

JOHN'S CORNER:

NEWS FROM THE WONDERFUL WORLD OF SOIL AND PLANTS

by John Ferguson

The Journal Science Signaling had a recent article on how plants trick bacteria to protect themselves from bacteria assault (January 5th issue). Researchers have identified one of the protective compounds that plants produce called "rosmarinic acid". This compound mimics a molecule that bacteria use to communicate with each other about their population density. Normally, the bad bacteria grow and reproduce to very high numbers before they attack a plant so they can overwhelm a plant's defenses. It appears this compound tricks the bacteria into attacking before they have sufficient numbers to harm the plant, so the plant's immune system can fight them off.

Another report in Science Daily from Arizona State University has found that blue and green clays can kill bacteria. Clay has been used for thousands of years for medicinal purposes (eating for nutrition, stop bleeding from wounds, soaking in a mud bath, etc.). They found that certain clays can kill even antibiotic resistant pathogenic bacteria. The clay minerals work in tandem with certain nutrients in what chemists call their reduced state (it is not electrically balanced). A couple of these are iron (Fe^{2+}) and aluminum (Al^{3+}). Bacteria require small amounts of the reduced iron to live and grow. The iron atom tricks the cell wall of the bacteria into opening up to let the atom in and then the aluminum atom keeps it open and prevents the bacteria from closing it. This allows a lot of this reduced iron to enter the cell. This excessive amount of iron then poisons the bacterial cell, killing it as the reduced iron becomes oxidized (electrically balanced).

Note: In soils and rocks when iron is in a reduced state it gives the material a greenish color and when the iron is oxidized, it gives soils a reddish color.

Another study from the Journal Frontiers of Plant Science (Sept. 2015) found that plants need an active social life to stay healthy. Decades ago, researchers confirmed that talking to plants helped them grow stronger and healthier. This study found that plants use molecular signals to engage in constant life-enhancing conversations with the microbes in their ecosystem. Plants



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require a harmonious relation with its microbial community to thrive, and is especially critical when plants are threatened by drought or extreme weather. These signaling chemicals are contained in the root exudates that plants release into the soil. Numerous studies have shown that organically raised plants are much more resistant to weather extremes than those grown with toxic chemicals.

Note: Many readers have written in and stated that I am not technical enough and other readers have written in stating that I was too technical. I try to provide enough technical information and references to those whom want it and use a lot of common language for those whom do not have a technical background.