

THE SPREAD RATE OF *CYDALIMA PERSPECTALIS* (WALKER 1859) IN SLOVAKIA (2013–2015)

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The box tree moth, *Cydalima perspectalis* (Walker) (Lepidoptera: Crambidae) was discovered in Slovakia in 2010. In 2013, we started to monitor its spread rate and we continued to do so till 2015. We found that the box tree moth has a relatively fast spread rate and it is successfully acclimatised with 3 overlapping generations in one year. It thrives in the warm climatic regions of Slovakia but can also spread to the moderately warm climatic regions. During our monitoring we observed natural predators of the box tree moth. *Passer domesticus* L. and *Parus major* L. *Turdus merula* L. and *Ficedula albicollis* Tem. predated on imagos, while *Ficedula albicollis* caught distracted flying imagos (melanic form of *C. perspectalis* did not attract predators unlike the natural form), *Turdus merula* searched for the prey in the canopy of *Buxus* sp.

Keywords: *Cydalima perspectalis*, *Buxus sempervirens*, invasive alien pest, Lepidoptera

1 Introduction

Globalization of trade and travel on an unprecedented scale has inadvertently led to the increased transport and introduction of alien species, and the breaking down of natural barriers between countries and continents (Lowe et al., 2000). Invasive alien species are increasingly recognized as one of the major threats to biodiversity (Wittenberg et al., 2006). The box tree moth, *Cydalima perspectalis* (Walker) (Lepidoptera: Crambidae), formerly placed in the genera *Phakellura*, *Glyphodes*, *Diaphania* and *Neoglyphodes* (Mally and Nuss, 2010), is a native pest of *Buxus* trees in Asia (Wang, 1980). *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 et al., 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), Slovakia (Slamka, 2010), Belgium (Casteels et al., 2011; De Prins et Steeman, 2011) and northern Italy (Biondi, 2010; EPPO, 2011a). In September 2011, Sáfián et Horváth (2011) collected the species in a botanical garden in western Hungary. In 2011, the species appeared in the European part of Turkey, being recorded from the western side of Istanbul (Hizal, 2012;

Hizal et al., 2012). However, the species also appears to be capable of bearing fairly low temperatures and spreading naturally in the continent (Krüger, 2008; Feldtrauer et al., 2009; Muus et al., 2009; Sigg, 2009; Leuthardt et al., 2010; van der Straten et al., 2010), so that its very rapid expansion is most likely due to both active colonization and independent human-induced introductions. Box trees are abundantly planted as ornamentals in most climatically suitable European regions; thus, the availability of host plants should not be a limiting factor. Although predation and parasitism seem to occur in *C. perspectalis* in Europe, few studies have covered these topics to date (Zimmermann and Wührer, 2010).

2 Material and Methods

The monitoring of *C. perspectalis* in the years 2013–2015 in Slovakia was carried out with the help of questionnaires addressed to landscape architects and horticulturists (mostly Alumni students from the Slovak University of Agriculture) and field observations. The questionnaire contained detailed descriptions and photos of *C. perspectalis* and its symptoms on *Buxus* sp. The respondents confirmed the presence or absence on the locality and attached pictures, where it was possible to clearly identify *C. perspectalis*. Doubtful data were not considered. Areas without information were visited and the presence of *C. perspectalis* was confirmed visually. Localities with the presence of

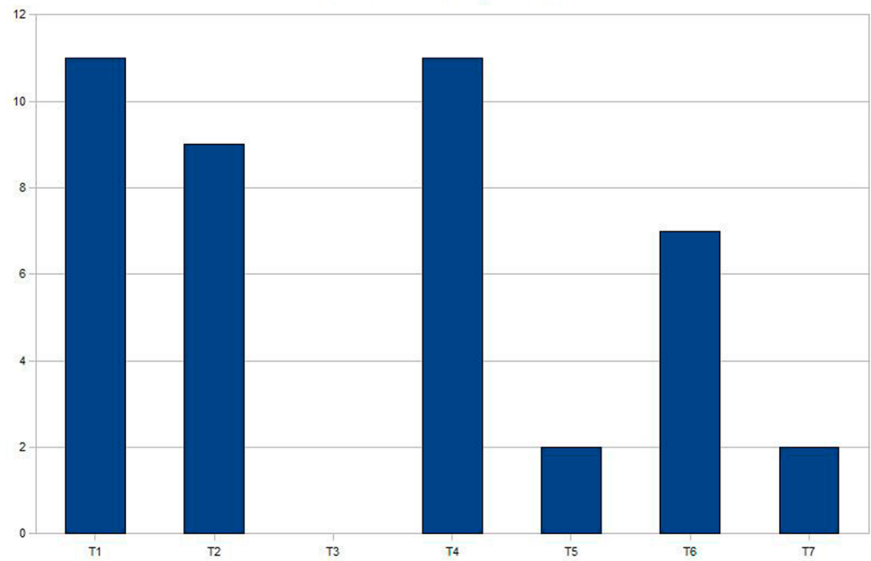


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C. perspectalis were categorized according to the Climatic regions map of Slovakia (Lapin et al., 2002). During our field observations we also tried to observe occurrence of natural predators on *C. perspectalis* larvae and imagos.

3 Results and discussion

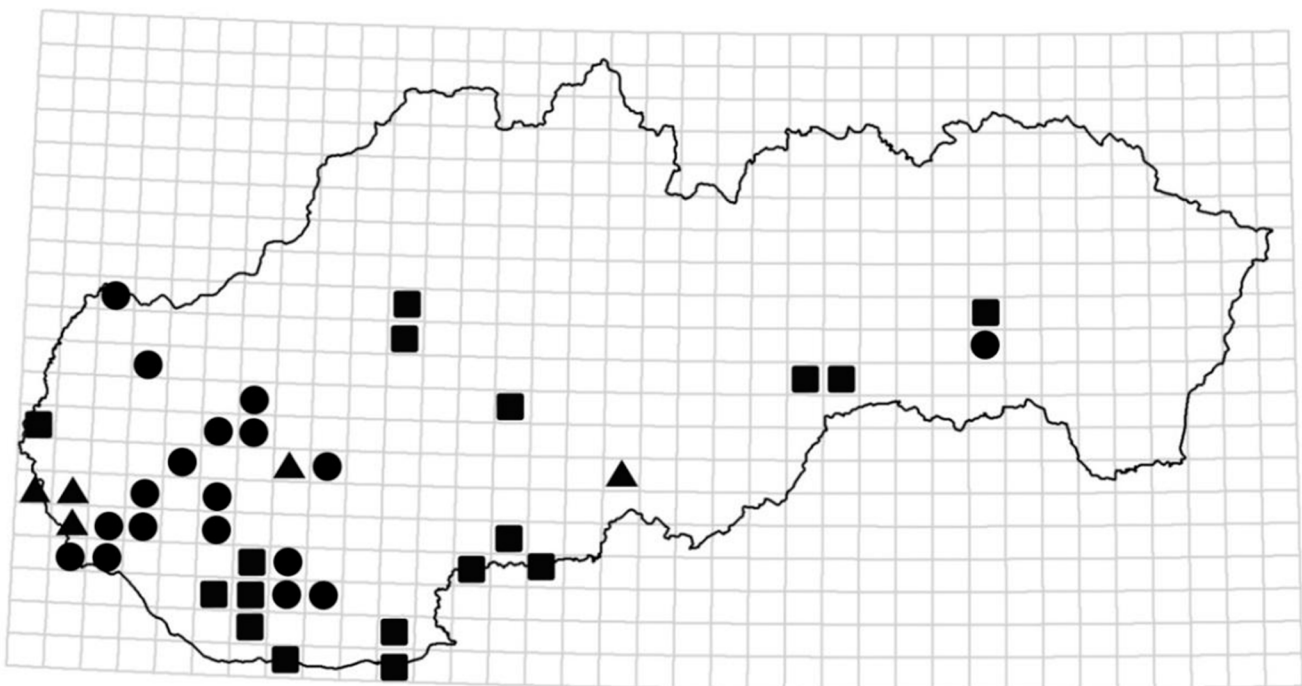
In the 1st year of monitoring (2013) we found *C. perspectalis* in Bratislava – Karlova Ves (dfs: 7686a), Nitra (dfs: 7674c) and Lovinobaňa (dfs: 7583d). In all localities, we found heavy infestations and 3 overlapping generations of *C. perspectalis*. In the next year (2014), we found a rapid spread of *C. perspectalis* in nearby localities from the infested sites but also newly infested localities. In 2014, 4 years after the first record of *C. perspectalis* in Slovakia, we found infested specimens of *Buxus* sp. in Rusovce (dfs: 7968b), Kalinkovo (dfs: 7969b), Skalica (dfs: 7169c), Senica (dfs: 7370a), Devín (dfs: 7869c), Šamorín (dfs: 7969d), Miloslavov



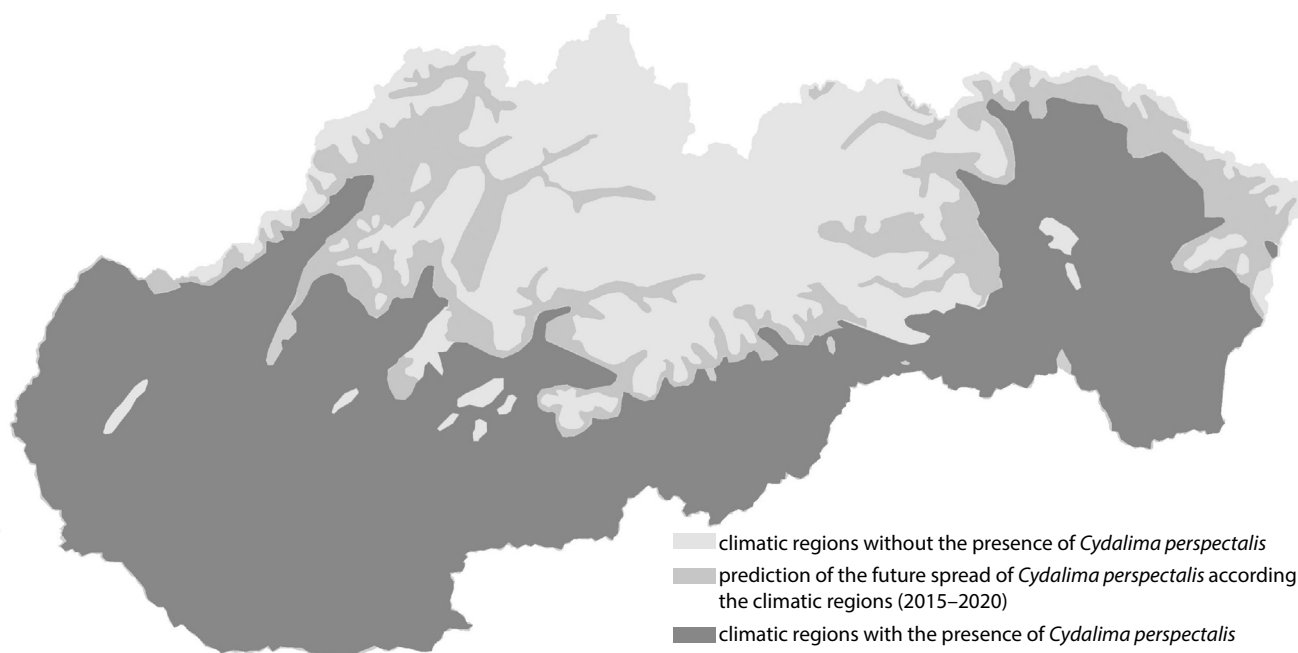
■ **Figure 1:** Number of localities with the presence of *Cydalima perspectalis* in different climatic regions
Source: Lapin et al (2002)

(dfs: 7869d), Podunajské Biskupice (7869c), Malinovo (dfs: 7869b), Záhorská Bystrica (dfs: 7768c), Chorvátsky Grob, Bernolákovo (dfs 7769d), Šenkvice (dfs: 7770a), Senec (dfs: 7770c), Hlohovec (dfs: 7869b), Piešťany (dfs: 7472b), Koliňany (dfs: 7675a), Matúškovo

(dfs: 7872a), Štitáre (dfs: 7674d) and Košice (dfs: 7293c). In all localities, we found heavy infestation with 3 overlapping generations. In the 3rd year of monitoring (2015), we found *C. perspectalis* in Zvolen (dfs: 7480b), Veľká Ves nad Ipľom (dfs: 7980b), Komárno (dfs: 8274b), Nové



■ **Figure 2:** Presence of *Cydalima perspectalis* in the monitored years (2013–2015) in Slovakia



■ **Figure 3:** Climatic regions with the presence of *Cydalima perspectalis* and further prediction of its spread in the years 2015–2020 in Slovakia

Zámky (dfs: 8074b), Sokolovce (dfs: 7473c), Modra (dfs: 7669d), Partizánske (dfs: 7376c), Kosihovce, Čebovce (dfs: 7881a), Malé Leváre (dfs: 7467d), Nitrianske Sučany (dfs: 7276d), Kamenica nad Hronom (dfs: 8178c), Trenčín (dfs: 7174a), Tvrdošovce (dfs: 7974a), Šaľa (dfs: 7873a), Trnava (dfs: 7671b), Palárikovo (dfs: 7974c) and Trebejov (dfs: 7193c).

Cydalima perspectalis was found during our survey in climatic regions characterized as warm, with more than 25 summer days (with daily maximum air temperature ≥ 25 °C). The most localities were in climatic subregions T1 (warm, very dry, mild winter) and T4 (warm, moderately dry, with cool winter) (see Fig.1). The total of 16 localities were in the climatic subregions T2 (warm, dry, with cool winter) and T6 (warm, moderately humid, with cool winter). Only 4 localities were in the climatic regions T5 (warm, moderately dry, with cool winter) and T7 (warm, moderately humid, with cool winter). The only climatic subregion in the warm climatic region without a confirmed presence of *Cydalima perspectalis* was the subregion T3 (warm, dry with cool winter). Figure 3 describes the area, where *Cydalima perspectalis* is considered a pest and also a prediction for the years 2015–2020, where *C. perspectalis* can be a pest on *Buxus* sp. Our findings are similar to the predictions made by Wan et al (2014) New localities of the box tree moth from 2016 indicate that it can successfully survive in

moderately warm climatic regions, what supports our predictions (Bakay, unpublished data).

During our survey we also observed natural predation of larvae and imagoes of *C. perspectalis*. Larvae of *C. perspectalis* were predated by *Passer domesticus* L. and *Parus major* L. *Turdus merula* L. and *Ficedula albicollis* Tem. predated on imagoes, while *Ficedula albicollis* caught distracted flying imagoes (melanic form of *C. perspectalis* did not attract predators unlike the natural form), *Turdus merula* searched for the prey in the canopy of *Buxus* sp.

4 Conclusions

C. perspectalis is considered a dangerous alien pest with a rapid spread. The box tree moth seriously damages *Buxus* species and can cause even death of older plants. Since *Buxus* is a widely used ornamental plant in Slovakia, we witnessed a very efficient spread of the box tree moth mainly in the warm climatic regions of Slovakia. The box tree moth had 3 generations and we predict its wider spread in to the moderately warm climatic regions of Slovakia. Further monitoring is necessary especially with the focus on natural predators of the box tree moth in Slovakia.

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