Enlightened Soil Corp

En-Soil Algae

The Natural Path to Enhanced Soil Fertility

A Harmful Algae Bloom Case Study
at a Johns Island Horse Farm

Algae Bloom and Live Algae as a Soil Amendment

Algae bloom in ponds and waterways is a major complication of synthetic chemical fertilizers (NPK). These compounds dissolve into solution and migrate with water, allowing contamination of adjacent bodies of water. Algae is a plant, and wild algae that are native to ponds will respond to fertilization. The result is unwanted algae bloom that can have a deleterious effect on water purity, waterborne ecosystems, and coastal/lakeside economies.

Micro-application of live, cultivated ***Chlorella vulgaris*** is an effective replacement for NPK. However, there is question about whether algae that is applied to soil can be washed into adjacent bodies of water, thus also initiating unwanted algae bloom.

The following describes recent experience related to algae bloom.

Figure 1. Ryegrass is growing at the Horse Farm, seeded 4 weeks earlier. En-Soil Algae has been used in place of synthetic chemical fertilizer (NPK).

1. An Algae Bloom Case Study: Horse Farm (December 2020)

En-Soil Algae—a pure culture of *Chlorella vulgaris*—is being used to fertilize rye grass in place of NPK at a Horse Farm on Johns Island, SC. The 16-acre horse farm is divided into multiple pastures and paddocks. Most of the pasture is being treated with algae, without additional fertilizer (Figure 1).

An exception is a comparison study on a 4-acre pasture, with half receiving algae, and the other half, NPK.

Algae on one half, and NPK on the other were applied soon after seeding rye grass in late November. Pasture treated with algae received the standard dose, 50,000 cells per square foot two weeks in a row (to be followed by application at 6-week intervals). The NPK- treated section had a single application.

This comparison test pasture abuts a 1-acre pond, and the line demarcating the test strips (NPK and algae) bisects the shoreline. Both algae and NPK were applied to within 6 feet of the shoreline.

Part 1 Continued:

Three weeks after the application of algae and NPK there was a hard, 1.5 inch rain. Three days later, algae bloom appeared on the pond (Figure 1). The question was whether this was Chlorella that originated from our initial application.

A sample of the algae bloom was analyzed by Dr. Steve Morton, lead phycologist at Micro Marine Environmental Consultants. He reported that the growth was indeed algae, and he identified it as cyanobacteria, or blue-green algae, not En-Soil Algae (*Chlorella vulgaris* which is a green algae). The two species have a distinctly different appearance.

Of interest, the bloom developed at the end of the pond that was adjacent to the NPK treated strip of pasture.

Conclusions:

First: This was a typical case of wild algae bloom caused by the application of chemical fertilizer. Algae, including cyanobacteria, are plants that respond to fertilization.

Second: En-Soil Algae had been applied twice before the bloom occurred, and it was applied as close to the pond as the chemical fertilizer. There was no evidence of algae bloom related to Chlorella.

Figure 2. Algae bloom on pond at the Horse Farm.

2. Laboratory evidence showing that algae have limited migration:

This was a simple experiment, and one that is easy to repeat. Two-gallon nursery pots were filled with garden soil at varying depths. One group of pots was partially filled to a depth of 4 inches of soil, and another group to a depth of 8 inches. The soil was predominantly sandy loam taken from Sweetgrass Garden, Johns Island, SC.

Red clover were planted in all of the pots. When seedlings were 2 inches tall, we did the algae runoff experiment.

First, the pots were saturated so that there was brisk runoff of water into collecting trays under the pots, and this was discarded. The next day the pots were treated with *Chlorella vulgaris*, 100,000 cells per square foot of pot surface area. Of note, the standard, recommended dose is 50,000 cells per square foot, so this was a high-dose application.

Two hours after applying algae, 2 inches of water was applied to the surface, simulating a 2-inch rain. Because the soil was saturated, the additional water ran through the pots quickly, and the runoff was collected. Dr Morton, analyzed this in the laboratory of **Micro Marine Environmental Consultants**. He found no algae in the run-off using light microscopy. In addition, he applied a concentrate of the runoff to algae growth medium, and there was no growth. His conclusion was

Figure 3. Left: Algae have settled at the bottom of a container of En-soil Algae concentrate that has been in the refrigerator for 3 days. Right: after gentle agitation the algae are in a uniform suspension.

Discussion:
Apparently, live *Chlorella vulgaris* applied to soil surface and 'watered-in' remains near the soil surface. Based on this experiment, it does not reach a depth of 4 inches, even with a soaking, 2-inch rain. There are multiple explanations:

- NPK dissolves into solution, but algae do not (Figure 3). The algae maintain cellular integrity; the cell wall remains in tact.
- Thus, the algae cells are particulate. They do not push as far as 4 inches through particulate soil, even when water-born (as with a heavy rain).
- Algae have a positive surface charge, and soil particles are negatively charged.
- Finally, live algae are applied in micro quantities. The standard application, 50,000 cells per square foot, sounds like a lot. However, it is not when considering that one gram of garden soil contains as many as 10 billion microorganisms When applied to soil, the dilute suspension is as clear as water. Even if some algae filtered through soil, the quantity would be minuscule; but our experience is that there is no migration beyond the immediate application area.

It seems paradoxical to avoid harmful algae bloom by applying algae to the soil. However, we conclude that the controlled, micro-application of cultured, live *Chlorella vulgaris*—En-Soil Algae—can be a solution to the unwanted algae bloom that contaminates waterways due to use of synthetic-chemical NPK fertilizers.