

INTERACTIONS BETWEEN *HARMONIA AXYRIDIS* AND TWO INSECT PATHOGENIC FUNGI

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Harmonia axyridis is a predatory coccinellid, native to central and eastern Asia. It has been available in many countries for use as a biological control agent of pest aphids and scale insects. In many of these countries, including the USA, *H. axyridis* has established. It is now considered an invasive alien species in many countries for a number of reasons including its impact on functional biodiversity. In this paper we describe experiments conducted to assess the interactions between *H. axyridis* and two insect pathogenic fungi: *Pandora neoaphidis* and *Beauveria bassiana*. *Pandora neoaphidis* is an aphid-specific fungus and *B. bassiana* is a generalist insect pathogen known to be a natural mortality agent of overwintering ladybirds and is a potential candidate for the biological control of *H. axyridis*. In this paper we explore ways in which these two pathogens interact with *H. axyridis*.

First we compare the susceptibility of three species of ladybird, *H. axyridis*, *Coccinella septempunctata* and *Adalia bipunctata* to *Beauveria bassiana* after exposure at three doses (10^5 (low), 10^7 (mid), 10^9 (high) spores per ml). In addition we assessed the impact of *B. bassiana* on the fecundity of these three ladybird species. Larvae of all species were highly susceptible to *B. bassiana* infection even at low doses. In contrast adult *Harmonia axyridis* were extremely resistant to *B. bassiana* infection but even low doses reduced fecundity dramatically. In comparison *C. septempunctata* and *A. bipunctata* adults were highly susceptible to *B. bassiana* even at mid and high doses but low doses did not result in significant mortality or reduce fecundity. We discuss these results in relation to the potential for control of *H. axyridis* using *B. bassiana*.

Second we assessed the predation of the aphid-specific pathogenic fungus *P. neoaphidis* by *H. axyridis* collected from the UK (an invasive population) and Japan (a native population) relative to that of *C. septempunctata* and *C. septempunctata* subspecies *brucki*. Overall, predation of uninfected aphids was greater than infected aphids and, when given a choice, a preference for aphids was shown. However, *H. axyridis* (UK) consumed a greater quantity of fungal cadavers than *C. septempunctata*, *C. septempunctata* subspecies *brucki* and *H. axyridis* (Japan) and showed little preference for uninfected aphids over infected aphids. *Harmonia axyridis* (UK) may, therefore, have an impact on the occurrence and persistence of *P. neoaphidis*. The differences in intraguild predation by *H. axyridis* collected in the UK and those from Japan suggest that individuals that invaded the UK could have a different genetic profile to those in its native range.