

Heat waves impair bumblebees' ability to detect floral scents, study finds

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The common carder bee (*Bombus pascuorum*) feeding on the large-flowered hemp-nettle (*Galeopsis speciosa*) in the Austrian Alps. If it gets too hot, the insects can hardly detect the scents of the flowers. Credit: Sabine Nooten / University of Würzburg

Climate change is affecting ecosystems in many different ways. One of

its consequences is increasingly longer and more intense periods of heat, which affect essential natural processes—such as pollination. A team of researchers from Julius-Maximilians-Universität Würzburg (JMU) has now investigated in more detail how heat affects one particular player in these processes—the bumblebee.

The work is [published](#) in the journal *Proceedings of the Royal Society B: Biological Sciences*.

"Bumblebees are important pollinators in natural and agricultural systems. They therefore have a high economic and biodiversity value," explains Dr. Sabine Nooten, head of the study. The furry insects are also extremely susceptible to heat events, as they are particularly well adapted to colder habitats.

As pollinators, bumblebees are guided by the scents emitted by plants. These chemical signposts not only reveal the location of the plants, they also contain information about the condition of the flowers.

In the experiment, bumblebees were exposed to temperatures of 40°C in tubes—with serious consequences. "We found that the heat significantly impaired the bumblebees' ability to detect floral scents," says Nooten. They virtually lose their sense of smell.

Deteriorations of up to 80% were observed in [female workers](#). Males lost up to 50% of their sense of smell. It was also noticeable that [wild bumblebees](#) had even greater problems with the heat than commercially used animals.

Even a subsequent regeneration period at suitable temperatures did not immediately lead to an improvement—24 hours after the heat tests, most of the specimens still showed impairments.

The study confirms how strongly the interaction between insects and plants is affected by [climate change](#). Heat waves therefore play a key role here. These findings might prove important for future species conservation initiatives.

A follow-up project based on the results of the study has already been approved, says Nooten. "Now that we have found out that heat waves impair the physiological processes of bumblebees to detect flower scents, our focus is now on the behavioral side. We will test how the foraging behavior of bumblebees is affected by experimental [heat waves](#)."

More information: Sabine S. Nooten et al, The heat is on: reduced detection of floral scents after heatwaves in bumblebees, *Proceedings of the Royal Society B: Biological Sciences* (2024). [DOI: 10.1098/rspb.2024.0352](#)

Provided by Julius-Maximilians-Universität Würzburg

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