

June, 2020

AND WE THOUGHT LAST YEAR WAS STRANGE!

Last year brought us the polar vortex, record May rainfall, and prevent plant acres. Most of the folks we saw at the winter farm shows from December through March were looking forward to a more “normal” year in 2020, and so were we. Our last big show ended during the first week of March, and as we all know by now, things were about to change in many unanticipated ways. For example, we mailed hundreds of invitations to our customer appreciation meetings right after the last farm show. Then, the state governors in Illinois and Iowa announced restaurant closures, and we had to mail cancelation notices for every one of those meetings just a week later. As one of our long-term customers humorously remarked, he had never been invited to and disinvited from the same meeting in just one week.

Aside from the unfortunate need to cancel our customer appreciation meetings, the rest of our spring season was largely normal. From the start of the shut-downs in Illinois, we were defined as an essential business since we provide supplies to agriculture. Accordingly, we kept the office open so local customers could pick up ordered product, and we were open to all in-bound and out-bound shipments by commercial freight, parcel services like UPS, and our material suppliers like ULINE.

Although we don't have a lot of daily traffic in our warehouse and office, we did try to keep all offices and other public areas as clean as possible. Since we opened the soil health lab, we have maintained an ample

supply of latex gloves, cleaning supplies, and disinfectants on hand. Due to the local shortage of these items, we donated some of these supplies to other area businesses that were running short of protective gear for their employees.

Our in-bound and out-bound shipments on commercial freight ran as fast as usual, and some of the shipments actually arrived early. We also ship a lot of orders by UPS, and all but a few of the out-bound shipments were delivered on time. Of the three or four UPS shipments that were late, all of them were due to weather delays and all arrived just one day late. We also accelerated our on-farm delivery schedule and completed our shipments about 10 days earlier than normal despite handling a record amount of product.

Fortunately, we have remained virus-free at our place, and we also don't know of anyone among our close contacts who have contracted the virus. We hope this good luck continues, and we especially hope that things are well with you and your family.

SOIL HEALTH LAB IS OPEN FOR BUSINESS

Our soil health lab has been open to process samples throughout the spring, and we expect this to continue through the summer and fall seasons. If you want us to process samples this summer, please let us know. We can either come out to your fields and collect the samples in a safe manner, or you can submit samples by postal mail or parcel service. Our prices and processing times remain the same as last year, and please contact us if you have any questions.

LATEST FIELD REPORTS FROM CHANDLER USERS

While visiting with farmers this spring, we heard about some of their experiences with the Chandler products in the past year. With their permission, we want to share some of these observations:

Chandler Dry Seed Treat

Several customers reported that they got in a hurry to plant last year and decided to go without using Chandler Dry Seed Treat on some of their acres. Many of these folks said they could tell the difference in slower emergence, thinner stand, and lower yield. In particular, one customer noted that planting without Dry Seed Treat was the biggest mistake he made in 2019.

Chandler Soil

- As we reported last year, we have talked to several farmers who recently started using Chandler Soil, and they could see the difference in how their soils drained, especially after all of the extremely wet weather in May and June, 2019. We have recently received similar reports from customers who experienced heavy rains last fall and early this spring.
- One of our long-term customers who farms in central Michigan recently completed an extensive soil sampling program on his farm. The objective of the project was to generate a current nutrient management plan for several of his fields. He has used Chandler Soil and Biocat 1000 on these fields for several years, and he **has not applied any** commercial potash or phosphorus fertilizer (or manure) in nine years. From the dozens of soil samples collected, less than five of the samples showed medium levels of P and K, and all of the remaining samples had high to very high phosphate and potash levels. By boosting the biological activity in his soils, our friend in Michigan has maintained his soil nutrient levels while hitting his yield targets (225 BPA corn and 75 BPA soybeans) but without spending any money on P or K.

THE ABC'S OF P AND K

Microbial activity plays a very important role in the availability of potassium and phosphorus for corn, soybeans, and other plants. Here are the basics:

Potassium

Although potassium ranks seventh on the list of most common soil minerals, nearly all of this K (90% to 98%) is locked up by other mineral structures and is unavailable to plants. Available potassium comes from applied fertilizers, decayed residues, and mineral sources that can be released or solubized. We know that beneficial fungus release nutrient from decaying residue. For example, corn residue contains nearly enough potash to produce the next crop. Additional K is released by the solubizing process, which is driven by several distinct bacterial species. The available potassium ions released from residue or solubized from minerals are then carried to the plant roots by beneficial fungus.

Potassium is required for water movement and photosynthesis in growing plants, and K deficiencies make plants more susceptible to stress. Most of the potash used by the plant is taken up early in the season and stored for later use.

Phosphorus

The phosphorus cycle in the soil is similar to the potassium cycle, and the P available to plants comes mainly from decayed residue and solubized mineral sources. In this case, a slightly larger share of mineral phosphorus is available to plants, but residues generally contain less P because much of this nutrient used by the crop is removed with the grain. As well, beneficial bacteria are largely responsible for solubizing phosphorus from mineral sources, and fungal species transmit the P ions to the plant roots.

Phosphorus is important for early plant growth, but the P-solubizing bacteria are inactive below 60 degrees F. One way to avoid early-season deficiencies is to boost the residue decay process.

DOLLAR VALUE OF APPLIED P AND K

A few years ago, *Farm Journal* surveyed farmers about their fertilizer applications on corn and soybeans. For corn, the average respondent applied 64 pounds per acre of phosphate fertilizer and 82 pounds per acre of potash fertilizer. Based on recent fertilizer prices, the value of this average application is about \$46 per acre. For soybeans, the average application rate was 51 pounds per acre of phosphate fertilizer and 83 pounds per acre of potash fertilizer. The retail value of this application is about \$45 per acre.

LATEST RESEARCH ON SOIL MICROBES

We recently read an article about the latest advances in soil microbiology research, and some of the results are fascinating. A key finding from the latest research is that there are groups of microbes that tend to live together because they support one another. For example, predatory microbes are toxic to other microbes, and there are some types of bacteria that protect other bacteria from these predators. As a result, the protective bacteria tend to form colonies in the soil with those bacteria that they protect.

In our webinars and other discussions of the residue decay process, we have outlined how beneficial microbes in the soil break down plant components like cellulose, hemicellulose, and lignin. For example, the decay organisms (mainly fungus and some bacteria) use the carbon in plant cellulose as a food source. Recent research shows that other groups of microbes feed on chitin, which is an organic carbon compound that is similar to cellulose but is mainly found in the cell walls of fungus. So, these microbial colonies live together so they can scavenge energy from dead fungus in the soil.

We think the most important lesson from these new findings is that we should promote the growth of a broad spectrum of microbes and not focus too much on specific species. Chandler Soil is designed to support all types of beneficial soil microbes.

APPLY CHANDLER SOIL WHILE SIDE-DRESSING

If you weren't able to apply Chandler Soil last fall or this spring because it was too wet, you can still help the current crop by boosting your soil health this summer. Soil microbes are most active in warm weather, so a mid-season boost can increase nutrient availability this year and start the process of improved water infiltration, reduced soil compaction, and higher organic matter.

Side-dress applications of Chandler Soil are cost effective because you can use a lower rate (8 ounces per acre), and the product is placed near the row where most of the microbial colonies reside. Chandler Soil may be applied by itself or in a tank mix with most liquid fertilizers.

DID YOU KNOW?

Molybdenum is a key micronutrient for soybeans, alfalfa, and other legumes that fix atmospheric nitrogen through bacterial activity. Although plants only need about 2 pounds per acre, soil molybdenum levels can be very low under some conditions. In particular, deficiencies can occur on lighter ground, acidic soils (pH less than 6.2), or fields with excess sulfur levels. In plants, molybdenum is relatively immobile, so a deficiency tends to show up in new growth as pale or cupped leaves.

Due to the importance of molybdenum, Chandler Foliar includes this micronutrient plus 7 others, N, and plant growth hormones.

ORGANIC NO-TILL REPORT AVAILABLE

In the past year, we co-sponsored a new special report on organic no-till farming by Lessiter Media. Special Report #61 is titled "Going After Bigger Profits with Organic No-Till" and it includes several articles about cover crops, weed control, and other advances in the no-till approach to organic farming. If you would like a free copy of the report, please call our office (309-659-7773), send email to info@midwestbioman.com, or drop us a note by postal mail.

MORE THAN WE WANTED TO KNOW

Over time, we have learned a lot of useful information about beneficial soil microbes. In the past few months, we have also learned more about viruses than we ever wanted to know. Despite the serious health risks associated with the novel coronavirus, it does have some unique properties that can help us control these risks.

As we have all heard many times by now, soap is the best way to defeat this virus. Coronaviruses, but not all viruses, have lipids or fat cells in their outer shell. So, any type of soap can break up the virus by dissolving the lipids, and this only takes about 20 seconds. Soaps can also remove viruses by flushing them from our hands or other sensitive areas.

The outer structure of the coronavirus is also composed of protein molecules that are twisted together to form a stronger shell. The proteins can be untwisted or denatured with heat, changes in pH, or chemical reactions. For example, we always tell people that the only way to harm the Chandler products is to expose them to high heat (above 140 degrees F) because the heat denatures the proteins in the enzymes.

Medium-strength ethyl or isopropyl alcohol solutions (about 70%) are effective against most viruses because they dissolve the lipids and denature the proteins in the coronavirus shell. So, alcohols attack viruses in two ways, and the required exposure time is comparable to soap. Weaker alcohol solutions cannot denature proteins and are not effective disinfectants. For example, distilled spirits like vodka don't work because their alcohol content is generally less than 60%.

Contrary to intuition, high-strength alcohol solutions (over 90%) are less effective against viruses. The water in the medium strength solutions prevents the alcohol from evaporating too fast, and the water helps the alcohol penetrate the protein structure. Also, strong alcohol solutions can damage the protein structure in viruses, which can make them harder to break apart.

NEW SOIL HEALTH TESTS AVAILABLE

As we announced in the March newsletter, we now offer a new Solvita test for potential urea loss from the soil. Under some field conditions, the ammonium formed from urea fertilizer or manure can be volatilized or converted to ammonia gas that may be lost. The potential loss from volatilization is generally larger if the urea fertilizer or manure is concentrated in the top 2 inches of the soil profile, the soil temperature is over 70 degrees, the soil is drier, or the soil is alkaline (pH is over 8). To conduct the test, we use a fresh sample gathered from the top 4 inches of the soil profile, and we also need to know the amount of urea fertilizer or manure applied per acre.

We also offer an available carbon test as part of our extended package of soil health measurements. Active carbon is the portion of organic matter that is readily available to feed microbes. Although organic matter is hard to build in some parts of the US (especially on lighter soil types or in regions that are warmer or more arid), we can manage soils to increase active carbon and improve soil health.

The Midwest Bio-Tech News

The newsletter is published quarterly in March, June, September, and December, and the first newsletter was published in March, 1993. An electronic archive of the newsletters published during the past 5 years is posted at our website, www.midwestbioman.com.

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