Loss of bumblebees is a loss to farmers

Recent expansion and intensification of agriculture to meet growing food demands is among the main drivers of the alarming loss of insect diversity worldwide. This decline can lead to a marked degradation of the ecosystem services that insects provide, such as pollination or regulation of crop pests. For example, a wide range of wild bee species, such as bumblebees, are recognised as very efficient pollinators of apples. Yet, bumblebees in particular, have suffered a severe decline at global scale, including in South America. Habitat loss, overuse of pesticides and interactions with other exotic bumblebees are probably the most important factors behind the decline of native bumblebees from southern Argentina. Yet it is unclear to what extent this phenomenon affects yields of important pollinator-dependent crops, such as apples and the subsequent impacts on farmer's profits.

In our recent research, we introduced honeybee hives (*Apis mellifera*) and colonies of the native black bumblebee (*Bombus pauloensis*) into apple orchards embedded within the historical distribution range of this bumblebee species, but where it has disappeared recently. We then compared crop yield in farms hosting both species (honeybees and bumblebees) with farms hosting only honeybees. The results were astonishing: apple trees located on orchards missing the native black bumblebees, produced just half the quantity of apples produced by trees located on orchards hosting both honeybees and bumblebees. This meant a reduction of more than 50% of the profits for farmers. Our results are important as they show that the loss of just one key pollinator species causes a significant reduction in apple production and the economic profit for local farmers.

Our study highlights the need for more sustainable agriculture and promotion of management practices supportive of farm biodiversity; for example, reducing the use of pesticides or by promoting seminatural habitats at different spatial scales. Changing the current agricultural paradigm by driving a transition from conventional to ecological intensification, seems to be crucial to reconcile the increasing demand of food and the conservation of agroecosystem biodiversity. We must be aware of the multiple advantages of taking better care of the environment: in this case producing more and healthier food and safeguarding the economic profits of local farmers.

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