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Impatiens glandulifera, a new host of the tortrix *Pristerognatha fuligana* in Bulgaria

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Abstract. In October 2020, larvae of *Pristerognatha fuligana* ([Denis & Schiffermüller], 1775) (Lepidoptera: Tortricidae) were found in stems of the invasive alien species *Impatiens glandulifera* Royale in Sofia region on the slopes of Plana and Lozenska Mt. The trophic connection of this tortrix moth with *I. glandulifera* is new for Bulgaria.

Key words: invasive plants, insect-plant interactions, food web.

Introduction

Impatiens glandulifera (Himalaya balsam) is a highly adaptive and invasive neophyte, participating mainly in monodominant or mixed hygrophytic communities with the native vegetation along the rivers (CABI 2015). The species is widely known as an invasive alien in temperate areas in Europe, Asia, North America and New Zealand. In Bulgaria *I. glandulifera* was first recorded in 1978 (Petrova *et al.* 2020). Hymalayan balsam poses a significant threat to habitat status and biodiversity (Tokarska-Guzik *et al.* 2012). Its expansion can reduce species richness by as much as 25% can reduce species richness by as much as 25% (Hulme & Bremner 2005). At present, the mechanisms for limiting the distribution and impact of its populations have been sufficiently studied, including the possibilities for biological control (Sheppard *et al.* 2006). For now, the task is to identify the natural enemies of the Hymalayan balsam, such as insect pests.

In Bulgaria, studies related to pests of this invasive species are isolated. Until now one such insect species has been found – *Chrysolina herbacea* (Duftschmid, 1825) (Coleoptera: Chrysomelidae) (Belilov *et al.* 2020). This necessitates additional research on insect pests of *I. glandulifera*, trophically associated with this invasive plant in order to determine their regulatory role in its population.

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Material and Methods

The study was carried out in October 2020, at the end of the vegetation season, in four test plots in Sofia region. In each test plots, the stems of invasive plants were checked for *Pristerognatha fuligana*'s caterpillars. Two plots were selected in **Plana Mt.** – one in the vicinity of Dolni Okol vill. (42°29'40.51"N 23°29'12.81"E, 8.10.2020, 1066 m a.s.l., 8 larvae) and another one in Dyavolski most area (42°33'36.85"N 23°25'21.69"E, 12.10.2020, 650 m a.s.l., 4 larvae) and further two were studied in **Lozenska Mt.** – one in "Sipei" area 42°34'2.076"N 23°25'48.594"E, 15.10.2020, 655 m a.s.l., 9 larvae) and another close to Kokalyane vill. (42°34'44.555"N 23°25'34.075"E, 21.10.2020, 650 m a.s.l., 11 larvae). Larvae were found on each plot.

The *P. fuligana*'s larvae were determined according to Swatschek (1958). We also used lepiforum.de 2019, the German web portal of Lepiforum. The larvae of this moth are pale greenish with light brown heads and prothoracic plates (Fig. 1).

The larvae of moth were photographed in laboratory condition with a Nikon D750 camera mounted on StackShot Automated Macro Rail plus a Nikon AF-S VR Micro-NIKKOR 105 mm Lens and Raynox DCR-250 Macro Lens. Forthy nine selected images were combined with Helicon Focus (version 7.6.1) software. Finally, the resize, color balance, contrast and sharpness were adjusted using Adobe Photoshop CS6.

Fig. 1. *P. fuligana*'s larva in stem of *I. glandulifera.*

Results and Discussion

As a result, a number of 5.5 larvae of *Pristerognatha fuligana* per site were found in the rotting stems of *I. glandulifera*. In each case, only one caterpillar per stem was found. They were observed to feed close to the discoid webs of the host plant. No pupae or traces of holes in the stems were found. The tortrix larvae were observed in 80% of the stems of plants each of plot. *P. fuligana* has been first reported in the country in the Sofia region by Velcheva (2000), but so far it had not been associated with a food plant. The trophic connection of *P. fuligana* with *I. glandulifera* is new for Bulgaria. *P. fuligana* is monophagous, the larvae feed on tissues inside the stems of *I. glandulifera* and *Impatiens*

noli-tangere L. In the literature, the Himalayan balsam is a well-known food plant of the moth, but it had been reported only in two countries – Belgium and Switzerland (Meert & Nossent; Burkhart & Nentwig 2008). The natural habitat of *P. fuligana* covers Western and Eastern Europe and expands to the East Palaearctic region as far as Japan, but it is not known in its native distribution range of Himalaya (Razowski 2003; Burkhart & Nentwig 2008). The tortrix moth has one generation, at least two ones are possible. Imagines fly from April to August and eggs are laid during this period in the stems of touch-me-not balsam and Himalayan balsam, where the stem-mining caterpillar feeds and hibernates (Razowski 2003). In Bulgaria, another species of *Pristerognatha* occurs, *P. penthinana* (Guenée, 1845) (Zlatkov 2011). However, this moth is monophage feeding only on *Impatiens noli-tangere* (Razowski 2003).

In our study, no negative effect of moth on the growth of *I. glandulifera* was found. In Switzerland it has also been shown that *P. fuligana* did not have an effect on the development of the Himalayan balsam and did not harm the plant (Burkhart & Nentwig 2008).

I. glandulifera is a fairly large plant and the impact of just one caterpillar of *P. fuligana* is too small to affect its growth. Also, the plant regenerates easily, which helps to quickly close holes from caterpillars feeding, thus also preventing its further infection by pathogens. Finally, we conclude that this moth is not an effective natural regulator of this highly invasive species. However, there seems to be a considerable impact of specialised herbivores in its native area (Liu & Stiling 2006). Therefore, the study of its enemies might nevertheless result in a method to control its invasion in Bulgaria.

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