



Effect of low-input habitats on biodiversity in Swiss agricultural landscapes

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EFFECT OF LOW-INPUT HABITATS ON BIODIVERSITY IN SWISS AGRICULTURAL LANDSCAPES

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Abstract

Since 1993 Swiss farmers increasingly convert land to low-input habitats, these ecological compensation areas (ECA) making up today 10% of the Utilised Agricultural Area. To assess whether ECA introduction allows enhancing agro-biodiversity, biodiversity indicators are monitored in the Swiss Plateau. ECA had higher diversity of plant, bird, and arthropod species. However, in some ECA meadows and traditional orchards, the composition of the vegetation still reflected their former intensive management. It is concluded that faunistic indicators react more rapidly to the introduction of ECA than the vegetation.

Introduction

From 1993 onwards, Swiss farmers had to increasingly provide ecological services in order to receive subsidies from the government. One of the most important measure is that each farmer has to convert 7% of his/her farmland to low-input habitats, namely ecological compensation areas (ECA). The objectives are to enhance natural biodiversity, to halt the loss of agro-biodiversity and to re-spread endangered species (Forni et al., 1999). Today, the utilised agricultural area (UAA) is interspersed with these ecological compensation areas, making up 10% of the UAA (extensive grassland 100,000 ha, traditional orchards 25,000 ha, wild flower strips 3,300 ha, other elements 8,000 ha). Since 1996, several biodiversity indicators are monitored in order to assess whether government objectives are reached. The results of the surveys between 1998 and 2001 of vegetation, breeding birds and arthropods of ECA in the Swiss Plateau are reported here.

Material and methods

Biodiversity monitoring was carried in the Swiss Plateau from 1998 to 2001 (figure 1). Vegetation relevés were conducted on 1,914 ECA (hay meadows, litter meadows, hedgerows, orchards) to describe their quality in terms of plant species composition and vegetation structure according to the requirements of the by-law on ecological quality (BLW, 2001). Territories of breeding birds were mapped in 23 study areas (minimum 4km² each) and related to ECA. Spiders, carabid beetles and butterflies were sampled in ECA (wild flower strips, extensive and low intensity meadows, extensive pastures, hedgerows, orchards) and non-ECA (intensively used meadows, winter wheat) in three 8km² case study areas in the Swiss Plateau.

Results and discussion

82% of ECA litter meadows and 64% of hedgerows were of good ecological quality in terms of plant species composition. However, the composition of the vegetation in ECA hay meadows and orchards still reflected their former intensive management, with only 20% and 12% respectively being of good ecological quality.

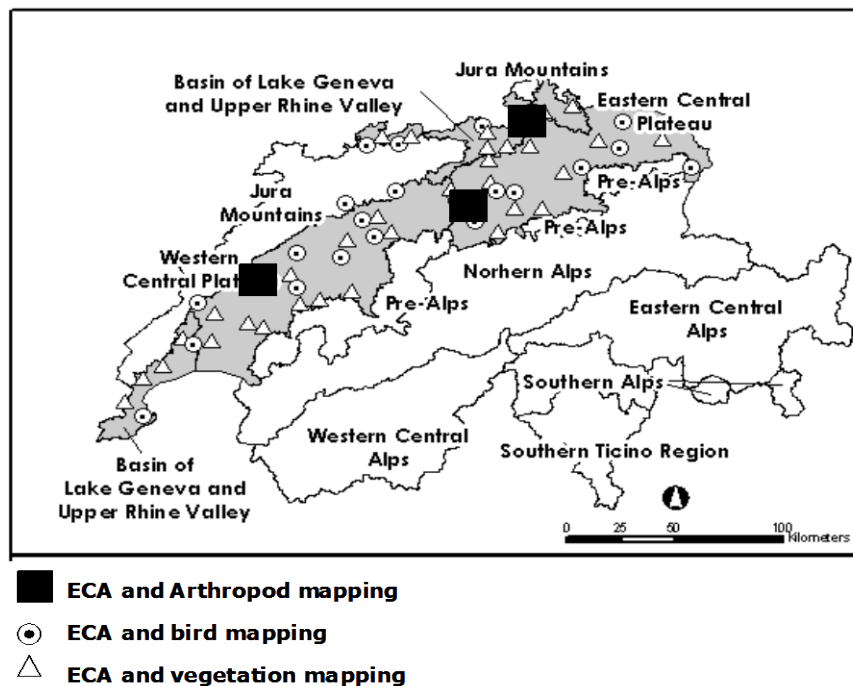


Figure 1. Study areas of biodiversity monitoring in the Swiss Plateau.

Amongst 2008 nesting sites of 29 bird species, the nests of hedgerow birds and birds of humid areas were more frequent on or near ECA. On the other hand, the nest of birds of open agricultural land, were significantly less frequent on or near ECA. Among birds of traditional orchards, only one species was slightly more frequent in or near ECA. Canonical correspondence analysis of spider, carabid beetle and butterfly communities revealed a significant effect of ECA on their species assemblages. ECA meadows had unique spider species assemblages in comparison with non-ECA meadows. 80% of carabid beetle species in an arable landscape were found exclusively or preferably on wild flower strips. Although butterfly diversity was generally low, it was significantly higher on ECA. Butterfly species richness was higher in extensively used or low intensity meadows than in the high intensity sites. ECA attracted more specialised butterfly species compared to intensively managed control plots.

Conclusion

The introduction of ECA into the Swiss agricultural land seems to have positive effects on the different biodiversity indicators. However, faunistic indicators react more rapidly to the introduction of ECA than the vegetation. Among the different types of ECA, meadows are of good ecological quality in terms of diversity of plant, bird and arthropod species and should further be supported. Only few hedgerows are presently inscribed in the ECA scheme but their positive effects on vegetation and birds suggest that more hedgerows should be integrated in ECA scheme.

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