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Intensive farming methods affect birds and plants in Europe

Intensive farming methods have simplified landscapes across Europe, leading to a loss of biodiversity. A recent study has investigated the effects of intensive farming on plants, beetles and birds in Western European regions and found that plants and birds are particularly affected.

In recent decades, changes in agricultural practices have transformed the structure of landscapes across Europe, particularly in the West. Intensification of agriculture has simplified a previously complex landscape, which has been accompanied by a loss of biodiversity in European farmlands. Agricultural intensification (AI) affects biodiversity at all levels of the landscape, from field and farm levels, through to the regional scale.

In this study, the diversity of plants, ground beetles (carabids) and breeding birds was measured at local and regional levels in cereal crop fields in eight European countries: Estonia, France, Germany, Ireland, Netherlands, Poland, Spain and Sweden. The total diversity of species at field, farm and regional scales was estimated from the average diversity within communities and from the average diversity between different communities at all three scales.

AI was estimated from fertiliser and pesticide inputs, tillage operations and mechanical weed control used by farmers in the study areas. Based on this information, AI was divided into low, medium and high levels in each region and the impact of AI on biodiversity in the landscape was assessed.

For all regions studied at all three scales (field, farm and regional), AI was linked to reduced diversity of plants and birds, but not ground beetles. This suggests the impact of AI on biodiversity is not uniform and some groups of species are more affected than others. In addition, how mobile the different groups of species are, plays an important role in the pattern of diversity found across the landscape.

- High levels of AI affected plants at all scales: plants are not mobile and the more simplified the landscape became (with associated loss of diverse habitats), the greater the loss of plant diversity.

- High levels of AI especially affected birds at the farm and region scale. However, with low levels of AI, the diversity of birds was increased. Less intensive agricultural management of fields (e.g. less weed control), maintaining a diversity of field margins (such as hedgerows and woodland) and providing semi-natural habitats in arable landscapes are all important for bird diversity.

- Ground beetle diversity found within fields probably benefitted from having various types of field margins and near-by semi-natural areas, which would supply habitats for new recruits of beetles to the fields.

Although the level of intensive agriculture practised locally by farmers affected species diversity at the field scale, biodiversity (especially of birds and ground beetles) found among different communities at the farm scale was more important in terms of regional biodiversity. Therefore, different local farming practices significantly affect the pattern of the landscape structure and the biodiversity found in agricultural landscapes.

Understanding the detailed impacts of AI on different groups of species at field, farm and regional scales is important for the development of effective agri-environmental schemes. Resources can be targeted at areas where high levels of diversity occur and would be affected by a further simplification of the landscape structure through high intensity farming methods.

Source: Flohre, A., Fischer, C., Aavik, T. *et al*. (2011) Agricultural intensification and biodiversity partitioning in European landscapes comparing plants, carabids, and birds. *Ecological Applications*. 21: 1772-1781.

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