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NEWS FROM THE WONDERFUL WORLD OF SOIL AND PLANTS

By John Ferguson

Subject: artificial fertilizers microbes and vitamins soil invertebrates
CO₂ soil translocation

Many gardeners have already planted their fall tomatoes. While cleaning up my office I found a paper from a few years ago on tomatoes. It was a study released by the University of California at Berkely found that artificial fertilizer destroys a plants microbiomes ability to fight disease while they were studying applying beneficial microbes sprayed on leaves to prevent diseases on tomatoes.

They discovered that fertilizing the tomatoes before spraying the leaves for disease control rendered it ineffective. They also found that beneficial bacteria sprayed at low doses or concentrations were more effective than high concentrations in preventing disease. *Current Biology* (2018)

We often hear about how microbes fix nitrogen (N) from the air or some other elements from the soil. What we often forget is that many of these microbes produce things that are essential to human health.

For example, the Azobactor family of microbes that live in healthy soil, produce vitamins B-1, 2, 3, 5, 6, and 12 along with vitamins C and E. When we kill off these good guys by using toxic chemicals, then these vitamins are missing and our food is not as nutritious.

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Additionally, even if the microbes are present in the soil, they also need to have the building blocks of these vitamins. Lets look at vitamin B-12 which helps regulate our immune systems. From our study of all the elements and what they do last year, we know this vitamin is built around the trace element Cobalt (Co). How often do you see the element cobalt listed on a bag of fertilizer? This is why in addition to a good organic fertilizer it is recommended to apply some Re-mineralizer to all our plants (especially our fruits and vegetables) every few years. It is very cost effective as a 40-pound bag can cover 300 square feet.

A paper in the journal *Frontiers in Environmental Science* (2021) found that the pesticides used in American agriculture (and horticulture) pose a grave threat to organisms that are critical to healthy soil, biodiversity, and soil carbon sequestering to fight climate change.

The University of Maryland, Center for Biological Diversity, Friends of the Earth, and others completed the biggest and comprehensive review combing data from over 400 studies. "They found that pesticides harmed beneficial, soil dwelling invertebrates including earthworms, ants, beetles, and ground nesting bees."

A few years ago, a paper in the journal *Science* showed that toxicity to invertebrates has doubled over the last few years.

If you wonder how this negligence happened, I read that the EPA uses European Honeybees (a species that lives its entire life **above** ground), to evaluate the effect on invertebrates (species that live their entire life **below** ground).

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Articles in “Physics Today” and “Nature Sustainability (2023)” were on using rock dust, especially basalt sand, as a tool to sequester carbon in place of using calcium and magnesium that is currently used to form carbonate minerals that contain carbon from the air.

The researchers found that carbon dioxide binds tightly to the silica minerals that come from the basalt and granite. They discovered that both granite and basalt sequestered or fixed four times more carbon dioxide than expected. The carbon once fixed or combined into silicate based minerals was extremely stable in the soil.

Hence, another benefit of using products like Re-mineralizer is that it has a large percentage of basalt and granite sand in it which helps remove carbon from the air reducing greenhouse gasses in addition to providing valuable trace elements.

I first encountered the concept of “soil transplantation” back in 1998 while lecturing in Costa Rica at the Catie Research Institute. The scientists working there described how for years they collected pine seeds from Honduras and planted them at the test gardens. They would then germinate and die.

Finally, they dug up a small pine tree with root and dirt and trans-planted it. It grew and thrived. Additionally, pine seeds planted adjacent to the pine tree also grew and thrived with the growth effects decreasing as one moved away from the pine tree.

It became obvious that there was something in the soil these pine trees required to live.

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In the journal of Applied Ecology (2022) a study by the Netherlands Institute of Ecology, compared 46 field experiments in 17 countries and four continents - soil transplantation does make a difference.

They found that if one takes some healthy soil including the associated soil life and any plant seeds present, and you then make a donation in an area that was degraded it made a significant difference. Following the soil transplantation, they found that natural life will recover at an accelerated pace.

At Catie, they eventually discovered it was one species of mycorrhizal fungi that the pine trees from Honduras required to live and grow.

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