

Plant-plant communication between barley and weeds plants and effects on searching behaviour of ladybirds

Velemir Ninkovic & Jan Pettersson

Abstract

It is often stated that increased botanical diversity reduces pest problems and enhances the impact of natural enemies. (Andow 1991). However, the mechanisms behind this are only partly known. An alternative or contributing factor could be increased difficulties for the pest insect to find its host plants (Feeny 1976; Vandermeer 1989), which may be as a result of the interference of non-host plant volatiles with odours from the preferred host plant (Thiéry and Visser 1987). To what extent this effect is relevant to the searching behaviour of predators is still poorly understood.

In the present study the main aim was to investigate the odour mechanisms affecting habitat preferences of *Coccinella septempunctata* (L.). A field study was performed in commercial barley field (ca 50 hectares). In a field study, the frequency of adult *C. septempunctata* was higher in barley circular plots (diameter of 4 m) containing high densities of the common weeds *Cirsium arvense* (L.) Scop. and *Elytrigia repens* (L.) Nevski. than in control plots with only barley. In olfactometer experiments in the laboratory, adult *C. septempunctata* showed a significantly more positive response to mixed odours of barley and each of the two weeds than to barley alone. Ladybirds responded differently to barley plants that were previously exposed to volatiles from the two weeds. The *E. repens*-exposed barley plant showed no attractivity while the *C. arvense*-exposed barley plants maintained attractivity. As no aphids or pollen resources were present in the plots during the experiment, the results show that *C. septempunctata* responds to the botanical characteristics of the habitat even if no food resources are available. These results strongly suggest that olfactory cues and plant-plant communication from diversified plant stands can be important mechanisms in predator attraction to sites with a complex botanical diversity.

Keywords: searching behaviour, habitat preferences, plant volatiles, *Cirsium arvense*, *Elytrigia repens*, barley,

References

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