

JOHN'S CORNER:

NEWS FROM THE WONDERFUL WORLD OF SOIL AND PLANTS

by John Ferguson

As gardeners we are always interested in how organic matter decays into rich humus. There were two new independent papers published in the online journal E-Life (2020) on decomposition of organic material.

The researchers looked at over 65 individual studies in both fields and forests and found that plant decomposition is faster when the litter is composed of multiple species.

The other paper was composed of 69 studies and 660 observations. They found the loss of biodiversity hurt decomposition and carbon storage in the soil (think 100% pine forests for pulp and timber). They also found that chemical stressors from herbicides to pesticides hurt decomposition.

The above principle is one of the reasons why aged (composted) native mulch works so well to improve soils when made from branches and limbs of hundreds of species.

The herbicide Atrazine (which has been outlawed in Europe since 2003) has been found to hurt reproduction in animals according to a paper in the journal Reproduction, Fertility and Development (2020).

They found exposure to Atrazine caused "major abnormalities" in the male reproductive system in many animals. The damage included male infertility or even male-to-female sex reversal in some animals like frogs.



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Researchers have discovered a new mechanism as to how some plants color their fruit. The paper was published in the journal *Current Biology* (2020). Most plants use pigments to give them color to their leaves, flowers and fruits. They found that the blue color of fruits of the plant *Viburnum tinus* is caused by structural components in their cell walls similar to that used by butterflies and birds. The effect is caused by lipids in the cell wall.

More and more gardeners are growing their own fruits and vegetables not only for the better taste but for the higher nutrient levels. Nutrition is critical for our immune systems to work properly; hence nutrient dense food is critical.

A major nutrient for humans is vitamin-C which is used by our immune system. The study found that Red Bell Peppers, which are a fruit and not a vegetable as we were taught are a good source of this vitamin.

They found that organically grown bell peppers has *significantly higher levels* of vitamin-C and antioxidants than conventionally grown varieties.

Over the last few years, we are seeing more and more evidence that plants can communicate with each other. A study by researchers at the University of Wurzburg published in the journal *PNAS* 2020, has found another communication mechanism.

They found that when plants are stressed (whatever the causes) they emit long distance traveling electrical signals known as membrane potential waves. "This allows plants to transmit information quickly and precisely over long distances even though they have neither brain nor nerve cells".



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When I read the article, it reminded me of a bible verse where it states let the plants speak to you. It seems that plants do speak to us in many ways but sometimes in a language we do not recognize or understand.

A study from Argentina has found a strong link between exposure to glyphosate (Round-Up) and asthma. In a small city surrounded by agricultural fields they found glyphosate levels much higher in the city than in the fields. Asthma rates were directly correlated with higher glyphosate exposure. It also correlated with higher rates of cancer and reproductive problems.

When they tested grain dust samples, they found glyphosate in 100% of the samples and at concentrations 20 times higher than other pesticides.

In the book "Bringing Nature Home - How You Can Sustain Wildlife with Native Plants by Doug Tallamay" he talks about how critical native plants that support insects are to our birds.

A study in the journal PLOS ONE (2020) has found that our farmland is now 48 times more toxic to insects than it was just 25 years ago. Much of this increase was due to the use of neonicotinoid insecticides which are very persistent in the environment.

As gardeners we should ask the question to the garden centers "Have these plants been grown or treated with neonicotinoids?" If so, we should refuse to purchase them.

We noticed this issue a couple years ago when purchasing milkweed plants from local growers for our nursery. Monarch butterflies would lay their eggs on the milkweeds and the caterpillars would soon die due to the neonicotinoids used. As a result, we now grow many of our own milkweeds organically to prevent this issue.

In addition to being food or beautiful as in our butterflies, insects serve a valuable ecological role from recycling nutrients to aerating soil.



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I read another paper over the holidays on how microbes work together for their mutual benefit. Researchers at the University of Tsukuba have found that bacteria use fungal highways to move around and travel.

The vitamin thiamine (B-1) is required for almost all life forms and it is scarce in nature but is synthesized by some bacteria and other microbes. They found that fungi would let the bacteria travel along their hyphae in exchange for thiamine the bacteria produced (I guess they had to pay their toll fee). Published in the journal Life Science Alliance 2020