

The unnoticed invasion of a pest with high harmful potential in fruit and vegetable production: the brown marmorated stink bug *Halyomorpha halys* in Germany

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Abstract

The Asian brown marmorated stink bug (BMSB) Halyomorpha halys is spreading rapidly into urban areas in South-Western Germany since 2011. It can develop and establish on more than 300 host plants, incl. several fruit cultures (e.g. apple, pear, peach, plum) and vegetable fruits. First damages in fruit orchards occurred 2017 near the border of Germany to Switzerland in the area of Lake Constance. Economic damages are already occurring in Italy and Switzerland and they are expected for Germany in the coming years.

In the project network “Invaprotect”, supported by the EU Interreg V, this new invasive pest is being recorded with a mobile phone application. The project aims to build a fast and early warning system for the future introduction of invasive insect pest. The monitoring tool enables the project partners from Germany, Switzerland and France to focus their plant protection advisory service and to use up-to-date online mapping for risk assessment. The network will record the ongoing distribution of the BMSB in the upper rhine valley and transfer knowledge how to identify this new invasive species and its potential natural enemies.

Keywords: Heteroptera, monitoring tool, urban green, biocontrol strategy

Introduction

In October 2011 the Asian brown marmorated stink bug *Halyomorpha halys* has been observed for the first time in Germany. It has been found in Northern Germany in Bremerhaven in containers with machine parts from North America where it has been immediately eradicated and as well in Konstanz city in the Southern part of Germany, Baden-Württemberg. It is likely that the population in the South has been spreading from an infestation near Zurich, Switzerland that is dated back to 2004 or older (Wermelinger et al. 2008, Haye and Zimmermann 2017). In the late 1990ies it has been introduced to North America where it has been established for about ten years until it started to cause damages in apple and peach orchards. Economic damages are already occurring in Italy and Switzerland, e.g. in apple, pear and peach (Unterthurner et al. 2017). The BMSB has also been recognized to build large aggregations of overwintering populations e.g. in houses.

Material and Methods

The monitoring in Germany started in 2014, including online records from a citizen science approach from Switzerland (Haye & Wyniger 2017) that was also used in Southern Europe (Maistrello et al. 2016). In the project network “Invaprotect” a mobile phone application was the main tool for recording infested locations. New records had been verified by the project administration of this working package, e.g. by voucher specimen or photographs. Detailed information on phenology and identification can be found in Zimmermann and Reißig (2017). All stages of the BMSB had been checked for potential predation or parasitism.

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Results

Since the first record on the border to Switzerland the populations have been constantly growing and most likely been distributed by traffic from city to city. The current distribution reaches out along the Rhine valley from Freiburg up to Frankfurt / Main. Several yet isolated observations include the city centers of Stuttgart, Cologne, Berlin and Munich. These city records include shrubs and woody ornamental plants (maple, holly, a.o.). Since 2015 vegetable fruit damages occur near Freiburg (Altmann, pers. comm.). In 2017 the BMSB was found for the first time in a peach orchard and in private home garden cherries near Lake Constance. In Weil am Rhein it has also been recorded from an isolated grape vine production with adults on grape berries and several ovipositions on vine leaves.

Discussion

The BMSB seems to start their populations in urban ornamental woody plants. After some years they start spreading in gardens and orchards. Grape only seems to be attractive when there are no other fruits nearby. A few potential parasitoids had been found in suitable habitats, e.g. *Anastatus* sp., *Trichopoda pennipes*, but not directly hatching from *H. halys*. Since *Trissolcus japonicus* occurs naturally in North America (Herlihy et al. 2016) and is quite effective in Asia it should be considered to discuss the potential of classical biocontrol to reduce the impact of future insecticide treatment. Several host plants worldwide are listed in Northeastern IPM (2018).

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References

- Haye, T. & Wyniger, D. (2017): Die Marmorierte Baumwanze, *Halyomorpha halys*. www.halyomorphahalys.com. Accessed Jan 2018
- Haye, T., Zimmermann, O. (2017): Etablierung der Marmorierten Baumwanze, *Halyomorpha halys* (STÅL, 1855), in Deutschland. Heteropteron, Heft 48: 34-37.
- Herlihy, M.V., Talamas, E.J., Weber, D.C. (2016): Attack and success of Native and exotic parasitoids on eggs of *Halyomorpha halys* in three Maryland habitats. PLoS ONE 11(3): e0150275. doi:10.1371/journal.pone.0150275
- Maistrello, L., Dioli, P., Bariselli, M. & Forini Giacalone, I. (2016): Citizen science and early detection of invasive species: phenology of first occurrences of *Halyomorpha halys* in Southern Europe. - Biological Invasions **18**: 3109-3116.
- Northeastern IPM (2018): Host plants of the brown marmorated stink bug in the U.S. <http://www.stopbmsb.org/where-is-bmsb/hostplants/>. Accessed Jan 2018
- Unterthurner, M., Zelger, A., Fischnoller, S., Walcher, M., Haye, T. (2017): Die Marmorierte Baumwanze im Visier. Obstbau 5: 276–282.
- Wermelinger, B., Wyniger, D., Forster, B. (2008): First records of an invasive bug in Europe: *Halyomorpha halys* Stal (Heteroptera: Pentatomidae), a new pest on woody ornamentals and fruit trees? Mitt Schweiz Entomol Ges **81**:1–8.
- Zimmermann, O., Reißig, A. (2017): Marmorierte Baumwanze *Halyomorpha halys*. Hinweise zur Pflanzengesundheit. Landwirtschaftliches Technologiezentrum (LTZ) Augustenberg, 4 pages.

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