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Predation behaviour of *Harmonia axyridis* on *Adalia bipunctata*

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Several years after the *Harmonia axyridis* invasion in Europe, a decline of some native species was observed. This decline could be due to the Asian ladybird, which is known as an intraguild predator of coccinellids (Cottrell & Yeargan, 1998; Snyder *et al*., 2004; Ware & Majerus, 2008). In order to assess the incidence of intraguild predation by *H. axyridis* on the native species, *Adalia bipunctata*, experiments were run in Petri dishes without extraguild prey and on whole plants with extraguild prey. The predation behavior of one starved 4th instar of *H. axyridis* larva on an *Adalia bipunctata* egg batch or on one 1st, 2nd, 3rd or 4th instar larva was observed during 30 min and described according to the ethogram of Yasuda *et al.* (2001). For each combination, 20 replicates were observed and prey mortality was also recorded after 30 min and 24 h. The reverse interactions, the predation of *A. bipunctata* on *H. axyridis*, were observed as well. Experiments were repeated on caged aphid-infested broad bean plants. Six treatments with 2nd instar larvae were done and repeated five times: 5 *A. bipunctata* + 5 *H. axyridis*; 5 or 10 *A. bipunctata*; 5 or 10 *H. axyridis*; no larvae (aphid control). The cages were opened when pupation started and the numbers of larvae and aphids were recorded. In Petri dishes, *A. bipunctata* eggs and larvae were easily attacked by *H. axyridis* larvae, which displayed an aggressive behaviour towards all *A. bipunctata* instars. After 30 min, 80% mortality was observed among the three firsts instars larva. By contrast, the first larval instars of *H. axyridis* were less attacked by the fourth instar of *A. bipunctata*, supposedly because they were physically and/or chemically protected. Regarding the eggs, no significant differences of predation behavior were observed between the two species. After 24 h, all eggs of each species were completely consumed, which shows that their respective chemical defences were not effective. On caged plants, intraguild predation by *H. axyridis* on *A. bipunctata* was confirmed even in the presence of aphids and led to a decrease of the cannibalism in *H. axyridis* when the aphids became scarce. In conclusion, the eggs and larvae of *A. bipunctata* are potential intraguild prey for *H. axyridis* larvae. A different prey attack and predation behaviour of *A. bipunctata* was observed towards *H. axyridis* larvae but not towards eggs. The aggressive behaviour of *H. axyridis* and, possibly, its chemical or physical defences lead to an assymetric predation towards *A. bipunctata*. On plants with extraguild prey, intraguild predation by *H. axyridis* on *A. bipunctata* was confirmed and decreased cannibalism in *H. axyridis*.

References

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