

# Dominance of honey bees is negatively associated with wild bee diversity in commercial apple orchards regardless of management practices

## Short title : Honey bees affect wild bees in apple orchards

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### Abstract

Commercial apple production relies on managed honey bees for pollination, and on intensive management for pest control. Previous studies revealed the detrimental effects of these factors on wild bee diversity in agroecosystems, and the pollination services they provide. However, the extent to which honey bee dominance and management interact under field-realistic conditions to shape wild communities has never been investigated. We measured the species richness and functional and phylogenetic diversity of wild bees associated with apple blossoms, in 46 organic and non-organic orchards, and along a climatic gradient across Western Europe and Morocco. Our results consistently show a strong and negative association between honey bee dominance and all diversity indices, regardless of local practices and surrounding landscape cover. Collectively, we show that wild bee diversity decreases with increasing honey bee density, with alternative management practices (i.e., organic) having no significant influence on wild bee communities in commercial apple orchards.

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