

Science for Environment Policy

Insect diversity improves crop pollination

The decline in numbers of wild bees has caused concern regarding falling levels of pollination for important agricultural crops. Researchers have now demonstrated that the diversity of the pollinator community can significantly affect pollination.

Insect pollination is a vital ecosystem service; a large proportion of the human diet either directly or indirectly depends on animal-based pollination. It is also essential for the conservation of wild plants. Previous studies have linked a reduction in pollination with a decline in insect numbers and diversity. However, these studies used observations of ecosystems in the wild, and did not manipulate numbers or diversity experimentally. As a result such studies cannot detect whether the number of pollinators or the diversity of the community causes the drop in pollination, because both occur simultaneously in the wild and their impacts cannot be teased apart.

In this study, researchers took an experimental approach to detect whether the diversity of the pollinator community affects the fertility of radish plants, which rely on insect pollination for reproduction. Twelve sets of plants, with nine plants per set, all approximately the same age and size, were enclosed in cages. Researchers then introduced a pollinator community of 18 individual insects to each cage over four periods each lasting one day. Each community consisted of either a single pollinator species, three species from a single 'functional group' (a group of species with similar ecological characteristics), three functional groups with a single species of each, or three functional groups with three species of each (nine species). The functional groups included social bees, solitary bees and hoverflies.

Results revealed that groups of plants pollinated by three functional groups rather than one produced, on average, more fruits per flower (0.78 versus 0.61) and more seeds per fruit (3.48 versus 2.91). The effect of the number of pollinator species on fertility was weaker, although the number of seeds per fruit was slightly higher when there was a greater number of species from a single functional group.

Researchers suggest that the strong effect of diversity on the degree of pollination may be a result of complementary behaviour of the functional groups. For example, although social bees visited four times more flowers than solitary bees or hoverflies, they tended to do so at different times of day; different groups also tended to visit flowers at different heights on the plants, resulting in more comprehensive and efficient pollination coverage. Overall, the species that provided the greatest pollination service was the bumblebee *Bombus pascuorum*, which is part of the social bee functional group.

This study demonstrates that the numbers of individual pollinators is not the only factor affecting important pollination services. The diversity of the pollinator community can also have a significant effect. The researchers conclude that these results highlight the need for conservation and restoration, not only of populations of single pollinator species, but the diversity of the pollination community as a whole.



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