

Bees use their sense of taste for the assessment of pollen nutritional composition

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The need for certain nutrients constantly changes within a bee colony. Over- as well as undereating nutrients can have detrimental effects at the individual as well as the colony level. Being able to differentiate between pollen species and assess the nutrient content of pollen could help to adapt the foraging behavior to the current nutritional needs of a colony. In our studies we use behavioral and electrophysiological experiments to find out if bumblebees (*Bombus terrestris*) can receive and perceive amino and fatty acids and whether they use them to make decisions while foraging for pollen.

In electroantennograms (EAG) with chemotactile stimulation we measured whether bees were able to receive amino acids at the antennal level. We then went one step further and looked at the perception of amino at fatty acids using chemotactile conditioning of the proboscis extension response (PER).

Even though we found that bumblebees were able to perceive amino acids solved in water, they were not able to use amino acids for the differentiation of pollen differing in amino acid concentrations. They were however able to differentiate between pollen of different fatty acid concentrations.

Moreover, in feeding experiments, bumblebee microcolonies did not show obvious preferences for pollen of higher or lower amino acid concentrations, but tried to avoid high fatty acid concentrations. High pollen fatty acid content reduced reproductive success and lowered survival, which likely explains the bees' choice behavior. We therefore suggest that bumblebees assess pollen nutritional quality based on detrimental nutrients.

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