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New records of the alien invasive species *Harmonia axyridis* (Pallas, 1773) in Italy (Coleoptera: Coccinellidae)

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Abstract. We present the first records of the invasive alien species *Harmonia axyridis* from Aosta Valley, Umbria and Apulia. These observations are important because, outside its native range, the species exerts severe impacts on native biodiversity and human health. Early warnings are crucial to prevent its further spreading.

Riassunto. *Nuove segnalazioni della specie aliena invasiva* Harmonia axyridis *(Pallas, 1773) in Italia (Coleoptera: Coccinellidae).* In questa nota segnaliamo per la prima volta la specie aliena invasiva *Harmonia axyridis* per Valle d'Aosta, Umbria e Puglia. Laddove naturalizzata, questa specie esercita un impatto significativo sulla biodiversità e sulla salute umana, richiedendo perciò rapidi interventi atti a limitarne la diffusione.

Key words. Alien species, distribution, established species.

The harlequin ladybird *Harmonia axyridis* (Pallas, 1773) is a coccinellid beetle native to Asia which has been widely introduced throughout the world as a biocontrol agent to contrast aphids and coccids (see KOCH, 2003 for a review). *Harmonia axyridis* is listed among the 100 of the worst invasive alien species in Europe (ROY & ROY, 2008), since its impact on native biodiversity (ROY & WAJNBERG, 2008) and human health (MAZZA *et al.*, 2014) are considerable.
Outside its native range, this species can outcompete indigenous Coccinellidae exploiting resources more efficiently; it is an opportunistic predator of many native Diptera, Neuroptera and Coleoptera (KOCH *et al.*, 2003). *Harmonia axyridis* can cause significant economic damages to fruit crops, mainly grapes, on which it feeds, also altering their taste. It is also known to nip humans if handled (BOTEZATU *et al.*, 2013). Moreover, the hemolymph of the harlequin ladybird contains allergenic substances such as Hara 1 and 2, which may cause rhinitis, asthma, conjunctivitis and urticaria to humans (KOCH *et al.*, 2003).
The ectoparasitic fungus *Hesperomyces virescens* Thaxt. infects *H. axyridis*, also in Europe, and it may threat also native ladybirds (CERYNGIER & TWARDOWSKA, 2013).
In Italy, the species has been intentionally introduced in greenhouses for biocontrol between 1995 and 1999 (BURGIO *et al.*, 2008). The presence of *H. axyridis* in natural environments has been reported since 2006 in Northern Italy (Piedmont, Turin: BURGIO *et al.*, 2008). CORNACCHIA & NARDI (2012) reviewed the extent of occurrence of *H. axyridis* in Italy, showing data from twelve regions (Fig. 1).

In this note we report the occurrences of this invasive ladybird for three other Italian regions: Aosta Valley, Umbria and Apulia.

Fig. 1. Map of the known regions of occurrence of *Harmonia axyridis* in Italy (left), according to CORNACCHIA & NARDI (2012) (grey colour) and location of the new records in Aosta Valley, Umbria and Apulia (stripped pattern); our records are highlighted in the regional maps on the right.

In Aosta Valley, an adult specimen (colour form *succinea*) was collected on September 15th 2014 on a stone wall (Dejoz, Valsavarenche). No other specimens were detected in the surroundings.
In Umbria and Apulia, several individuals were observed (and in part photographed) or collected; then, the identification of the specimens (all belonging to the form *succinea*) was confirmed by the authors.
In Umbria, about 20 individuals were found on October 15th 2013 in a room (Spazzavento, Città di Castello, Perugia province). Three further individuals were observed and photographed in August 2014, and one collected on November 2nd 2014, on a window sill in Città di Castello.
In Apulia, one adult individual was photographed on a branch of an ornamental tree (Bignoniaceae) in a green area of Monopoli (Bari province). Further evidences are required to confirm the actual establishment of *H. axyridis* in all these regions. Details of the collection data are as follows:

Material examined. **Aosta Valley:** Valsavarenche (AO), Dejoz, headquarters of the Gran Paradiso National Park, 1555 m a.s.l., 45°35'32.56"N 7°12'36.14"E, 15.IX.2014, M. Menchetti, E. Mori & L. Ancillotto leg., 1 ex. (form *succinea*; Fig. 2), collection of the Museo di Storia Naturale dell'Università degli Studi di Firenze. **Umbria:** Città di Castello (PG), Spazzavento, 409 m a.s.l., 43°26'12.37"N 12°13'23.10"E, 15.X.2013, photo by G. Bettacchioli, 1 ex. (form *succinea*); Città di Castello (PG), 386 m a.s.l., 43°27'52.78"N 12°14'33.80"E, 15.VIII.2014, photo by G. Bettacchioli, 1 ex. (form *succinea*); *idem*, 2.XI.2014, G. Bettacchioli leg., 1 ex. (form *succinea*), private collection G. Bettacchioli. **Apulia:** Monopoli (BA), 12 m a.s.l. 40°57'09.77"N 17°17'57.86"E 9.IX.2013, photo by V. Bini, 1 ex. (form *succinea*).

Fig. 2. The specimen of *H. axyridis* from Aosta Valley (scale bar = 2 mm).

These new reports come from a range of latitudes, altitudes and landscapes confirming, as already reported by BAZZOCCHI *et al.* (2004) and by BIDINGER *et al.* (2012), that most of the national Italian territory is suitable for the establishment of *H. axyridis*. Dispersal abilities of this ladybird are remarkable, as well as its plasticity to adapt to different environmental conditions. However, the passive transport is the main pathway of invasion of new areas (BROWN *et al.* 2011; CORNACCHIA & NARDI, 2012). Moreover, *H. axyridis* can have up to five generations per year in the introduced range (ONGAGNA *et al.*, 1993; BAZZOCCHI *et al.*, 2004; CORNACCHIA & NARDI, 2012).

An appropriate level of knowledge of the distribution of alien species plays a critical role to cope with biological invasions (GENOVESI & SHINE, 2004). Thus, monitoring of all the sites where we recorded *H. axyridis* is required to plan control strategies in order to preserve the native biota and to minimize adverse impacts.

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References

BAZZOCCHI G., LANZONI A., ACCINELLI G. & BURGIO G., 2004. Overwintering, phenology and fecundity of *Harmonia axyridis* in comparison with native coccinellid species in Italy. *BioControl*, 49: 245-260.

BIDINGER K., LÖTTERS S., RÖDDER D. & VEITH M., 2012. Species distribution models for the alien invasive Asian Harlequin ladybird (*Harmonia axyridis*). *Journal of Applied Entomology*, 136 (1-2): 109-123.

BOTEZATU A., KOTSERIDIS Y., INGLIS D. & PICKERING G., 2013. Occurrence and contribution of alkyl methoxypyrazines in wine tainted by *Harmonia axyridis* and *Coccinella septempunctata*. *Journal of the Science of Food and Agriculture*, 93: 803-810.

BROWN P.M.J., THOMAS C.E., LOMBAERT E., JEFFRIES D.L., ESTOUP A. & LAWSON HANDLEY L.J., 2011. The global spread of *Harmonia axyridis* (Coleoptera: Coccinellidae): distribution, dispersal and routes of invasion. *BioControl*, 56: 623-641.

BURGIO G., SANTI F., LANZONI A., MASETTI A., DE LUIGI V., MELANDRI M., REGGIANI A., RICCI C., LOOMANS A.J.M. & MAINI S., 2008. *Harmonia axyridis* recordings in northern italy. *Bulletin of insectology*, 61 (2): 361-364.

CERYINGIER P. & TWARDOWSKA K., 2013. *Harmonia axyridis* (Coleoptera: Coccinellidae) as a host of the parasitic fungus *Hesperomyces virescens* (Ascomycota: Laboulbeniales, Laboulbeniaceae): a case report and short review. *European Journal of Entomology*, 110 (4): 549-557.

CORNACCHIA P. & NARDI G., 2012. Nuovi dati su *Harmonia axyridis* in Italia (Coleoptera, Coccinellidae). *Bollettino dell'Associazione Romana di Entomologia*, 67 (1-4): 51-68.

KOCH R.L., 2003. The multicolored Asian lady beetle, *Harmonia axyridis*: a review of its biology, uses in biological control, and non-target impacts. *Journal of Insect Science*, 3: 32.

MAZZA G., TRICARICO E., GENOVESI P. & GHERARDI F., 2014. Biological invaders are threats to human health: an overview. *Ethology Ecology & Evolution*, 26 (2-3): 112-129.

ONGAGNA P., GIUGE L., IPERTI G. & FERRAN A., 1993. Cycle de développement d'*Harmonia axyridis* (Col. Coccinellidae) dans son aire d'introduction: le Sud-Est de la France. *Entomophaga*, 38: 125-128.

ROY H. & ROY D. 2008. Delivering Alien Invasive Species Inventories for Europe (DAISIE). Species Factsheet. *Harmonia axyridis*. Available at: http://www.europe-aliens.org/speciesFactsheet.do?speciesId=50711. Downloaded on 19th September 2014.

ROY H.E. & WAJNBERG E., 2008. From biological control to invasion: the ladybird *Harmonia axyridis* as a model species. *BioControl*, 53: 1-4.

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