

Effects of cutting regime, surroundings and field age on floral resources for pollinators in hay fields

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ABSTRACT

Bees and other flower-visiting insects are experiencing periods of food shortage, particularly in intensively managed agricultural landscapes in Europe. As part of the Danish project EcoServe (<http://agro.au.dk/ecoserve/>) we therefore investigated whether increased richness of selected herbaceous species in organic hay fields acted as a floral resource thus enhancing abundance and biodiversity of pollinators. Moreover, we investigated if availability of floral resources was affected by cutting regime (timing and number of cuttings during the growing season) in 11 herbaceous species, which are often used in grassland seed mixtures.

In a field survey, we visited 20 organic hay meadows of different age (3-100 years), and conducted surveys regularly throughout the flowering season to quantify diversity of insect-pollinated plants and pollinators. Our results showed that diversity of pollinators was significantly and positively related to diversity of plants, but that hay fields embedded in a complex landscape harbored a higher diversity of both plants and insects than hay fields in more homogeneous areas. Also, diversity of plants and insects increased in older hay meadows.

In an experimental set-up, we tested the availability of flowers in plots of monocultures and a mixture of 11 herbaceous species under two cutting regimes: (1) plots were cut once every four weeks throughout the growing season, and (2) plots were cut only at the end of the flowering season. While the majority of species provided flowers for pollinators when plots were not cut during the flowering season, most plant species set few if any flowers if cut frequently. One exception was *Trifolium repens*, which was slightly stimulated by cutting. Thus, traditional grasslands which are frequently mowed are expected to be poor in flowers.

Our results suggest that it is important to leave unmowed flower-rich areas in the fields throughout the flowering season to avoid periods of food shortage. The potential for unmowed hay fields to enhance diversity and abundance of pollinators, however, depend on the composition of the surrounding landscape and age of the field.