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JOHN'S CORNER:

NEWS FROM THE WONDERFUL WORLD OF SOIL AND PLANTS

by John Ferguson

As gardeners we are always interested in how to grow the best plants, from turfgrass to fruit trees and flowers. We have often talked about the importance of re-mineralizing our soils. Over the holidays I read a paper published in the journal HortScience (2020) on a group of micro nutrients called rare earth elements that adds more evidence that micronutrients are critical for maximum growth, plant health, animal and human health. These are a group of 17 different elements.

This study was on the medicinal plant *Salvia miltiorrhiza* commonly known as Danshen in China. Medicinal components from this plant are used to treat cardiovascular diseases, liver dysfunction, renal deficiency, to diabetes and cancer.

The beneficial compounds are secondary plant metabolites obtained from the dried roots. Previous studies have shown that these rare earth elements accelerated cell growth, enhanced these secondary plant metabolites, and provided tolerance against fungal diseases. These secondary plant metabolites are often in the form of flavonoids or phenols that also counter diseases of the human body caused by oxidative stress.

The researchers found that these rare earth elements stimulated increased root growth even in low concentrations which also increased chlorophyll content. Additionally, they increased the amount of secondary plant metabolites along with increased enzyme activity. For example, one of the medicinal components called "tanshinone" increased by almost 55%.

This is why we recommend that Re-mineralizer be applied 40 pounds per 700 square feet ever few years. It helps us have healthier soils which means healthier plants, which means healthier food for all life, from insects and birds to humans.



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Another minor element essential for plants is iron (Fe). However, it is often in chemical forms that plants cannot use which then limits plant growth. Scientists at the Max Planck Institute for plant breeding research have found that plants will release substances from their roots (exudates called coumarins) that feed bacteria, which have the ability to digest the iron bearing minerals and make the iron available to plants. For plants to use this mechanism it requires organically rich soil to support the bacteria and other microbes. Published in the journal Cell Host & Microbe (2020).

We all know that we use salt as a preservative in many food products since it kills bacteria. Many of the soils along the Gulf coast are already high in salt, hence products high in salt like poultry manure or cow manure, are not good choices for our area, and frequently cause harm to our plants. The above information on bacteria and iron is another example of how salt-based products harm our plants as it shuts down this mechanism for plants to get their needed iron.

The picture below shows another negative effect of salt. The area below the membrane on the left image has no dissolved salt and the roots go right on through the membrane. When salt is present the roots can sense it and will not even go near the area with where salt is present. Salts in the soil prevents the roots from going deep to obtain water and nutrients.

This effect is one of the reasons the roots of St. Augustine turfgrass do not grow deep when artificial fertilizers are used, as the salts leach a few inches down into the soil and form a hardpan layer, even though the grass has the biological potential for roots to grow to grow over 12 feet deep (University of Florida study)!



Many of us probably remember this advertisement shown below.



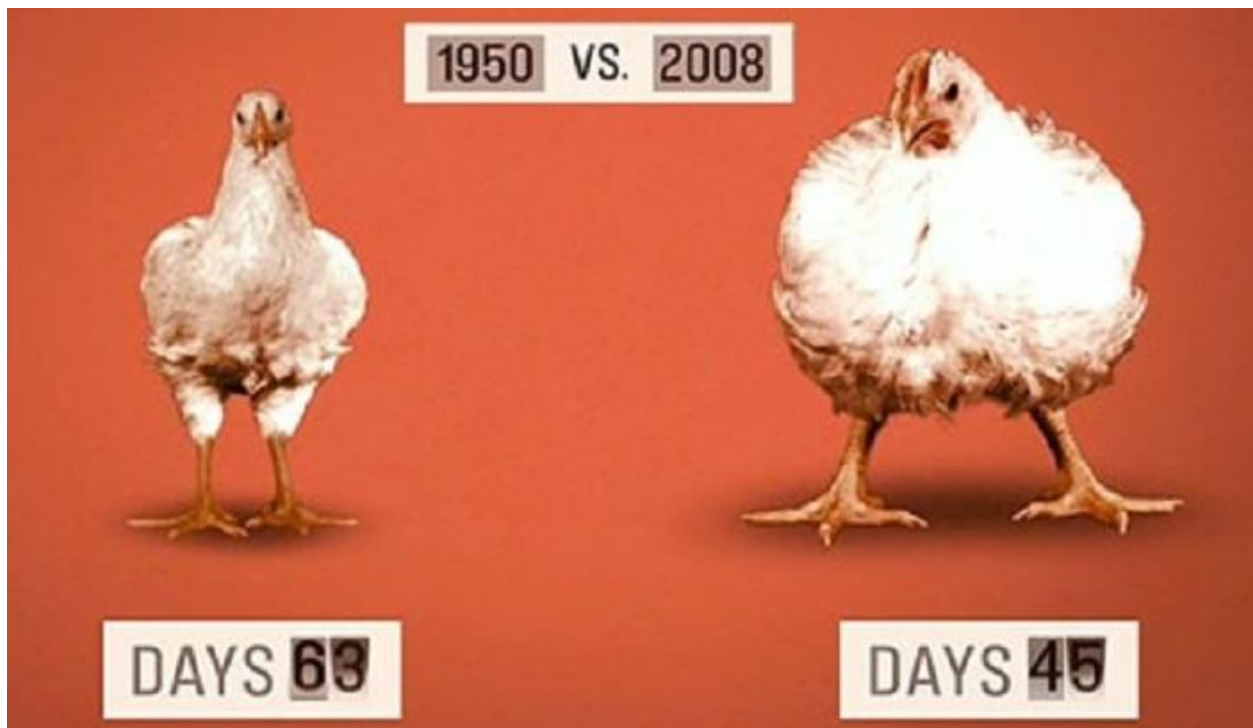
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Salts are not good for plants and the effects can range from stunting and poor growth, increased insect and disease issues, to outright death of the plant.

The salt effect is one of the reasons good organic fertilizers like the Microlife™ line of products provide better results, as all artificial fertilizers are chemically salts!

Another reason not to use poultry manure or cattle manure (in addition to salts), is that both cattle and poultry are fed large amounts of antibiotics and growth hormones, as the picture below indicates. These dangerous substances end up in the manure as well as the meat.





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From a Publication of ATTRA, the National Sustainable Agriculture Information Service a division of the USDA:

“Much of the arsenic used as an antibiotic in commercial broiler production ends up in the litter. Using this litter as a soil amendment is not prohibited by the National Organic Program. Much of this litter comes from commercial broiler operations, which use arsenic as a feed additive to control parasites and increase weight gain. Most of this arsenic does not accumulate in the poultry meat, but is excreted by the birds. As a result, almost 90% of the arsenic fed to poultry ends up in the litter. Because this heavy metal has the potential to build up in the soil, cause health problems for farm workers and produce consumers, and be trans-ported to adjacent lakes or streams....”.

Note: The use of arsenic is being slowly phased out as it is also a strong carcinogen.

The reasons to use modern organic methods based on biological science increase almost daily!