Semi-natural habitat patches complement flower strips in protecting pollinators

August 4 2021

Vivien von Königslöw catches the bees and hoverflies with a landing net to better identify them during pollination. Credit: Albert Ludwigs University of Freiburg/Photo: Vivien von Königslöw

Freiburg ecologists observe the diversity of insects on the edge of apple orchards on Lake Constance.

At the moment, many flower strips are buzzing and humming: cornflowers, poppies, wild carrots and many other flowers attract numerous insects. The field edges covered by these flowers typically bloom between mid-May and mid-August. Complementary habitats are needed to support pollinator insects in agricultural landscapes throughout the year. Semi-natural small structures, such as ditches, banks, hedgerows, or overgrown fences, could provide such a complement.

"Researchers have already shown many times how important natural habitats are for pollinators. Almost always, however, only large-scale structures have been researched for this purpose, for example, wide meadows or pastures. Studies on what small structures mean for pollinators and which species particularly benefit from them are rare," says Vivien von Königslöw from the Institute of Earth and Environmental Sciences at the University of Freiburg.

As a result, together with Dr. Anne-Christine Mupepele and Prof. Dr. Alexandra-Maria Klein, she studied flower strips as well as semi-natural habitat patches in the Lake Constance area over a period of two years, a place in which there is a particular interest in pollinating insects due to large-scale fruit cultivation. The researchers published their results in the journal *Biological Conservation*.

Semi-natural habitats attract more bees

"Our goal was to find out how the diversity of wild bees and hoverflies can be promoted in the vicinity of large-scale orchards," says von Königslöw. To do this, their study compared the occurrence of bees and hoverflies in flower strips and in existing flower-rich habitats, each located on the edge of conventional apple orchards in southern Germany. Their analysis showed that the different flowering times and plant species in the semi-natural habitats, such as hedgerows and small groves, mainly benefit solitary and oligolectic bees, i.e. those that collect only

one pollen species. The existing biotope areas attracted bee species with a different pollen specialization than the sown flower strips. At the same time, the researchers found a greater number of pollinators in the flower strips and counted more species than in the small structures. "Thus, semi-natural habitats complement existing flower strips," von Königslöw concludes.

For their research, the ecologists established flower strips at the edge of private orchards in 2018. Semi-natural small structures, including drainage ditches, embankments and overgrown fences, were already in place. The researchers monitored the bees and hoverflies at least once a month from spring to late summer.

Effective and cost-efficient

"Semi-natural habitat patches can play an important role in protecting pollinators because they help ensure that flowers are available all year round," says Klein, head of the Chair of Nature Conservation and Landscape Ecology at the University of Freiburg. They also provide potential retreats and nesting sites, which are important for overwintering bumblebees, for example. "For effective and cost-efficient protection of pollinating insects, the focus should not only be on flower strips," Klein concludes. "Existing small structures of spontaneous vegetation, plant species that grow on their own from existing seeds in the soil, are also attractive to insects and should be preserved."

The Freiburg scientist explains that at present, however, there are hardly any incentives for farmers to develop and preserve small semi-natural habitat patches.

More information: Vivien von Königslöw et al, Overlooked jewels: Existing habitat patches complement sown flower strips to conserve

pollinators, *Biological Conservation* (2021). DOI: 10.1016/j.biocon.2021.109263