

***Cydalima perspectalis* (Walker, 1859), a new species for the Romanian fauna (Lepidoptera: Crambidae: Spilomelinae)**

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Summary

The box tree moth *Cydalima perspectalis* (WALKER, 1859) is an East Asian species that has been recently introduced in Europe. Its larvae feed on *Buxus* species and can seriously damage these ornamental plants. In this paper we report the occurrence of the species in southern Romania (Bucharest). Given the considerable distance from the nearest records in western Hungary and European Turkey, it is likely that we deal with an independent introduction related to *Buxus* ornamental plants. The population dynamics and potential expansion of the species in Romania should be carefully monitored.

Key words: *Buxus*, distribution, expansion, invasive species, monitoring

Introduction

The box tree moth *Cydalima perspectalis* (WALKER, 1859) is naturally distributed in the subtropical regions of East Asia (India, China, Japan, Korea and the Russian Far East). The larvae feed on several *Buxus* species (Buxaceae) (e.g. *B. microphylla*, *B. sempervirens*, *B. sinica*), and can severely affect these ornamental plants (MALLY & NUSS 2010 and references therein).

Cydalima perspectalis has been detected in Europe in 2007, when it was reported from south-western Germany (KRÜGER 2008), Switzerland (BILLEN 2007, KÄPPELI 2008, SIGG 2009) and the Netherlands (MUUS *et al.* 2009, VAN DER STRATEN & MUUS 2010). Since then the species has been found in an increasing number of localities and several other European countries. Between 2008 and 2010 it was recorded from southern England (MITCHELL 2009), France (FELDTRAUER *et al.* 2009), Austria (RODELAND 2009), Liechtenstein (SLAMKA 2010), Belgium (CASTEELS *et al.* 2011, DE PRINS & STEEMAN 2011) and northern Italy (BIONDI 2010, EPPO 2011a). In September 2011, SÁFIÁN & HORVÁTH (2011) collected the species in a botanical garden in western Hungary. The same authors also mentioned that the species has been recently found in Slovenia, without providing further details. In 2011, the species appeared in the European part of Turkey, being recorded from the western side of Istanbul (HIZAL *et al.* 2012). It is assumed that *C. perspectalis* has been accidentally introduced into Europe, linked to the use of *Buxus* plants for ornamental purposes (e.g. KRÜGER 2008, KÄPPELI 2008, MUUS *et al.* 2009, SIGG 2009). However, the species also appears to be capable of bearing fairly low temperatures and spreading naturally on the continent (KRÜGER 2008, FELDTRAUER *et al.* 2009, MUUS *et al.* 2009, SIGG 2009, LEUTHARDT *et al.* 2010, VAN DER STRATEN & MUUS 2010), so that its very rapid expansion is most likely due to both active colonization and independent human-induced introductions.

Although in 2011 the box tree moth has been removed from the alert list of the European and Mediterranean Plant Protection Organization (EPPO) (EPPO 2011b), the larvae of *C. perspectalis* are known to often cause severe defoliations of the evergreen *Buxus* (e.g. KRÜGER 2008, KÄPPELI 2008, SIGG 2009) and therefore represent a serious threat to these plants.

The species has been placed in various Spilomelinae genera (e.g. *Palpita* HÜBNER, 1808, *Diaphania* Hübner, 1818, *Glyphodes* Guenée, 1854, *Neoglyphodes* Streltsov, 2008), but recent morphology-based research indicates that the species should be placed in *Cydalima* Lederer, 1863 (MALLY & NUSS 2010).

Material

One living specimen of *C. perspectalis* was photographed (**Fig. 1**) on the afternoon of October 6, 2011 in the north-western part of Bucharest (southern Romania, 44°29'12" N, 26°02'22" E, 92 m a.s.l.) (**Fig. 2**). The third author found the specimen lying in the grass in the yard of a kindergarten, but no *Buxus* plants were identified in the immediate vicinity.



However, the surrounding area has several gardens and parks and it is likely that the specimen originated from a distance of a few hundreds of meters.

Results and discussion

Because of its rapid expansion in Central Europe, *C. perspectalis* has been subject to an increasing number of studies during the last 2-3 years. Although

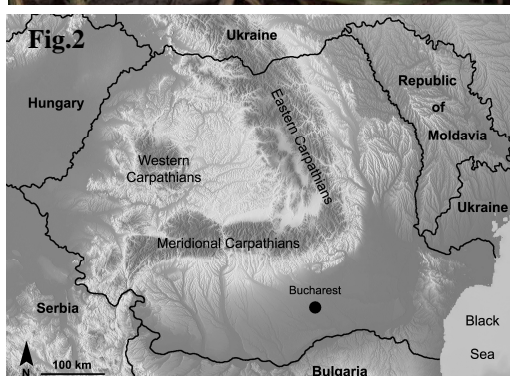


Fig. 1. *Cydalima perspectalis*, Bucharest (southern Romania), October 6, 2011 (Photo C. Mihai).

Fig. 2. The first Romanian record of *Cydalima perspectalis* is from Bucharest (black dot).

its biology in Europe is not fully known yet, data from certain regions are already available in literature (e.g. LEUTHARDT *et al.* 2010, SAGE & KARL 2010, VAN DER STRATEN & MUUS 2010, KORYCINSKA & EYRE 2011, HIZAL *et al.* 2012). Eggs are around 1 mm in diameter and are laid in flat batches on the underside of *Buxus* leaves. In the beginning they are pale yellow, but later they present a black spot where the cephalic capsule of the larva is forming. The mature larvae are up to 4

cm long and have a green ground colour with longitudinal black (thick) and white (thin) stripes and black dots outlined in white on the dorsal side of the body. The species overwinters during the larval stage.

The pupae are 1.5-2 cm long and lay inside a whitish cocoon usually deeply hidden among *Buxus* twigs and leaves.

The adults can be fairly easily identified based on external morphology (Fig. 1). The wings are bright white with tinges of purple (especially in fresh specimens). The forewings have brown costa and the termen with a wide brown margin. A white discoidal spot is well contrasted by the brown costal margin that it touches. A brown band on the anal margin of the forewing is present in many (but not all) specimens. The hindwings have a broad brown marginal band. The body is white, with the exception of the head and the terminal part of the abdomen, which are brown (MALLY & NUSS 2010, KORYCINSKA & EYRE 2011). Occasionally, melanic forms appear which are completely brown, with the exception of the white discoidal spot on the forewings (KORYCINSKA & EYRE 2011, SÁFIÁN & HORVÁTH 2011). *Cydalima perspectalis* has 3.5-4 cm wingspan and is a large species among European Crambidae. It is mostly active by night, but it may also be found during daytime (e.g. the specimen from Bucharest).

Buxus plants infested by *C. perspectalis* can be identified by the presence of a high number of dead leaves and of a considerable amount of webbing with frass and cephalic capsules of earlier larval stages. The larvae can completely defoliate *Buxus* bushes and can eventually kill the plants (e.g. KRÜGER 2008, SIGG 2009, SAGE & KARL 2010, HIZAL *et al.* 2012). The negative effects are amplified by the fact that the moth seems to have at least two-three broods in Central Europe (e.g. LEUTHARDT *et al.* 2010, SAGE & KARL 2010), which means that larvae are active during the entire growth season of the plants.

Control measures of *C. perspectalis* are relatively well-established in East Asia, due to its economic importance. There is information on its chemical (ZHOU *et al.* 2005) and biological control (CHOO *et al.* 1991, LEE *et al.* 1996), as well as on its pheromones (KAWAZU *et al.* 2007). It appears that certain field trials with the Japanese pheromone in Europe were unsatisfactory (VAN DER STRATEN & MUUS 2010). Pheromones were used to determine the number of broods in the area of Basel (LEUTHARDT *et al.* 2010). Since research on the biological control of *C. perspectalis* in Europe is highly needed, the remaining effective measures include the use of chemical products and, if possible, physical control by cutting infested material (KORYCINSKA & EYRE 2011).

The records from Bucharest and the European part of Istanbul (Turkey) (HIZAL *et al.* 2012) are the easternmost currently known on the continent. Bucharest is separated by more than 800 km from the nearest records of *C. perspectalis* in western Hungary (SÁFIÁN & HORVÁTH 2011) and by about 450 km from Istanbul. It is not impossible that the species is actually more widespread but has passed completely unnoticed in the areas between. However, given its apparently recent introduction in Europe, it is more likely that the record from Bucharest is due to accidental introduction together with infested *Buxus* plants. Since the species appears to resist well to Central European winters and can spread both naturally and artificially (through infested *Buxus* ornamental plants), it is likely that it will soon become much more widespread in Europe. In Romania urgent research is needed to assess the degree of colonization, population dynamics and potential expansion of *C. perspectalis*. Studies on its biology are also necessary in the context of limited data from Europe and especially its eastern parts.

During the last year only, two new Lepidoptera species have been added to the Romanian list of invasive species (RÁKOSY & MOMEU 2009), namely the North-American noctuid *Tarachidia candefacta* (HÜBNER, [1831]) (SZÉKELY *et al.* 2011) and *C. perspectalis*.

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References

- BILLEN W. (2007) *Diaphania perspectalis* (Lepidoptera: Pyralidae) – a new moth in Europe. *Mitteilungen der Entomologischen Gesellschaft Basel* 57: 135-137.
- BIONDI S. (2010) Forum Entomologi Italiani. <http://www.entomologiitaliani.net/forum>
- CASTEELS H., WITTERS J., VANDIERENDONCK S. & VAN REMOORTERE L. (2011) First report of *Cydalima perspectalis* (Lepidoptera: Crambidae) in Belgium. 63rd International Symposium on Crop Protection (poster presentation).
- CHOO H. Y., KAYA H. K., LEE S. M., KIM T. O. & J. B. KIM (1991) Laboratory evaluation of entomopathogenic nematodes, *Steinernema carpocapsae* and *Heterorhabditis bacteriophora* against some forest insect pests. *Korean Journal of Applied Entomology* 30(4): 227-232. (in Korean).
- DE PRINS W. & C. STEEMAN (2011) Catalogue of the Lepidoptera of Belgium. <http://webh01.ua.ac.be/vve/Checklists/Lepidoptera/Lepmain.htm>
- EPPO (2011a) New data on quarantine pests and pests of the EPPO Alert List. *EPPO Reporting Service*, Paris 9: 11-12
- EPPO (2011b) European and Mediterranean Plant Protection Organization. http://www.eppo.fr/QUARANTINE/Alert_List/deletions.htm
- FELDTRAUER J.-F., FELDTRAUER J.-J. & BRUA C. (2009) Premiers signalements en France de la Pyrale du Buis *Diaphania perspectalis* (Walker, 1859), espèce exotique envahissante s'attaquant aux Buis (Lepidoptera, Crambidae). *Bulletin de la Société Entomologique de Mulhouse* 65: 55-58.
- HIZAL E., KOSE M., YESIL C. & KAYNAR D. (2012) The New Pest *Cydalima perspectalis* (Walker, 1859) (Lepidoptera: Crambidae) in Turkey. *Journal of Animal and Veterinary Advances* 11(3): 400-403.
- KÄPPELI F. (2008) Der Buchsbaumzünsler – Im Eiltempo durch Basler Garten. *g'plus – die Gärtner-Fachzeitschrift (Zürich)* 20: 33.
- KAWAZU K., HONDA H., NAKAMURA S. & T. ADATI (2007) Identification of sex pheromone components of the box tree pyralid, *Glyphodes perspectalis*. *Journal of Chemical Ecology* 33(10): 1978-1985.
- KORYCINSKA A. & D. EYRE (2011) Box tree caterpillar *Cydalima perspectalis*. Plant pest factsheet, the Food and Environment Research Agency (Fera). www.defra.gov.uk/fera
- KRÜGER E. O. (2008) *Glyphodes perspectalis* (Walker, 1859) – neu für die Fauna Europas (Lepidoptera: Crambidae). *Entomologische Zeitschrift* 118: 81-83.
- LEE S. M., LEE D. W. & H. Y. CHOO (1996) Biology and pathogenicity of entomopathogenic nematodes, *Steinernema* spp., isolated from forest soil in southern Korea. *FRI Journal of Forest Science Seoul* 53: 117-123. (in Korean)
- LEUTHARDT F. L. G., BILLEN W. & BAUR B. (2010) Ausbreitung des Buchsbaumzünslers *Diaphania perspectalis* (Lepidoptera, Pyralidae) in der Region Basel – eine für die Schweiz neue Schädlingsart. *Entomo Helvetica* 3: 51-57.
- MALLY R. & NUSS M. (2010) Phylogeny and nomenclature of the box tree moth, *Cydalima perspectalis* (Walker, 1859) comb. n., which was recently introduced into Europe

- (Lepidoptera: Pyraloidea: Crambidae: Spilomelinae). *European Journal of Entomology* 107: 393-400.
- MITCHELL A. (2009) Box tree moth *Diaphania perspectalis* (Walk.) – a new pyralid moth to Britain and Ireland. *Atropos* 36: 17-18.
- MUUS T. S. T., VAN HAAFTEN E.-J. & VAN DEVENTER L. J. (2009) De buxusmot *Palpita perspectalis* (Walker) in Nederland (Lepidoptera: Crambidae). *Entomologische Berichten* 69: 66-67.
- RÁKOSY L. & L. MOMEU (2009) Neobiota din România. Presa Universitară Clujeană, Cluj-Napoca, 212 pp.
- RODELAND J. (ed.) (2009) Lepiforum: Bestimmung von Schmetterlingen (Lepidoptera) und ihren Präimaginalstadien. <http://www.lepiforum.de/>
- SÁFIÁN S. & B. HORVÁTH (2011) Box Tree Moth – *Cydalima perspectalis* (Walker, 1859), new member in the Lepidoptera fauna of Hungary (Lepidoptera: Crambidae). *Natura Somogyiensis* 19: 245-246.
- SAGE W. & G. KARL (2010) Der Buchsbaumzünsler *Cydalima perspectalis* (Walker, 1859) nun auch in Südbayern. *Mitteilungen der Zoologischen Gesellschaft Braunau* 10(1): 79-85.
- SIGG C.-R. (2009) Auch das noch: Ein neuer Buchs-Schadling schlägt zu. Massive Schaden durch den Buchsbaumzünsler. *Der Gartenbau (Solothurn)* 4: 2-4.
- SLAMKA F. (2010) Pyraloidea (Lepidoptera) of Central Europe. František Slamka, Bratislava, 174 pp.
- SZÉKELY L., DINCĂ V. & I. JUHÁSZ (2011) Macrolepidoptera from the steppes of Dobrogea (south-eastern Romania). *Phegea* 39(3): 85-106.
- VAN DER STRATEN M. J. & T. S.T. MUUS (2010) The box tree pyralid, *Glyphodes perspectalis* (Lepidoptera: Crambidae), an invasive alien moth ruining box trees. *Proceedings of the Netherlands Entomological Society Meeting* 21: 107-111.

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