



The effect of environment complexity on colony level flower constancy in a semi-natural environment

Author(s): Jake Robert Tully, Jake Tully , Georgia McCombe , Jennifer Jandt

Institution(s): University of Otago, New Zealand ; University of Otago, New Zealand ; University of Otago, New Zealand ; University of Otago, New Zealand

Pollinators often restrict their visits to flowers of only one species or morph within a species on a single foraging trip, a phenomenon known as flower constancy. While flower constancy has been the focus of many studies, a comprehensive explanation of how individual constancy, or the variation of constancy observed within a colony, is influenced by changes in environmental complexity remains elusive. Moreover, these studies often use artificial flowers, which remove the natural complexity of the environment that the bee experiences. If constancy arises due to a constraint of cognition, then bees should exhibit a higher degree of constancy in more complex environments. We provide multiple colonies of bumble bees (*Bombus terrestris*) with two different types of complex environments: (A) one flower species with a simple handling floral type, blooming in four different colours, and (B) two flower species, one with a simple and one with a complicated handling type, blooming in two colours. All bees in the colony are marked with an identifying tag, and individual foragers are followed throughout free-flying foraging bouts using a focal sampling method, recording each bloom visited within each bout. Two weeks into the study, the complex environment shifts from A to B (or vice versa), and the forager's visitation patterns are recorded again. We quantify the probability that a bee 'switches' or remains constant to flower colour or species during a foraging bout using a 'constancy index' and compare constancy indices across environments A and B. If foragers are more constant under one of these environments, we will have a better understanding of the type of complexity that influences flower constancy.