

# Interaction with insects accelerates plant evolution, research finds

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The experimental plants pollinated by bumblebees displayed significant differences on limestone soil (r) and tuff soil (l). Credit: UZH

A team of researchers at the University of Zurich has discovered that plants benefit from a greater variety of interactions with pollinators and

herbivores. Plants that are pollinated by insects and have to defend themselves against herbivores have evolved to be better adapted to different types of soil. The research is [published](#) in the journal *Nature Communications*.

Plants obtain nutrients and water from the soil. Since different [soil types](#) differ in their chemical and physical composition, plants need to adapt their physiology to optimize this process on different soil types.

This evolutionary process leads to the formation of ecotypes, i.e., locally adapted "plant breeds" that differ slightly in appearance and may no longer be easily crossbred. The latter effect is considered to be the first step toward the formation of separate species. The adaptation of crops to local soil types is also crucial for [agricultural productivity](#).

## **Experiment with bumblebees and aphids**

A team of researchers led by biologist Florian Schiestl of the Department of Systematic and Evolutionary Botany at the University of Zurich has now discovered that the interaction of plants with pollinators and herbivorous insects influences their adaptation to soil types and thus the formation of ecotypes.

In a two-year experiment, about 800 swede plants were grown over 10 generations on different soil types in a greenhouse. One group was pollinated by [bumblebees](#), another by hand; in addition, the plants were cultivated with and without aphids (as herbivores).

At the end of the evolutionary experiment, the researchers investigated the extent to which the plants on the two soil types differed in shape and composition and how well they had adapted to the soil. In terms of

shape, it was found that only the plants pollinated by bumblebees showed clear differences between the soil types, while the hand-pollinated plant groups remained largely the same.

## Plants pollinated by bumblebees adapt best

When it comes to adaptation to soil types, the researchers even found significant adaptation only in bumblebee-pollinated plants with aphids after the two years of experimental evolution, while no significant adaptation to soil types was observed in the other groups.

The study also identified several genes that may play a critical role in this adaptation process. The results show that biotic interactions can have a strong influence on plants' ability to adapt to [abiotic factors](#) and that adaptation is most efficient when [plants](#) are exposed to a variety of interactions.

**More information:** Thomas Dorey et al, Biotic interactions promote local adaptation to soil in plants, *Nature Communications* (2024). [DOI: 10.1038/s41467-024-49383-x](#)

Provided by University of Zurich

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