

HFFA Research GmbH

Plant protection in Germany and biodiversity

Impacts of conventional and organic land management practices on regional and global species richness

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List of abbreviations

BMEL	– Federal Ministry of Food and Agriculture (German: Bundesministerium für Ernährung und Landwirtschaft)
BÖLW	– Federation of the Organic Food Sector (German: Bund Ökologische Lebensmittelwirtschaft)
BLI	– Biodiversity Loss Intensity
BVL	– Federal Office of Consumer Protection and Food Safety (German: Bundesamt für Verbraucherschutz und Lebensmittelsicherheit)
CBD	– Convention on Biological Diversity
DEFRA	– Department for Environment, Food and Rural Affairs
DLG	– German Agricultural Society (German: Deutsche Landwirtschafts-Gesellschaft)
EASAC	– European Academies Scientific Advisory Council
EU	– European Union
FAO	– Food and Agriculture Organization
GEF-BIO	– Global Environment Facility’s Benefits Index for Biodiversity
GHG	– Greenhouse Gases
IUCN	– International Union for Conservation of Nature
IVA	– Industrial Association for Agriculture (German: Industrieverband Agrar)
LEL	– State Institute for the Development of Agriculture and Rural Areas (German: Landesanstalt für die Entwicklung der Landwirtschaft und des ländlichen Raums)
LfL	– Bavarian State Research Center for Agriculture (German: Bayerische Landesanstalt für Landwirtschaft)
MSA	– Mean Species Abundance
NBI	– National Biodiversity Index
PDF	– Potentially Disappeared Fraction
SITC	– Standard International Trade Classification
TI	– Thünen Institute (German: Thünen Institut)
UNEP	– United Nations Environmental Programme

Summary

The aim of this study was to quantify current yield differences in Germany between organic farming and conventional farming and, correspondingly, derive the impact of these farming systems with their respective plant protection strategies on biodiversity at a national and global scale.

The area-weighted average of all major arable crops shows that organic farming in Germany results in 51 percent lower yields as compared to conventional farming. This difference has grown over time and is particularly high when taking specialized cash crop farms as a reference. The results on yields in conventional as well as organic farms in Germany compare well with other scientific analyses and have been confirmed by many researchers.

Calculating the resulting effects of these two different farming methods and their differences in yields on species richness is an exceptional challenge because there is still no scientific standard for quantifying complex biodiversity. Rather, the state of knowledge only allows stressing particular characteristics of biodiversity. Consequently, there are many indicators for measuring specific biological diversity. Eight such indicators suitable to calculate the biodiversity effects of organic farming and conventional farming in Germany could be identified.

The calculation results show that these indicators often assign a benefit to organic farming with respect to maintaining biodiversity on managed arable land. However, these indicators also show that already organic farming is a serious human intervention in natural ecosystems and results in a considerable loss of biodiversity. Conventional farming only adds very little additional loss. Biodiversity is calculated to decline on arable land in Germany on average by 67 percent in organic farming and 86 percent in conventional farming. Against this background, it can be concluded that organic farming often puts less pressure on biodiversity of farmed land compared to conventional farming.

However, this perspective changes when the sole objective of species protection is extended by a second objective - namely securing the supply of food and other agricultural products. The significant yield advantage of conventional farming in Germany results in less biodiversity losses per unit of yield in conventional farming compared to the organic alternative. Looking at the average of all major arable crops and the chosen eight biodiversity indicators, the loss of biodiversity in organic farming is about 55 percent higher than in case of using advanced, productivity-enhancing technologies in agriculture.

These results confirm that any biodiversity benefits which might exist in organic farming are no longer evident in light of an efficiency analysis. They can even com-

pletely disappear and turn into disadvantages, especially when extending the national to a global perspective. Shifting effects on international agricultural markets combined with domestic production losses – e.g. due to an increased conversion to organic farming in Germany – result in an expansion of the production and agricultural land use of our trading partners. However, most of these countries are located in world regions that do have higher biodiversity levels than Germany. This means small potential biodiversity gains from a conversion to organic farming in Germany are surely paid for by substantially higher biodiversity losses through cultivating new agricultural land elsewhere.

A yield decline in Germany - due to a partial (20 percent) or complete (100 percent) conversion from conventional farming to organic farming - would globally require about 815,000 hectares respectively 6.5 million hectares of currently unused arable land containing manifold biodiversity, i.e. species. Consequently, this global perspective must be considered when decisions on maintaining and improving the protection of specific species and biodiversity at large are pending in a national – e.g. German – context.

The results of this analysis are in line with the current state of scientific knowledge. They emphasize the special value of a “land sparing” approach to minimize the trade-off between agricultural supply and food security on the one hand and the conservation of species on the other hand for a highly productive agricultural region like Germany. Moreover, the state of knowledge does not justify an ideology-based overvaluation of particular land management options. It rather suggests to negotiate specific targets of various land use management options and generate win-win situations appropriately considering both objectives. In this regard a relatively intensive and resource-efficient arable farming in Germany can make a substantial contribution, both regionally and globally.

The analysis results in recommendations for economic, public and policy decision-makers. Polarizing the debate into “ecology” vs. “economy” is not target-oriented. Ideologically hardened fronts must be broken and converted into consensus-orientated discussions fully including existing scientific knowledge. In this regard science faces a particular challenge. Decision-makers need to understand and consider to what extent their decisions not only directly affect a specific target, but also influence other variables of complex systems such as the system of biodiversity and land use. Both systems, biodiversity as well as land use, are highly globalized. A sole focus on the national perspective is not appropriate in this context and further research is needed.



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