Leaf-cutting ants are polyphagous herbivores that, despite their catholicity, show distinct preferences in the choice of plants as substrate for their fungus. Their foraging patterns are the result of an intricate interplay between the different colony members: foragers, gardeners and their symbiotic fungus. We investigated to what extent avoidance learning and memory for plant unsuitability for their fungus underlie plant selection by foragers, and whether foragers are influenced by gardening workers, which do not forage at all but are responsible for the processing of the harvested fragments. The rationale of the experiments was to test the acceptance of a novel plant by naïve foragers in two different situations. In the first, a suitable plant was previously incorporated into the colony and gardeners were therefore familiar with it. In the second, a previously-acceptable plant was experimentally made unsuitable by infiltrating leaves with a fungicide not detectable to the ants, but harmful to the symbiotic fungus, so that gardeners experienced these leaves as unsuitable after their incorporation into the garden. Naïve foragers readily accepted a novel plant species after having interacted with gardeners that knew this plant as suitable. However, when naïve foragers interacted with gardeners in the presence of untreated, but previously-unsuitable plant fragments, they showed a significant decrease in acceptance. Since the experienced gardeners were the only source of information about the former unsuitability of the leaves, it can be concluded that interactions with experienced gardeners suffice for naïve foragers to learn about substrate quality if the substrate is present. The gardeners’ negative past experience with a plant lowered the acceptance of naïve foragers to a now suitable substrate. It is argued that foragers are able to learn about substrate suitability not only while foraging, but also inside the nest from their gardening nestmates.
One contributing factor to the decline of honeybees could be that reduced colony strength during the winter period, and in times of sparse natural forage, leaves bees more susceptible to parasites, disease, and starvation. Beekeepers may attempt to enhance colony health during such times by feeding high protein supplemental diets to colonies. Unfortunately, these tend not to be as readily consumed as pollen. The addition of natural pollen to such diets can increase uptake by bees. It is therefore believed that pollens contain naturally occurring feeding stimulants to honeybees. Modern analytical techniques provide the best hope of being able to conclusively isolate and identify such stimulants. Current work is looking at the novel application of Counter-current Chromatography, within a process of bio-guided fractionation of mixed-species pollen extracts, to attempt to isolate and identify compounds within pollen that elicit an increased feeding response in pollen consuming bees. Results obtained through feeding trials indicate that the majority of the common sugars and amino acids present in pollens may have a limited effect on increasing consumption. Work to isolate compounds responsible for increasing the consumption of diets in feeding trials continues, with initial screening suggesting sterols may be present in the more active extracts. If stimulant identification can be achieved it is hoped a future range of more palatable supplemental diets, which more effectively maintain colony strength, may be produced for use by beekeepers. Such diets could also be of significant benefit to commercial beekeeping and industrial pollination services.