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JOHN'S CORNER:

NEWS FROM THE WONDERFUL WORLD OF SOIL AND PLANTS

by John Ferguson

Ultra-quick electrical pulses have been found to kill weeds and pathogens. New research from Old Dominion University are developing a new cancer therapy using these techniques. They generate about 3 million pulses in about one second and these kills cancer cells in animals in less than 10 seconds. These pulses heat up the cells internally which causes them to die. This same process causes the cells of weedy plants to die also, so I expect we will see electric weeders in the future.

Urban horticulture and agriculture is rapidly becoming more popular in the USA as more and more people want to prevent health problems and save money on medical expenses by eating healthy organic food. Many non-residential properties offer areas to build gardens. These may be school yards, church grounds, abandoned lots, neighborhood parks, even roof tops, etc. Decades ago these properties could have belonged to a farmer whom dumped anything from used oil and antifreeze to lead based paints and other toxic chemical onto the ground where they may persist for decades. Lead and arsenic are two of the most common pollutants found after years of usage before being phased out. Many soil labs can test for these and other toxic contaminates. If the levels are low and depending on the contaminate then many of the issues can be solved by mixing in a good compost. The microbes in compost will degrade many organic chemicals from hydrocarbon (fuels and waste oil) to pesticides and even explosives. If there are high levels of toxins then a weed cloth barrier can be used to cover the ground and prevent roots from growing into the bad soil. Raised beds can be built on top of the weed barrier and the vegetables grown in them.

Rice University in Houston is developing a Urban Agriculture/Horticulture department led by Dr. Joe Novak and the on-campus gardens will provide nutritious **organically** grown food for the schools cafeterias.

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One very important reason for growing our own food organically is our mental health. The microbiome of our digestive system provides over 80% of our immune system. This relationship between our guts and brains depend on trillions of beneficial bacteria, fungi, viruses, archaea, and eukaryotes that inhabit them. Researchers have found a relationship between these microbes and a series of neurological disorders and psychiatric conditions. These include depression, anxiety, autism spectrum disorders, Parkinson's disease and many more. When we eat nutrient poor junk food loaded with toxic chemicals we

destroy our microbiome. For more detail see the journal, Environmental Health Perspectives, June 2018, "What is Your Gut Telling You? Exploring the Role of the Microbiome in Gut-Brain Signaling". <https://ehp.niehs.nih.gov/ehp3127>

Another similar study from the Joslin Diabetes Center has found that people with type 2 diabetes suffer from depression and anxiety and that it is linked to the gut microbiome, which is linked to the quality of food we eat.

A new study from the University of California Berkeley published in the Journal Current Biology, July 2018 has found the more artificial fertilizer applied to plants, the amount of disease increased. The study clearly showed that the amount of artificial fertilizers applied changed the community of microbes on the leaves which then allowed pathogens to attack the plant. They also discovered that when applying beneficial bacteria to the plants leaves (probiotics), lower doses (less concentration) were more effective than high doses at preventing infection. This interaction of microbes and leaves is referred to as the phyllosphere. The last item they discovered was that some of the bacteria on the leaves could fix nitrogen from the air and give it to the plant. This effect may explain why a high quality compost tea is so effective at preventing diseases and increasing the health of plants.

A couple weeks ago we were talking about the decline of nutrients in our food supply. A study of food in Canadian markets has found similar results. They compared nutrition of 25 different vegetables and fruits today to those grown in the 1950's. In potatoes they discovered a 100% loss of vitamin A, 57% of its

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vitamin-C and iron (Fe), and 28% of its calcium (Ca). They also lost 50% of their riboflavin and 18% of their thiamine content. Similar results were found for other food crops. I wonder what the decline would have been if they went back to 1900?

Researchers using a new laser scanning microscope have found that as a root grows, it forms a cap of hard tough cells to protect the tender fragile growing tip. Ever few hours the cap is sloughed off and replaced with a new one.



We have all heard the phrase "We are what we eat", and this applies to insects and animals also. For example a study in the Journal BMC Complementary and Alternative Medicine (2017) has found that Tualang honey from the Malaysian jungle kill breast cancer cells in animal studies. Most of our medicines come from plants, hence it is no surprise that honey made from them would also have health benefits. Similarly Manuka honey from New Zealand has been found to be helpful in the treatment of shingles. The honey has to be raw, unfiltered and unprocessed to be effective.

Another paper published in the American Society of Agronomy Journal (May 2018), has found that chloride toxicity reduces the growth and production of plants, confirming other studies. Chloride forms when salt known as sodium chloride (NaCl) dissolves in water. Chlorine in our municipal water systems turns into chloride when we water our landscape. The more one waters, the more problems you have.

Another drawback to plastic mulch has been discovered. Eventually the plastic starts to physically degrade from exposure to sunlight and the elements. These find particles make their way into the soil over time. These film residues decrease soil fertility, interfere with water transport, and diminish the growth of plants. Journal of Science Advances 2018.



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A study published in the Journal Environmental Health Perspectives (July 2018) has found that exposure to "greenness" is associated with slower cognitive decline. This confirms other studies on the benefits of being a gardener!

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