

Conservation Corner for March 7, 2017

Growing More with Less

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Microbes in the soil. Sounds pretty boring to most people. The good news for you is that the study of microbes and microorganisms in the soil is the biggest and hottest research in agriculture right now. Why does this matter to you? Because microbes can help farmers produce more food with less.

What is really in the soil?

Soil is more than dirt, and it's not just a growing medium. Soil has many components, and in past articles, the Conservation Corner has talked about nutrients in the soil and healthy soils. This article is covering more of what those micro living parts are. There are bacteria, fungi, microbes, little bugs, and worms in our soils.

Microbes can be found pretty much everywhere around us. Yeast in our bread, beer, and wine is one of those that humans figured out pretty early on is beneficial to us. Yogurt contains microorganisms that cause milk to ferment and create some dairy yumminess. The newest research is being conducted on microbes like bacteria and fungi for farming applications.

Let's take a minute and talk about the microbes in our soils. There are plenty of bad guys out there that can wreak havoc on our crops and gardens. There are many soil-borne fungi that cause death or very poor stands in our crops. One that gardeners may be familiar with is verticillium wilt on tomatoes. Farms also have those same challenges in their fields. It is just on a much bigger scale.

What about those good guys in the soil? This is where the research is trending and finding some helpful stuff. Scientists have known for quite some time that there's this area around plant roots that they call the rhizosphere. That fancy term just means that there's a lot of microbes right around the very tips of the roots.

One of the microbes that helps legume plants like beans, peas, alfalfa, and peanuts, grow better is rhizobium bacteria. These bacteria are special because they can take nitrogen, a basic building block of plants, from the air and soil and fix it in nodules on and in their roots. This means farmers can reduce the amount of nitrogen they need to apply to the next crop in the rotation, such as corn. Another example of a beneficial is mycorrhizal fungi. These fungi can help plants take up water and nutrients.

Creating seed treatments using microbes

So here's the super interesting part – scientists have been developing microbial seed coatings and treatments that are beneficial to crops. What's even more interesting is that these bacteria and microbes are specific to a region. Thousands of soil samples have been taken from farms across North America to get a better idea of what microbes are out there. This helps companies to

develop seed coatings or treatments that are helpful to specific areas of the country. That's cool! Farmers, like you want products that work.

Right now there are products called inoculants that can stimulate the growth of legumes, corn, cotton, and wheat. Inoculants are added to the soil during planting or just after. These products can help improve nutrient uptake by the plants which helps the plant grow faster and provide a better yield and help protect the plant from diseases and insects. Some inoculants have been around for a while and have a good success rate. Newer inoculants are giving good results to farms as well. Home gardeners can also take advantage of inoculants. Many garden seed catalogs offer inoculants to help boost yield and plant vigor.

New products being developed are seed coatings. These coatings could help seeds fight off the bad guys in the soil that can cause them harm.

Of course a lot of these innovations are not quite available to farmers yet. They are in testing stages around the US. So far the test plots are showing successes of 4-5 bushel per acre increase in corn and a 1.5 bushel per acre increase in soy. In comparison, those inoculants that are already being used can show up to a 5+ bushels per acre in soybeans.

Why should consumers care?

What is the big deal with this? Hopefully, in the not too distant future this technology can be used to reduce agriculture's need for commercial inputs like fertilizers and pesticides. Any time agriculture can reduce its inputs whether its fuel, fertilizer, pesticides, or water while maintaining or increasing its output, meaning food for us or feed for livestock, that's a huge win for our environment.

Consumers should be comforted that agriculture is trying to come up with more tools in its toolbox that reduce its impact to the environment as minimally as possible while producing a quality product.

Do you have any questions regarding the information in this article or other agriculture related questions? Please contact Jodi DeHate at jodi.dehate@macd.org or 231-839-7193. Special thanks to Molly Mackey from the Wexford-Missaukee Agriscience CTC class for providing research and inspiration for this article.



In this field of soybeans, the seed and all other inputs were the same throughout the field, the only difference is that the tall beans had the biological inoculant "FirstUp" – a bacteria that helps the plant utilize nutrients. Yields for the treated beans were 5 to 10 bushels more per acre than those that were not treated. Photo courtesy of Jean Santijer.



The soybeans on the left were treated a biological inoculant, and the ones on the right were not. Notice how much larger the root systems are on the treated plant. Photo courtesy of Jean Santijer.