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Box Tree Moth *Cydalima perspectalis* as a Threat to the Native Populations of *Buxus colchica* in Republic of Georgia

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ABSTRACT

An invasive phytophagous insect, the *Cydalima perspectalis* (Walker, 1859) (Lepidoptera: Crambidae), new to the fauna of the region of the Caucasus Mountains, was detected in boxwood plantations of various species in the region of Krasnodar Krai. In 2013, larvae of the moth caused lethal damage to artificial plantations of boxwood in the Greater Sochi area and Novorossiysk area in southern Russia. In summer and autumn 2015, 48 and 13 boxwood study sites respectively in the natural *Buxus colchica* (Pojark) forests were examined in six regions (out of nine) in the Republic of Georgia. The substantial damage caused by *C. perspectalis* feeding on boxwood leaves in native boxwood forests was discovered in four different regions in the western part of the Republic of Georgia: Imereti, Samegrelo-Zemo Svaneti, Guria and Autonomous Republic of Adjara. Today, the box tree moth is known to occur at several locations in the Black Sea coastal region of the Caucasus Mountains. This paper provides the first well documented record of *C. perspectalis* in the Caucasus region.

Key words: Caucasus Mountains, *Buxus colchica*, invasive species, box tree moth.

INTRODUCTION

Buxus colchica (Pojark) is an evergreen Tertiary-period relict plant on the IUCN Red List of Threatened Species. Since 2006 *B. colchica* has been also included on the 'Red List' of the Republic of Georgia in the category VU, criterion A2, i.e. due to the tendency of areal fragmentation and habitat loss. Kolkhic boxwood is a related species of boxwood growing in Europe. According to a database known as "The Plant List" (http://www.theplantlist.org/.) kolkhic boxwood is regarded as synonymous with *B. sempervirens*. The name refers to the ancient landscape of Colchis on the Black Sea, the main distribution area of this variety in the Republic of Georgia, with the Georgian trivial name "Kolchuri Bsa" (in Georgian: კოლხური ბზა). The geographic range of the *B. colchica* is concentrated in the Caucasus – from North Kolkheti in southern Russia to South Kolkheti in Turkey. It can be found in the northeastern part of Turkey (Trabzon) and on the Russian Black Sea coast as well as in Azerbaijan (Talish)

(Matchutadze and Davitashvili, 2009). But mainly it is found in the western part of the Republic of Georgia – in limestone massifs – in the regions of Abkhazia, Samegrelo, and Racha-Lechkhumi. The plant occurs within an elevation range of 1,300 to 1,800 meters above sea level (Matchutadze and Davitashvili, 2009).

Buxus colchica is a forest forming species of *Carpinus betulus* L. and other broad-leaved forests stands. In this type of forests, the following endemic species characteristic of limestone are represented in large numbers, i.e. *Ruscus ponticus* Woronow, *Hedera helix* L., *Asplenium adiantum-nigrum* L., *Carex divulsa* Stokes, *C. transsilvanica* Schur, *Veronica peduncularis* M. Bieb., *V. persica* Poir. (Akhalkatsi, 2015). In the eastern part of the Republic of Georgia, boxwood stands are in abundance in the Aragvi gorge and the localities of Saguramo, Bulachauri, and Navdaraant Kari. In Kakheti region, boxwood stands are encountered at a number of locations. The place "boxwood hill" is strongly represented in the Kvareli region, along the Bursa riverbanks: Devubani, Sviana Khevi, Chontis Khevi, Saborio Khevi and Didgori localities. Hornbeam, Georgian oak, lime, and beech are compatible species of the aforementioned boxwood forests in the river Stori gorge. In these forests, boxwood forms the secondary layer. Moreover, *B. colchica* is found in the region of Kolkheti in broad-leaved mixed forests featuring *Rhododendron ponticum* L., *Laurus nobilis* L., *Ruscus colchicus* Yeo, *R. ponticus* Woronow, *Daphne pontica* L., *Ilex colchica* Pojark., *Rhododendron ungernii* Trautv., *Epigaea gaultherioides* (Boiss. and Balansa) Takht, which are mainly distributed in the western part of the Republic Georgia in non-marshy lowland locations and at lower elevations of woodland areas. There are different opinions on the primary origin of the boxwood found in the eastern part of the Republic of Georgia. Some researchers view it as a Tertiary era relict, which is preserved in nature refuges (Matikashvili, 1953). Most researchers believe that the box tree was planted in the surroundings of churches, and eventually became naturalized in the natural environment of its new geographic range (Akhalkatsi, 2015). *B. colchica* is a small-leaved and the most winter hardy of European boxwood, which can withstand winter temperatures up to -10 °C, and lives up to 600 years, but grows very slowly. Under favorable conditions, it reaches a height of 15 m (sometimes 20 m), and its base diameter reaches 30 cm. *B. colchica* branches are straight, sticking out, four-sided, and green. All parts of the plant, especially the leaves, are poisonous to humans. In order to grow the *B. colchica*, carbonate soils are required or it can grow on limestone rock sand in alluvial soil. Plant communities of the *B. colchica* create a favorable wet microclimate (Matchutadze *et al.,* 2013).

The first signs of *B. colchica* damage were discovered in 2009. In 2011, a new disease (box blight) caused by the invasive fungi species *Calonectria pseudonaviculata* (Crous, J.Z. Groenew. and C.F. Hill) L. Lombard, M.J. Wingf. and Crous (anamorph *Cylindrocladium buxicola* Henricot) was found in boxwood natural populations in protected areas in the Caucasus region (Gorgiladze *et al.,* 2011; Meparishvili, 2013). An assessment of sanitary conditions in natural populations of boxwood was conducted in June and October 2014 in Mtirala National Park and the Kintrish Protected Area (Matsiakh, 2014; Matsiakh and Tsiklauri, 2015). According to this study, a new threat

to natural boxwood found across the Colchis lowlands caused by the harmful invasive phytophagous species known as the box tree moth, *Cydalima perspectalis* has been recently discovered in 2014 (Matsiakh, 2015). Damage to the box tree by the box tree moth was identified in green areas located near the offices of the Kintrishi Protected Area (Kobuleti) and the offices of Mtirala National Park (village of Chakvi) as well as in the city of Batumi and the Tikeri nursery farm (Administration of Kobuleti, Lepl Forestry Agency of Adjara). The first specimen of *C. perspectalis* was found on September 22, 2012 in the Russian city of Sochi on boxwood bushes found at a temporary nursery, where the plant material had been imported from Italy for the planting area of the Basic Olympic Village in the Imeretian Valley (Tuniyev *et al.,* 2016). The control measures in place with using insecticide "Aktelik" were not successfully enough which caused the subsequent rapid resettlement and spread of the pest to the green stands of Sochi and later the natural population of boxwood in the yew-box grove in the Caucasian Biosphere Reserve (short unpublished information in the Georgian language). Since October of 2013, *C. perspectalis* has penetrated the relict native boxwood forests of Sochi National Park (Shchurov *et al.,* 2013).

Today the box tree moth is well-known as native insect pests in subtropical regions of eastern Asia (i.e. India, China, Korea, Japan, Russian Far East) (Walker, 1859; Hampson, 1896; Inoue, 1982; Kirpichnikova, 2005; Park, 2008; Leraut, 2012), whereas at the same time, *C. perspectalis* is an invasive species in box tree *Buxus* spp. areas in Europe, and has been spreading and establishing itself across the continent over the last decade. First the species were observed in the southwestern Germany and later in 2007 in the Netherlands (Krüger, 2008; van der Straten and Muus, 2010). Currently *C. perspectalis* spreads rapidly across Europe, i.e. in Switzerland (Leuthardt *et al.,* 2010), France (Feldtrauer *et al.,* 2009), England (Salisbury *et al.,* 2012), Belgium and Austria (Lepiforum, 2013), Croatia (Koren and Crne, 2012), Czech Republic (Šumpich, 2011), Hungary (Sáfián and Horváth, 2011), Italy (Lepiforum, 2013), Romania (Székely *et al.,* 2011), Slovenia (Seljak, 2012), Slovakia (Pastorális, 2010), Turkey (Hizal *et al.,* 2012).

The purpose of this study was to inspect the spatial distribution associated with the box tree moth, which now poses a significant threat to existing native populations of *B. colchica* in the Republic of Georgia.

MATERIALS AND METHODS

In summer and autumn 2015, natural forests of boxwood were examined in six regions (out of nine) in the Republic of Georgia, including the species' distribution area from the east to the west of the country in the following geographic areas: Kakheti, Imereti, Racha-Lechkhumi and Lower Svaneti, Samegrelo-Zemo Svaneti, Guria and Autonomous Republic of Adjara. All the development stages of the *C. perspectalis* were collected in the course of fieldwork, and photographed using a Canon G15 camera. The adults were identified according to Mally and Nuss (2010). Areas of the spread of the box tree moth were mapped using GPS coordinates.

RESULTS AND DISCUSSION

In summer and autumn of 2015 a total of 48 and 13 boxwood study sites were examined respectively. A brief description of the sanitary conditions of these forests and the discovery of box tree moth concentrations in the aforementioned study areas were presented in Table 1. In July and August, substantial damage caused by *C. perspectalis* feeding on boxwood leaves in native boxwood forests was discovered in two regions in the western part of the Republic of Georgia: Samegrelo-Zemo Svaneti and Guria Regions. The plants had been completely defoliated by the box tree moth and a very large number of *C. perspectalis* imago individuals were discovered in boxwood forests in Djumari (Guria region) (Fig. 1).

In October and November of 2015, damage caused by the box tree moth on the *B. colchica* was discovered in Zestaponi (Imereti Region) as well as in natural boxwood populations in the Autonomous Republic of Adjara. In the course of summer research, the distribution of the *C. perspectalis* was observed in boxwood forests and green areas in the Black Sea coastal region. This finding confirms that the box tree moth is spreading into native boxwood forests towards the central part of the Republic of Georgia. The greatest damage caused by *C. perspectalis* feeding on boxwood trees in the Autonomous Republic of Adjara demonstrates the successful adaptation of an alien pest in the natural forests of the Caucasus region, causing great concern and the threat of the extinction of native boxwood forests in this region (Fig. 2). The fully defoliated with a dry appearance plants after the heavy infestation by larvae of *C. perspectalis* was observed on plants of *B. colchica* grown as a tree close to the village of Mirveti and along local rivers (Fig. 3). During the autumn inspection, no tree with green leaves have been found and many trees had debarked trunks (Fig. 4). It was supposed, there is no chance for them to recover. Trees with intact bark can resprout, but it is likely they will not be able to survive next spring under new attack from overwintering larvae.

The damage caused by *C. perspectalis* to native box trees in the Caucasus region was found to be critically serious. The morphologic description of the different life stages and damage caused by the box tree moth were studied in detail by Korycinska and Eyre (2011). The biological and morphologic features of the box tree moth were examined and described in this paper based on the above mentioned research study. Greenish yellow eggs with black heads were found on the underside of box tree leaves, overlapping each other. Newly hatched larvae were greenish yellow in color with a pattern of thick black and thin white stripes along the length of the body, and can reach a length up to 40 mm (Fig. 5). It is known that the box tree moth has six larval stages and the last stage of larva can retain a yellowish green base color, but sometimes can also be more brownish. First, instar larvae feed by “windowing” or eating the lower surface of leaves only and leaving the upper epidermis intact. A study conducted by Leuthardt (2013) showed that young larvae contain twice as much alkaloid content as larvae in later instars. The alkaloid content doubles between one-year-old leaves and older leaves in box tree leaves, which may explain why damage on a box tree

most often starts in the lower part of the tree, where the oldest leaves are found. Older larvae feed inside silk webbing and skeletonized leaves of host plants, leaving only the midribs, and occasionally the outer margin, intact. Webbing, frass, and molted black head capsules were also observed. The two-color form of imago was detected in native boxwood forests found in the Caucasus region. First, one the most common color form of adults has a thick dark brown fringe of uneven width around the edges of white-colored wings with a wingspan of around 4 cm (Fig. 6). Another less common color form of imago, has completely brown wings, except for a small white streak on the forewing (Fig. 7). The pupae were in cocoons of white webbing spun among foliage on boxwood trees. The winter stage of the box tree moth as a larva protected in a cocoon spun between *Buxus* leaves was observed in November 2015 (Fig. 8).

Figs. 1-2. 1. Fully defoliated native boxwood forests in the Djumari, Guria Region in summer 2015. (Photographed: Aug. 1, 2015 by I. Matsiakh). 2. Damaged and dead boxwood trees in Kirnati vil., Autonomous Republic of Adjara (Photographed: Novemb. 3, 2015 by I. Matsiakh).

Figs. 3-4. 3 Native boxwood trees (*Buxus colchica*) after infestation of *Cydalima perspectalis* near the Mirveti waterfall, Autonomous Republic of Adjara (Photographed: Novemb. 3, 2015 by I. Matsiakh) 4. Trunks of boxwood trees debarked by the box tree moth in the Kirnati vil., Autonomous Republic of Adjara (Photographed: Novemb. 7, 2015 by I. Matsiakh).

Table 1. Locations, stand characteristics for sampling sites and reported pests and diseases of *Buxus colchica* in the Republic of Georgia

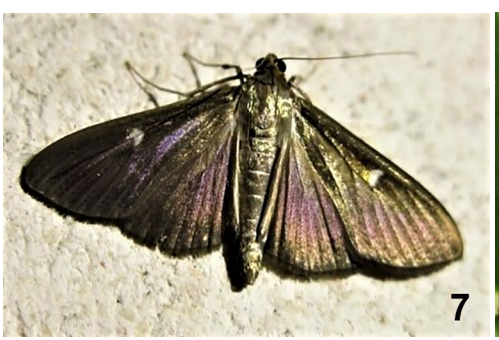
Region	Locality, Forestry district	Coordinates; altitude above sea level, m	Description of boxwood forests type	Health conditions of examined trees*	Sampling period; numbers of inspected research sites	Damages by *Cydalima perspectalis*	Symptoms of *Calonectria pseudonaviculata*	Presence of other pests and pathogens
Kakheti	Telavi, Kvareli	42°06'51,21"N 45°25'13,34"E from 583 to 608	Planted near the local cemetery under good growing conditions, 300-year-old tree	Healthy looking trees	Summer 2015; 2	no	no	yes
					Autumn 2015	No visit to this region		
	Akhmeta, Kvarelli		Planted on "Boxwood Mountain" with hornbeam, beech and Georgian oak, 90-year-old tree	Healthy looking trees	Summer 2015; 4	no	no	yes
					Autumn 2015	No visit to this region		
Imereti	Zestaponi, Kutaisi	42°17'39,81"N 43°00'12,57"E from 656 to 772	Planted on formerly agricultural land near rivers and an electric power plant and native 200-year old trees growing with sweet chestnut hornbeam, wild pear and maple in the main vegetation layer	Recovered after strong infection of boxwood blight disease	Summer 2015; 6	no	yes	yes
					Autumn 2015; 1	yes	yes	yes
	Tkibuli, Kutaisi	42°20'08,93"N 43°01'59,19"E from 460 to 1051	Native 100-year-old trees and shrubs located near the Sagvelitbe river and on the slopes	Generally healthy looking trees but with symptoms of boxwood blight disease, recovered after infection	Summer 2015; 9	no	yes	yes
					Autumn 2015; 3	yes	yes	yes
Racha-Lechkhumi and Lower Svaneti	Ambrolauri	42°28'35,76"N 43°03'46,22"E from 497 to 1069	Native 70- to 130-year-old trees on the banks of the Shareula and Jonouri rivers	Healthy looking trees	Summer 2015; 7	no	no	yes
					Autumn 2015; 3	no	no	yes
	Tsageri, Ambrolauri	42°36'10,70"N 42°39'50,68"E 578	Native 70-year-old trees on the banks Jonouri river	Healthy looking trees that suffer from strong recreational activity	Summer 2015; 4	no	no	yes
					Autumn 2015; 1	no	no	yes

Table 1. Continued.

Region	Locality, Forestry district	Coordinates; altitude above sea level, m	Description of boxwood forests type	Health conditions of examined trees*	Sampling period; numbers of inspected research sites	Damages by *Cydalima perspectalis*	Symptoms of *Calonectria pseudonaviculata*	Presence of other pests and pathogens
Samegrelo-Zemo Svaneti	Zugdidi	42°24'03,67"N 41°48'58,30"E 166	Planted trees near the monastery	Damaged with wood decay symptoms	Summer 2015; 2	yes	yes	yes
					Autumn 2015	No visit to this region		
	Zugdidi, Tsalenjikha	42°41'36,71"N 42°09'32,12"E from 328 to 498	Native 100-year-old trees on the banks of the Khobistskhali and Tsiokvilara rivers	Damaged and recovered trees	Summer 2015; 6	yes	yes	yes
					Autumn 2015; 3	yes	yes	yes
	Zugdidi, Martvili	42°35'52,02"N 42°21'14,40"E from 240 to 438	Native 80-year-old trees on the banks of Tehuri river and planted 200-year-old trees near to the monastery of Fathers, Abasha river	Damaged and completely defoliated trees and shrubs	Summer 2015; 4	yes	yes	yes
					Autumn 2015	No visit to this region		
Guria	Lanchkhuti, Guria	41°55'46,99"N 42°01'30,16"E from 22 to 123	Planted near Guria city	Completely defoliated and dead trees	Summer 2015; 4	yes	no	no
					Autumn 2015	No visit to this region		
Autonomous Republic of Adjara	Khelvachauri, Batumi	41°35'03,47"N 41°42'56,39"E 235	Planted as a second layer with sweet chestnut, black alder and *Juglans* sp.	Completely defoliated and dead trees	Summer 2015	No visit to this region		
					Autumn 2015; 2	yes	yes	yes
					Total in summer 2015: 48 inspected research sites			
					Total in autumn 2015: 13 inspected research sites			

*health conditions of examined trees: healthy looking, recovered, damaged, completely defoliated, dead trees

Figs. 5-6. 5. Mature *C. perspectalis* larva feeding on a boxwood leaf (Photographed: Novemb. 6, 2015 by V. Kramarets). 6. Imago of the box tree moth with a typical brown and semi-transparent white wing pattern (Photographed: Novemb. 6, 2015 by V. Kramarets).



Figs. 7-8. 7. Imago of the box tree moth with virtually fully brown wings (Photographed: Novemb. 7, 2015 by I. Matsiakh). 8. The winter stage of the box tree moth larva protected in a cocoon spun on *Buxus leaves* (Photographed: Novemb. 7, 2015 by V. Kramarets).

During the short period of the research study, the number of the box tree moth generations was not possible to determine. It is known that two generations per year occur in Central Europe (Nacambo *et al.,* 2013), while in China the number of the box tree moth generations per year varied between three and five (Chen *et al.,* 2005; She and Feng, 2006). Initial observations in the Sochi region of southern Russia have shown that the insect pest may have from two to four generations per year (Gninenko *et al.*, 2014). The researchers found 2nd and 3rd instars under natural conditions in Sochi in late October 2013, and the larvae actively crawled, but only a fraction of them fed in mid-November (Gninenko *et al.*, 2014). In addition, Gninenko *et al.* (2014) mentioned that the latest generation of *C. perspectalis* may develop with the timing of certain phases partially overlapping. Late pupae and third-generation females occurred in nature, and 1st and 3rd instars of the next “wintering” generation were observed in late October. It is very important to establish the development cycle of this species and the total number of complete generations per season in the Caucasus region. Due to its multivoltine capacity to develop several generations per the year in its native conditions (Maruyama and Shinkaji, 1993, Zhou *et al.,* 2005),

the subtropical climate of the Caucasus region contributes to the development and nutrition of larvae, which increases their ability to spread. Moreover, the large size of adults and their ability to migrate 7-10 km per year (Leuthardt *et al.*, 2010) and the presence of a sufficient number of boxwood trees in the forests, the landscaping of cities, villages, churches, and cemeteries, might create an additional threat to native boxwood forests in the Caucasus region. It is known that one of the features of an altered state of biocoenosis is a violation of forest layering (Jonsson, 2012). In the research, a large amount of excrement was found on the surface of the soil that may be a source of mineral nutrients for grass, and in some places, direct sunlight may reach the lower tiers of shade-tolerant plants. Presumably, this is beneficial to the growth of grass cover, as air circulation does not violate the dense mats of decaying leaves. In this particular case, the displacement of weakened boxwood by plants and shrubs from the lower vegetation layers was observed.

In our opinion, entirely new succession and biocoenosis will change existing boxwood forests. Having destroyed its primary source of food, the pest will begin to feed on other plants and tree species. The main host plants of *C. perspectalis* are *Buxus* species including *B. sempervirens* L., *B. microphylla* Siebold and Zucc., *Buxus balearica* Lam., *B. sinica* (Rehder and E. H. Wilson) M. Cheng and *B. colchica*. In its various countries of origin, the studied pest has also been reported on *Euonymus japonicus* Thunb., *E. alatus* (Thunb.) Siebold (Celastraceae), *Ilex purpurea* Hassk. (Aquifoliaceae), *Pachysandra terminalis* Siebold and Zucc. and *Murraya paniculata* (L.) Jack (Rutaceae), but still there are no reports of these plant species being attacked in Europe (Wang, 2008; Hizal *et al.,* 2012; Bella, 2013). In the Imereti (Zestaponi) and Adjara Regions, where *C. perspectalis* has destroyed all local boxwood plants, larvae of the box tree moth have been found on *Rubus* spp.*, Ruscus colchicus* Yeo, *Rubus fruticosus* L. and *Smilax excelsa* L. Nevertheless, infestation with *C. perspectalis* also was discovered on *Ruscus colchicus* Yeo*, R. aculeatus* L.*, Eriobotrya japonica* (Thunb.) Lindl., *Acer campestre* L.*, Fraxinus excelsior* L. and *Rubus* spp. in the city of Sochi (Trokhov and Kaurova, 2015). Those visible damages have been observed in very rare occasions and it is not very likely that box tree moth has an impact on phytocoenosis in a more general sense. On the other hand, *Euonymus* spp. and *Ilex purpurea* that widely distributed in Transcarpathia (West Ukraine) have been mentioned as the alternative hosts that may increase the risk of damage by this invasive pest to be distributed in other parts of the Ukraine (Nagy *et al.,* 2017).

It remains unknown if generalist or specialized natural enemies of *C. perspectalis* in the Caucasus can feed on larvae and imagines of this insect. Nevertheless, eco-friendly regulation using predators and parasitoids (*Chrysoperla carnea* Stephens, *Harmonia axyridis* Pallas, *Orius majusculus* Reuter and *Trichogramma* wasps) was discussed by Herz and Göttig (2015) and Tabone *et al.* (2015). Acceptance tests by Göttig and Herz, (2016). with eight *Trichogramma* species showed that there is a present acceptance of *C. perspectalis* as a host especially for *T. dendrolimi* (Matsumura, 1926), but parasitism was low for all the studied species (maximum mean: 44%) (Göttig and

Herz, 2016). Tachinid *Pseudoperichaeta nigrolineata* (Walker, 1853) has emerged from late larval instars, but none of the 194 pupae collected during field surveys had become parasitic (Nacambo, 2012). The use of an Asian host-specific natural enemy for classical biological control has to exclude potential negative effects on non-target species of lepidopteran families native to Europe (Wan *et al.*, 2014).

There are no specialized enthophages of *C. perspectalis* have been reported in the studied region. Thus, one research approach may be to search for specialized entomophagous species in natural habitats as well as their introduction into the Caucasus region. From March 2015 through April 2015, more than 1,100,000 individuals of the entomophagy *Chouioia cunea* Yang (Hymenoptera: Eulophidae) were introduced to native boxwood forests in Sochi National Park (Tuniyev *et al.,* 2016). During April 2015, eight beehives of Fabra populated by the wasp *Euodynerus posticus* Herrich-Schaeffer, were established in the Adler Forestry (Tuniyev *et al.,* 2016). This practice may be a sensible solution aimed to reduce the negative impact of herbivore invaders, however requires a large amount of investment as well as a thorough analysis of all possible risks from the released new parasites and their effects on other native local insects. It has shown that biological insecticide produced from the soil bacterium *Bacillus thuringiensis* var. *kurstaki* (Berliner, 1915) may be used to successfully *C. perspectalis* caterpillars control (Cawoy *et al.,* 2011, Lacey *et al.,* 2015). A new means used to control the box tree moth using the baculovirus *Anagrapha falcifera* nucleopolyhedrovirus (AnfaNPV) have been recently investigated (Rose *et al.,* 2013). Laboratory experiments have demonstrated susceptibility of *C. perspectalis* to AnfaNPV.

There are no available studies connected with a search for fungi or bacteria that can cause disease in the box three moth in the Republic of Georgia. In our opinion, the study on effective special biological agents may serve as potentially promising pathways towards their development as microbial control agents against *C. perspectalis*. Intraspecific competition for food as the most radical level of influence is included in the massive outbreaks of the box tree moth. With a shortage of food, some larvae die, while others move towards nourishment via inappropriate - or unsuitable for them - host plants. This might cause a reduction in larva survival rates and sharply reduces the fecundity of adults, finally leading to a very rapid attenuation of a herbivore outbreak. The quick reproduction of the box tree moth and the depletion of fodder may pursue the pests to actively search for new forage plants. The adaptation to new sources of nourishment may ensure survival of *C. perspectalis* in the Caucasus area.

The successful acclimatization of this species is also enhanced; adaptation to new forage plants with the absence of natural mechanisms of regulation of pest populations serve as a significant threat to the natural vegetation of the studied region. The penetration of box tree moth into the native boxwood forests is also alarming and compounded by the defeat of *B. colchica* by the boxwood blight pathogen. The first published data on the discovery of *C. buxicola* in the Republic of Georgia became available in 2011 (Gorgiladze *et al.,* 2011). Today, the pathogen is observed in four regions of the country (Matsiakh, 2015). The box tree moth is spreading in the Republic

of Georgia during two years after its introduction in Batumi. The pest has either spread naturally or has been introduced by man multiple times in the study area. As a result, it is now established widely in the western part of the country and in many places across Europe (Nacambo *et al.,* 2013).

This is the first well documented record of *C. perspectalis* in the Caucasus region, and based on its reproductive potential, it may be expected that it will rapidly spread into other regions of the Republic of Georgia, substantially damaging native boxwood forests and becoming a threat to the existence of *Buxus colchica* as a species in the Caucasus region.

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