

## **The reasons for aggregated nesting and the nesting requirements of the ground-nesting bee *Andrena vaga* Panzer, 1799 (Hymenoptera: Andrenidae)**

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Ground-nesting bees constitute 75 percent of the wild bee species in Germany, their cuckoo bees included. Although they are the most abundant functional group of wild bees, ground-nesting bees are less studied than cavity nesting bees that built their nests in wood or use pre-existing cavities.

Many ground-nesting bees nest gregariously, which means in aggregations of individual nests. The motives behind this behaviour are still indistinct, but five hypothesis should be reviewed: the saving of energy and time for building and provisioning of the brood cells (nest site fidelity), the reduction of parasitism risk, the distribution of key resources and a deficit of ideal nesting substrates.

Especially regarding nesting site characteristics ground-nesting bees depend on more knowledge is needed as further descriptions and details resulting from precise measurements are lacking. The importance of floral resource availability on bees has been studied extensively, whereas findings about their nesting requirements is often restricted to cavity-nesting bees. Information about nesting site preferences and tolerable ranges is crucial for wild bee conservation as well as for studies about the biology and ecology of bees.

The aim of this study is to review the introduced suppositions about the emergence of aggregations for the example of the ground-nesting bee *Andrena vaga* (Panzer 1799). For this, the portion of emerged females that build their own nest in their natal aggregation will be measured. In addition, the parasitism rate will be related to the size of the aggregation and the availability of food resources around the aggregations will be identified.

Further, the ideal characteristics of the nesting site and a range of tolerated conditions should be determined. Therefore, soil samples will be analysed regarding texture, water content, pH, organic material, salinity and the presence of heavy metals and pesticides. Additionally, both the soil and the surface temperature as well as the solar irradiation will be monitored. Site characteristics like the soil density, slope, exposition and vegetation cover will be surveyed. All parameters will be compared with the conditions on an un-colonised control.