First Report of an Established Population of *Gelechia hippophaella* (SCHRANK, 1802) (Lepidoptera: Gelechiidae) on Seabuckthorn in Latvia

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Abstract: This is the first report of an established population of *Gelechia hippophaella* (SCHRANK, 1802) in Latvia. Three leaf-feeding moth species: *Archips rosana, Exapate congelatella* and *Gelechia hippophaella* were identified in the seabuckthorn (*Hippophae rhamnoides*) plantations of which *G. hippophaella* was the dominant species.

Key words: *Hippophae rhamnoides, Gelechia hippophaella*, new pest, Latvia.

Introduction

Seabuckthorn (*Hippophae rhamnoides*) is a valuable and, in several countries, a newly cultivated fruit crop of high dietary, pharmaceutical, processing and decorative value. Its fruits are one of the most important processing products, which contain a significant diversity of healthy compounds, e.g. antioxidants (ascorbic acid, gallocatechins, proanthocyanidins, tocopherols, etc.) (Zadernowski et al. 2003, Rösch et al. 2004, Albrecht, Fischer 2005, Shternshis 2005, Seglina et al. 2006, Périno-Issartier et al. 2010). In addition, other parts of seabuckthorn plants (leaves, shoots and bark) are also a significant source of different useful compounds for medical needs (Gol'dberg et al. 2007, Morozov 2007). In Latvia, seabuckthorn is not a native plant species and its cultivation was started approximately 100 years ago (Mauriņš, Zvirgzds 2006). Today seabuckthorn in Latvia is an important crop plant for processing purposes –cosmetic products, balsams, juice, and oil. Seabuckthorn fruits produced in Latvia are used as additives in acidified milk products and additionally, a large amount of the fruit crop is exported (Segliņa 2007).

More than 20 pest species have been reported from the native distribution areas of seabuckthorn in Asia (mainly China and Siberia) (Sharma 2003, Shternshis 2005, Luo et al. 2008, Ming et al. 2008) and two species – *Rhagoletis batava* and *Gelechia hippophaella* were identified as being the most important in Siberia (Shternshis 2005).

Until the beginning of the 21st century, no significant pests were observed on this plant species in Latvia. In 2007, complaints were received from one farm about significant damage to seabuckthorn foliage – a large number of spun leaves caused by moths of an unknown microlepidoptera. Our aim was to identify this new pest species.

Methods

Studies were conducted in a commercial seabuckthorn plantation located near Miltiņi village (Bērzes pagasts, Dobeles municipality, Central Latvia) – in the same farm that initially reported damage, and two seabuckthorn fields (14 and 6 year old) were assessed. The two seabuckthorn fields were separated by an apple orchard approximately 200 m in width.

In order to identify the Lepidoptera species, damaged plant parts infested by larvae randomly were collected in the 14 year old field

on three dates – 27.05.2010, 31.05.2010 and 09.06.2010. Collected larvae were reared in glass bottles covered with a plastic Petri dish. Until pupation, larvae were periodically fed with fresh seabuckthorn leaves. All pupae until adult emergence were kept in dry glass bottles (also covered by a plastic Petri dish), which were free from plant parts. Pupae from which no moths emerged until 26.07.2010 were stored in the refrigerator at a temperature of 4°C from 27.07.2010 to 07.09.2010.

Larval damage was evaluated on 248 plants in the 6 year old field. From each plant, one branch (50 cm long) was randomly chosen and spun leaves (Figure 1) produced by larvae were counted on 11.06.2010. An additional sample of seabuckthorn leaves from 30 branches was collected and the influence of the pest on herbal tea quality was checked after leaf drying. Collected leaves were dried on white paper cloth at room temperature until leaves were dry.

Results

A portion of the collected larvae were infested by parasitoids, and some of the other larvae died during the breeding process and as a result, only 44 larvae were successfully bred until the adult moth stage, at which point they were identified to species level.

The first moth to emerge was identified as *Archips rosana* (LINNAEUS, 1758) (Tortricidae) and it was only one specimen of this species was observed during this study. The larva of this polyphagous species was collected on 31.05.2010 and it developed to the adult stage within one week. All other larvae developed over a much longer period until they started to pupate and it was necessary to feed them several times with fresh seabuckthorn leaves. In total, 36 moths emerged during July 2010 and all of them were identified as *Gelechia hippophaella* (SCHRANK, 1802) (Gelechiidae).

Finally, during the period from 08.09.2010 until 15.10.2010, seven adults of *Exapate congelatella* (CLERCK, 1759) (Tortricidae) emerged from the pupae which had been stored in the refrigerator for 42 days.

Our results show that *G. hippophaella* is the dominant Lepidoptera species (82% from all successfully reared moths), which inflicted significant damage on seabuckthorn plants in the two plantations studied. Visual observations of damaged plants in the 6 and 14 year old plantations allow us to conclude that *G. hippophaella* is a serious pest.

The number of spun leaves produced by larvae per sampled branch was variable – from 1 to 26 spun leaves (Table 1). Of the 248 studied branches, only 18 were free from damage and five or more spun leaves per branch was observed on 160 branches. On average 65% of the branches were infested and 7 spun leaves per branch were observed.

Our study of herbal tea samples confirms this problem. We have observed that when collecting seabuckthorn leaves for the production of herbal tea, it is impossible to avoid the presence of larvae in collected leaves. During the traditional leaf-drying process, larvae continue feeding on seabuckthorn leaves and they pollute the final product with their excrements.

Table 1. Number of spun leaves produced by larvae per one seabuckthorn branch.

Number of spun leaves per branch	Number of branches	%
0	18	7,3
1–5	89	35,9
6–10	84	33,9
11–15	36	14,5
16–20	14	5,6
21–25	6	2,4
26	1	0,4
Totally:	**248**	

Discussion

This is the first report of an established population of *G. hippophaella* in Latvia. The species has been monitored by Latvian lepidopterologists since the 1980s but to date, only one specimen was caught in a light trap in September 2006 (near the Baltic Sea coast in a coastal dune habitat, in the surroundings of Pape village, Rucavas pagasts, Rucavas municipality) (Savenkov, Šulcs 2010). It is probable that the specimen of *G. hippophaella* caught in 2006

was a newcomer originating from Scandinavia where this species is common (Karsholt et al. 1996). In 2006, *G. hippophaella* was also caught (one specimen) for the first time in Estonia (Jürivete, Õunap 2008).

Currently it is not possible to estimate the impact of damage caused by *G. hippophaella* on fruit yield, and further research is needed on these aspects. However, the high number of spun leaves produced by the larvae is important for farmers who cultivate seabuckthorn not only for fruits but also for herbal tea production.

G. hippophaella can cause significant damage to seabuckthorn in Eastern Siberia (Shternshis 2005) and it seems that they may have a similar effect on seabuckthorn growing in Latvian conditions. The occurrence of this new pest in Latvia will possibly affect seabuckthorn commercial growers.

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