

The Multicoloured Asian Ladybird *Harmonia axyridis* Pallas (Coleoptera : Coccinellidae), a threat for native aphid predators in Belgium?

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KEY WORDS. Multicoloured Asian Ladybird, *Harmonia axyridis*, invasive alien species, biological control, Belgium.

The Multicoloured Asian Ladybird (*Harmonia axyridis* Pallas 1773) is native to large parts of Asia. It preys mostly on tree-dwelling hemipteran insects such as psyllids, scale insects and aphids (1). It is a commercially attractive bio-control agent for aphid populations because its larvae are very voracious, polyphagous and easy to rear (2-4). *H. axyridis* is widely used for reducing pest aphid populations in greenhouses, orchards and gardens in North America since 1916 and in Western Europe since 1982, where it is sold by different private companies (e.g. Biotop SAS, BioBest and Koppert) (1,4). Little attention has been paid to the development of feral populations of *H. axyridis* in Europe. This is surprising given the rapid colonisation of a wide range of American ecosystems, and growing concerns over the negative impact of natural enemy introductions (5-7). Recent observations suggest that this species is now invading (semi-)natural ecosystems in Belgium and may become a potential threat for native ladybird species and other aphid predators.

Adults of *H. axyridis* are strongly oval and convex in shape, measure 5-8 mm and are larger than most of the indigenous ladybird species. The elytra usually display a wide "keel" at the apex. They are highly colour polymorphic with elytra ranging from pale yellow-orange to black bearing 0-19 spots. The head, antennae, and mouthparts are generally straw-yellow but are sometimes tinged with black. The pronotum is similarly straw-yellow with up to five black spots or with lateral spots usually joined to form two curved lines, an M-shaped mark, or a solid trapezoid.

Larvae are elongate, somewhat flattened, and adorned with strong tubercles and spines. The mature larva is distinctively and strikingly coloured. The overall ground colour is mostly black to dark bluish-grey, with a prominent bright yellow-orange patch extending over the dorsolateral lobes of abdominal segments 1-5 on each side. A more detailed description of the species is given by (1).

A large scale field survey of ladybirds was launched in Belgium in 1999 by the *Coccinula* working group, initiated by "Jeunes & Nature" and the Research Centre for Nature, Forests and Wood in the Walloon Region and the

"Jeugdbond voor Natuurstudie en Milieubescherming" and the Institute of Nature Conservation in the Flemish Region. The number of collaborators increased rapidly (about 450 at present) and a large part of the Belgian territory is now being surveyed for ladybirds.

Although *H. axyridis* has been used for biological control in Belgium since 1997 (8), no observations in the wild were reported until September 2001 (Ghent). Since then, the number of observations increased steadily (Fig. 1), especially in the provinces of Brabant and Antwerp (Fig. 2).

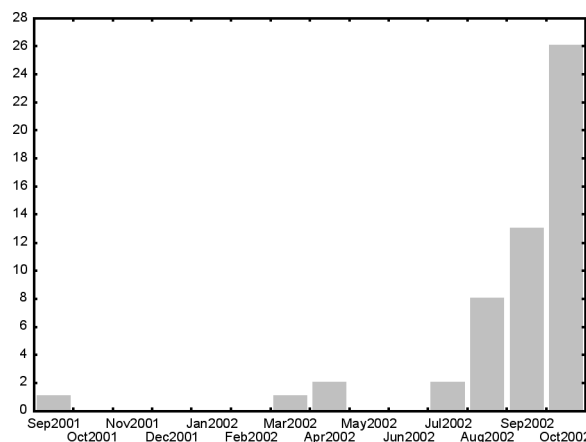


Fig. 1. – Trend in the number of field observations of *Harmonia axyridis* until October 2002.

Although numerous observations originated from cities and anthropogenic sites, individuals were also found in (semi-)natural habitats such as forests and meadows (e.g. Wilrijk, Houwaart, Olen and Koersel). Most individuals were found on deciduous trees, especially lime (*Tilia* sp.) and maple (*Acer* sp.). Observations of eggs, larvae and pupae are now widespread and demonstrate that the Multicoloured Asian Ladybird reproduces successfully in many places. Overwintering aggregations were also observed in houses (e.g., Brussels and Antwerp) since the end of October 2002. Observations of feral populations elsewhere in Europe have recently been reported in Greece (9), Southern France (4,10), and Germany (11).

Studies of the expansion of *H. axyridis* in North America showed that it can rapidly colonise large areas. After some time, this species often becomes the

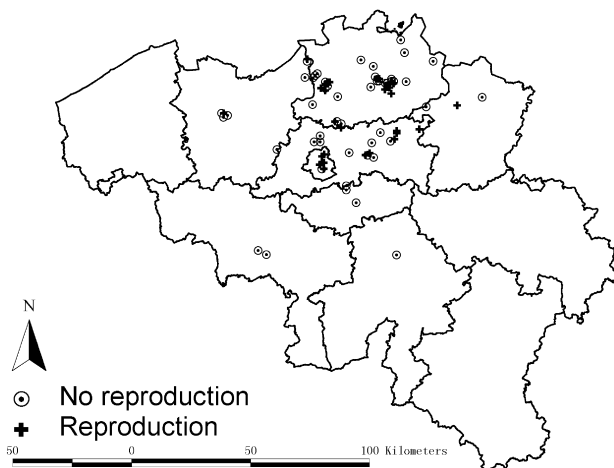


Fig. 2. – Sites with observations of *Harmonia axyridis* since September 2001. Reproduction is indicated when eggs, larvae and/or pupae were observed.

predominant species in aphidophagous guilds and can induce the decline of native ladybird species (12-14). Furthermore, it is a very good colonizer and is very competitive because it :

- has a wide trophic niche and a high level of phenotypic plasticity for several life-history traits (15),
- is very voracious and is often involved in intraguild interactions with other aphidophagous species, including *Adalia bipunctata* (L.) and *Coccinella septempunctata* L., two ladybird species native to Western Europe. In this case, it frequently behaves as an intraguild predator (16-18),
- has strong dispersal capacities and undertakes long range migrations to overwintering sites (19-21).

If the exponential increase in the number of *H. axyridis* populations continues in following years, it is likely that it will invade most of the (semi-)natural ecosystems in Belgium (and in the neighbouring countries), causing harm to native aphidophagous species. In this context, the responsibility of private companies (selling *H. axyridis* or other biocontrol agents) should be pointed out. The example of *H. axyridis* demonstrates the urgent need for risk assessment procedures before biocontrol agents can be sold and spread on a large scale, as is already imposed for environmental dissemination of pesticides and genetically modified organisms. Furthermore, given the example of N-America, studies on feral populations of *H. axyridis* in Belgium, and other affected countries, are urgently needed in order to estimate its impact on the indigenous aphidophagous fauna.

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Received: February 23, 2003

Accepted: April 18, 2003