Social bees travel greater distances for food than their solitary counterparts, study finds

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Honeybee with pollen on sunflower. Credit: Francisca Segers

Social bees such as honeybees and bumblebees have larger foraging ranges, according to researchers at the University of Bristol.

The findings, published today in *Current Biology*, show that social bees venture further for pollen and nectar. This has implications for predicting pollination services and for creating effective conservation strategies for bees and plants.

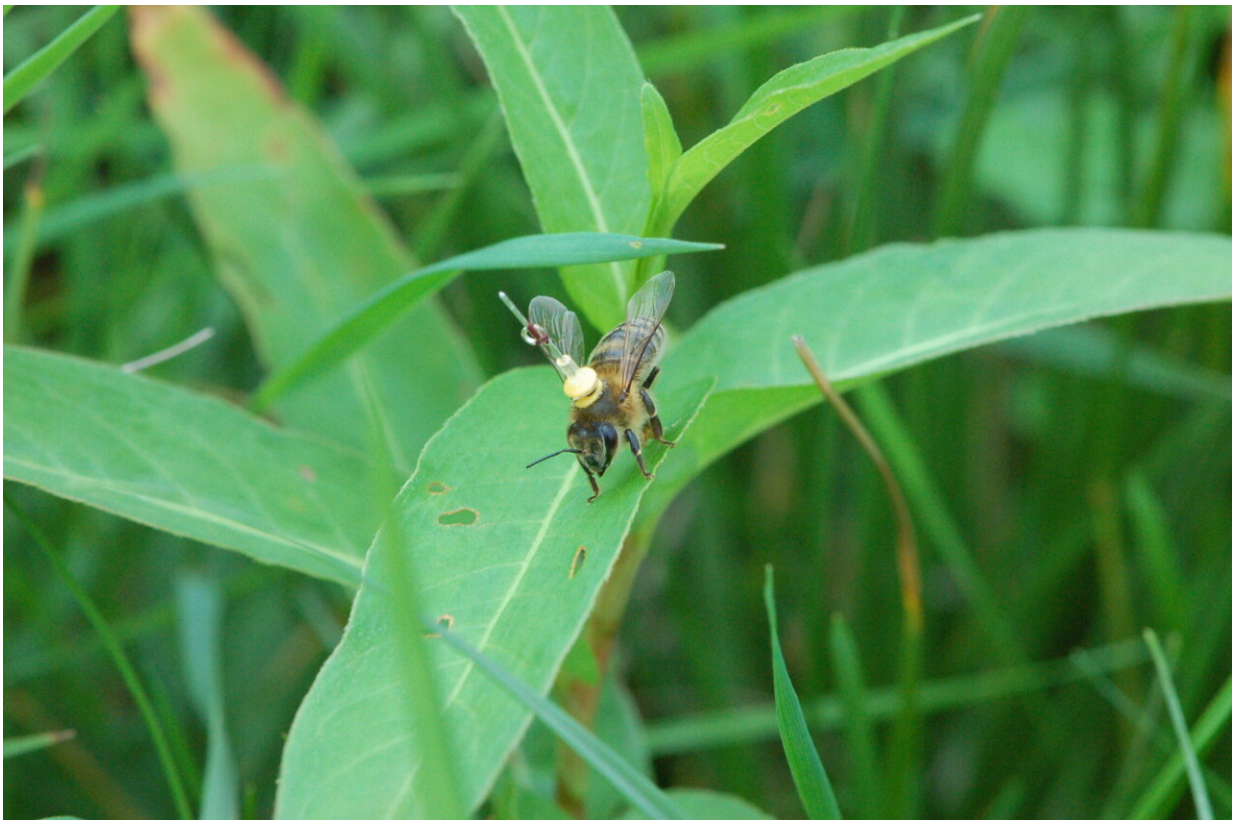
Social bees travel bigger distances as a result of several traits which include body size, colony size, communication and flower constancy.

Larger bees like the bumblebee have greater foraging ranges. They have bigger wings and can fly faster so it's easier for them to cover more ground.

Bees from greater colonies will experience more competition from their sisters if they stay close to the nest so they need to travel further to avoid congestion.

Many social bees have evolved different kinds of communication methods. This allows foragers that have found a highly rewarding flower species to tell their sisters about their discovery. As a result, more bees will have a preference for the same kind of flowers.

Furthermore social bees tend to visit one type of flower during a foraging trip. Flower constancy means that bees ignore viable alternative options as they focus only on a subset of all available flowers, forcing them to travel further to find their favored flower.



Honeybee with transponder. Credit: Christoph Grueter

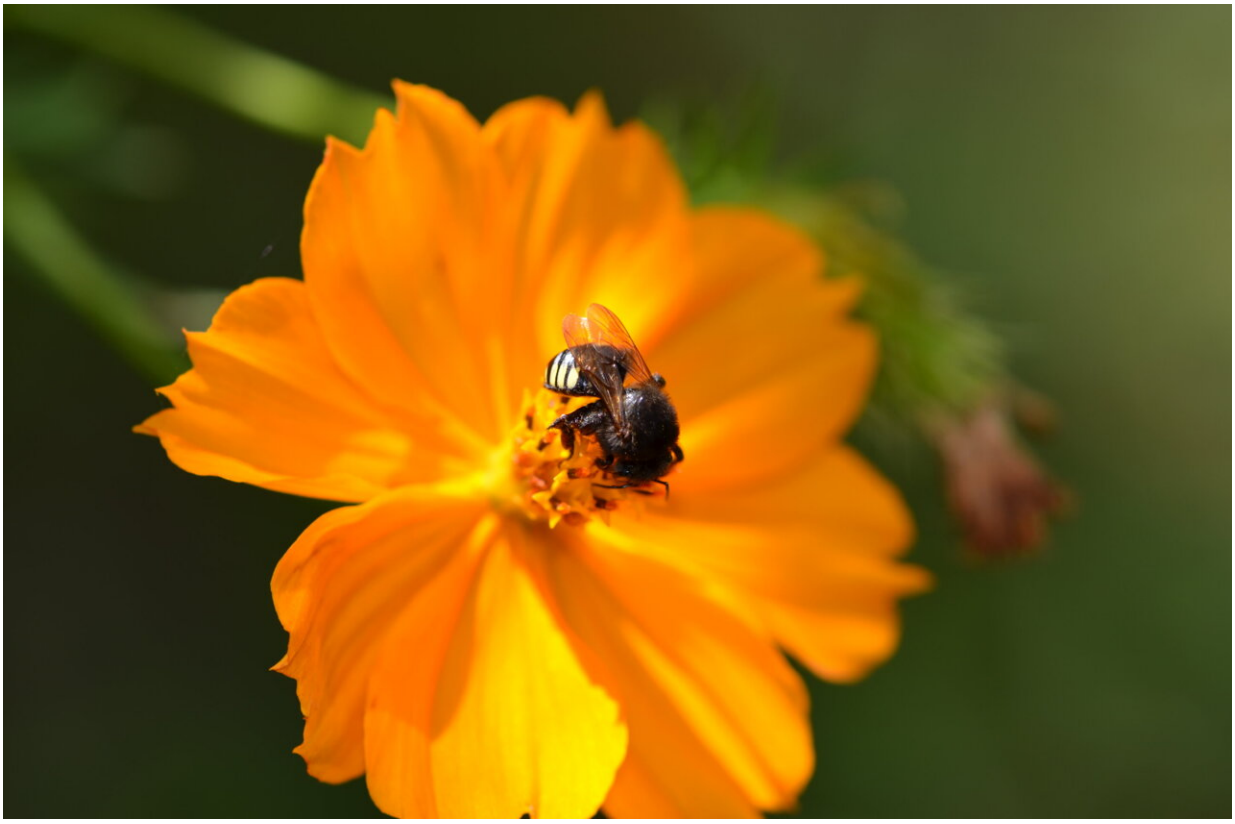
As bees, and especially social bees, are amongst the most important pollinators, while also being under threat, the findings have implications for their protection and the conservation of endangered plants that they pollinate.

Lead author Dr. Christoph Grueter, from Bristol's School of Biological Sciences explained, "Our findings suggest that solitary bees might be most affected by human-caused habitat loss and fragmentation because they will struggle more to find suitable food sources at greater distances.

"Social bees might be particularly important for the protection of endangered plant species that exist only in isolated patches. Since many

social bee species can be kept in hives, we could use our understanding of their foraging ranges in targeted ways to aid the pollination of plants in remote areas."

Dr. Grueter and Lucy Hayes carried out the study during lockdown using coding to build a simulation model in combination with published literature to find the existing data on bee foraging ranges of 90 bee species. They also developed an agent-based model to test how social, dietary, and environmental factors affect foraging ranges. Now he plans to study and confirm the findings in the bees' natural environment and look at which bees are most and least affected by habitat loss and fragmentation.



Stingless bee (Melipona quadrifasciata) collecting nectar. Credit: Christoph Grueter

He added, "Since there will be a big international push for reforestation and rewilding, this will help us understand how reforestation and rewilding projects might affect and be affected by different pollinator groups.

"Their social lifestyle means that bee colonies collect food over a much larger area than solitary bees. This helps us to plan effective conservation strategies to help both bees and the plants they pollinate."

"Sociality is a key driver of foraging ranges in bees," by Christoph Grueter and Lucy Hayes, is published in *Current Biology*.

More information: Christoph Grueter, Sociality is a key driver of foraging ranges in bees, *Current Biology* (2022). DOI: 10.1016/j.cub.2022.10.064. www.cell.com/current-biology/f … 0960-9822(22)01712-2

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