

**FIRST RECORD OF BROWN MARMORATED STINK BUG
(*HALYOMORPHA HALYS* (STÅL, 1855)) (HEMIPTERA:
PENTATOMIDAE) IN SLOVENIA**

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Abstract - The brown marmorated stink bug *Halyomorpha halys* (Stål, 1855) was recorded for the first time in Slovenia in spring 2017. A single specimen was caught on the pheromone trap in Šempeter pri Gorici in mid-April 2017. A week later another specimen was accidentally found on the parking area of a shopping centre in Nova Gorica. During the summer 2017 the brown marmorated stink bug was discovered in some other localities in the area around Nova Gorica. The discovery of this new alien species is the result of methodical monitoring, which has been carried out in Primorska region since 2016. The new pest presents a severe threat for many agricultural important crops in the area, as well as in other parts of the country.

KEY WORDS: *Halyomorpha halys*, brown marmorated stink bug, Slovenia

Izvešček - PRVA NAJDBA MARMORIRANE SMRDLJIVKE (*HALYOMORPHA HALYS* (STÅL, 1855)) (HEMIPTERA: PENTATOMIDAE) V SLOVENIJI

Marmorirana smrdljivka *Halyomorpha halys* (Stål, 1855) je bila prvič odkrita v Sloveniji spomladi leta 2017. Eno samo odraslo stenico smo ujeli na feromonsko vabo v Šempetru pri Gorici sredi aprila 2017. Teden dni kasneje smo vrsto še enkrat naključno našli na parkirišču trgovskega centra v Novi Gorici. Tekom poletja smo marmorirano smrdljivko odkrili na več lokacijah na Goriškem. Odkritje nove vrste stenice je rezultat sistematičnega spremljanja, ki ga na Primorskem izvajamo od leta 2016. Nov škodljivec lahko povzroči pomembno škodo v pridelavi številnih kmetijskih kultur na območju, kot tudi drugod po državi.

KLJUČNE BESEDE: *Halyomorpha halys*, marmorirana smrdljivka, Slovenija

Introduction

Brown marmorated stink bug (*Halyomorpha halys* Stål, 1855; Hemiptera: Pentatomidae) is an East Asian species, native to Japan, Korea, China and Taiwan (Lee et al. 2013). The term 'marmorated' refers to the colour pattern of the insect, which resembles marble. In the mid-1990s it was introduced into the USA, first detected in 1996 in Pennsylvania (Hoebeke & Carter 2003). Within a few years has rapidly spread across the United States and Canada (Fogain & Graff 2011). In Europe, it was first recorded in Lichtenstein in 2004 (Arnold 2009) and in Switzerland in 2007 (Wermelinger et al. 2008). In the following years it has spread to neighbouring countries; Germany, France and Italy (EPPO, 2013, Maistrello et al. 2014), Greece (Milonas & Partsinevelos 2014), Hungary (Vétek et al. 2014), Romania (Macavei et al. 2015), Serbia (Šeat 2015), Austria (Rabitsch & Friebe 2015) and also in the territory between Black and Caspian seas; in Southern Russia, Abkhazia and Georgia (Gapon 2016). In 2016 was first recorded in Slovakia (Hemala & Kment, 2017) and Spain (Dioli et al. 2016), in 2017 in Croatia (Šapina et al. 2018) and Slovenia.

Brown marmorated stink bug (BMSB) is a highly polyphagous invasive species with more than 100 host plants reported (Bergmann et al. 2016). Adults and nymphs feed on buds, leaves, stems and fruits of wild and cultivated plant species causing severe damage in agricultural production (Hoebeke & Carter 2003, Lee et al. 2013, Bariselli et al. 2016, Valentin et al. 2017, Vétek & Korányi 2017, Leskey & Nielsen 2018). The species is also considered as nuisance pest (Lee & Leskey 2015). A large number of adults invade homes and human-made structures in the autumn to overwinter inside protected environments (Inkley 2012). After the emergence from overwintering shelters in early spring, the adults start searching for suitable hosts for feeding (Zobel et al. 2016). It is multivoltine species, with more generations per year in its native range in Asia (Rice et al. 2014) and it has one to two generations the Mid-Atlantic region of United States (Nielsen et al. 2008). The first observation carried out in central Italy (Emiglia Romagna) shows that in Mediterranean climate 2 generations per year are present (Bariselli et al. 2016).

Materials and methods

The monitoring of Brown Marmorated Stink Bug was carried out in the Western part of Slovenia. In 2016 BMSB was monitored by visual observations, based on canopy shake sampling and beat sampling. Monitoring was mainly focused on agricultural plants (pome fruit orchards, soybean, tomato and pepper plants) and some ornamental plants. Several visual inspections were made during spring emergence in May, at peak population spikes (July and August) and in autumn (from September to November) in the period when stink bugs seek for overwintering sites. In 2017 the aggregation pheromone-baited traps have been used to monitor BMSB in the period from the beginning of April to the end of November. We used Pherocon[®] BMSB STKY[™] Dual Panel Adhesive Traps, which we placed in the hedges around orchards and fields with host plants. The traps were hung in tree canopy at approximately 2

meters height. The lures were changed every 12 weeks, the traps were checked weekly.

Basic morphological characteristics of *Halyomorpha halys* and its similarities to the native species *Rhaphigaster nebulosa*

The adult specimens of *H. halys* range from 12 to 17 mm in length. It has brownish or greyish, mottled dorsal coloration with dense and dark punctuation, variable in size and colour. Key identifying characteristics of the BMSB include the two light bands on the dark antennae, absence of ventral spine and typical banding pattern of the abdominal margins (connexivum).

Detailed descriptions of adults are provided by Hoebeke and Carter (2003) and Wyniger and Kment (2010).

Halyomorpha halys can be easily confused or mistaken for *Rhaphigaster nebulosa* (Poda, 1761), common European species, which has the same size, similar appearance, habitat preference and behaviour. Key distinguishing characteristics of BMSB and *Rhaphigaster nebulosa* are listed below for the purpose of quick distinguishing and identifying both species.

<i>Halyomorpha halys</i>	<i>Rhaphigaster nebulosa</i>
Ventral spine absent.	Long ventral spine, which arises from 2nd abdominal sternite and extending forwards between base of hind and middle legs.
Two white bands on antennae; first at the base of the segment IV, second at the apex of segment IV and base of segment V.	Three white bands on antennae; at the base of segments III to V.
The membrane of fore wing with distinct longitudinal dark marks on the veins.	The membrane of fore wing with dark round spots, arranged irregularly.
Connexivum with yellow medial spots triangular.	Connexivum with yellow medial spots rectangular.
Tarsal segments in posterior legs white	Tarsal segments in posterior legs black

Results and discussion

The brown marmorated stink bug was recorded for the first time in Slovenia in Šempeter pri Gorici in mid-April 2017. A single adult specimen was caught on pheromone trap. A week later another specimen was accidentally found on the parking area of a shopping center in Nova Gorica. During the summer 2017 *H. halys* was

found on other five localities in the area around Nova Gorica. In July it was caught on pheromone trap placed in soya been in Bilje. In August it was detected by visual observation of olive tree in Podmark. At the same time in August it was caught on pheromone traps in Miren and Kromberk. In the middle of September, it was detected in urban area in the commercial building in Kromberk. Only single specimens of *H.*



Fig. 1: *H. halys*, Kromberk, 2017



Fig. 2: *H. halys* nymph on *Hibiscus syriacus*, Šempeter pri Novi Gorici, 2017

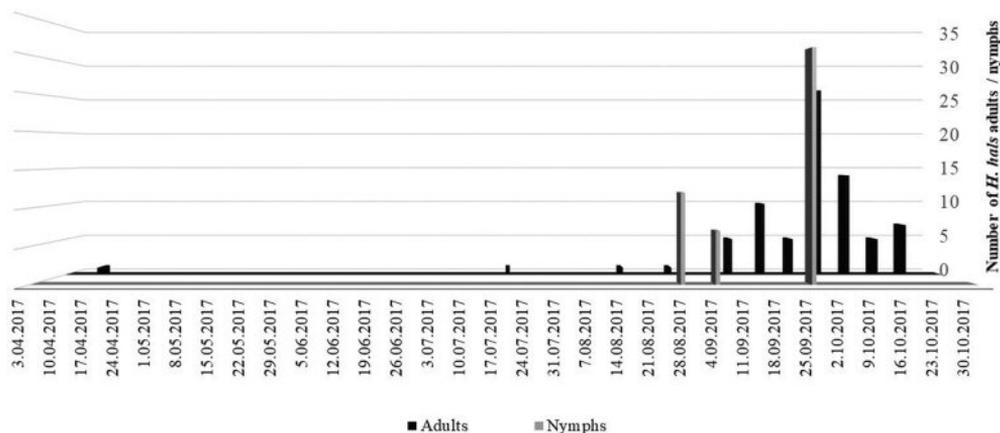


Fig. 3: Population dynamics of *Halyomorpha halys* on the location Šempeter pri Gorici in the period April- November 2017

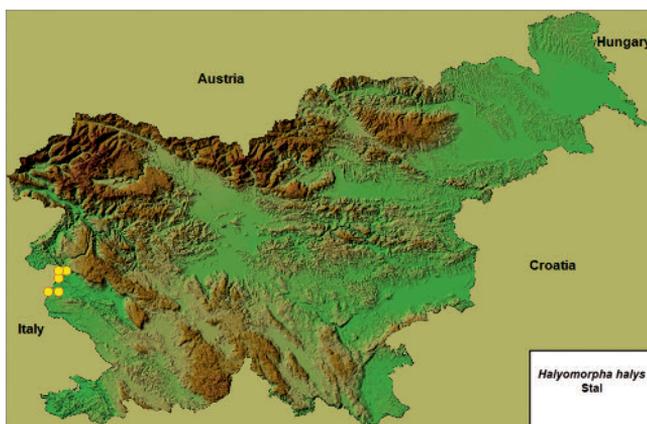


Fig. 4: Map of *Halyomorpha halys* detections in Western Slovenia

halys were caught in most locations, except in the location Šempeter pri Gorici, where the first spring detection was followed by continuous catches during the summer till the late autumn. The occurrence of *H. halys* in Western part of Slovenia in 2017 is closely related to presence and expansion of the species in neighbouring Italian regions. Since the first occurrence in Italy in 2012, the pest has spread in the Po Valley causing severe damage in the regions of Emilia-Romagna (Modena, Reggio Emilia and Bologna provinces), Piedmont, Lombardy, Veneto and Friuli (Bariselli et. al. 2016). The region of Friuli Venezia Giulia bordering Slovenia on the east, has been dealing with *H. halys* since 2014. By the end of 2016 it has spread eastward to the area of Province of Gorizia and reached the Slovenian border. Considering brown marmorated stink bug flight capacity, traffic flow and density in the border area, it was only a matter of time before it would enter Slovenia.

Table 1: The results of *H. halys* monitoring with pheromone traps in 2017

Trap No.	Locality name:	Coordinates:		Type locality/ nearby host plant	<i>H. halys</i> status	Detection date:
		Y	X			
1	Sužid	13.556543	46.246418	apple orchard	Absent	-
2	Staro selo	13.532095	46.247462	fruit garden	absent	-
3	Vipolže	13.526675	45.972929	peach orchard. vineyard	absent	-
4	Kromberk	13.686544	45.962317	sweet cherry /fig orchard	present	August 31. 2017
5	SC Bilje	13.630261	45.894877	peach / plum orchard	absent	-
6	Miren	13.602069	45.891144	peach /pear orchard	present	August 31. 2017
7	Bilje	13.674428	45.895604	soya been	present	July 24. 2017
8	Postojna	14.221731	45.773098	railway station	absent	-
9	Vogrsko	13.705111	45.918004	highway cross	absent	
10	Šempeter	13.645309	45.932240	greenhouse	present	April 11. 2017
11	Brje pri Komnu	13.717726	45.785155	fruit garden	absent	-
12	Velika Bukovica	14.220695	45.546326	fruit garden	absent	-
13	Nasirec	13.910586	45.615188	fruit garden	absent	-
14	Beka	13.900656	45.597284	apple orchard	absent	-
15	Strunjan	13.617208	45.527360	fig orchard	absent	-
16	Bivje (Sp. Škofije)	13.785966	45.561944	pear orchard	absent	-
The data of other detections of <i>Halyomorpha halys</i> by visual observation						
	Nova Gorica	13.653538	45.954686	parking place	present	April 18. 2017
	Podmark	13.643611	45.936580	olive orchard	present	August 30. 2017
	Kromberk	13.658634	45.960896	commercial building	present	September 9. 2017

Conclusions

The first occurrence of *H. halys* in Western Slovenia presents a serious risk for agriculture production in the area. According to the damage reported from other countries severe yield losses could be expected on the following crops: peaches, pears, apples, kiwi, corn and soya bean. Considering that the spread of the pest cannot be stopped, its expansion in whole territory of the country is expected in a short period. Establishment and increase in the pest population can cause significant economic losses in Slovenian agriculture and can also create nuisance problems in urban areas.

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