

A review of pest status of recently recorded alien insects in Bulgaria

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Abstract

Bulgarian biodiversity and economy are threatened by the introduction of alien insects because of increasing transport and the global warming. The alien terrestrial insects recorded so far in Bulgaria account for 300 species and 108 of them have been detected during the last 20 years. The highest number belongs to Hemiptera (101) and Coleoptera (88), followed by Lepidoptera (34), Hymenoptera (23), Phthiraptera (16), Diptera (15), Thysanoptera (8), Orthoptera (6), Blattodea (3), Psocoptera (3), Zygentoma (1), Siphonaptera (1), and Dermaptera (1). Most of them originate from Asia, followed by Americas, Africa, etc. The species with cosmopolitan distribution and considered as cryptogenic are 82. The trade with plant material and in particular ornamental plants is considered as a main pathway for the introduction of the alien species.

A list of 20 species recorded during the last five years in Bulgaria is presented. The pest status of the alien insects *Cameraria ohridella* Deschka et Dimic, *Phthorimaea operculella* Zeller, *Harmonia axyridis* (Pallas), *Metcalfa pruinosa* Say, *Tuta absoluta* (Povolny), *Nezara viridula* (Linnaeus), *Pseudococcus calceolariae* (Maskell), *Aphis spiraecola* Patch and *Acizzia jamatonica* (Kuwayama) that recently increased rapidly their population density and range of distribution in Bulgaria is discussed.

Keywords: Alien insects, pest status, pathway, Bulgaria.

Introduction

Bulgarian biodiversity and economy are threatened by the introduction of alien insects because of several reasons. The increasing transport

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from Turkey and Black Sea region may introduce new insects from Asia. Global warming may allow the movement to the north and establishment in Bulgaria of some Mediterranean species (*Bemisia tabaci* Gennadius, *Cearatitis capitata* Wiedemann and other Tephritidae species, many scale insects, etc.). Alien species can also be imported in Bulgaria from EU countries because of reduction of border control between EU countries. Till now about 190 insects have been treated as quarantine species in Bulgaria, but despite the phytosanitary measures, thirty-one of them have already been introduced to the country. The first analysis of non-indigenous insects of Bulgaria was made by TOMOV *et al.* 2007. Several projects concerning inventory and monitoring of alien insects were conducted in Bulgaria during the last ten years. A short review of main results of the surveys made is presented in this paper.

Material and Methods

The review is made based on literature data and personal observations conducted during the period 2008-2013 in the framework of several projects. General surveys were made within the following projects: "Non-indigenous insects and their threat to biodiversity and economy in Albania, Bulgaria and Republic of Macedonia" and "Alien terrestrial arthropods and their threat to biodiversity of Bulgaria".

Results and Discussion

The surveys on literature data and personal observations showed that the alien terrestrial insects recorded so far in Bulgaria account for 300 species and 108 of them were detected during the last 20 years. The highest number belongs to Hemiptera (101) and Coleoptera (88), followed by Lepidoptera (34), Hymenoptera (23), Phthiraptera (16), Diptera (15), Thysanoptera (8), Orthoptera (6), Blattodea (3), Psocoptera (3), Zygentoma (1), Siphonaptera (1), and Dermaptera (1). (TOMOV *et al.* 2007, TOMOV *et al.* 2009a, TRENCEVA *et al.* 2012, SIMOV *et al.* 2012)

Most of them originate from Asia (84), followed by Americas (74), Tropic (28) Africa (21), Australia (7) and Mediterraneans (4). The species with cosmopolitan distribution and considered as cryptogenic are 82.

Twenty alien species, new for the Bulgarian fauna, were reported in the last five years (Table 1). Most of them had low population density or were

detected indoors only. At present several species are serious pests on crops and ornamental plants or pose a threat to the biodiversity in Bulgaria.

Table 1. Alien species detected during last five years in Bulgaria.

Species	Reference
1. <i>Periphyllus californiensis</i> (Shinji, 1917)	YOVKOVA <i>et al.</i> 2013
2. <i>Corythucha arcuata</i> (Say, 1832)	DOBREVA <i>et al.</i> 2013
3. <i>Deraecoris flavilinea</i> (A. Costa, 1862)	SIMOV <i>et al.</i> 2012
4. <i>Pulvinaria hydrangeae</i> (Steinweden, 1946)	TRENCEVA <i>et al.</i> 2012
5. <i>Aedes albopictus</i> (Skuse, 1894)	MEDLOCK <i>et al.</i> 2012
6. <i>Bruchidius siliquastri</i> Delobel, 2007	STOJANOVA <i>et al.</i> 2011
7. <i>Idiopterus nephrolepidis</i> Davis, 1909	TASHEVA-TERZIEVA <i>et al.</i> 2011
8. <i>Ceroplastes ceriferus</i> (Fabricius, 1788)	PENCHEVA & YOVKOVA 2011
9. <i>Duponchelia fovealis</i> Zeller, 1847	PENCHEVA <i>et al.</i> 2011
10. <i>Cacoecimorpha pronubana</i> (Hubner, 1799)	PENCHEVA <i>et al.</i> 2009
11. <i>Aulacaspis yasumatsui</i> Takagi, 1977	TRENCEVA <i>et al.</i> 2010
12. <i>Prociophilus fraxinifolii</i> Riley, 1879	TRENCEV & TRENCEVA 2009
13. <i>Harmonia axyridis</i> (Pallas, 1773)	TOMOV <i>et al.</i> 2009b
14. <i>Cinara curvipes</i> (Patch, 1912)	TOMOV <i>et al.</i> 2009a
15. <i>Acizzia jamatonica</i> (Kuwayama, 1908)	VÉTEK & RÉDEI 2009
16. <i>Platygaster robiniae</i> Buhl & Duso, 2008	TOMOV <i>et al.</i> 2009a
17. <i>Tuta absoluta</i> (Meyrick, 1917)	HARIZANOVA <i>et al.</i> 2009
18. <i>Argyresthia thuiella</i> (Packard, 1871)	TOMOV <i>et al.</i> 2009a
19. <i>Obolodiplosis robiniae</i> (Haldeman, 1847)	TOMOV <i>et al.</i> 2009a
20. <i>Trioza alacris</i> Flor, 1861	PENCHEVA <i>et al.</i> 2009

***Phthorimaea operculella* (Zeller)** was found in 1950 in restricted area of South Bulgaria. Since then it has been detected in several localities in South Bulgaria but in low abundance. Heavy infestation by potato tuber moth was observed during the last 5 years in the south part of Bulgaria. The pest extends it areal to the North and has been detected in the North-East Bulgaria as well. (VANEVA-GANCHEVA & GRIGOROVA 2010).

The horse-chestnut leafminer ***Cameraria ohridella* Deschka et Dimic** is the only species with confirmed negative ecological impact. From three to four generations of *C. ohridella* per year were observed in Bulgaria. The trees in Bulgarian natural stand of *Aesculus hippocastanum* – natural reserve “Dervisha” are heavily infested and a total defoliation in August, made by the second summer generation of the moth, occurs every four years. The infestation by *C. ohridella* negatively affects the seed and fruit weight of *A. hippocastanum*. The reduced seed weight may severely impair growth and survival of the horse chestnut seedlings. The long term natural succession in the forest may be altered by the moth, and may even lead to the replacement of *A. hippocastanum* in the last remaining endemic refuges of the species. In addition, *C. ohridella* can affect biodiversity by its high abundance and apparent competition (PERE *et al.* 2010).

The tomato leaf miner ***Tuta absoluta* (Povolny)** was reported for the first time in Bulgaria in 2009 (HARIŽANOVA *et al.* 2009). An infestation on tomato was observed in glasshouses mainly in the south part of Bulgaria (region of Plovdiv and Petrich).

The multicolored ladybird ***Harmonia axyridis* (Pallas)** was observed in Sofia in 2008 (TOMOV *et al.* 2009b). A rapid spread of the ladybird in Bulgaria was observed in the framework of a survey made in 2009. At present the beetle is distributed all over Bulgaria. Initially the infestation by *Eucallipterus tiliæ* (L.) on *Tilia cordata* Mill. was the main reason for natural spread of *H. axyridis* in Bulgaria but at present the food web of the species includes more than 70 aphid and other insect species.

In July 2009, the occurrence of the monophagous psyllid ***Acizzia jamatonica* (Kuwayama)** was recorded, and damages were observed on a solitary silk tree, *Albizia julibrissin* Durazzini in Nessebar (VÉTEK & RÉDEI 2009). At present the species is distributed mainly in southeastern Bulgaria and the Black Sea coast.

***Pseudococcus calceolariae* (Maskell)** was reported for the first time in 1968 (TSALEV 1968) as a pest on ornamental plants indoors. Our observations conducted during the last 3 years showed that the pest was able to overwinter in the field in the South Black Sea region producing big colonies on *Catalpa bignonioides* and *Cercis siliquastrum*.

The extremely polyphagous planthopper ***Metcalfa pruinosa* Say** was reported for the first time in Bulgaria in 2004. It was found on *Thuja*

oxidentalis L. spp. in small numbers and on restricted area (TRENCHÉV *et al.* 2007). Feral populations of *M. pruinosa* were found in 2009 at the Black Sea coast on *Acer campestre* L. and *Robinia pseudoacacia* L. At present the species is distributed mainly in northern Bulgaria and the Black Sea coast on more than 30 plant species.

The polyphagous species ***Nezara viridula* (Linnaeus)** was reported in Bulgaria by STRAWIŃSKI (1959). In the recent years, the species is a serious pest on Solanacea crops mainly in southern Bulgaria. It is an urban pest and also enters the houses in autumn for overwintering.

***Aphis spiraecola* Patch** was detected in Bulgaria for the first time in 2007 (RASHEVA & ANDREEV 2007). At present the pest is distributed mainly in southern Bulgaria where it has almost replaced *A. pomi* in the apple orchards. The species was detected in Sofia and the Black Sea coast (PENČHEVA & YOVKOVA 2011).

Conclusions

About 52 alien insect species are widely distributed crop pests in Bulgaria but only eleven of them are considered as economically important: *Leptinotarsa decemlineata* (Say), *Trialeurodes vaporariorum* (Westwood), *Myzus persicae* Sulzer, *Diaspidiotus perniciosus* (Comstock), *Pseudaulacaspis pentagona* (Targioni, Tozzeti), *Viteus vitifoliae* (Fitch), *Hyphantria cunea* (Drury), *Phthorimaea operculella* (Zeller), *Helicoverpa armigera* (Hübner), *Grapholita molesta* (Busck) and *Frankliniella occidentalis* (Pergande) (TOMOV *et al.* 2010).

A threat to the biodiversity of Bulgaria is posed by the widely distributed species: *Harmonia axyridis* (Pallas) and *Cameraria ohridella* Deshka et Dimic (PERE *et al.* 2010).

A threat to human health is posed by the Asian tiger mosquito *Aedes albopictus* (Skuse), which was detected in Bulgaria in 2011 (MEDLOCK *et al.* 2012). The trade with plant material and in particular ornamental plants is considered as a main pathway for the introduction of alien species.

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