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Manure can offset invisible changes to soil structure from chemical fertilisers

Long-term use of chemical fertilisers causes nano-scale changes in the soil that can be offset by organic matter such as manure, according to a recent University of Western Australia (UWA) study.



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The research compared soil from a plot with no fertiliser to soil that had added chemical nitrogen, phosphorus and potassium fertiliser in the short term (3 years) and in the long term (22 years).

The scientists also examined soil that had been treated with the chemical nitrogen, phosphorus and potassium fertiliser plus added pig manure.

UWA plant biologist and study co-author Xinhua He says two decades of chemical fertiliser application had destroyed the structure of the minerals in the soil.

He says when organic matter was added to the soil in the form of manure, it retained a make-up of nanominerals similar to that of the unfertilised soil.

'If you put some organic matter, you put some manure into the system, they will recover, they will retain this soil mineral structure,' Dr He says.

The research, which used soil samples from experiments in China, will be published next month in the journal *Chemosphere*.

Dr He says government departments already encourage farmers to retain leaves and shoots in the soil to improve the soil structure.

But he says the research is the first to show the long-term effects of chemical fertilisers and manure on the nanoparticle

(10-6 mm) scale.

'This [organic matter] is good, even at the very fine structure of the soil particles,' he says.

The long-term soil samples were taken from an experiment on wheat and corn crops set up in 1990 while the short-term site was established in 2009.

The study showed only small changes to the soil following three years of chemical fertilisers and Dr He says it shows the importance of continuous funding for long-term studies.

The soil was analysed with a two-dimensional correlation spectroscope and a high resolution-transmission electron microscope.

Dr He says further unpublished research on soil samples – a 22-year-old sample from China and 160-year-old samples from Rothamsted Research in the UK – showed similar results using a sensitive ion-microprobe at UWA, the only facility of its kind in the southern hemisphere.

Source: Science Network WA

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