Honey bees more faithful to their flower patches than bumble bees, new study shows

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Honey bees are more faithful to their flower patches than bumble bees when it comes to returning to collect more pollen and nectar, according to a study by U.S. Department of Agriculture, Agricultural Research

Service scientists.

Overall, 76% of honey bees in the study revisited the same plot of alfalfa flowers in contrast to just 47% of eastern bumble bees. This study was published in *Ecosphere*.

But size does matter, especially to bumble bees. They were more faithful to larger flower patches, while the likelihood of honey bees returning to a flower patch was not affected by patch size. Large patches in the study were nearly 15 by 15 yards, each planted with 225 plants, more than twice as many as the small patches, which were about 10 by 10 yards with 100 alfalfa plants each.

To remain faithful to a specific location, an insect or animal requires reliable spatial memories enabling them to navigate complex landscapes and repeatedly return to the same site. Both honey and bumble bees have demonstrated this ability to return to previously visited foraging locations, so there must be other species-specific factors to explain the differences in patch fidelity observed between the two species, explained ecologist Johanne Brunet with the ARS Vegetable Crops Research Unit in Madison, Wisconsin, who led the study along with postdoctoral associate Fabiana Fragoso.

Differences in patch fidelity could be the result of bumble bees' more explorative foraging behavior—their willingness to invest individually in foraging, often visiting more than one type of flower per foraging bout—compared to honey bees' more highly developed communication system—the honey bees' well-known waggle dance. Honey bee foragers perform the dance when they return to the hive to share the location of valuable food sources with other foragers; bumble bees do not.

"So higher patch fidelity of honey bees, relative to bumble bees, may reflect a greater aversion to risk, be it in terms of wasting energy and

resources or encountering predators" Brunet said.

The better our understanding of the characteristics that drive patch fidelity in important pollinators like honey bees and bumble bees, the better beekeepers, producers and conservation biologists will be able to support pollinators health as well as uphold the essential agricultural need to have crops pollinated to produce a harvest, Brunet added.

But the implications go far beyond that. For example, the pattern of pollination can have potential impacts on gene flow, the way in which gene pools of two separate populations of the same species mix.

"Bumble bees' lower patch fidelity can translate into higher gene flow among the patches they visit, creating a higher probability for bumble bees to move genes longer distances," Brunet said. "Higher gene flow in plant populations in the natural environment will also tend to homogenize their genetic diversity."

More information: Fabiana P. Fragoso et al, Honey bees exhibit greater patch fidelity than bumble bees when foraging in a common environment, *Ecosphere* (2023). DOI: 10.1002/ecs2.4606

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