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Keeping Your Dirt Clean

For This North Dakota Farm Supplier, Better Yield Starts with Healthy Soil

Brady Krchnavy grew up on a farm during the 1980s and 1990s, a time when profitability from crop production was hard to get. So Krchnavy moved into farm radio as a career, instead, and ran across an input to improve soil health that appeared to lead to greater profitability.

Intrigued, Krchnavy tested the mycorrhizal fungi product in his garden and shared it with farmer friends to test in their fields. Now, as owner/president of New Age Farming, he has not turned back. Based in southeast North Dakota, New Age Farming focuses on soil health and plant stress tolerance as a leading mycorrhizal fungi supplier for farmers nationwide.

"Mycorrhizal fungi are the backbone of our business, and we are committed to helping each farmer get optimum yield and healthier soil, all in one simple-to-use product. Mycorrhizal fungi increase root surface area up to 1,000 times, increase yield, [and] greatly improve soil health, drought tolerance, nutrient uptake and much more," says Krchnavy. "The soil biology really makes it a sustainable product that can increase yields — from eastern U.S. fields to California vineyards."

Over the last seven seasons, Krchnavy has documented corn yield increases across 20,000 acres in North Dakota, South Dakota, Minnesota and Montana. Increases range from six to 20 bushels per acre, depending on the weather and on the hybrid chosen. He has found that when the soil is left untilled, farmers see the best results, as tillage exposes the fungi to light and may kill them.

"I encourage farmers to try MycoApply® EndoPrime® SC with different hybrids because each reacts a little differently. Flex ear hybrids work better than fixed ear hybrids," he notes. "Weather also plays a role. Since *MycoApply EndoPrime* SC expands the corn root system, we see more of a yield advantage during dry seasons. Overall plant health is revealed in better stalk color and diameter."

Brady Krchnavy

Krchnavy has received positive feedback from farmers who have tried *MycoApply EndoPrime* SC. He has repeat customers as well as an expanding customer base interested in the product.

"Farmers continue to increase their use of it. They know soil is the mainstay of their business, and they have to preserve and enhance the soil to increase productivity," he says.

As farmers currently are faced with low commodity prices similar to the challenges of the 1980s, Krchnavy says 2019 presents a great opportunity to try *MycoApply EndoPrime* SC.

Increases range from six to 20 bushels per acre, depending on the weather and on the hybrid chosen.

"Corn farmers can expect a 2.5- to 3-to-1 return on investment. If you spend $10 per acre, you can expect to get $25 to $30 back," he says. "With the bigger root system, I have some customers who cut back on fertilizer use with no yield penalty to also help offset the cost of the product."

Krchnavy stresses that by concentrating on improving soil health and plant vigor, higher yields are attainable and sustainable. "You have heard it said that if you take care of the soil, the soil will take care of you. Overall better soil health will keep the dirt you need in your fields."

For more information about New Age Farming, contact Krchnavy at *newagefarm@outlook.com*.

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Healthy Plants Need Healthy Soil

"Soil isn't an inert growing medium that needs to be filled up with water and nutrients when it runs out. Rather, if soil is healthy, it is teeming with large and small organisms that live together in a dynamic, complex web of relationships."

– USDA Natural Resources Conservation Service

Farmers deal with the ongoing challenge of topsoil loss from crop acreage every season. Once topsoil erodes, fields are less productive. The problem is often addressed through conservation practices, but farmers also must focus on building the health of that topsoil at the same time.

According to the Natural Resources Conservation Service (NRCS), soil health is defined as the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals and humans. As such, soil must be managed to remain viable for food, fuel and fiber production.

"Plants, including all crops, need access to nutrients and water as soon as the seed germinates and at several critical stages throughout the growing season," says Trevor Israel, Valent field market development specialist. "Plant health may be easier for farmers to understand because it is easier to see in the field. You can't see soil health, but it is critical for long-term success."

Focus on All Health Areas

Soil scientists traditionally identify three areas of soil health: physical, chemical and biological. Physical areas refer to the size and distribution of mineral particles in the soil, along with clay, silt or sand composition. Aggregation within the soil composition is the activity that reduces soil compaction while increasing space for roots to infiltrate and support plant growth.

NRCS defines soil aggregate stability as a measure of soil structure, or the way sand, silt and clay particles are arranged and connected. A healthy soil will have adequate soil structure, or tilth, for the water movement, aeration, root penetration and biological activity to take place.

The second area of soil health focus is chemical. Chemical characteristics are measured by such things as pH, cation exchange capacity, macro- and micronutrients and organic matter levels. And the right nutrient levels are critical to plant health and crop yield. A deficiency in any nutrient level can create imbalances.

Biological areas refer to living organisms in the soil and their size and diversity. Larger organisms provide such services as breaking down residue, feeding on pests and improving soil structure and porosity, which increases infiltration and reduces topsoil runoff. Smaller microbes also decompose organic matter, fix nitrogen, cycle nutrients and perform other related critical functions. Any upset in these biological processes can negatively impact microbe activity.

By focusing on all three of these areas of soil health, farmers can better maximize soil productivity.

"Modern corn production requires you to think about all three aspects of soil health, not just the soil chemistry," says Matt Ruark, University of Wisconsin-Madison soil scientist. "There are many limiting factors to better yields, so when you can increase biological activity in the soil, you also improve the physical soil structure and the availability of nutrients to the corn plant."

NRCS shares similar advice for farmers to enhance yield potential by "providing the best foundation for plant growth, including functions influenced by interrelated physical, chemical and biological properties, many of which are sensitive to soil management practices."

Source:
Soil health in field and forage crop production. USDA Natural Resources Conservation Service Pennsylvania. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/pa/soils/health/?cid=nrcseprd940817. Accessed December 7, 2018.

Start Early

With continued advances in soil management and crop production technology, farmers can now add *MycoApply EndoPrime* SC to their toolbox of cropping practices for better plant health today and increase cropland productivity with healthy soil for years to come.

"*MycoApply EndoPrime* SC can affect all three of the facets of soil health properties: physical, chemical and biological," says Trevor Israel, Valent field market development specialist. "Most notably, *MycoApply EndoPrime* SC can enhance the biological side by offering healthy microbes that are friendly to the plant. The microbes and corn plants help each other."

Israel notes *MycoApply EndoPrime* SC is a unique row crop product with four species of arbuscular mycorrhizal fungi. Each of the four species has different strengths, creating a strong arsenal to perform well against many plant stressors throughout the season.

Specifically, *MycoApply EndoPrime* SC expands root absorption area to improve nutrient access and uptake for better drought tolerance and to achieve yield potential. Arbuscular mycorrhizal fungi colonize plant roots and then produce hyphae, which extend beyond the root and immediate soil area to access and transport nutrients and water back to the plants. It can expand the corn root surface absorption area up to 50 times and will be present throughout the growing season.

Reap the Benefits

Corn is uniquely sensitive to high temperatures and drought stress. Mycorrhizal fungi colonization leads directly to improved plant health by helping to protect against these stressors in a number of ways.

With the use of *MycoApply EndoPrime* SC, the fungal hyphae are able to access very small soil pores and extract more water and nutrients than roots alone during drought by extending beyond the root depletion zone to find these resources plants need during stress conditions. Mycorrhizae can also store resources until needed by the plant, allowing for increased tolerance to stressors, including drought.

In soil where elements are deficient or in an unavailable form to plant roots, mycorrhizal fungi hyphae secrete enzymes into the soil, which release bound nutrients, so they can be used by the plant for better plant growth.

1. More Complete Nutrient Management

The hyphae produced by the mycorrhizal fungi help corn plants access mineral nutrients from the soil, especially the immobile elements phosphorus (P), zinc and copper. Enzymes produced by the mycorrhizal fungi convert these "tied up" nutrients to a useable form.

In the case of phosphorus, for example, organic P must be broken down to become inorganic P that can be used by plants. With increased production of these enzymes by the plant roots, the mycorrhizal fungi work with other microorganisms to convert insoluble minerals into soluble forms.

The hyphae also improve access to the more mobile nutrients, including sulfur, calcium, potassium, iron, magnesium, manganese, chlorine, bromine and nitrogen. The ability of the hyphae to access areas in the soil outside the root zone provides roots with opportunities for increased absorption of these various mineral nutrients.

In fact, the absorptive area of fine mycorrhizal hyphae is approximately 10 times more efficient than that of root hairs and about 100 times more efficient than that of roots. The rate of nutrient uptake by plant roots colonized by mycorrhizal fungi is faster than by non-mycorrhizal roots. In addition, mycorrhizal fungi increase decomposition and the subsequent capture of inorganic nitrogen from complex organic materials such as plant residue.

2. Bigger Yields

The expanded root absorption area that comes with the use of *MycoApply EndoPrime* SC helps you protect your yield potential. As the corn plant nears its critical pollination stage, *MycoApply EndoPrime* SC maximizes water and nutrient availability, which are key to determining yield potential.

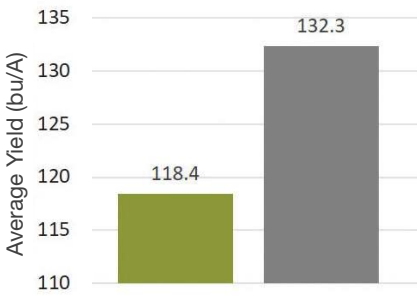
Across 24 trials over two years, *MycoApply EndoPrime* SC demonstrated a 75 percent win rate versus an untreated check and an average 4.7-bushel-per-acre yield advantage. In other field trial research, an average 7.95-bushel-per-acre increase was recorded when the plants were under stress.

3. Greater Overall Plant Health

Arbuscular mycorrhizal fungi are the only known organisms to produce glomalin, a sticky protein that "glues" soil and organic particles together to improve soil stability, aeration, water infiltration and water-holding capacity.

As organic particles are glued into tightly bound, large, water-stable aggregates, they create a stable soil structure, enhancing its physical properties. The aggregates offer better aeration and moisture conditions for growth, regulated organic matter decomposition and loss. The aggregates also prevent erosion, support soil microbe survival and regulate carbon and nitrogen release into the environment, enhancing the soil's chemical and biological properties.

Effect of Mycorrhizae on Corn Yield when Corn is Subjected to Drought Conditions



Heat and drought stress during silking can reduce yields 2.5% to 8% per day.[1]

Source: 2016, Leland, MS

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EASE OF APPLICATION

Applied in-furrow at planting with water or starter fertilizer as a carrier, the new liquid *MycoApply EndoPrime* SC formulation is convenient and easy to use. Unlike other products, farmers can add *MycoApply EndoPrime* SC into their current practices, including tank mixing it with other inputs such as in-furrow insecticides and fungicides.

"We have strong science-based claims to document colonization with liquid fertilizers and other crop inputs. This all leads to better root development, healthier plants and more productivity," says Israel. "Farmers can add *MycoApply EndoPrime* SC to their cropping practices for better plant health in 2019 and for better soil health and land productivity for years to come."

STRONGER CORN
STARTS BENEATH THE SURFACE

EXPAND ROOT ABSORPTION
Hyphae extend from root to access areas inaccessible to bigger roots.

DROUGHT STRESS TOLERANCE
Mycorrhizae can store resources until needed by the plant.

NUTRIENT ACCESS AND UPTAKE
Hyphae can access small soil spaces that root hairs can't. They also produce enzymes to release nutrients that are tied up in the soil.

IMPROVED SOIL STRUCTURE
Hyphae produce glomalin which creates stable soil aggregates for better soil structure.

The all-new, easy-to-use liquid formulation of MycoApply® EndoPrime® SC contains four select species of mycorrhizal fungi designed to help your corn crop stand up to stress. Applied in-furrow, *MycoApply EndoPrime* SC allows for easy application via water or starter fertilizer to fit seamlessly into your existing cropping practices. **Protect your crop today and your cropland productivity through healthy soil for generations to come with *MycoApply EndoPrime* SC.**

Contact your local retailer or visit **EndoPrimeCorn.com** to learn more.

MycoApply EndoPrime® SC NEW

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Always read and follow label instructions.