

Science for Environment Policy

Lower diversity of soil organisms in new farmland

Converting grassland to arable land can reduce the diversity of nematodes, predatory mites, earthworms and enchytraeid worms in the soil, according to a study by Dutch researchers. However, they found that restoring arable land to grassland did not fully restore the diversity of these four groups during the course of the four-year study.

Although previous studies have identified the impact of agricultural intensification on individual groups of soil-dwelling animals, few studies have looked at 'community-level' effects on several animal groups. As species are lost, ecosystem resilience may fall, as could the provision of vital ecosystem services, such as nutrient cycling. Understanding such effects could help land managers predict and measure the effect of converting grassland to arable land on ecosystem services, which rely on a diverse soil community.

Together with the results of a previous study conducted by the researchers, the findings of this study show that converting grassland into arable land reduces the abundance and diversity of some soil-dwelling species, and disproportionately affects larger animals, such as earthworms. The results could help identify specific indicators to help monitor ecosystem service provision from arable land.

To investigate the effects of agricultural intensification and de-intensification on soil communities, the researchers compared the diversity of bacteria, nematode genera, enchytraeid species, earthworm species and predatory mite species across four ecosystems: long-term managed grassland, long-term arable land, grassland converted to arable land at the start of the experiment in 2000, and arable land converted back to grassland at the same time.

They found that all five groups were affected by the conversion of grassland to arable land. For instance, the diversity of nematode species was reduced by 18%, while earthworm species present in the long-term grassland were entirely absent from the new arable land. Enchytraeid diversity was reduced by 50% and predatory mite diversity by 80%. Bacterial diversity fell by 8%.

Re-establishing grassland did not fully restore diversity to levels similar to the long-term grassland over the four year study. Although the diversity of nematodes and predatory mite species increased, bacterial diversity remained unchanged. Uniquely, enchytraeid diversity fell when arable land was converted back to grassland, although not by a statistically significant amount.

The researchers suggest that the different responses of the species could partly be caused by differences in body size and diet between the animal groups. For example, larger animals, such as earthworms and predatory mites, may be more vulnerable to soil tillage. Predatory mites also depend on specific prey, which may also be reduced after conversion, whereas the food supply for groups, such as nematodes, enchytraeids and bacteria, is likely to be more consistent.

Similarly, longer generation times and lower mobility through soils could mean larger animals are not able to re-colonise grassland as quickly as smaller organisms.



6 September 2012
Issue 296

**Subscribe to free
weekly News Alert**

Source: Postma-Blaauw, M.B., de Goede, R.G.M., Bloem, J., Faber, J.H., & Brussaard, L. (2012) Agricultural intensification and de-intensification differentially affect taxonomic diversity of predatory mites, earthworms, enchytraeids, nematodes and bacteria. *Applied Soil Ecology*. 57: 39- 49. Doi: 10.1016/j.apsoil.2012.02.01.

Contact:
ron.degoede@wur.nl

Theme(s): Agriculture, Biodiversity, Land use, Soil

The contents and views included in Science for Environment Policy are based on independent, peer-reviewed research and do not necessarily reflect the position of the European Commission.

To cite this article/service: "Science for Environment Policy": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.