



Predatory ability of wild generalist predators against eggs and first instar nymphs of *Halyomorpha halys*

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Extended abstract: *Halyomorpha halys* (Heteroptera: Pentatomidae), native to East Asia, is a polyphagous species with more than 300 recognized host plants (Rice et al., 2014). Thanks to its close association with man-made structures during the overwintering period, which facilitates human assisted dispersion (Maistrello et al., 2018), this insect is a fast spreading invasive pest of fruit orchards and many other crops both in the USA. (Leskey and Nielsen, 2018) and in Italy (Maistrello et al., 2017).

Direct damages caused by this insect include malformation, suberisation, discoloration, necrotic areas and watery rot, all of them causing damage that render products unmarketable (Rice et al., 2014). To manage the invasion of this pest, farmers have increased the use of broad spectrum insecticides, resulting in disruption of the most innovative IPM strategies, with serious risks both for the economy and the environment (Maistrello et al., 2017; Leskey et al., 2012). The use of broad spectrum insecticides can also lead to the reduction of populations of beneficial insects, such as pollinators, parasitoids and predators, in consequence altering the natural balance. Therefore, it is necessary to identify more sustainable strategies to control this pest. *H. halys* is an alien species for Italy, thus species specific antagonists are absent in the newly invaded areas. However, native species of generalist predators and parasitoids could eventually use *H. halys* as prey/host, becoming good candidates for the biological control. As matter of fact, generalist predators can be more effective on invasive species than the specialist predators in their introduced range (Chang and Kareiva, 1999).

In this study, the predatory ability of European native generalist insect predators collected from the wild settings was verified on eggs and young instars of *H. halys* using a no choice test. For the study, the following European native species were tested: *Forficula auricularia* (Dermaptera, Forficulidae), *Harmonia axyridis* (Coleoptera, Coccinellidae), *Pholidoptera littoralis* (Orthoptera, Tettigonidae), *Nagusta goedelii* (Rhynchota, Reduviidae), *Rhynocoris iracundus* (Rhynchota, Reduviidae) and two species of the *Himacerus* genus (Rhynchota, Nabidae). These predators were captured in green areas and urban parks of Reggio Emilia (Northern Italy) using tree beating and sweep net techniques.

After a starving period of 24 hours, each predator was individually placed inside a transparent box with a bean plant bearing at least two well developed leaves and the *H. halys* prey item, that consisted of one egg mass or a hatched egg mass (with first instar nymphs) or 5 second instar individuals. *R. iracundus* was also tested with adults of *H. halys*. For each treatment, a control treatment consisted the same set up but without the predator. After 48 hours the survival of the preys specimen and the predators was recorded, and, for the egg masses, emergence was checked during the following 5 days.

From the comparison between the survivors of the treatment group (prey and predator) and the control one (no predators) it emerged that *P. littoralis* is the only species capable of preying on all the instars tested, including eggs. The other predators did not feed on the eggs, although *F. auricularia* damaged them. *N. goedelii* significantly preyed the first instars, while *R. iracundus* and nabids of the *Himacerus* genus preyed on second instars. *R. iracundus* significantly preyed also on adult individuals of *H. halys*.

This study showed the potential of some European native generalist predators for the biological control of *H. halys*, in particular of *R. iracundus* and *P. littoralis*. The augmentative release of these predators into cultivated areas could negatively affect the survival of *H. halys* in the fields, and especially in combination with augmentative release of native parasitoids, such as *Anastatus bifasciatus* (Hymenoptera, Eupelmidae) (Costi et al., 2018), it might result in increased impact and effectiveness of biological control against this invasive pest.

However further research is necessary both in the laboratory (preference tests) and in the field to verify their effectiveness and the potential impact on the agroecosystem.

Acknowledgements

The work was partially funded by the Emilia Romagna region, within the Rural Development Plan 2014-2020 Op. 16.1.01 – GO PEI-Agri – FA 4B, Pr. «HALYS», coordinated by CRPV.

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