

FIRST RECORD OF *HARMONIA AXYRIDIS* (COLEOPTERA: COCCINELLIDAE) FROM THE IBERIAN PENINSULA

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Abstract: We present the first Iberian record of the multicolored Asian lady beetle, *Harmonia axyridis* (Pallas), from northern Spain. Two specimens were captured at flowers of *Tilia platyphyllos* Scopoli in Bilbao (Biscay province, Basque Country, Spain). The problem of the introduction of non native coccinellids as biological control agents is briefly discussed.

Key words: Coleoptera, Coccinellidae, *Harmonia axyridis*, Spain.

Primer registro de *Harmonia axyridis* (Coleoptera: Coccinellidae) en la Península Ibérica

Resumen: Se reporta el primer registro del coccinélido *Harmonia axyridis* (Pallas) de la Península Ibérica. Se colectaron dos ejemplares sobre flores de *Tilia platyphyllos* Scopoli en Bilbao (provincia de Vizcaya, País Vasco, España). Se discute brevemente el problema de la introducción de coccinélidos no nativos como agentes de control biológico.

Palabras clave: Coleoptera, Coccinellidae, *Harmonia axyridis*, España.

Introduction

Harmonia axyridis (Pallas, 1773) is a well-known aphid-predator coccinellid native from large parts of Asia. Their native distribution extends from the Altai Mountains in the west to the Pacific Coast in the East, and from Southern Siberia in the north to Southern China in the south (Korschefsky, 1932; Dobzhansky, 1933; Chapin, 1965; Kuznetsov, 1997; Sasaji, 1971). This insect has been used as biological control agent in the United States since 1916 due to its predatory behaviour (Gordon, 1985). This exotic coccinellid has also been released in Europe (Iperti & Bertrand, 2001; Katsoyannos *et al.*, 1997) and was also recorded in South America (de Almeida & da Silva, 2002).

In the United States, this species has spread quickly throughout the country from 1988, when the first established population was documented (Brown, 2003), but numerous releases were made since 1916 (Gordon, 1985). This insect is also recorded in Canada (Berthiaume *et al.* 2003), in Argentina (Saini, 2004) and in Brazil (de Almeida & da Silva, 2002). In Europa *H. axyridis* is well established in England, where was initially detected in 2004 (Majerus & Roy, 2005). Probably the introductions of this insect were made through the global trade of goods between North America and Great Britain and in flights from different parts of the World. This exotic species is also established in Germany (Tolasch, 2002; Klausnitzer, 2002), France, Belgium (Adriaens *et al.*, 2003), Greece (Katsoyannos *et al.*, 2003), Italy (Bazzocchi *et al.*, 2004) and The Netherlands (Cuppen *et al.*, 2004).

Brief taxonomic history

H. axyridis belongs to the tribe Coccinellini of the family Coccinellidae (Kovar, 1996). In 1773, this coccinellid was initially described as *Coccinella axyridis*. Posteriorly, eight

junior synonyms were also proposed, mainly due to this species being highly polymorphic and several subspecies and aberrant forms have been described as well (Korschefsky, 1932).

The adults of *H. axyridis* are strongly oval and convex in shape, and they are larger (5-8 mm) than most of the Spanish indigenous ladybird species. The elytra usually display a wide “keel” at the apex. They are highly coloured polymorphic with elytra ranking from pale yellow-orange to black bearing 0-19 spots (Fig. 1). 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, flattened, and decorated with strong tubercles and spines. The mature larva is distinctively and strikingly coloured (Iablokoff-Khnzorian, 1982).

Brief history about the biology of *H. axyridis*

H. axyridis preys mostly on tree-dwelling hemipteran insects such as psyllids, scale insects and aphids (Iablokoff-Khnzorian, 1982). The larvae are very voracious, feed on aphid populations and they are very easy to rear (Ferran *et al.*, 1996). For these reasons it was a commercially attractive biocontrol agent in greenhouses and orchards. It was sold by different private companies for reducing aphid populations (Biotop SAS, BioBest and Koppert) (Maignet, 2002). Due to negative impact of the introduction of this exotic ladybird has been produced in the United States, (potential threat for native ladybird species and problems for the people because of its abilities to swarm), at this moment most biological control companies don't sell it anymore. In spite of these problems, little attention has been



Fig. 1. Two specimens of *Harmonia axyridis* (colour type 'succinea') captured in flowers of *Tilia platyphyllos* in Biscay Province (Spain).

paid to the development of feral populations of *H. axyridis* in Europe. This is an important issue given the rapid colonisation of a wide range of ecosystems in North America and the growing concerns over the negative impact on the natural enemy introductions (Follet & Duan 1999). *Harmonia axyridis* is able to prey on the native European coccinellids *Adalia bipunctata* (L.) y *Coccinella septempunctata* L. and it can feed on some fruits producing damages to pears (EPPO, 2005).

Studies of the expansion of *H. axyridis* in North America showed that it can rapidly colonise large areas, due to it has a wide trophic niche and high level of phenotypic plasticity, it is very voracious and it competes with other native aphid species and it has strong dispersal capacities and undertakes long range migrations to overwintering sites (Nalepa *et al.*, 1996).

Material studied

Two adults (one female and one male) were collected in an anthropogenic ecosystem, a green-park with many trees, in the flowers of the deciduous tree lime *Tilia platyphyllos* Scop. at Loiu (Biscay Province) 25 of June 2007 (Figure 1). They were preying on the aphid *Eucallipterus tilliae* L. Larvae were not found. The sampling and the identification of the insects was made by the senior author. This sampling is a part of the pest control services organize by Neiker every year in the surroundings of the Bilbao airport to intercept potential pests and diseases. The specimens were deposited in the Museo Nacional de Ciencias Naturales (CSIC), Madrid.

History of *Harmonia axyridis* in the Iberian Peninsula

In 1995 *H. axyridis* was used to control aphids on greenhouses in Almeria, province of Andalusia (Southern Spain) (SIFA, 2004). The insect will be established inside the greenhouses (Jacas *et al.*, 2006) but there is no evidence of

subsequent establishment in the wild. In 2003 and 2004 two specimens of *H. axyridis* were found in a garden of La Laguna (Tenerife, Canary Island). There are no official reports of introductions for agricultural purposes from the Canary Government and the insect has no developed numerous populations yet (Machado, 2005). *H. axyridis* has been recorded in Tenerife Island during 2006 (Santos Eizaguirre, pers. comm.). In 1984-1985 *H. axyridis* was used to control aphids on citrus crops in the Algarve province of Portugal, and on the Portuguese administered islands of the Azores (Katsoyannos *et al.*, 1997). There is no evidence of subsequent establishment. However, recent work by Soares and Serpa (2007) concluded that if re-introduced to the Azores, *H. axyridis* would present a risk to the native species *Coccinella undecimpunctata* L. It would be necessary to carry out more surveys in Spain mainland to follow up the populations of this insect in order to have more information about this invasive species

Conclusions

Because larvae having not been found, we cannot assure that *H. axyridis* has established in the region. It is interesting to note that both captures were localized in a small area close to the Bilbao airport. The global trade of goods and the commercial flights may constitute a possible way for the entrance of this exotic ladybird. Another possible way of entrance for *H. axyridis*, could be the border between Spanish Basque Country and French Basque Country, where this species may have established (Maignet, 2002; Ipertri & Bertrand, 2001).

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