

Vegetation-free patches encourage ground-nesting wild bees

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Creation of vegetation-free patches (1m²) on a calcareous grassland near Göttingen. Credit: Hanna Gardein

Relatively little is known about the nesting requirements of ground-nesting wild bees, although nesting sites are of central importance for most wild bee species. There are almost 600 wild bee species in Germany and 75% nest in the soil. To date, however, most of the research has concentrated on the wild bee species that nest above ground in cavities.

Now, researchers at the University of Göttingen have shown in a study on calcareous grasslands that the removal of vegetation in small areas led to a significant increase in ground nests, especially if there was a high abundance of flowering plants nearby. The results were published in *Global Ecology and Conservation*.

For this study, the researchers selected eight calcareous grasslands around Göttingen. Calcareous grasslands are protected habitats that form on dry slopes with alkaline conditions. They are extensively managed, traditionally with sheep grazing, resulting in a high diversity of wildflowers and grasses. "Calcareous grasslands are one of the most species-rich habitats in Central Europe and are therefore crucial for the protection of bee diversity," explains Dr. Annika Hass, postdoctoral researcher in Functional Agrobiodiversity, University of Göttingen.

To test whether ground-nesting [wild bees](#) prefer to build their nests in vegetation-free areas, the research team removed the vegetation on three patches on each of the eight calcareous grasslands. Each bare patch was one meter square and they were separated by at least 30m. "The patches were very quickly accepted by the bees," says first author Hanna Gardein, who is now a Ph.D. student at the Institute for Bee Protection at the Julius Kühn Institute in Braunschweig.

Overall, the number of bee nests was fourteen times higher on the bare patches compared to control plots. Nesting activity was also significantly higher in these vegetation-free patches, especially when the temperature

of the soil was higher.



Experimental setup: vegetation-free patch (1m², left) with adjacent control plot (right). Credit: Hanna Gardein



Nest entrance about 2mm in diameter, of a Furrow or Sweat Bee, made on one of the vegetation-free patches. Credit: Hanna Gardein

"Our study enables us to give specific recommendations for the creation of such measures: if you want to create such beneficial conditions for ground nesting bees, you should preferably situate them on warm and steep slopes. Here we were able to observe a particularly high level of colonization. The wild bees also prefer nesting sites that are directly adjacent to areas with flowering plants," Gardein says.

The importance of bare ground for wild bees was also confirmed by comparing the eight calcareous grasslands: more wild bees were

recorded on the calcareous grasslands that had an overall higher bare ground availability and more flowering plants in the whole study site. This was especially true for ground-nesting [wild bee species](#).

"Our study underlines the need to consider the availability of nesting resources in studies and projects to promote wild bees," says Professor Catrin Westphal, Functional Agrobiodiversity Group at Göttingen University.

Professor Teja Tscharntke, Agroecology Group at Göttingen University, concludes, "The removal of vegetation on a small scale proved to be a simple measure to implement, and this can contribute significantly to the promotion of ground-nesting wild bees."

More information: Hanna Gardein et al, Ground-nesting bees prefer bare ground areas on calcareous grasslands, *Global Ecology and Conservation* (2022). [DOI: 10.1016/j.gecco.2022.e02289](https://doi.org/10.1016/j.gecco.2022.e02289)

Provided by University of Göttingen

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