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JOHN'S CORNER:

NEWS FROM THE WONDERFUL WORLD OF SOIL AND PLANTS

by John Ferguson

It seems there is a new research paper on the benefits and complex interaction of microbes, plant growth, and their health are being released almost daily. We are learning about the importance of microbes for human health also. I was reading about some research at the University of Florida on a dental probiotic. It not only prevents cavities but also helps the tooth re-grow its enamel.

Researchers at the University of Delaware have found that when plants are cut they clot at the site of injury just like humans clot at the site of a wound. It had been a mystery until now where they indentified two enzymes that produce this response. Plants produce a biopolymer called *callose*that they deposit at the wounding site that seals the injury. These enzymes also regulate movement of nutrients and water around the injury to prevent loss of resources.

I read an article last week from the Woods End Research Laboratories (Dan Davidson) that used an analogy of a cars engine and soil health. A plants growth and health is strongly influenced by the quality of the soil it grows in. So, "what is the size of your engine? Have you checked lately? Just as if one uses a dynamometer to measure horsepower on a tractor or car, you can use the Solvita soil respiration to measure the horsepower of your soil. The better tuned an engine the greater the horsepower and efficiency. I believe soil is similar and by improving the quality (tuning) and building the biological factory (modifying and supercharging) your soil engine can produce more

horsepower." This requires lots of humus (compost) in the soil to provide the energy for the microbes and a good quality mulch on top.

The Solvita test kit is easy to use by any gardener and it can be ordered at https://www.solvita.com, and gives a quick easy measurement of one's soil health. The test measures the respiration of microbes in the soil using the carbon dioxide (CO_2) produced by the microbes.

The full article is found at
https://www.solvita.com/field-treat-soil-like-engine-dan-davidson

A paper by South Dakota State University has found that a host plant will be colonized by multiple species of fungi simultaneously and the plant knows exactly where certain benefits are coming from. The host plant can distinguish between good and bad fungal behavior and allocates resources (carbohydrates required by the fungi that we call root exudates) accordingly.

They found these fungi form common mycorrhizal networks that give them access to multiple hosts. They found that when host plants were shaded and thus decreased their carbohydrate allocation, fungi responded by reducing their nutrient share to the plant.

Another paper in the journal Natures Geosciences has found that microbes can mine elements from soils and rocks. This study found that bacteria can extract rare elements from the platinum group elements (platinum, palladium, etc.). The microbes were able to extract these valuable elements and concentrate them. Many of these elements are

not found in sufficient concentrations in nature to be mined by conventional techniques.

Another paper from the Imperial College in London has found ancient microbes could use a primitive form of photosynthesis (anoxygenic photosynthesis), which uses molecules such as hydrogen, hydrogen sulfide, or iron as fuel (energy) instead of water.

Researchers from the University of Zurich have found that bacteria can develop a collective memory that can increase their tolerance to stressful events (individual cells have short memories). This is similar to how one transistor may cause an electrical change, but with millions of transistors working together, we have a computer.

In the Journal Agriculture, Ecosystems and Environment a recent study found that organic orchards had more beneficial fungi than conventional orchards. It has been known for years now that mycorrhizal fungi help plants receive nutrients, prevent disease, survive drought and other weather extremes. When one uses a chemical fungicide, we lose these important benefits.