

Lack of copper in ancient soil regulates nitrification

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Credit: University of Western Australia

Researchers from The University of Western Australia and Newcastle University (UK) have discovered copper levels in the soil affect the delicate balance of microbes responsible for soil nitrification, which affects how well crops grow.

Soil nitrification has critical implications for the environment. Lack of nitrogen in the [soil](#) can limit plant growth but too much nitrogen can cause algal blooms and [greenhouse gas emissions](#).

The research differs from previous studies that suggested nitrogen fertilisers played a large role in affecting the microbes (archaea and bacteria) which are responsible for soil nitrification.

Soil nitrification has been an important process in [global nitrogen cycle](#) since the earth was first oxygenated. One of the biggest farming costs globally is the use of nitrogen fertilisers to aid crop productivity and this latest discovery has important implications in developing further understanding of soil nitrification for the agricultural industry.

Professor Tony O'Donnell, Dean of UWA's Faculty of Science, said the soils in Australia were some of the oldest in the world, compared to soils in the northern hemisphere where most global research has been done to date.

'In testing ancient Western Australian soils, we found a relationship between the soils age and the levels of archea and bacteria microbes," Professor O'Donnell said.

"When we looked into this further we found that in ancient Western Australian soils, the lack of copper limited the archea microbial population which in turn limited their soils nitrification, instead bacterial nitrification dominates."

Professor Daniel Murphy, UWA Chair of Soil Biology, said the only way to effectively manage nitrogen in farming systems was to understand the microorganisms responsible and what affected their growth.

"These findings are an important step forward in developing targeted solutions to manage nitrification in soil," he said.

"Use of [nitrogen](#) fertilisers is only 50-60 percent effective so understanding the nitrification process in soils is very important."

The study has been published in the journal *Scientific Reports*.

Provided by University of Western Australia

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