
Experimental assessment of insect pollination on rape seed yield in real field conditions demonstrates positive effect of wild bees

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Abstract

Pollination is an ecosystem service on which humans depends through its link to food production; 35% of global crop production depends on insect pollination. Some crops, e.g. oilseed rape (*Brassica napus L.*), are pollinated by a broad range of insects such as by honeybees, wild bees, and hoverflies. According to experimental studies, oilseeds rape production can be increased by 10-50% by insect pollination, however these studies have generally been realized in greenhouse conditions, ignoring the effects of farming management and landscape on crop production and insect communities. Moreover, no consensus on the part of insect pollination on oilseed rape yield nor on the relative contribution of insect pollinator species have yet been achieved. Here, we quantified the contribution of insect pollination on oilseed rape production in real farmers' fields. We selected 352 oilseed rape plants in 73 fields in 3 consecutive years along a gradient of landscape diversity. On each plant, we quantified seed mass on one control branch and one branch where pollinators were excluded using bags. Abundance of pollinator species in landscape are quantified by pan-traps. We show that the removal of all insects can decrease oilseed rape yield by 46% (+/- 10%). Neither pollinator richness nor abundance had any effect on oilseed rape production, but some wild bees, e.g. *Halictus sp.*, had positive and significant effect with up to 30% increase in the seeds production. This study confirms the crucial role of insect pollination in crop production and the importance of maintaining pollinator diversity in farmlands.

Keywords: Pollination, Oilseed rape, Pollinator diversity, Yield, Pollinator exclusion

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