

## THE SEARCH OF ORIENTAL FRUIT MOTH (*GRAPHOLITHA MOLESTA*) WITH PHEROMONE TRAPS

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**Key words.** Oriental fruit moth, leafrollers, pheromone trap, distribution.

**Summary.** Oriental fruit moth is a quarantine pest in Lithuania and other countries. This species was searched for with pheromone traps during 1995-1997. It was not found during that period, although earlier oriental fruit moth was registered in Klaipėda and Utena (1992 and 1994), Vilnius and Panevėžys (1992 and 1993) districts. Moth of twelve *Tortricide* species flew into pheromone traps of oriental fruit moth during 1995-1997 in Lithuanian gardens, among them *Pammene suspectana* Ln. et Zll., which had not been registered in Lithuania before, *Pammene spiniana* Dp. and *Cydia gallicana* Gn., very rare in Lithuania, and *Grapholitha funebrana* Tr. predominated.

Rytinio vaisėdžio (*Grapholitha molesta*) paieška Lietuvoje feromoninėmis gaudyklėmis

**Santrauka.** Rytinis vaisėdis tiek Lietuvoje, tiek daugelyje kitų šalių įrašytas į karantininių organizmų sąrašus. Šios rūšies Lietuvoje ieškota feromoninėmis gaudyklėmis 1995-1997 m. Tačiau tiriamuoju laikotarpiu jis neaptiktas, nors anksčiau buvo užregistruotas Klaipėdos ir Utenos (1992 ir 1994 m.) bei Panevėžio ir Vilniaus (1992 ir 1993 m.) rajonuose. Į rytinio vaisėdžio feromoną Lietuvoje skrido 12 lapsukių rūšių, iš jų iki 1997 m. Lietuvoje neregistruota *Pammene suspectana* Ln. et Zll., labai retos Lietuvoje *Pammene spiniana* Dp. ir *Cydia gallicana* Gn., o vyravo *Grapholitha funebrana* Tr.

Поиск восточной плодовой моли (*Grapholitha molesta*) в Литве с помощью феромонных ловушек

**Резюме.** В Литве, как и во многих других странах, восточная плодовая моль занесена в списки карантинных организмов. Поиск этого вида в Литве осуществлялся с помощью феромонных ловушек в 1995–1997 гг. Однако в исследуемый период его найти не удалось, хотя вид ранее был зарегистрирован в Клайпедском и Утянском (1992 и 1994), в Панявешском и Вильнюсском (1992 и 1993) районах. В Литве в ловушки с феромоном восточной плодовой моли летели листовертки 12 видов. Среди них незарегистрированная в Литве до 1997 г. *Pammene suspectana* Ln. et Zell., очень редкие в Литве виды *Pammene spiniana* Dp. и *Cydia gallicana* Gn., а доминировала *Grapholitha funebrana* Tr.

### INTRODUCTION

Oriental fruit moth (*Grapholitha molesta* Busck) is a quarantine pest both in Lithuania and other countries (Quarantine, 1977; Вредные, 1996; Lietuvos, 1998). There is a visual method (to investigate damaged buds, shoots, fruits), a light method (to fascinate imago by electric bulb during the dark time), a chemical method (to attract imago into traps by attractants) to search for this species. The first method is time- and material-consuming. For example, 1.7 million fruits and shoots were cut in the Carpathian region in two years, and 69 caterpillars were found (Кудина, 1980). The majority of investigators prefer the chemical method, if the population of moth is not numerous (Сметник, 1980). The sex

pheromone of *Grapholitha molesta* (Busck) consists of *cis* and *trans* 8-dodecenylacetate isomers and dodecenoldodecyl in the ratio of 92:8:2 (Biber, 1979), but the result is best when the ratio of these materials is 100:6:30 (Linn, 1983). The aim of this work was to search for the oriental fruit moth with pheromone traps in Lithuania and to determine other tortricoid species attracted by pheromone of *Grapholitha molesta*.

### MATERIAL AND METHOD

The Delta traps with sticky inserts and dispensers (L034) of AgriSense company (USA) were used in 1997. The investigated places were gardens of companies, gardens of farmers, indi-

vidual gardens and a fruit store. The traps were started to be hanged out in July and kept till September inclusive. The attraction of the pheromone was guaranteed for six weeks. Two dispensers were used for one trap. Seventy one sticky inserts from 22 districts of Lithuania were brought to the Fitosanitary Investigation Laboratory. As there was no possibility to distinguish visually moths from other species, especially from *Grapholitha funebrana* and *Gr. tenebrosana*. the method of making genitalia preparation was used (Комарова, 1983, Ivinskis, 1996). About 20 abdomens of moths were taken from each insert, if their quantity was sufficient. The moths were determined by using special keys and illustrations (Определитель, 1978, Определитель. 1981. Определитель, 1986. Bradley, 1979).

The author has analyzed the material of 1997, except that of Šiauliai regional plant protection and quarantine station. That material (6 inserts), also the material collected in 1995 and 1996 (98 and 57) was investigated by L. Stankevičienė. Thirty four places of 17 districts in 1995, 20 places from 16 districts in 1996, 46 places from 22 districts in 1997, and 75 places from 26 districts during these 3 years were studied (Fig.)

## RESULTS AND DISCUSSION

A list of 18 species of moths after the analysis of 71 inserts ( there were no moth in 4 of them) in 1997, 57 (9 empty) in 1996, 98 (44 empty) in 1995. (Table).

Some data on the species caught during the investigations are presented below.

*Grapholitha funebrana* Tr.

Rare in Lithuania, registered in Vilnius and Kaunas districts. Flight period - the end of June to the end of August (Ivinskis, 1993).

*Grapholitha tenebrosana* Dp.

Not rare in Lithuania, registered in Ignalina, Kaunas, Kaišiadorys and Vilnius districts. Flight period – June and July (Ivinskis, 1993).

*Cnephasia stephesensiana* Dbl.

Common and widespread throughout Lithuania. Flight period – July and August (Ivinskis, 1993).

*Celypha purpurana* Hw.

Not rare, registered in Kuršių Nerija, Lazdijai, Plungė, Vilnius and Varėna districts. Flight period – June and July (Ivinskis, 1993).

*Celypha striana* D. et S.

Common and widespread throughout Lithuania. Flight period – June to August (Ivinskis, 1993).

*Cydia gallicana* Gn.

Very rare, registered in Panevėžys district (Raguva). Flight period - May to July (Ivinskis,



Fig. Distribution of *Tortricidae* moth in Lithuania

THE SEARCH OF ORIENTAL FRUIT MOTH (*GRAPHOLITHA MOLESTA*)

Table. The species of moths (*Lepidoptera*) found in oriental fruit moth pheromone traps (1995-1997)

No	Species	*Rational frequency of species, %		
		1997	1996**	1995**
1.	<i>Grapholitha funebrana</i> (Tr.)	93	79	43
2.	<i>Grapholitha tenebrosana</i> (Dp.)	3		19
3.	<i>Cnephasia stephensiana</i> (Dbl.)	46	39	
4.	<i>Celypha purpurana</i> (Hw.)	23		
5.	<i>Celypha striana</i> (D e S)	1		
6.	<i>Cydia gallicana</i> (Gn.)	11		
7.	<i>Cydia pomonella</i> (L.)	3	2	14
8.	<i>Pammene germmiana</i> (Hb.)		2	
9.	<i>Pammene spiniana</i> (Dp.)	1		
10.	<i>Pammene suspectana</i> (Lng. e Zll.)	3		
11.	<i>Rhopobota naevana</i> (Hb.)	1		
12.	<i>Epiblema foenella</i> (L.)	1		
13.	<i>Anacampsis populella</i> (Clr.)	1		
14.	<i>Anarsia lineatella</i> (Zll.)	1		
15.	<i>Hypsopygia costalis</i> (F.)	1		
16.	<i>Depressaria emeritella</i> St.	1		
17.	<i>Mesapamea secalis</i> (L.)	1		
18.	<i>Mesapamea secalella</i> Rm.	1		

\* Relative frequency of species was counted by the ratio of inserts where the same species of moth was found to all investigated inserts in the period of one year.

\*\* The author of this work analyzed the data collected by L. Stankevičienė.

1993). In 1997 was found in Družai (Širvintos district), at the station of plant sort investigations in Rietavas (Plungė district), Piktupėnai (Šilutė district), Lazdijai border, Naujoji Valia (Marijampolė district), Debeikiai (Anykščiai district), Kaniūkai and the farm of E. Milašius (Ignalina district).

*Cydia pomonella* L.

Common and widespread throughout Lithuania. Flight period – the end of May to August (Ivinskis, 1993).

*Pammene germmiana* Hb.

Rare, registered in Vilnius and Varėna districts. Flight period – May and July (Ivinskis, 1993).

*Pammene spiniana* Dp.

Very rare, registered in Kaunas. Flight period – July and August (Ivinskis, 1993). In 1997 caught in Žaiginys (Raseiniai district).

*Pammene suspectana* Ln. et Zll.

Not registered in Lithuania. found in Latvia. Flight period – May and June (Ivinskis, 1993). In 1997 caught in Utena, Potašinė and Trakėnai (Marijampolė district).

*Rhopobota naevana* Hb.

Common and widespread throughout Lithuania. Flight period – the end of May to August (Ivinskis, 1993).

*Epiblema foenella* L.

Common and widespread throughout Lithuania. Flight period – June and August (Ivinskis, 1993).

The data of three years (1995-1997) show that oriental fruit moth was absent in Lithuania. This species originated from North West China. It spread from Japan to Australia, Central Europe, the eastern coast of USA, Brazil at the beginning of the 20th century. Later oriental fruit moth reached other countries, including South Africa. The caterpillars live in peach buds and shoots, seldom in apricot, plum, cherry, apple, pear (Quarantine, 1997). One caterpillar can injure 8 shoots and cause the plant languish and anomalous branching (Сметник, 1990). The fruits can be damaged too, and then a brown-rot infection (*Monilinia spp.*) can attack (Вредные, 1996). Oriental fruit moth is very rare in Lithuania, registered in Panevėžys and Vilnius districts. Flight period - July till August (Ivinskis, 1993). According to the data of the State Plant Protection Service, moths of this species were caught in Klaipėda and Utena (1992 and 1994), Vilnius and Panevėžys (1992 and 1993) districts (Fig.). Lithuania is situated beyond the natural area of oriental fruit moth (Козичева, 1980; Власова, 1980). Maybe the unfavourable climatic conditions (heavy winters and the lack of basic nourishment plant – peach destroyed by frost in Lithuania) are the limiting factors for oriental fruit moth to spread and establish in Lithuania.

There are 35 tortricoid species known as flying to pheromone traps of oriental fruit moth, and most frequent are *Grapholitha funebrana* and *Cnephasia stephensiana* (Комарова, 1983). *Pammene spiniana*

and *Celypha striana* which were caught in such pheromone traps in Lithuania are not mentioned in that list. *Grapholitha funebrana* is the predominant species caught in oriental fruit moth pheromone traps in Lithuanian gardens. Besides, it provided the possibility to specify the distribution of very rare species and to register a new one in Lithuania (Fig.).

Administrative districts, in which the pheromone traps of *Grapholitha molesta* were used in 1995-1997

Ak – Akmenė, Al – Alytus, An – Anykščiai, Ig – Ignalina, Jr – Jurbarkas, K – Kaunas (exception, without traps), Kl – Klaipėda, Kr – Kretinga, L – Lazdijai, M – Marijampolė, Ml – Molėtai, Pl – Plungė, Pn – Panevėžys, Rd – Radviliškis, Rs – Raseiniai, Sk – Skuodas, Šl – Šiauliai, Šlč – Šalčininkai, Šlt – Šilutė, Šr – Širvintos, Šv – Švenčionys, Tl – Telšiai, Trg – Tauragė, Uk – Ukmergė, Ut – Utena, V – Vilnius, Vlk – Vilkaviškis

Gm-*Grapholitha molesta*, Pss-*Pammene suspectana*, Psp-*Pammene spiniana*, Cg-*Cydia gallicana*

## CONCLUSIONS

1. During 1995-1997 no *Grapholitha molesta* Busck moths were caught with pheromone traps in Lithuanian gardens .

2. Moths of twelve *Tortricide* species flew into pheromone traps of oriental fruit moth during 1995-1997 in Lithuanian gardens, among them *Pammene suspectana* Ln. e Zll., which earlier has not been registered in Lithuania, *Pammene spiniana* Dp. and *Cydia gallicana* Gn., very rare in Lithuania, and predominated *Grapholitha funebrana* Tr.

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