



JOHN'S CORNER:

NEWS FROM THE WONDERFUL WORLD OF SOIL AND PLANTS

by John Ferguson

Research by the American Chemical Society have found that agricultural chemicals applied to land persist in the soils for decades after the last usage. These chemicals can continue to influence soil health even years after converting to organic practices.

They studied 46 regularly used pesticides and their breakdown products, where samples were taken from 100 different fields. The total number and concentrations of these synthetic chemicals decreased significantly the longer the fields were under organic management.

They also found lower levels of beneficial microbes in the fields with the highest levels of these toxic chemicals, which strongly suggests these chemicals decrease soil health. Environmental Science & Technology (2021).

A few weeks ago, I talked about types of coffee and how its grown affects its benefits. A new study from Virginia Tech, Columbia, and Cornell universities has found that shade grown coffee is also more bird friendly. Shade grown coffee provides crucial habitats for migrating birds hence purchasing organic shade grown coffee is not only better for one's health it also protects our birds, especially the migratory species. People and Nature (2021)

The Smithsonian Tropical Research Institute and the university of Sheffield have found that nitrogen fixing legume trees play a major role in the health of tropical forests

Many tropical soils are low in nutrients which limits growth. These trees were able to accelerate the weathering processes in nutrient poor soils, releasing important nutrients (elements), for themselves and surrounding trees.

In addition to providing nitrogen, these trees were able to acidify the soil by feeding acid loving bacteria that helped breakdown the minerals releasing the required elements. Proceedings of The National Academy of Science (2021).

Several studies have suggested one way to fight climate change is reforestation. This effect above would allow trees to grow faster and sequester more carbon.

To maximize our results this study suggests this method would work in our area also, as we have many clays where minerals are tied up chemically, or sands where there are very little available nutrients.

Our native Black Locust tree (*Robinia pseudoacacia*) is a legume that grows well in almost any soil, has essentially zero pest problems, it is freeze and drought tolerant, fast growing, helps with erosion control, plus beautiful flowers in the spring. The wood is also very straight and extremely rot resistant, hence was almost eliminated along the gulf coast as it was cut to make sailing masts or used for wood to build buildings. The seeds are eaten by birds, squirrels and other





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animals. The only possible negative is that in good conditions it often spreads by suckers.
(Picture from internet images)

Speaking of fighting climate change. Researchers at the University of Texas have discovered a new phylum of microbes that breakdown plants (organic matter) without producing methane a potent greenhouse gas.

These microbes can live in extreme environments like the hot springs of Yellowstone Park. This new phylum is named Brockarchaeota after Thomas Brock whom studied microbes in extreme environments and are part of a poorly studied group of microbes called archaea. These microbes recycle carbon without producing methane (a potent greenhouse gas) which makes them unique. Nature Communications (2021)

As the dangers of pesticides and other synthetic chemicals are becoming known researchers are turning to nature to find solutions. These may be biological or chemicals derived from plants.

To use an example of an insect pest that many are aware of is the common bed bug that causes lots of misery around the world. This insect pest has evolved to be resistant to almost every synthetic chemical control measure.

New research has found that essential oils derived from plants are lethal to bed bugs. These essential oils are often natural chemicals like thymol from thyme, carvacrol from oregano and thyme, eugenol from cloves, etc. Pesticide Biochemistry and Physiology (2021)



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Gardeners have known for years that orange oil is very effective in controlling many pests, garlic oil is very effective in repelling mosquitos and used in products like Mosquito Barrier.

MicroLife has a product made from essential oils derived from plants to control pests like chinch bugs and sod webworms, called Eco Smart. Neem oil (from the Neem tree) is frequently used to control over 200 insect pests.

AgraLawn Crab grass killer is very effective at killing weeds in St. Augustine, Zosia and Bermuda lawns and is made from cinnamon bark. I spray cedar oil on the drywall of my closet a couple times a year to keep moths away, that like to eat my wool suits and shirts.

The examples above, are all organic methods that have been proven to be very effective.

We all are aware of bioremediation, using microbes to clean up things like oil spills (Exxon Valdez, the BP disaster in the Gulf of Mexico, etc.) and degradation of other toxic chemicals from jet fuel to explosives. We talked about phytomining a couple week ago, using plants to pull elements out of the soil and concentrate them to levels where they can be recovered from the plants.

Another growing area of natural method research is known as “phytoremediation”. Similar to phytomining where plants collect and concentrate elements, phytoremediation is where plants are used to collect toxic chemicals and remove them from soil or water.

This is a process of using plants to clean up contaminants in our soils, or leachates from mine tailings or landfills, etc. The US Forest Service and the University of Missouri is studying the use of trees to clean up landfill leachate as it may have thousands of chemicals in it.



An example of phytoremediation is *Populus deltoides* the common Cottonwood. It is being used to eliminate toxins from groundwater due to its quick water intake and high respiration rate. For example, toxins like TCE (trichlorethylene which is used to degrease parts) are absorbed and removed from soil and water.

We often talk about fungi in the soil and how they help protect plant roots and help plants collect water and nutrients. Many of us enjoy mushrooms (the fruiting spore of fungi) on our salads or sautéed on our steaks.

Mushroom (fungi) have been studied for their nutritional benefits and found to be very high in vitamins, nutrients, and antioxidants.

Mushrooms are now being studied for their medicinal benefits. Research at Penn State University analyzed data from 19,500 cancer patients and found people who ate 18 grams of mushrooms daily had a 45% lower risk of cancer. *Advances In Nutrition* (2021)

Several environmental groups filed Freedom of Information claims against the EPA and they found some very disturbing reports that the media is not covering.

They found that in 2016 the EPA reviewed seven studies on Round-Up and cancer. All of the studies found increased risks of cancer, especially non-Hodgkin lymphoma.

The EPA chose to lie and state that glyphosate did not cause cancer.



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How many lives in America and around the world could have been saved if they had told the truth? What effect is it having on our children as cities and schools spray glyphosate all over the parks and playgrounds?

A recent study published in JAMA by the Health Science Department at Tuft's University was on shifting the focus of food production from "food insecurity" to "nutrition insecurity".
Journal of the American Medical Association (2021)

A summary from Science Daily states "The concept of food security focuses on access to and affordability of food that is safe, nutritious, and consistent with personal preferences. In reality, however, the "nutritious" part often has been overlooked or lost in national policies and solutions, with resulting emphasis on quantity, rather than quality, of food."

"Food is essential both for life and human dignity. Every day, I see hunger, but the hunger I see is not only for calories but for nourishing meals. With a new focus on nutrition security, we embrace a solution that nourishes people, instead of filling them with food but leaving them hungry," said Chef José Andrés, founder of World Central Kitchen.

The authors define nutrition security as having consistent access to and availability and affordability of foods and beverages that promote well-being, while preventing -- and, if needed, treating -- disease. Nutrition security provides a more inclusive view that recognizes that foods must nourish all people.

"'Nutrition security' incorporates all the aims of food security but with additional emphasis on the need for wholesome, healthful foods and drinks for all. COVID-19 has made clear that



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Americans who are most likely to be hungry are also at highest risk of diet-related diseases including obesity, diabetes, heart disease, and many cancers -- a harsh legacy of inequities and structural racism in our nation.”

This is additional support that as gardeners we need to grow more of our own fruits, vegetables, and herbs organically, on mineral rich soil if we want to be healthy and protect our families.