

Monitoring *Harmonia axyridis* intraguild predation on native coccinellids in the field

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Less than ten years after its introduction for the biological control of aphids, the Multicoloured Asian Ladybird, *Harmonia axyridis* Pallas has invaded the whole of Belgium, including urban, agricultural and semi-natural habitats and has overlapped the niches of several native species (Adriaens *et al.*, 2008). In parallel, a decline of native ladybird species such as *Adalia bipunctata* (L.) and *A. decempunctata* (L.) was observed in tree habitats in Brussels (San Martin *et al.*, in prep). The causes of this decline are not clearly identified and could be connected to competition with or to intraguild predation (IGP) by *H. axyridis*. To track predation on native coccinellids in natural conditions, we developed a new method for detecting IGP by gas chromatography – mass spectrometry via prey exogenous alkaloids (Hautier *et al.*, 2008; Sloggett *et al.*, 2009). Using this method, IGP by *H. axyridis* in lime trees (*Tilia* spp.) was studied at twenty sites in Brussels in June-July 2008. Tree branches were beaten with a stick above a collecting net. *H. axyridis* larvae were isolated in microtubes and kept in a freezer until alkaloid analysis. Thirteen species of adult ladybirds were collected: in order of abundance, *H. axyridis*, *A. decempunctata*, *Calvia quatuordecimguttata* (L.), *C. decemguttata* (L.), *Halyzia sedecimguttata* (L.), *A. bipunctata*, *Propylea quatuordecimpunctata* (L.), *Exochomus quadripustulatus* (L.), *Oenopia conglobata* (L.), *Anatis ocellata* (L.), *Myrrha octodecimguttata* (L.) and *Aphidecta oblitterata* (L.). Five species were caught as larvae: in order of abundance, *H. axyridis*, *C. quatuordecimguttata*, *Adalia* spp., *C. decemguttata* and *P. quatuordecimpunctata*. Thus *H. axyridis* was the most abundant species; with adults being present at all twenty sites and larvae at eighteen sites. An analysis of 590 *H. axyridis* larvae revealed the presence of exogenous alkaloids in 21% of the collected larvae and at nineteen sites. Positive larvae contained mainly one single alkaloid but in 6% of the positive larvae, two alkaloids were detected in each individual, resulting from double predation on two different coccinellid genera. Overall, three exogenous alkaloids were identified in *H. axyridis* larvae: adaline, propyleine and calvine. They are naturally present, respectively in *Adalia* spp., in *P. quatuordecimpunctata*, and in *Calvia* spp. (Laurent *et al.*, 2005). In conclusions, *H. axyridis* is becoming the dominant coccinellid species on lime trees in Brussels, both in terms of presence/absence at the sites and in terms of abundance. The analysis of the exogenous alkaloid content of *H. axyridis* larvae reveals the existence of IGP on native coccinellids. These results indicate that IGP is not a rare event in the aphidophagous guild and support the hypothesis that IGP by *H. axyridis* on *Adalia* spp. could explain the observed decline of the latter species in arboreal habitats.

References

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