A new study describes the rate of loss in plant diversity in intensively farmed fields. The authors recommend that measures to protect biodiversity should focus on low-intensity farmland, due to difficulties associated with rebuilding lost biodiversity in intensively farmed land.

Intensive agriculture is one of the main drivers of the decline in worldwide biodiversity. The rate of species extinction in intensively farmed land is 100-1000 times greater than the natural rate and is predicted to increase ten-fold in the future. There are many socio-economic benefits of biodiversity, with pollination and natural control of crop pests among the services provided by wild organisms. This study describes exactly how biodiversity declines with increasing land-use intensity.

In this EU-funded study, conducted under the EASY project¹, the richness of plant species was compared with levels of nitrogen (N) input on 130 grasslands and 141 arable fields in six European countries: Germany, Spain, the UK, Hungary, Switzerland and the Netherlands. These sites were both intensively and extensively (non-intensively) farmed. The number of different plant species for each field was counted, with special attention given to species with less than 1 per cent cover, termed ‘rare’, and species covering between 1 and 10 per cent of the land, termed ‘subdominant’.

Total plant species richness ranged from 19 to 94 species on grasslands and 9 to 94 species on arable fields. The study found a link between increased nitrogen inputs and a decline in species richness. This decline was sharper for extensively farmed areas compared with those farmed intensively. This suggests that levels of biodiversity on extensively farmed land are much more responsive to land use changes, and that to have any impact on intensive farmland biodiversity, additional conservation measures are required. Thus, to restore biodiversity, more than just a change in the levels of nitrogen input is needed.

Plant species richness was also found to be linked with richness of invertebrate species such as bees, grasshoppers and spiders, in both grass and arable fields. The authors point out that restoration of plant species richness on grasslands is notoriously difficult and the effects of poor management in the past may have long-lasting effects. Rare species were shown to be the most vulnerable to increasing land-use intensity and the least abundant species were most likely to disappear following fertilisation with nitrogen.

Reducing the intensity of farming is costly in intensive systems; such systems have higher fixed costs for machinery, buildings and drainage, and higher compensation costs for reduced output and loss of income. Initiatives to support high levels of biodiversity are therefore best implemented in low-intensity farming systems, not only at a national level but at international level.

The authors recommend focusing conservation measures on areas that host the most species-rich farmlands such as south, central and eastern European countries at risk of abandonment or intensification, as well as targeting endangered species still inhabiting intensively farmed areas.

1. Evaluating Current European Agri-environment Schemes to Quantify and Improve Nature Conservation Efforts in Agricultural Landscapes (EASY) was supported by the European Commission under the Fifth Framework Programme. See: http://www.ncp.wur.nl/UK/Research/EASY/ Additional information: To learn more about the important contribution of LIFE projects to the implementation of the EU’s Biodiversity Action Plan for Agriculture, see the brochure “LIFE on the farm: supporting environmentally sustainable agriculture in Europe”.


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