

# Synergistic interactions of ecosystem services: florivorous pest control boosts crop yield increase through insect pollination

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## Abstract

Insect pollination and pest control are pivotal functions sustaining global food production. However, they have mostly been studied in isolation and how they interactively shape crop yield remains largely unexplored. Using controlled field experiments, we found strong synergistic effects of insect pollination and simulated pest control on yield quantity and quality. Their joint effect increased yield by 23%, with synergistic effects contributing 10%, while their single contributions were 7% and 6%, respectively. The potential economic benefit for a farmer from the synergistic effects (12%) was 1.8 times greater than their individual contributions (7% each). We show that the principal underlying mechanism was a pronounced pest induced reduction in flower lifetime, resulting in a strong reduction in the number of pollinator visits a flower receives during its lifetime. Our findings highlight the importance of non-additive interactions among ecosystem services (ES) when valuating, mapping or predicting them and reveal fundamental implications for ecosystem management and policy aimed at maximizing ES for sustainable agriculture.

