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Changes in plant composition alter pollinator communities and pollination



Changes in plant composition are becoming more frequent in the current climate change scenario, as some plant species are changing their distribution ranges. UAB and CREA researchers have conducted an experiment showing that the arrival of a plant into a natural community has profound effects on pollinator communities and on plant-pollinator networks. Importantly, these changes have consequences on pollination and reproductive success of resident plants.

Photo: *Bombus terrestris* visiting *Cistus albidus*. Author: Carlos Hernández-Castellano

Communities are subjected to community changes due to species extinction and colonization as a consequence of multiple natural phenomena (perturbations, migration events, etc.). In the last decades, though, **climate change is fostering shifts in species distribution**, causing some native species to arrive into communities where they were absent.

Recently, researchers from CREA, UAB, CSIC, Museu de Ciències Naturals de Granollers, and UAB, **have conducted an experiment simulating the arrival of a native species into a natural community**. Concretely, they introduced potted flowering *Cistus albidus* into scrublands (Montseny Natural Park) dominated by *C. salviifolius*, *Lavandula stoechas* (lavender), and *Thymus vulgaris* (thyme).

Changes provoked by the plant's arrival were surprising. *C. albidus* acted as a magnet species, attracting bumblebees (*Bombus terrestris*) to the communities. **Bumblebees are large bees with foraging distances of several kilometers**. As *C. albidus* produces large amounts of pollen and nectar, bumblebees were rapidly attracted, tripling its abundance.

Bumblebees visited not only *C. albidus* but lavender, a plant for which they show a strong preference because it produces a lot of nectar and because bumblebees forage it efficiently. Bumblebees double their visits to lavender, becoming the most important pollinator of the plant, followed by the honeybees. This was detrimental for lavender, as bumblebees visit more flowers per individual plant, and in doing so they increase autopolination, with negative consequences on reproduction (less fruit and seed production). ***C. albidus* arrival changed the ecological network, that is, the whole set of species and interactions.**

On the one hand the network became more generalized, that is, **pollinators visited more plants and plants were visited by more pollinators**. This caused the arrival of more pollen of other species into the plant stigmas (something negative). But it also caused that some species like thyme were visited by a more diverse array of pollinators (something positive). The latter

caused thyme's reproductive success to increase as a consequence of *C. albidus* arrival.

This study simulates a process that is increasingly frequent under the climate change scenario, in which some plants are rapidly changing their distribution. These results show that ecological relationships between plants and pollinators are rapidly rearranged as a response to novel situations, and **the observed changes in networks and reproductive success suggest that this variation can have consequences** on the stability of systems as well as in evolutionary dynamics.

*This work has been carried out in the context of the PhD thesis of the main author.

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References

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