# Loss of biodiversity limits toxin degradation

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You might not think of microbes when you consider biodiversity, but it turns out that even a moderate loss of less than 5% of soil microbes may compromise some key ecosystem functions and could lead to lower degradation of toxins in the environment.

Research published today (15 January) in the SfAM journal, *Environmental Microbiology*, reports that without a rich diversity of soil bacteria, specialised functions such as the removal of pesticide residues are not as effective.

Dr Brajesh Singh of the University of Western Sydney led the work, he said "If the ability of the ecosystem to remove toxins from the environment is reduced, there will be higher toxicity risks in the environment and for non-target organisms, including humans, from agricultural chemicals. It is likely that these contaminants will remain at higher levels in surface and underground water, as well. It is vital to gain a better understanding of the extent to which soil bacteria are involved in the removal of contaminants."

The reasons for, and extent of, the decline in microbial diversity in agricultural soils is likely to be complex. The team has looked specifically at long-term heavy metal pollution where metals such as cadmium, zinc, and copper build up in the environment, usually as a result of industrial use. Another source is from digested sewage sludge, which is spread in agriculture fields to supply nutrients to crops and improve soil fertility; the sludge has historically contained some heavy metals, which can become concentrated in the soil.

Although the concentration of heavy metal used this study was higher than the current EU limit, this study has confirmed that long-term exposure to such contaminants does reduce the diversity of bacteria in the soil.

With the global population set to reach nine billion by 2050, we face a challenge to feed an extra two billion mouths using the same resources that we have at present. Crop losses to pests and disease account for a large percentage of under-production and so giving up pesticides will be difficult. Similarly, the use of sludge as a fertiliser is likely to become more prevalent. Research like this allows us to understand better how to use important agrichemicals and waste products in a sustainable way and so will contribute to future food and environmental security.

**More information:** Loss of microbial diversity in soils is coincident with reductions in some specialised functions. Brajesh K Singh, Christopher Quince, Catriona A Macdonald, Amit Khachane, Nadine Thomas, Waleed Abu Al-Soud, Søren J Sørensen, Zhili He, Duncan White, Alex Sinclair, Bill Crooks, Jizhong Zhou and Colin D Campbell. *Environmental Microbiology*, Accepted Articles.

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