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NEWS FROM THE WONDERFUL WORLD OF SOIL AND PLANTS

By John Ferguson

A recent study compared nitrogen (N) supplied to plants in an artificial form (ammonium sulfate) to nitrogen in an organic form (poultry litter, blood meal or cover crop). They found a significant decrease in bacteria across many families of bacteria and a decrease in species diversity when artificial chemical fertilizer was used. *Journal Of Environmental Quality*, 2022.

Greenhouse gasses that cause climate change are becoming more important and our understanding of them is growing. Artificial fertilizers both in their manufacture and usage, produce lots of greenhouse gasses hence more farmers are using animal manures as a source of nutrients (natural fertilizer).

However, manure can also produce greenhouse gasses. Researchers found that by windrow composting the manures before field application, it reduced greenhouse gasses from 9-90% as compared to direct field application. *Journal of Environmental Quality*, 2021

Note: Cattle that are grass fed produce many times less greenhouse gases than those fed grain.

Note: Composting of organic wastes if done correctly can significantly reduce greenhouse gas emissions.

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Another study published in the Journal of Environmental Quality (2022) found that compost made from yard waste (grass, leaves, limbs, etc.) was very effective in removing heavy metals and excess nutrients from storm water. They were effective even when blended with 50% soil.

Soil compost blends are very useful in LID (Low Impact Development) projects.

Note: compost made from biosolids (sewage sludge) did not work and may increase the problems.

Researchers from a consortium of laboratories (HZDR) has found a bacterium that has magnetic crystals within its cells. The bacteria use the crystals to align themselves with the earth's magnetic field and to help orientate themselves. This makes them useful for separation processes.

They found these bacteria had proteins and other chemicals on the surface of their cell walls that allowed dissolved heavy metals like uranium to stick to their surface. Then using applied magnetic fields that would interact with the magnetic crystals they could remove the uranium from contaminated fresh or salt water.

It is believed the same process could be used to remove plutonium from waste water. Journal of Hazardous Material (2023).

Scientists at the University of Chicago have found a link between photosynthesis in plants and what is known as a Bose-Einstein condensate, sometimes referred to as the fifth state of matter.

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When energy from the sun (photons) hits a leaf's surface it knocks loose an electron leaving a hole behind in the molecule. The combination of the electron and the hole move around the surface of the leaf and is called an "exciton."

Previously this effect of electrons moving without friction had only been found in super conducting materials at extremely cold temperatures. This effect doubles the efficiency of converting energy of sunlight into a form that a plant can use. PRX Energy (2023)

The mysteries of God's creation are amazing and we have only scratched the surface.

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