 2023 corn champion with the help of EnSoil Algae™! I know Russell. He is a great farmer!

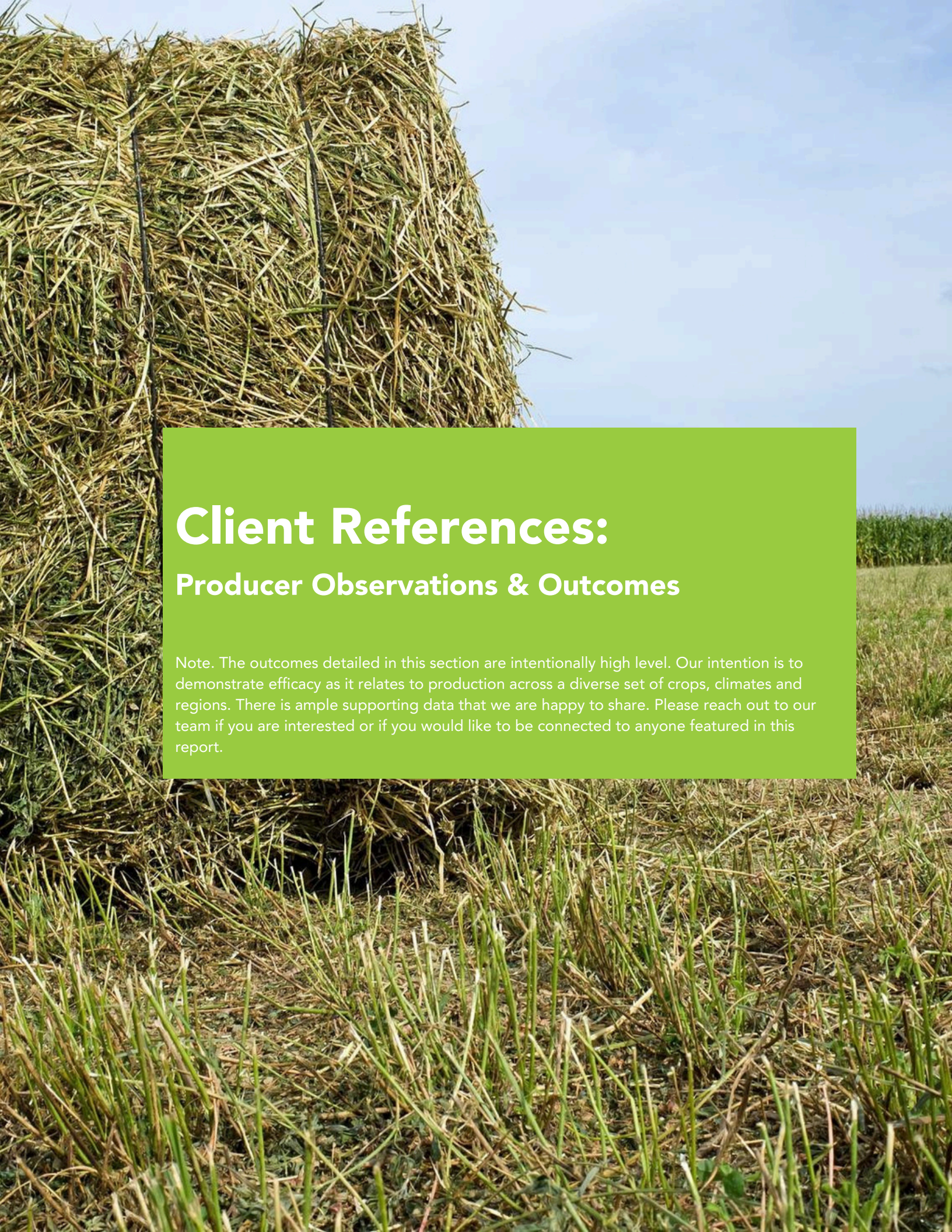
For many years, I would not promote any biological or chemical products because I could see that farmers could restore soil function by using diverse cover crops, no-till, and animal integration. I was wrong! Now, I have a different view. Not all farmers can use animals on their crop fields. Depending on your cropping system, EnSoil Algae™ can be a powerful tool to restore soil function. It works better with less pesticides and physical disturbance (tillage) and cover- crops.

I encourage you to use this product if you want to reduce your chemical fertilizer usage.

Ray Archuleta

Ray Archuleta

Ray Archuleta is a Certified Professional Soil Scientist with the Soil Science Society of America and has over 30 years’ experience as a Soil Conservationist, Water Quality Specialist, and Conservation Agronomist with the Natural Resources Conservation Service (NRCS). During his tenure with the NRCS Ray served in New Mexico, Missouri, Oregon, and North Carolina. Ray received his AS degree in Livestock Science from Northern New Mexico College and a BS degree in Agri- cultural Biology plus 30 hours of graduate work in soil related courses from New Mexico State University. He served in the Peace Corps for two years in Guatemala as a Livestock Specialist.After his retirement from the NRCS in 2017, Ray founded Understanding Ag, LLC, and Soil Health Academy, to teach Biomimicry strategies and Agroecology principles for improving soil function on a national scale. Ray also owns and operates a 150-acre farm near Seymour, Missouri that he operates along with his wife and family.



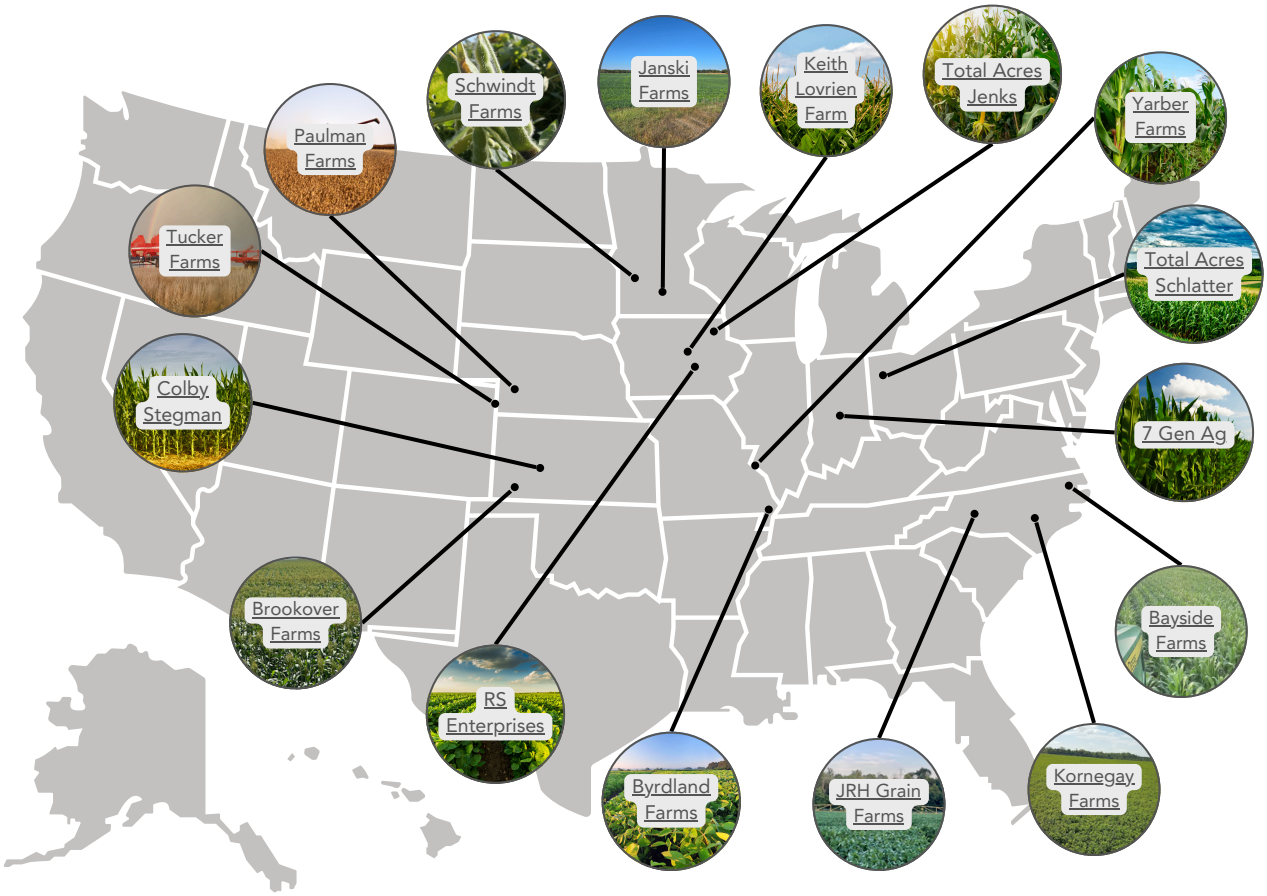
Client References:

Producer Observations & Outcomes

Note. The outcomes detailed in this section are intentionally high level. Our intention is to demonstrate efficacy as it relates to production across a diverse set of crops, climates and regions. There is ample supporting data that we are happy to share. Please reach out to our team if you are interested or if you would like to be connected to anyone featured in this report.

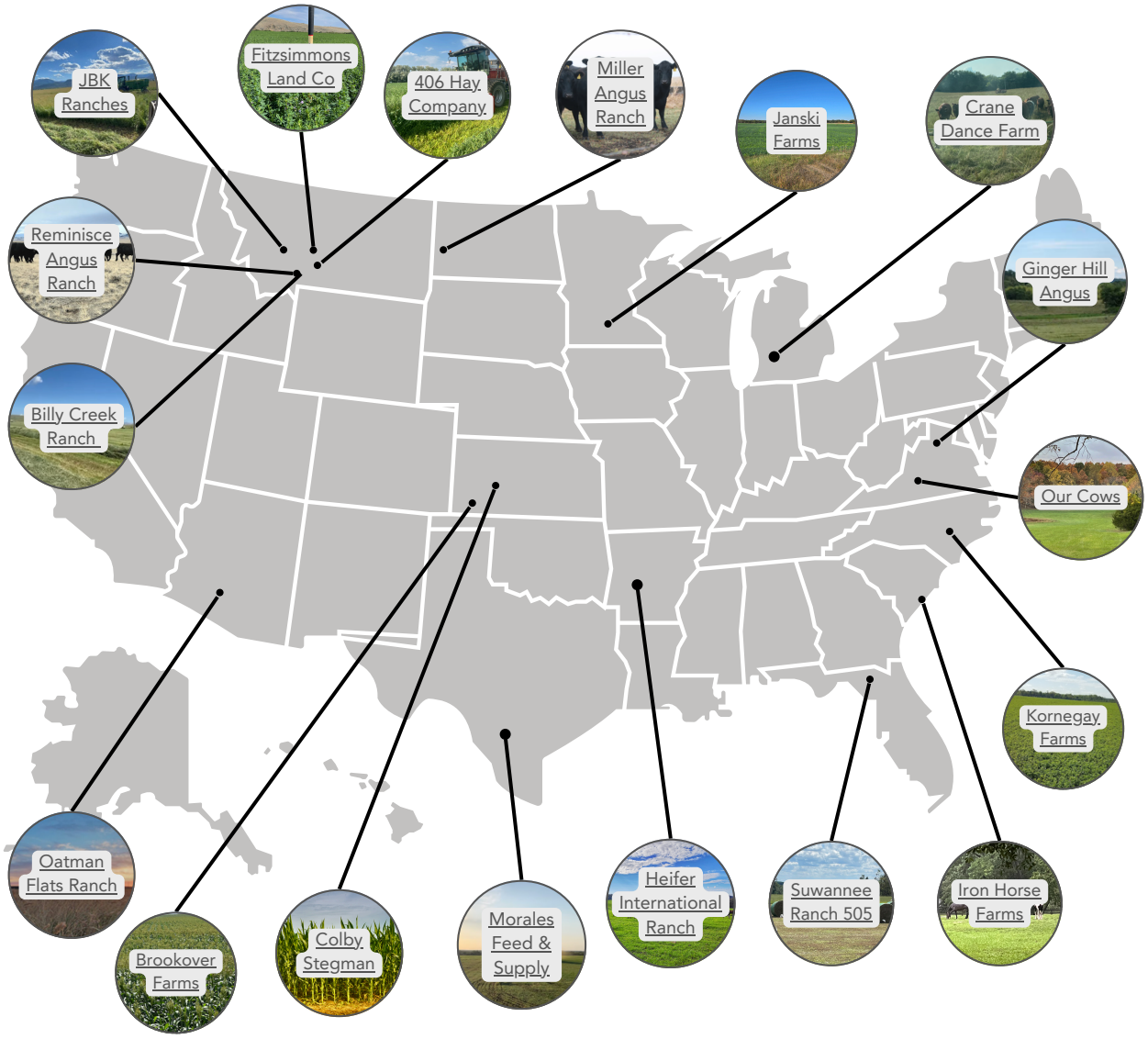
EnSoil Algae

Row Crops



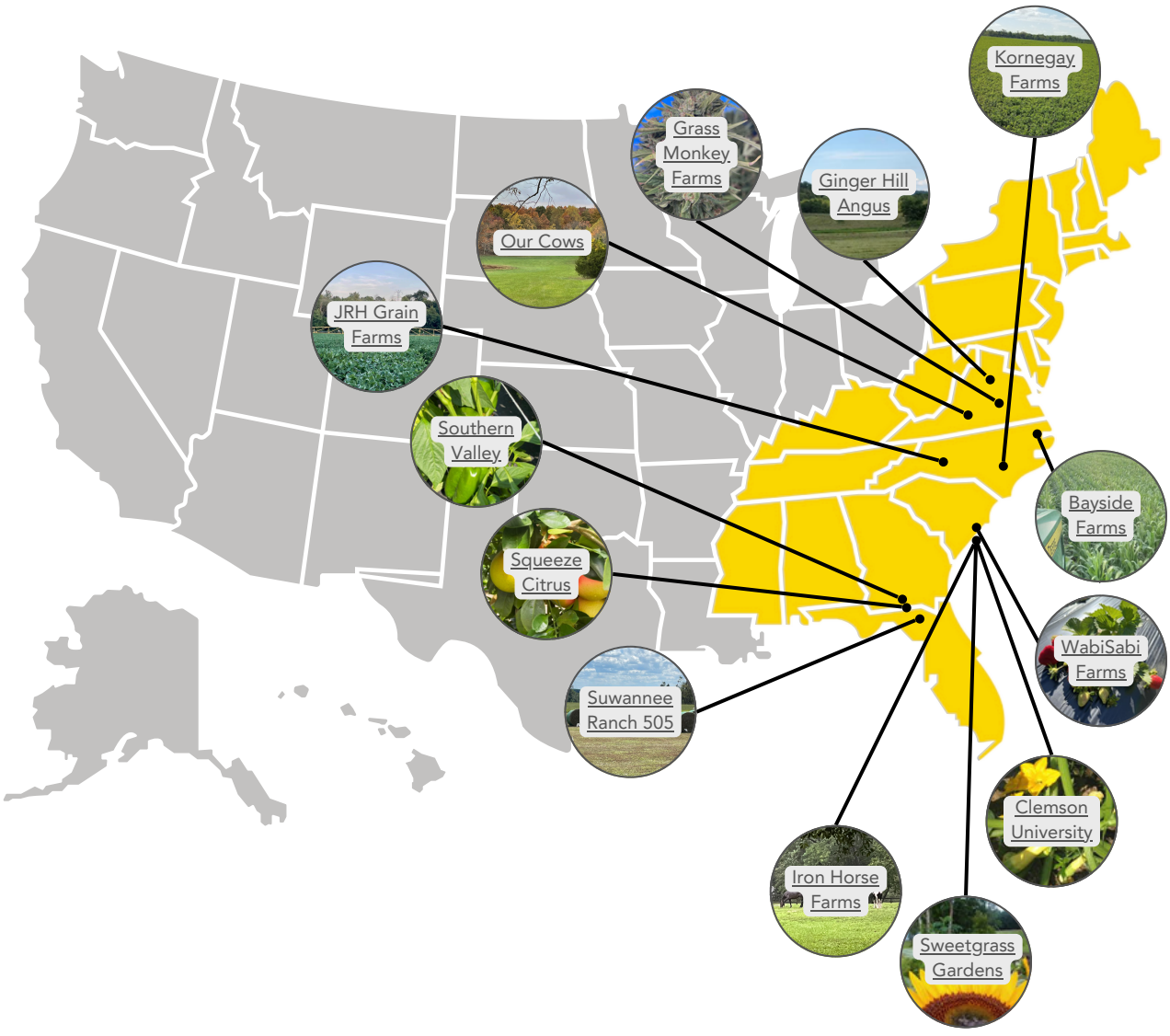
EnSoil Algae

Livestock & Feed



EnSoil Algae

East



EnSoil Algae

JRH Grain Farms

Russell Hedrick - Hickory, NC

Russell is co-owner of Soil Regen and a leading voice in the regenerative farming movement. This past season he harvested 460 bpa of corn, an American dryland record, and used EnSoil Algae™. He is raising non-GMO corn and non-GMO soybean. Russell is in year three of application studies with EnSoil Algae™.

Russell Hedrick spraying EnSoil Algae™ on his soybeans.

"EnSoil Algae™ has been an enhancer for our farm. It has enhanced our soil biology, foliar spray uptakes, optimized plant nutrient uptake, energy value, stress adaptation, plant health, and we have seen consistent yield increases versus the check strips. The ROI is there to use EnSoil Algae™ across all of our acres."

Roots to Shoots Trial 2024

RHIZE BIO

Sampled at V4-V6 via Haney test and Rhize Bio Metagenomics test	Nitrogen Fixation	Phosphorus Cycling	Soil OM (%LOI)	MAC%	Soil Resp (ppm CO2-C)
Untreated	31.1	36.3	5.3	123.5	124.9
Treated	43.9	39.2	6.0	139.6	132.2

(2023) Russell's EnSoil Algae™-treated beans @ 1359 seeds/ lb, compared to 2841 seeds/lb (with his normal fertility program) and 1736 seeds/lb with his deep injection fertility program. (right)

"The farm average was a difference of 2.1% in moisture content. EnSoil Algae™ delivered a yield bump of 6-8 bushels ('22) when added to a late season fungicide pass compared to fields that received the fungicide without EnSoil Algae™. Overall 90% rate of profitability based on yield. Farm average was 12.5 bpa gain. Largest gain was a 17 bpa in a field where EnSoil Algae™ was applied in furrow at planting and twice more over the top in season."

'22 early season untreated on left, treated on right

'22 mid Season untreated with EnSoil Algae™

'22 mid Season treated with EnSoil Algae™

'22 Feedback Corn: *"Exceptional growth, plant health, darker green. Plant growth was accelerated by 2-3 leaves within the first 2 weeks. Ear weight has been 1-3 ounces heavier in density."*

'22 Feedback Soybeans: *"More retained pods per plant on 3' row measurements ranging 5-8%. Minimal disease pressure. Plants sprayed with algae haven't had noticeable frog eye leaf spot or rust like their untreated counterparts. We treated 5 fields. In every field EnSoil Algae™ had a meaningful impact on yield. In addition, there was a significant dry down effect and great standability."*

EnSoil Algae

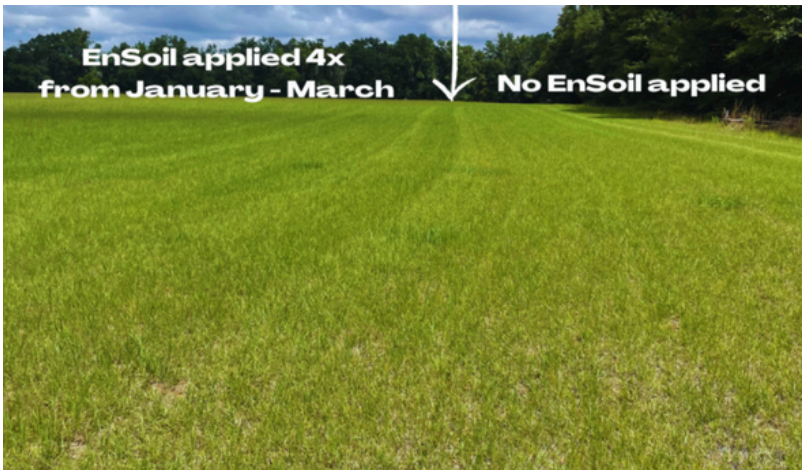
Suwannee Ranch 505

Don and Jane Brewer - Jasper, FL

Previously Don used 300 lbs of NPK fertilizer per acre, which yielded ~45 tons of hay per cutting. In 2023, he used EnSoil Algae™ three times: once in April, May, and July. Reducing NPK by 33% and adding EnSoil Algae™ increased hay production and cut input costs. In 2023, Don spent $20/acre on EnSoil Algae™ on a test plot of 31 acres. 2024 volume pricing will make EnSoil Algae™ available at $9/acre because Suwaneee will be applying to more than 1200 acres. This could increase Don's return on investment (ROI) on his 31 acre Bahia field by $339.14 in 2024.

31 acres Bahai grass	Input Quantities	2023 Harvest Totals	2023 Total Input Cost EnSoil Algae™ @ *$20/acre*	2024 Total Input Cost EnSoil Algae™ @ *$9/acre*
First Cutting (50% NPK reduction)	150 lbs NPK + EnSoil Algae™ (@ 8oz. per acre)	26 tons	$1925	$1584
Second Cutting (33% NPK reduction)	200 lbs NPK + EnSoil Algae™ (@ 8oz.per acre)	58.5 tons	$2356	$2015
Total Per Acre Gain			$7.76 / acre gain	$18.70 / acre gain
Total Gain on 31 Acre Plot			$240.56	$579.70
Total Gain for Applying on 400 Acres with 3 Applications			$9,312.00	$22,440

- Don applied EnSoil Algae™ to half of 22-acre field of Tifton 9 Bahia.
- No NPK has been applied in over 1 year.
- Only EnSoil Algae™ was applied to the left side.



- Oats harvested 5/5/23 for cattle feed.
- Applied EnSoil Algae™ a 5th time on 5/8/23.
- Photo taken on 5/20/23

EnSoil Algae

Winter Grazing Rye and Oats: Applying EnSoil Algae™ in Dry Conditions

2023 Conditions :
September: Daily temperature range 65-88 degrees with 2.50 rainfall
October: Daily temperature range 55-77 degrees with 2.67 rainfall
November: Daily temperature range 35-75 degrees with 2.80 rainfall

"Our soil is a sandy loam with a clay base on average of 12" below topsoil. We had no significant rainfall from 10/09/23 to 11/22/23 and heavy morning dew most days.This field had 3 previous EnSoil Algae™ applications from February to July 2023. The last time this field had NPK 20-0-20 applied was November of 2022. This field is generally used for pasture."

Field Process:

- 10/23/23: tilled to 4-5 inches to level out rough field.
- 10/24/23: planted 100 pounds per acre of mixed oat and rye seed via no-till drill.
- 10/28/23: noticed seed sprouts between 4-5 days after planting.
- 11/07/23: applied EnSoil Algae™ 2 weeks after planting, had not rained 2 for weeks before.
- Growth continued without rain for an additional 2 weeks. Most mornings provided heavy dew.
- 11/22/23: received 1-2 inches of rain.
- 11/29/23: noted rye and oats standing on average 7-10 inches with good color.

"Field seems to be retaining moisture better based on previous years. I kept waiting for the new growth to wither but it stayed healthy and has come on strong with the late rains."

Left side (EnSoil Algae™ treated) was seeded 2 weeks before the right side (untreated). While this is not a directly comparable side-by-side, the left side sprouted within 4 days of seeding and the right did not.

"As a side note, it was an awesome feeling to be able to stand next to our sprayer and take a video without smelling chemicals in the air or having my eyes burn. I believe this product is the answer to my soil health and the overall health of my cattle and ranch."

A Letter from Don Brewer: Rancher and Affiliate

It was back in January of this year (2023) that I first heard the words "*Chlorella vulgaris*". I was attending a seminar sponsored by Enlightened Soil Corp at our local ag extension office. To say I was intrigued would be an understatement. You see, I had been searching for answers and direction on how to obtain healthy soil and a way to reverse the damages that had stripped my soil of life as a result of using herbicides, pesticides and synthetic poisonings for decades. Is that even possible, I thought?

Tucker and Merideth Garrigan (speakers at the seminar) gave me a new hope and a fresh insight that bringing healing to the soil was not only possible but could be profitable. My formal education is not in agriculture, and I was not sure where to begin.

Upon expressing my lack of knowledge and feeling that I was on my own to figure things out, I was excited to hear that EnSoil Algae™ had been putting together an affilliate support team. This team has been incredible to work with. For every question or concern that arises, I have had their full support. The whole team is just a call, text or email away. If they don't have the answer, they will work diligently to get it. They love what they do, and it shows. In addition, their resources are endless. They have surrounded themselves with some of the top agronomists, seed-ologist, weed-ologist and any other "ologist" they may need to research and attain results. It's through this Affilliate Team that I'm meeting other farmers and ranchers that I have created relationships with for support and sharing of ideas. The team encouraged me to become part of my local farming community and I have also met other like-minded people across the country as well. Together we are making a difference.

Thank you to Merideth, Camille, Yazzy, Andrew and Tucker.

Don Brewer

Don Brewer
Suwannee Ranch 505

EnSoil Algae

Bayside Farms

Jay Lane - Elizabeth City, NC

Jay Lane farms 1600+ acres of corn and soybean and is focused on improving soil biology and implementing regenerative management practices as a means of improving his farm's profitability. Jay recognizes improving soil health, production increases, and reducing synthetic inputs all go together. This is Jay's 3rd consecutive year using EnSoil Algae™ and getting materially significant gains. The farm has reduced applied N 45 lbs on corn, and uses no fertilizer on beans.

On average, over three very different growing seasons, the total amount of viable pods on the top three nodes of the soybean plants doubled. In one trial the algae treated soybeans showed a 33 bushel advantage over untreated.

This EnSoil Algae™-treated soybean plant is maturing faster than untreated soybeans. It's nodulating at its second trifoliate, already fixing its own nitrogen!

Soybeans:

- **2023: 13 bu/acre increase (treated vs. untreated) with EnSoil Algae™ and an additional $175.24/acre.** Applied In-furrow, V8, R1.
- **2024: 13 bu/acre increase (treated vs. untreated) with EnSoil Algae™ with 89% ROI on a $12/acre cost of algae.**
- 3rd year in a row with no fertilizer use, and with improved macroindexes on fertility and available NPK. Soil testing indicates that soil biologicals are flourishing.

Soybeans: tops of plants are bigger, better uniformity, excellent color, no spotting, no insect pressure and no insecticide use.

EnSoil Algae

In corn, I can cut out about $70/acre in fertilizer cost and maintain yield with 2 applications of EnSoil Algae™. On fertilized corn, I am getting at least a 25 bushel increase in yield, achieving a 1050% ROI.

Corn:

- **2023: 26 bu/acre increase (treated vs. untreated) with EnSoil Algae™,** see below (two 25-acre EnSoil Algae™-treated fields, in between 25 acres as a control with no EnSoil Algae™- all of 75 acres of corn got 43 units of N)
- **2024: 27 bu/acre increase (treated vs. untreated) with EnSoil Algae™**

My average corn ear was often two more rows around than the untreated corn. In side by sides, there was an average 1.55 rows around increase. In some cases there was no count difference but the kernel depth was greater.

The lighter tint on the control field (no EnSoil Algae™) in the middle shows a nitrogen deficiency at V10 and was corrected with additional synthetic nitrogen (2023).

My available phosphorus is lower with added P fertilizer, but higher where I have algae and no fertilizer.

Grass Monkey Farms

Travis Moore - VA

Grass Monkey Farms grows hemp and cannabis plants in Virginia. They produce the plants and manufacture premium CBD products. Grass Monkey began using EnSoil Algae™ in their production process in an effort to improve production and grading quality of their plants for the purpose of premium certification and better margin. EnSoil Algae™ was applied bi-weekly. No fertilizer was used in the production of the plants.

'22 Feedback: *"I watered in the EnSoil Algae™ at early veg stage; last three weeks of veg; into all of the flower stage. I saw good roots, tight, massive buds -frosty, and 14 to 18% cannabinoids which are very pure."*

"The results are quite frankly ridiculous. Production more than doubled. CBD rates at 12-14% when the industry standard is 7-10%. Chemical fertilizers were not used in production and received premium grading. The return on investment in EnSoil Algae™ was through the roof."

''23 Feedback: *"The results are quite frankly ridiculous.The bed stage was dramatically improved. Plants grew much faster with much larger stalks and better branching. It is a good thing too, because they had to support a lot more weight. Production more than doubled. The plants were so strong, with so much root development, chain saws were required at harvest. Because we were using EnSoil Algae™ and not fertilizer, we were able to continue applying later in the growing cycle. With traditional fertilizer you have to stop fertilizing well before harvest to give it time to flush out of the plant as normal fertilizers reduce the quality of product. Grass Monkey's plants are subject to rigorous lab analysis. The Certificate of Analysis showed CBD rates at 12-14% before curing. The industry standard is 7-10%. Chemical fertilizers were not used in production, so analysis showed the plants were free of heavy metals and received premium grading. In summary, the return on investment in EnSoil Algae™ was through the roof."*

EnSoil Algae

WabiSabi Farms

Jimmy Livingston - Cordesville, SC

Wabi Sabi produces organic market vegetables: strawberries, watermelon radishes, greens. Jimmy has decades of organic farming experience at Wabi Sabi. The community has been looking to Jimmy for organic growing techniques and he runs a very popular u-pick operation.

'22 Outcomes: Jimmy uses his senses to know that his soil and plants are healthy. He has shared that his soil looks and feels very healthy.

'22 Feedback: *"We've had very exciting production on strawberries and radishes when incorporating EnSoil Algae™ into our fertility program. We only grow organically. We love that EnSoil Algae™ is an OMRI listed biological solution for improving soil health and plant production. The plants we've grown using EnSoil Algae™ are some of the prettiest we have ever grown."*

"We only grow organically. We love that EnSoil Algae™ is an OMRI listed biological solution for improving soil health and plant production."

Ginger Hill Angus

Dr. Brooke Miller - Washington, VA

'23 Feedback: "We had an historically dry year in Rappahannock County. We applied EnSoil Algae™ to our pastures 3 times opting not to apply any fertilizer. Our grass held up as well as any pasture in the area. We did not see it flourish like the ground we treated with EnSoil Algae™ in 2022, but given the drought conditions we are encouraged and see benefit for continued use of EnSoil Algae™."

Dr. Miller is a practicing family physician in addition to his work as a rancher and past President of the United States Cattlemen's Association (USCA). He has been treating his fields for hay production: fescue, orchard grass, clover cover crop.

'22 Outcomes: Testing showed a higher number of arbuscular mycorrhizae 'hairs'. These mycorrhizae attach to root hairs and are responsible for nutrient movement. There was a consistent increase of Abscisic acid (ABA), a stress adaptor that effects growth regulation. Both indicators translate to a really healthy plant and increase in yield.

'22 Feedback: Dr. Miller has applied EnSoil Algae™ to his fields for two seasons with excellent results in forage density, hay yield, color, growth, and overall health of his fields. *"We have been using EnSoil Algae™ for two years now at Ginger Hill Angus. The results have been quite remarkable. After our second year of spraying this algae product we have noted the areas where it was used show tremendous improvement in color and volume of forage in the treated areas compared to the controls. What has really amazed us is the dramatic reduction in broadleaf weeds in areas where the algae has been spread. Clover and forage grasses are thriving and ragweed is gone. We still see a good amount of broadleaf weeds in areas without EnSoil Algae™."*

1 and 2 not treated with EnSoil Algae™.

Pasture not treated with EnSoil Algae™ was prone to ragweed and broadleaf weeds.

3 and 4 treated with EnSoil Algae™.

Pasture treated with EnSoil Algae™ experienced improvement in thickness and color

EnSoil Algae

Our Cows, LLC

Anne and Rich Esposito - Bedford County, VA

The Espositos have 30 head of black Angus cows. They manage 30 acres of pasture and have 50 acres dedicated to hay production. It is a mix of fescue and orchard grass with some red clover.

- **1st application on hay fields in early Spring**
- **2nd application 3-7 days after 1st cut**
- **3rd application 3-7 days after 2nd cut**
- **4th application pre winter**

'22 Feedback: *"Our goal is 150 round bales. We had a pretty significant drop in production on our first cut. It was a dry Spring. We recovered some of the loss on the second cut. We don't normally cut a third time, but we were able to get a productive third cut and makeup the shortfall from the 1st cut. We did not fertilize at all."*

'23 Feedback: "We ended up with 280 round bales on a target of 150. We filled the barn and had a lot of hay to sell. We did not use any fertilizer again this year."

"For the two years of EnSoil Algae™ use, we've not had to deal with any health issues in the herd. They have great looking coats and they are happy and healthy. We are going to include our pasture in the EnSoil Algae™ program in 2024. Additionally, one of our hay clients asked to buy all of our hay. His horses have been devouring it."

EnSoil Algae

Kornegay Farms

Donnell Kornegay - Mount Olive, NC

Donnell Kornegay owns and operates Kornegay Farms near Mount Olive, NC. Donnell is looking for solutions to help reduce the use of synthetic nutrients and build the life in his soil. He farms approximately 3800 acres of corn, soybean, sweet potatoes, alfalfa, coastal bermuda, peanuts, rye, and oats. Donnell trialed EnSoil Algae™ on his wheat and alfalfa. Eastern North Carolina experienced a difficult dry period from mid July through the Fall.

Sweet Potatoes: "We sprayed the algae at bedding and again about one month later. The crop was looking good and there was a visual difference in the rows that received the algae. Harvest was delayed by almost a month due to lack of rain, but we ended up with a decent crop all things considered."

Wheat : 88 bpa wheat was produced using 20% less fertilizer and supplementing with chicken litter and algae.

"It was some of the best wheat we've ever produced. It looked healthier and had better uniformity than wheat without algae."

"We liked what we saw with EnSoil Algae™. We think it can help us cut back on fertilizer."

Alfalfa: "We did two applications of EnSoil Algae™, one 3 weeks before the first cut and one about a week after the first cut. We ended up getting 6 cuttings this year instead of our normal 4, and it was dry late summer."

EnSoil Algae

Iron Horse Farm

Allen Reed - John's Island, SC

Iron Horse is ten acres of horse pastures and stables located on Johns Island, SC. They began using EnSoil Algae™ to replace synthetic fertilizer in November of 2020. At that time, the farm was purchasing Bahia grass seed every spring and winter rye every fall. NPK fertilizer was also purchased annually based on Clemson soil test results and recommendations. In March, 2022 a SARE grant was conducted on the pastures to collect data comparing different levels of inputs of EnSoil Algae™ and recommended NPK.

'22 Feedback: *"Under new management, The Stables at Iron Horse instituted a pasture management program which included the use of EnSoil Algae™ fertilizer. Over an 18-month period the improvement in both quantity and quality of forage has been substantial. Our horses are enjoying their expanded grazing and feeding opportunities."*

(left) 2020 before application of EnSoil Algae™.

(right) 2022 after 18 months of EnSoil Algae™ use.

Due to the growth and visual appearance of the pastures where EnSoil Algae™ was applied, the owner and barn manager of The Stables at Iron Horse made the decision to not use NPK in 2023 and will not in 2024, reducing the fertilizer costs by $492.00 annually. A reduction of the grass seed cost by $3,211.00 resulted from the initiation of the application of EnSoil Algae™. By switching to EnSoil Algae™, The Stables at Iron Horse has reduces the annual budget by $3,700.00.

Iron Horse 2023

EnSoil Algae™ is applied in the spring three times and in the fall three more times. The spring application is done in 2 week intervals after the last frost. The fall application coincides with the winter rye seeding; once just before seeding, then two weeks after seeding, and lastly four weeks hence.

Cost savings aside, the benefit to the welfare of the 20 horses that graze the pastures is highly valued by the owners of these animals and the staff that cares for them. By using EnSoil Algae™ rather than NPK, horses do not have to be removed from their paddocks during treatments with EnSoil Algae™ like they would when NPK is applied. This prevents stress on the horses and additional work for the staff.

Sweetgrass Garden Co-op

Jennifer Wicker - John's Island, SC

Sweetgrass Garden grows and distributes free, fresh, naturally grown, local produce to charitable food distribution agencies on Johns Island and Wadmalaw Island. Regenerative farming practices and permaculture principles are utilized to maintain the farm. Sweetgrass has been funded on four USDA Sustainable Agriculture Research Education (SARE) projects. Two of the grants included research of the algae in Enlightened Soil.

'22 Outcomes: When EnSoil Algae™ was added to poorer soil (Control), tomato yield per plant was increased 45%. Likewise, treating rich soil with algae boosted yield per plant by 16%. Thus, algae boosted yield regardless of baseline fertility.

'22 Feedback: *"Sweetgrass Garden is dedicated to using organic, regenerative practices and teaching folks those practices. Donating produce to those in need that is treated with EnSoil Algae™ helps us stick to our mission while positively impacting our climate."*

EnSoil Algae

Central

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, Yield, & Nitrogen Use Efficiency

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)	Applied N (lbs/A)	Yield (bu/A)	NUE
Control	35.7	18.7	65	100	220	.45
Treatment 1	28.4	18.5	51.4	100	223	.45
Treatment 2	34.8	20.4	62.4	50	216	.23

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 & Nitrogen Use Efficiency

	yield (bu/A)	Applied Nitrogen (lbs/A)	NUE	$ 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	1.68	0	0	0	0
treatment 1	132.71	232	1.75	0	-$2446	-$2446	-$5146
treatment 2	141.29	125	.88	$5143	$1629	$6772	$4072

EnSoil Algae

Janski Farms

Daniel Janski - South Haven, MN

My observations with EnSoil Algae™ in corn were unnoticeable by eye. Yield maps told a different story. 10-25bpa yield increase where EnSoil Algae™ was applied. Green peas I applied EnSoil Algae™ to had a lush dark green color and much thicker foliage. Alfalfa had similar results to peas. My new seeding alfalfa had a much greater drought resilience using EnSoil Algae™ as a seed inoculant, and a foliar feeding of EnSoil Algae™. Quality and yield seemed to increase on every pass of EnSoil Algae™ applied. I think timing of EnSoil Algae™ applications could be crucial to greater impact of applications when stress factors are considered.

"It not often you can test a product in agriculture and have positive results in the first test. With EnSoil Algae™, that's all I needed. The results were not just printed on paper. They were visually noted in my first walk into a lush green field of alfalfa 10 days after applying EnSoil Algae™."

Alfalfa, Janski Farms	Control	EnSoil Algae™
Adjusted Crude Protein %DM	24.17	26.89
Relative Feed Value (RFV)	207.83	234.59
Relative Feed Quality (RFQ)	239.81	270.96
Acid Detergent Fiber (from Total Digestible Nutrients)	68.22	70.05

Dan Janski applied one application of EnSoil Algae™ on alfalfa. **Protein, digestibility, and feed values spiked significantly.** Fertility in both spots was the same. Samples were taken 10 feet apart. He used max-in boron and syntose sugar in both the control and test. This was simply adding EnSoil Algae™ to his foliar feeding program and comparing the two. Alfalfa photos on next page.

EnSoil Algae

Rhize Bio Trial Highlight

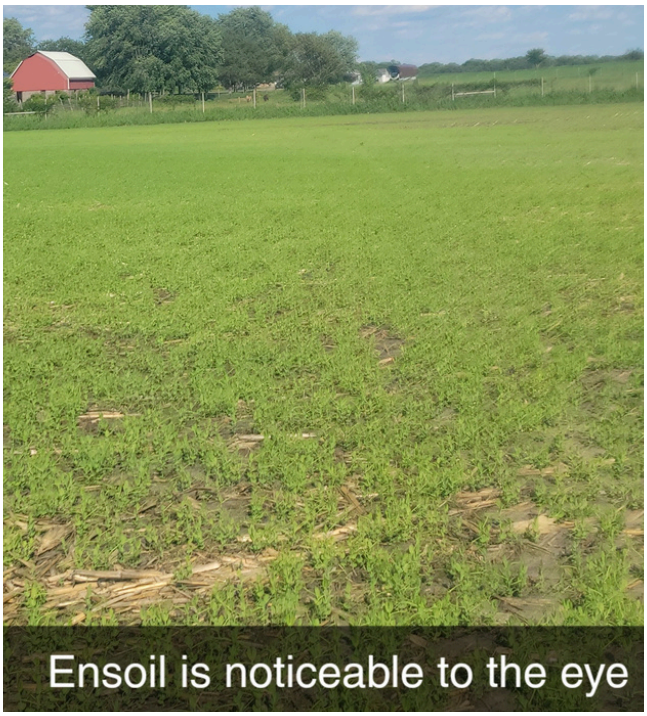
RHIZE BIO

Dan Janski's soil is Estherville/Fairhaven black sandy loam. In the corn field that the RhizeBio technology was deployed Dan realized a 12 bushel gain over the untreated field. His total yield of 234 bpa was 9 bpa higher than the farm average. Dan ran his normal fertility program which includes a zinc, manganese, boron package as well as molasses and fulvic acid.

Sampled at V4-V6 via Haney test and Rhize Bio Metagenomics test	**Observed Genera**	**Community Evenness**	**Mycorrhizae**	**WEOC (ppm)**	**Total N (ppm)**
Untreated	10.6	0.6	84.5	147.3	32.9
Treated	24.7	1.1	91.9	159.2	40.2

An increase in the **number of genera** can indicate a system more resistant and resilient to both abiotic and biotic stressors. It's possible that EnSoil Algae is supporting a healthier balance in the rhizosphere by being selective about what it allows inside its community, shown by an increase in **community evenness**, thus creating a more even and competitive environment.

In a separate, irrigated corn field Dan had a 27bpa gain with one application of EnSoil Algae™ vs the untreated section of the field. The nutrition program was same as above. He plans to monitor temperature and environmental stress to execute a supplemental EnSoil Algae™ application in 2025. He will have a standard of two EnSoil Algae™ applications: one at planting, one in crop.



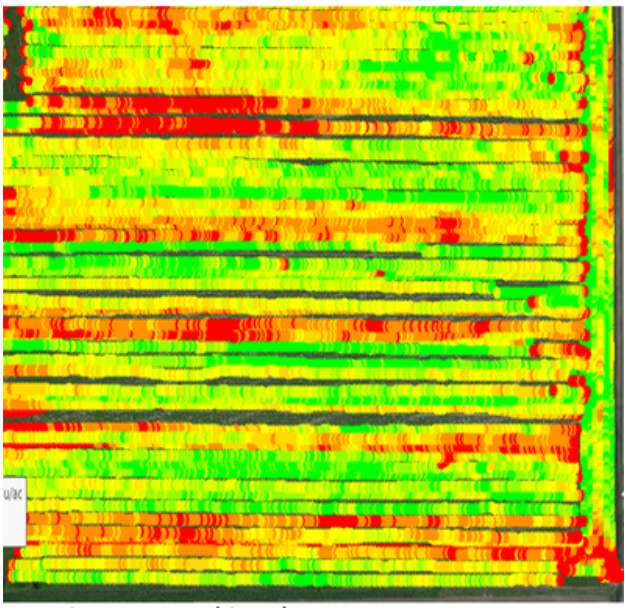
Keith Lovrien Farm

Keith Lovrien - Clarksville, IA

“I could easily see where my non-treated strips were. A clear “wedge” appeared when looking at the corn. The treated areas were taller and the non-treated areas were shorter, but between the two, there was a wedge, indicating that the product “bled over” into the untreated area some. The untreated corn closer to the treated corn was taller than the untreated corn further from the treated. I got a 40-50 bu/acre advantage with the EnSoil Algae™ this year. I think maybe 2 or 3 things contributed, the drought - the product helped a lot there, and this was the 2nd year of no till, though I had just used mulch till prior, that is, just a field cultivator, and I also applied hog manure. “

Corn, 80 acres. Treated strips received 2 applications.
1st application was 1 month pre-planting, 2nd application @ V4.

Spraying Map: Green = treated



Yield Map: Green = 40-50 bu/a above red

RS Enterprises

Randy Schnebbe - Victor, IA

"This year I had higher weed pressure than normal on my soybeans. I applied a higher volume of surfactant than normal to address the problem and combined the surfactant with EnSoil Algae™. I expected high burning on the soybean leaves due to the increased rate. After spraying, there was very little burn on the leaves and the weeds were completely taken care of. I attribute this to the combination of using surfactant with EnSoil Algae™. "

EnSoil Algae

Schwindt Farms, Inc.

Mitch Schwindt - Sacred Heart, MN

Mitch Schwindt is in year two of transitioning from conventional to regenerative practices and is using no-till, cover crops, crop rotation and biologicals to support his transition. In 2024, Mitch participated in the Rhize Bio Roots to Shoots program with his soybeans.

RHIZE BIO

Sampled via Haney and Rhize Bio Metagenomics tests	**Soil Resp. CO2-C (ppm)**	**%MAC**	**Mycorrhizae**	**Stress Adaptation**
Untreated	170.8	79.3	62%	80%
Treated	206.7	137.3	90%	84%

Both testing fields had similar soil and field conditions, and both experienced heavy saturation during the early season, especially in the treated field that contained more low areas. Both fields got treated with EnSoil Algae™, but the "untreated" field had not yet received any applications at the time of testing. EnSoil Algae™ was applied at 12 oz/acre, three times as a foliar, four weeks apart, mixed with brown sugar and a 6% humic product.

Sampled via Haney and Plant Tissue tests	**Soil N (lbs/A)**	**Tissue N (%)**	**Soil P (lbs/A)**	**Tissue P (%)**	**Soil K (lbs/A)**	**Tissue K (%)**
Untreated	62.6	4.1	58.7	0.36	119.9	2.17
Treated	57	4.4	78	0.39	76.9	2.66

- **EnSoil Algae™ stimulated microbial activity (increased CO2-C and %MAC,) increased mycorrhizae abundance, increased stress adaptation, and supported nutrient uptake into the plant tissue.**
- **In the case of overly abundance levels of micronutrients, EnSoil Algae™ supporting the plant tissue levels moving towards sufficiency ranges. For example: Iron (1759.69 untreated, 711.14 treated) and Aluminum (1211.64 untreated, 427.58 treated) levels were overabundant, (and possibly toxic.) Nutrient selectivity and uptake improve leading to plants obtaining more desired nutrients and reducing excess nutrient levels.**

EnSoil Algae

Colby Stegman Farms

Colby Stegman - Offerle, KS

Colby Stegman participated in the Rhize Bio Roots to Shoots program with milo on two fields, 3 years into a regen. transition. He does not till and has not applied synthetics for 2 years. His standard plant includes C-CAT (with humic and fulvic acids,) molasses, yeast, manure compost, and vermicompost.

RHIZE BIO

Sampled via Haney and Rhize Bio Metagenomics tests	pH	SOM	WEOC (ppm)	Soil Resp. CO2-C (ppm)	%MAC	SHC	Carbon Fixation	Plant Stress Adaptation
Untreated	6.1	2	141.8	36	25.4	7.6	69%	69%
Treated	6.6	2.1	144.7	58.6	40.5	9.8	89%	82%

EnSoil Algae™ significantly stimulated microbial activity and carbon fixation. Colby saw a performance boost in the treated sections including larger plant mass and improved visible plant health signals. Most nutrients were already at sufficient or near ideal levels in the plant tissue in the untreated sample so the margin for improvement was focused more on uptake. The K level in the tissue were above sufficiency ranges and the treated sample showed a decrease of tissue levels and an increase in K solubilizing genes in the microbiome which indicates improved uptake efficiency and microbial right recruitment.

Sampled via Haney, Rhize Bio Metagenomics, and Tissue tests	Soil N (lbs/A)	Tissue N (%)	Soil P (lbs/A)	Tissue P (%)	Soil K (lbs/A)	Tissue K (%)	K Solubilization
Untreated	36.3	3.44	42.8	0.41	253.3	3.26	39%
Treated	36.7	3.8	71.6	0.43	240.8	2.53	48%

EnSoil Algae

Byrdland Farms

Nelson Byrd - Charleston, MO

Nelson Byrd achieved an 11.6 bushel gain in his soybeans. This field has a historical top end performance of 55-60 bpa. This year it was 65.6 bpa and they experienced intense moisture stress in May. His soybean field is heavy clay gumbo soil. The analysis of microbial community improvement (increases in WEOC, CO2-C, %MAC, and mycorrhizae abundance) and research into field nutrient cycling will enable him to reduce phosphorus by 60% and potassium by 30% next season. He also noticed root growth in the treated seemed to be more robust and the plant vigor certainly improved.

RHIZE BIO

Sampled via Haney and Rhize Bio Metagenomics tests	pH	WEOC (ppm)	Soil Resp. CO2-C (ppm)	%MAC	Mycorrhizae	SHC
Untreated	7.9	92.6	79.4	85.8	67%	10.6
Treated	6.8	115.1	204.5	177.7	96%	17.9

Southwest Farms

Lee Albee - Natalia, TX

"We did two applications on five sections of the tomatoes we grow for market. We did not use any fertilizer on these five sections. All five sections were excellent. We had high yield and excellent quality. We are keeping EnSoil Algae™ as part of our produce program and we are excited to start working with it on our pastures."

EnSoil Algae

Yarber Farms

Nick Yarber - Mastoucah, IL

Nick Yarber had the best yield gain on soybeans with in-furrow planting and one foliar application (+5.3 bu/acre). His soybeans showed response to in-furrow and foliar. He did not received any rain for about the last 6-7 weeks before harvest.

Treatment on Soybeans	Yield (bu/acre)
Control: No EnSoil Algae™	68.0
EnSoil Algae™: In Furrow	69.7
EnSoil Algae™: In Furrow + Foliar @ V5	72.3

Swift River Pecans

Troy Swift - Fentress, TX

Troy Swift applied EnSoil Algae™ to two varieties of pecans (Sioux and Pawnee) three times throughout the growing season, ground sprayed and mixed with compost.

From Haney and PLFA Tests	Soil Resp. ppm CO2-C	%MAC	Biomass ng/g soil	Fungi ng/g	Arbuscular Mycorrhizae ng/g
UNTREATED	37.68	19.79	1687.67	45.02	23.95
TREATED	71.23	37.02	2001.99	147.1	63.21

"My soil health indices are moving in the right direction which is why I am going to continue using EnSoil Algae™ next year."

EnSoil Algae

Heifer Ranch

Donna Kilpatrick - Perryville, AR

"We applied EnSoil Algae™ twice this past season (2024) once late April, and once early November with cover crop seed. The treated field (front in below photo) was grazed twice between the two applications. We noticed greener plants that handled stress better, specifically they bounced back from flood stress better than the untreated fields. We also applied when planting trees and had good success."

7 Gen Ag

RHIZE BIO

Hal Brown - Mulberry, IN

From Haney and Rhize Bio metagenomics Tests	pH	SOM	WEOC (ppm)	Soil Resp. ppm CO2-C	%MAC	Soil Available N (lbs/A)	P Solubilization	Tissue K (%)
UNTREATED	5.5	3	170	75.8	44.6	93.4	25%	1.14
TREATED	6	4.1	184	147.1	80	118	43%	1.41

EnSoil Algae

Crane Dance Farm

Jill Johnson - Middleville, MI

Crane Dance Farm is a regenerative, certified humane, grass-based farm. Farmers Jill Johnson and Mary Wills provide chemical-free, nutritious beef, pork, lamb, poultry, honey, and eggs to local communities. They are Animal Welfare Approved through A Greener World, certified for 100% grass-fed beef, pasture-grown pork and chicken eggs, and work humanely with all their animals and in harmony with their land. Crane Dance Farm is committed to soil health and holistic management practices. They are currently a part of the significant 3M (Metrics, Management, and Monitoring) Project investigating pasture and rangeland soil health and its drivers. This project is a collaboration between The Noble Research Institute, Savory, Michigan State University, and Colorado State University, and many others.

The cows at Crane Dance love to chase the tractor with EnSoil Algae™ in the tank. They can't wait to get to the nutritious forage.

Significant Observations from two applications (2023, and three applications (2024):

- Significant regrowth on pasture post- grazing
- Extraordinary cow health since adding EnSoil Algae™
- The cows chase the sprayer with EnSoil Algae™
- Greener color in hayfield after only one application

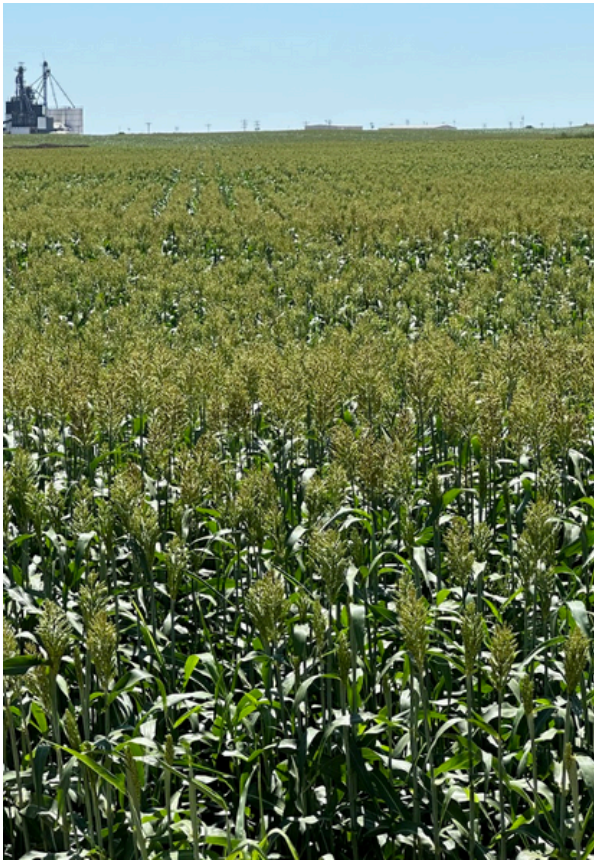
"On our farm, we have one old, gnarled, hollow-out organic pear tree that produces almost yearly. This past year, after feeding this tree algae applications, the fall yield was the most prolific ever: so many pears that we needed to lighten the load by constant monitoring and early picking. Happily, our free-rang chickens and geese enjoyed what gleanings they could before we interrupted their fun. Algae is making a significant different in the grass quality of our pasture-based livestock farm. Nice to know that our pear tree is happier too.

50 days after cutting hay and treating with one application of EnSoil Algae™.

EnSoil Algae

Brookover Farms

Wes Lundeen - Garden City, KS



"We are very encouraged by what we see with EnSoil Algae™. In year 1, we made three applications on two, 130 acre circles of sorghum. The crop showed outstanding uniformity and health. The circles with EnSoil Algae™ produced an extra 1.5 tons per acre while reducing fertilizer by 30%. In year 2, we repeated the outcome with a 45% fertilizer reduction. It is a solid return on the investment."

Miller Angus Ranch

Cletus Miller - Scranton, ND

We were happy with the response we got on our corn and our millet. We applied the EnSoil Algae™ to our corn right after burn down in June and then again in mid July. We had excellent precipitation this year and we believe the rain plus the algae made a huge difference.

"We harvested 19.5 tons of silage corn on ground with a proven yield of 8 tons and a previous best of 12 tons. The yield on the millet was also outstanding. We certainly got a return on our investment and we will look to expand our use of EnSoil Algae™ next year."

EnSoil Algae

Paulman Farms

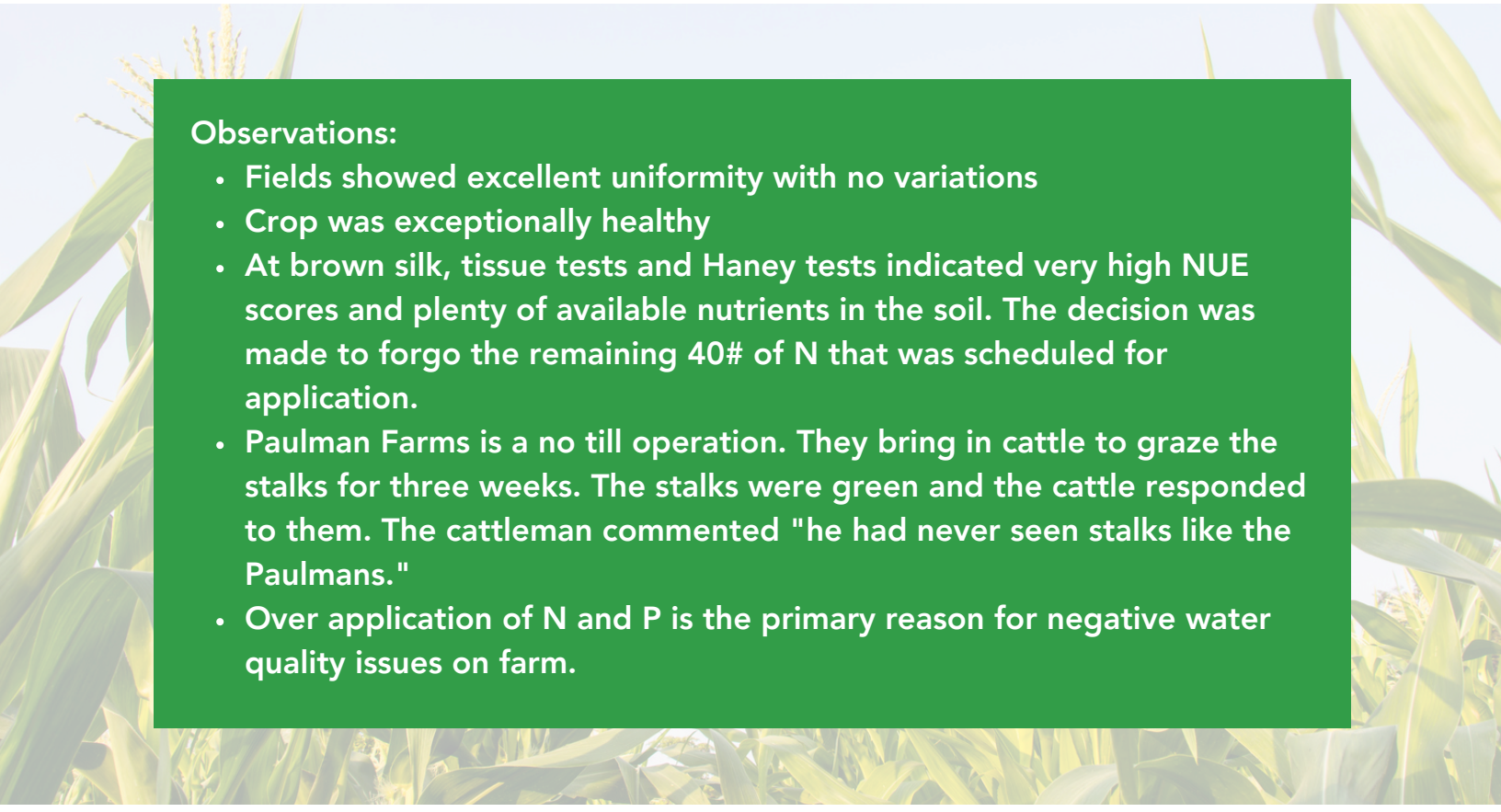
Roric Paulman - Sutherland, NE

Roric Paulman and his son Zack own and operate Paulman Farms in Sutherland Nebraska, a no till farm. They farm focused on soil health as a driver of profitability and efficiency. Their farming evolution is built on adoption of testing methods for tissue and soil and dynamic, in season management decisions, based on the testing.

In 2023, they applied two applications of EnSoil Algae™ to 300 acres of corn with expectations of improved nutrient uptake, soil health, and plant health. The applications were via Y drop at V6 and V8 with 32-0-0. The Paulmans also applied a microbial product from BTI AG in furrow, 1 ton of chicken litter compost per acre, and 120 units of N.

Testing strategy: tissue samples and soil samples for Haney Tests to be run through Regen Ag Labs in Pleasanton, NE. They were looking for total nutrient digestion and nitrogen use efficiency numbers along with carbon intensity scores to guide their nutrient application plans.

They had an ROI goal of 15% at 230bpa. They returned 250bpa without the last 40 units of N. Projected across the whole farm this nets $180K +.



Observations:

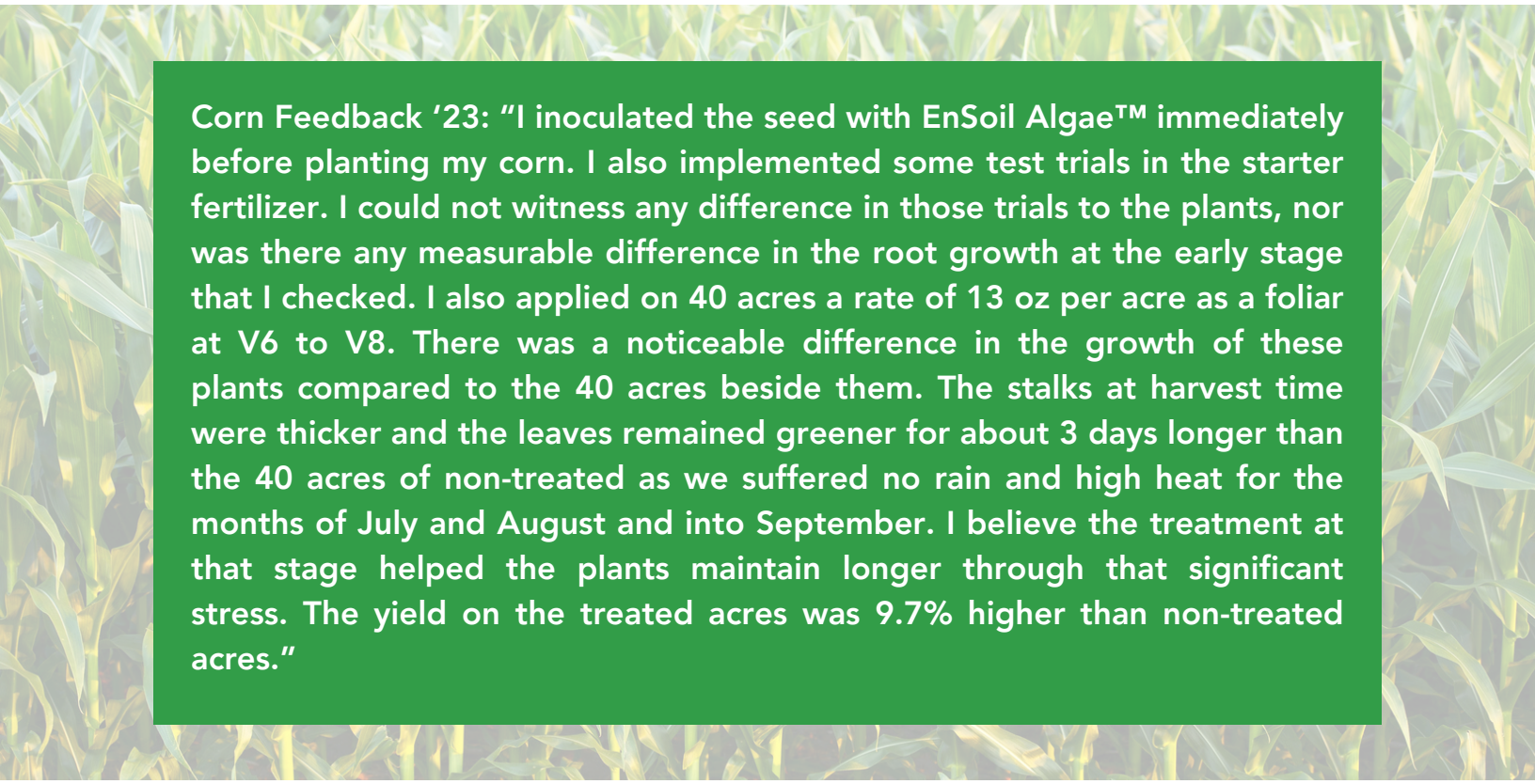
- **Fields showed excellent uniformity with no variations**
- **Crop was exceptionally healthy**
- **At brown silk, tissue tests and Haney tests indicated very high NUE scores and plenty of available nutrients in the soil. The decision was made to forgo the remaining 40# of N that was scheduled for application.**
- **Paulman Farms is a no till operation. They bring in cattle to graze the stalks for three weeks. The stalks were green and the cattle responded to them. The cattleman commented "he had never seen stalks like the Paulmans."**
- **Over application of N and P is the primary reason for negative water quality issues on farm.**

"It is all about approach. There is more profitability and efficiency available for farmers if they are willing to put the work into learning the new testing methods and dynamic in season management decisions. It is way more fun to farm this way."

Moving forward the Paulman's will expand tissue and soil sampling. Treatments will prioritize biology and compliment with fertility when called for, rather than the status quo. The ROI on EnSoil Algae™ delivered in 2023 warrants expanding the use of the treatment to the rest of the farm.

Tucker Farms

Steve Tucker - Venango, NE



Corn Feedback '23: "I inoculated the seed with EnSoil Algae™ immediately before planting my corn. I also implemented some test trials in the starter fertilizer. I could not witness any difference in those trials to the plants, nor was there any measurable difference in the root growth at the early stage that I checked. I also applied on 40 acres a rate of 13 oz per acre as a foliar at V6 to V8. There was a noticeable difference in the growth of these plants compared to the 40 acres beside them. The stalks at harvest time were thicker and the leaves remained greener for about 3 days longer than the 40 acres of non-treated as we suffered no rain and high heat for the months of July and August and into September. I believe the treatment at that stage helped the plants maintain longer through that significant stress. The yield on the treated acres was 9.7% higher than non-treated acres."

Peas and Milo Feedback '23: "Unfortunately, my pea trial suffered through a hail storm after I had applied the algae and then the dryness hit and they ripened up shortly after and nothing of any significance was seen. My milo trial suffered a devastating freeze that killed the plants while the head was in milk stage. Needless to say, I never harvested the crop. Weather here the last 4 years has played havoc on our crops. I look forward in light of the favorable outcome in the corn to trial it more on the crops in 2024. It is hard to get results when the weather takes it toll."

EnSoil Algae

Morales Feed and Supply

Fred Morales - Devine, TX

Morales Feed and Supply has been adding more and more biological products in the last 5 years to give area farmers more options to grow their crops. They now offer composted pelletized poultry litter, fish hydrolysate, humic acid, bulk compost and most recently EnSoil Algae™. In July of this year they started adding EnSoil Algae™ to our fish and molasses applications on bermuda grass. They applied 2 gallons of fish hydrolysate, 2 gallons of molasses and 8 ounces of EnSoil Algae™ with 20 gallons of water per acre, this was done in 30 day intervals over a 3 month period.

Based on what they saw this year, they plan to apply this same method but start in early spring rather than the heat of the summer. Most of the benefits they saw became apparent after the second application, by adding the fish and the molasses they can deliver food to the life in the soil and use the algae to help carry those microbes into the roots.

Observations:

- Grass was noticeably greener
- Less invading grasses
- Less insect pressure primarily from stem maggots
- Improved soil structure
- Reduced heat stress on grass in the late afternoons
- 40% reduction in use of synthetic nitrogen (lost 20% of production on first cutting but gained it back over subsequent cuts)
- Increased earthworm population

Takeaways: Observational increase in earthworm activity in the soil treated with EnSoil Algae™ is a strong indicator of overall soil health improvements. They do not usually see this amount of earthworms in the hot area of Texas at this time of year. They also observed less nutsedge pressure in the EnSoil Algae™ treated plots.

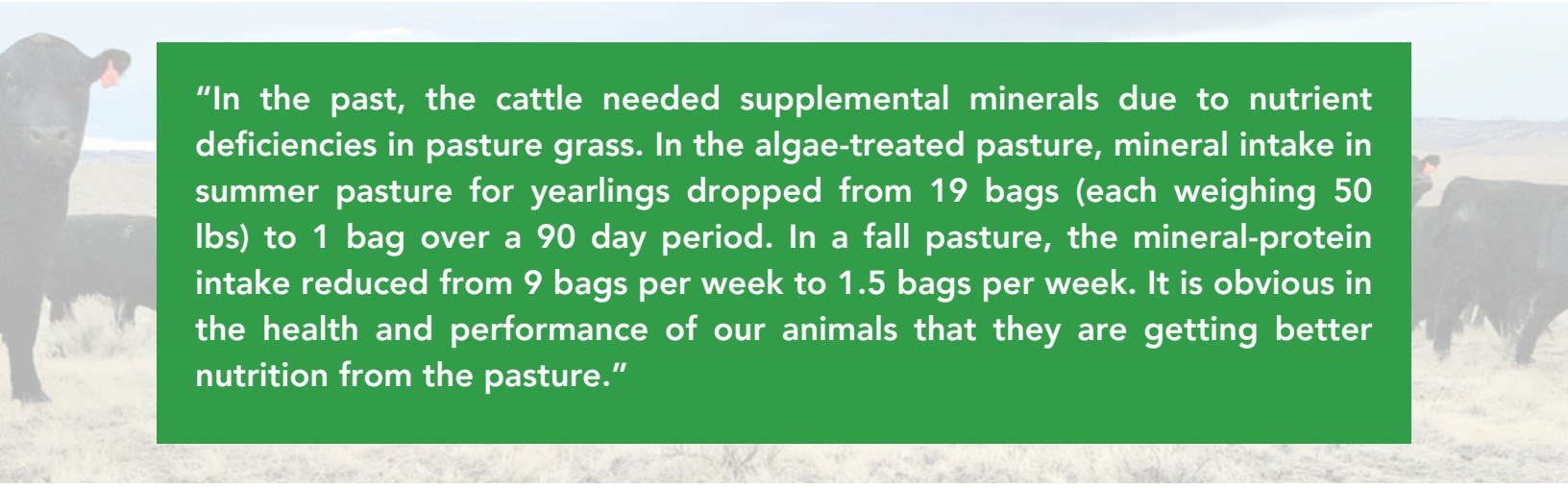
EnSoil Algae

West

EnSoil Algae

Reminisce Angus Ranch

Bryan Mussard - Dillon, MT

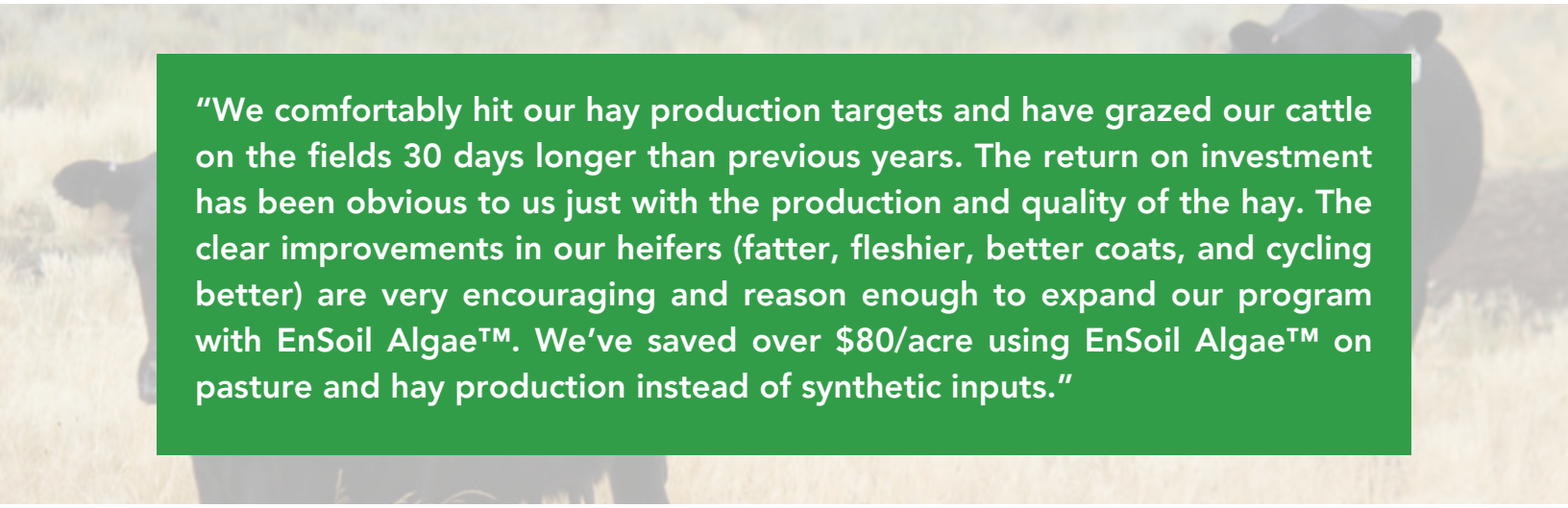


"In the past, the cattle needed supplemental minerals due to nutrient deficiencies in pasture grass. In the algae-treated pasture, mineral intake in summer pasture for yearlings dropped from 19 bags (each weighing 50 lbs) to 1 bag over a 90 day period. In a fall pasture, the mineral-protein intake reduced from 9 bags per week to 1.5 bags per week. It is obvious in the health and performance of our animals that they are getting better nutrition from the pasture."

Bryan and his family run 600 head of black Angus cattle and produce one of the premier Bull sales in the country. They have been involved in every sector of the cattle and beef business in a large-scale operation. They understand the margin challenges between the different segments and respect them.

Bryan is conducting an on-going animal study, demonstrating significant health benefits. He applies between 1-3 applications of EnSoil Algae™ to pasture, hay, and corn, and he feeds approx. 7,000 cattle every winter. He now requires that his feed suppliers grow this feed using EnSoil Algae™.

Algae-treated pasture grass remains greener longer, allowing longer grazing. He also reports significant increases in health measures, including: fewer cattle deaths during the winter, increased conception rates (7-9%), and lower intake mineral supplements. No other regen-ag or organic soil amendments were used to cultivate the pastures or hayfields.



"We comfortably hit our hay production targets and have grazed our cattle on the fields 30 days longer than previous years. The return on investment has been obvious to us just with the production and quality of the hay. The clear improvements in our heifers (fatter, fleshier, better coats, and cycling better) are very encouraging and reason enough to expand our program with EnSoil Algae™. We've saved over $80/acre using EnSoil Algae™ on pasture and hay production instead of synthetic inputs."

EnSoil Algae

Cows Preg Check

	Number	Open	% Open	Breeding Window (days)	
2024	453	34	8%	55	3rd year hay sprayed with EnSoil Algae™
2023	489	75	15%	57	2nd year hay sprayed with EnSoil Algae™
2022	484	85	18%	60	1st year hay sprayed with EnSoil Algae™

Breeding season- 08/25 - 10/16: 114 head of 2-3 year cows hauled 80 miles from normal breeding pasture to pasture that had been sprayed for 3 years with EnSoil Algae™

Heifers Preg Check

	Number	Open	% Open	Breeding Window (days)	
2024	138	8	6%	52	2nd year EnSoil applied to pasture during grazing, 60 days before breeding
2023	126	19	15%	55	1st year EnSoil applied to pasture during grazing, 60 days prior to breeding
2022	135	16	12%	60	

Breeding season- 08/25 - 10/16

Reminisce has a very loyal customer base. We (Enlightened Soil Corp) have had the pleasure of experiencing this up close and in discussion with Bryan's clients. Two primary reasons for their customer loyalty. First, they have a superior product, their bulls. They are developed for longevity, and they endure tough times on rugged ranches. The 2nd reason is their dedication to customer service. They provide what their competitors won't risk and that is feeding our customer calves by our bulls and providing them with very empowering data to improve their herds.

We (Enlightened Soil Corp) believe our shared values are why we have connected with Bryan and his family and why we have an opportunity to help each other and our respective customers. Transparency, accountability, fairness, and successful outcomes drive our actions. We are very grateful for the partnership.

EnSoil Algae

Oatman Flats Ranch

Dr. Yadi Wang - Dateland, AZ

Oatman Flats Ranch is the first Regenerative Organic Certified® Farm in the US Southwest. The farm is located in the hottest and driest part of North America, where annual rainfall is under 5 inches and the hottest day of the year is over 120 degrees. The farm currently grows heirloom winter wheat, multispecies forage crops, desert adaptive permanent crops, agroforestry with holistic grazing. The farm has set aside 45 acres of the fields for experiments starting on the summer cover crop (14 species). Four treatments include control (no cover crop), 50% : 50% grass to broadleaf ratio, 50% : 50% grass to broadleaf with EnSoil Algae™ and 50% : 50% grass to broadleaf with rotational sheep grazing.

"These results indicate that the EnSoil Algae™ accelerates microbial activity. The higher amount of organic nitrogen in soil implies a possible efficient pathway for plant primary metabolic processes and increases the likelihood of plants developing secondary metabolic processes quickly. Such shifts suggest more efficient energy conversions through plant growth, nutrient uptake, water using efficiency, development of self-defensive mechanisms, etc."

Dr. Yadi Wang at Oatman Flats Ranch

'23 Outcomes: These cover crop trials are only being irrigated once in late July throughout the entire season. At the end of November, the algae treated field has an average of 5 feet of the vegetation height whereas all other treatments have an average of 3.5 feet of the vegetation height (sheep mob grazed fields do not apply in this evaluation). Against all other treatments, Haney's analysis shows EnSoil Algae™ treated plots have significantly higher soil respiration, and water soluble organic carbon. Though the oxidized nitrogen group, such as nitrate amount is limited, both organic nitrogen to inorganic nitrogen ratio and organic nitrogen release are higher.

EnSoil Algae

Billy Creek Ranch Co

Nathan Anderson - Dillon, MT

"Billy Creek Ranch is a small cow/calf operation and alfalfa producer near the Crazy Mountains. We conducted a trial of EnSoil Algae™ on 60 acres of alfalfa. We made three applications of EnSoil Algae™ between late May and early August. We did not fertilize the 60 acres that received algae. We had a good weather year with precipitation and temperature. The alfalfa treated with EnSoil Algae™ was more productive than our conventionally farmed ground. We saw an increase of 15 bales per 20 acre section for a net gain of 45 bales. The results are very encouraging."

Suisun Valley Olives

Derrick Lum - Fairfield, CA

Derrick Lum is working towards a goal of reducing synthetic fertilizers. "We the farmers are the front line when we are working with these synthetic chemicals and fertilizers, then mother nature chooses how much rain to bring in so we don't know how much is actually going to the plant."

Derrick applied EnSoil Algae™ midway through the growing season on 1 acre of olive trees (for oil) through his drip irrigation. He noticed the treated trees were lighter in fruit set, and the growth of the trees was about 2 feet more than the untreated, so he knew the nutrients were going into the crop. Next year he will apply on other parts of his orchard and his market vegetable garden.

"I have seen the new growth in my olives in this (treated) row on the tips. Once the fruit is set on the tree, the nutrients go to the fruit.

EnSoil Algae

JBK Ranches

Jace Klucewich - Missoula, MT

Alfalfa Hay, 2 applications on 200 acres

"There were obvious visual markers where the EnSoil Algae™ was applied. The most exciting outcome was the production on our second cut. We got as much hay out of our second cut as we did our first. We have not had this happen before."

Grass Pasture, 1 application on 100 acres

"The visual response was more pronounced on our irrigated ground. We've grazed 40 heifers on the pasture all summer and they look great! We mixed the algae with herbicide, and noticed a faster and better kill of target weeds on our grass. The herbicide was more efficient with algae than without."

406 Hay Company

Ivan Negri - White Hall, MT

Mix of Oats, Barley, and Peas, 2 applications, some through pivot and some through sprayer.

"The application process was easy. Production was good considering the lack of natural moisture. The hay had great color. We are still waiting on yield numbers, waiting on a third cutting. We are also waiting on feed values."

EnSoil Algae

Fitzsimmons Land Co

Casey Fitzsimmons - Canyon Creek, MT

Alfalfa Hay, 1 application (May)

"I applied EnSoil Algae™ to a 56 acre field one time in May. This was adjacent to an 86 acre field that received our normal granular fertilizer application. Both fields were treated with herbicide. We mixed the EnSoil Algae™ with the herbicide for a single application. We planned to do a second application after we cut, but we held off because it was so dry. We did not use any fertilizer in the field that got the EnSoil Algae™. The alfalfa with algae was taller, leafier, healthier. There was no black stem. It is a very impressive product. We will use it on all of our acres next year."

	1st cutting	2nd cutting	Total production per acre	Cost per acre
EnSoil Treated--no fertilizer (56 acres)	201 -- 1300 lb bales	154 – 1300 lb bales	8241	$9
Fertilizer Treated--no EnSoil (86 acres)	335 – 1300 lb bales	234 – 1300 lb bales	8601	$90

EnSoil Algae

GROWER SUPPORT

We, Enlightened Soil Corp, are dedicated to the reduction of chemical dependency in agricultural, municipal, and personal land stewardship through soil biodiversity as the key to improved crop outcomes, higher profit margins, and better risk mitigation.

Our goal is to ensure we provide growers, ranchers, agronomists and all land stewards with focused expertise and assistance throughout the supply chain through a reliable network of support and regional resources. This includes comprehensive consultations and optimized custom product application protocols, as well as grower mentorship communities, crop consultants, testing labs, researchers and industry leaders.

Our Grower Support Team is available for consultation and can play a crucial role in ensuring users of EnSoil Algae™ achieve optimal agronomic and economic outcomes.

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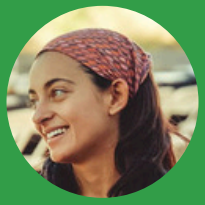

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