



What honey bees love about large plants: individual and colony perspectives

Author(s): Matina Donaldson-Matasci, Xingyao Chen , Matina Donaldson-Matasci

Institution(s): Department of Biology, Harvey Mudd College ; Department of Biology, Harvey Mudd College ; Department of Biology, Harvey Mudd College

The honey bee (*Apis mellifera*) waggle dance, used to communicate the location of resources like food and nest sites, is a classic example of social insect communication. Prior research has shown that the dance seems to be particularly advantageous in environments with large, patchy resources such as blooming trees, as found in the Asian tropics where honey bees evolved. We set out to investigate whether individual foraging strategies could have evolved to reflect a preference for such large, patchy resources, because they could enhance group-level foraging efficiency even if individual foraging efficiency is low. First, to establish that honey bees prefer larger patches of flowers, we documented the visitation behavior of honey bees on natural flowering resources in California coastal sage scrub habitat at the Bernard Field Station (Claremont, CA). We found that, within species, plants with more flowers do indeed have a higher rate of visitation per flower than plants with fewer flowers, meaning that competition on plants with more flowers is more intense. To distinguish among several hypotheses that might explain honey bees' preference for plants with many flowers, we chose two plant species to focus on in more detail, and collected data on nectar reward, flower density and plant height as well as honey bee visitation rate and the total number of flowers. We found that for white sage (*Salvia apiana*) high flower density was the best predictor of visitation rate, suggesting that honey bees may be choosing plants with more flowers simply because they typically also require less energy to forage from. In contrast, for California buckwheat (*Eriogonum fasciculatum*), we found that the total number of flowers was a better predictor of visitation rate than floral density, suggesting that at least in some cases honey bees focus on large resources for their greater long-term potential reward, even when increased competition may lower individual foraging efficiency.