

Changing Colours and Odours: Exploring Cues Used by Insect Pollinators in Two Brassicaceous Plants

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Abstract : Flowering plants use different traits to attract pollinators, which indicate flower location and reward quality. Visual and olfactory cues are among the most important floral traits exploited by pollinating insects. Pollination can alter physical and chemical cues of flowers, which can subsequently influence the behaviour of flower visitors. We investigated the main cues exploited by the syrphid fly *Episyrphus balteatus* and the butterfly *Pieris brassicae* when visiting flowers of *Brassica nigra* and *Raphanus sativus* plants. We studied post-pollination changes and their effects on the behaviour of flower visitors and flower volatile emission. Preference of pollinators was investigated by offering visual and olfactory cues simultaneously as well as separately in two-choice bioassays. We also assessed whether pollen is used as a cue by pollinating insects. In addition, we studied whether behavioural responses could be correlated with changes in plant volatile emission, by collecting volatiles from flower headspace. *P. brassicae* and *E. balteatus* did not use pollen as a cue in either of the two plant species studied. Interestingly, pollinators showed a strong bias for visual cues over olfactory cues when exposed to *B. nigra* plants. Flower visits by pollinators were influenced by post-pollination changes in *B. nigra*. In contrast, plant responses to pollination did not influence pollinator preference for *R. sativus* flowers. These results correlate well with floral volatile emission of *B. nigra* and *R. sativus*; pollination influenced the volatile profile of *B. nigra* flowers but not that of *R. sativus*. Collectively, our data show that different pollinators exploit different visual and olfactory traits when searching for nectar or pollen of flowers of two close related plant species. Although the syrphid fly consumes mostly pollen from brassicaceous flowers, it cannot detect pollen from a distance and likely associates other flower traits with quantity and quality of pollen.

Keywords : plant volatiles, pollinators, post-pollination changes, visual and odour cues

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