

Dipterous miners collected in greenhouse areas in Lithuania

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Dipterous miners were searched in Lithuanian closed habitats (industrial and temporary greenhouses) by using sticky traps and examining mined plants. The frequency of *Liriomyza bryoniae* was highest among all dipterous miner species found in sticky traps. *Chromatomyia horticola*, *Liriomyza phryne*, *Agromyza albipennis*, *L. taraxaci*, *L. congesta*, *Hydrellia griseola*, *L. soror*, *Phytomyza wahlgreni* were further most frequent in sticky traps after *L. bryoniae*. *Amauromyza luteiceps* and *Pseudonapomyza moraviae* are new species for Lithuania. *Liriomyza labanoro*, *L. obliqua* and *Phytomyza ferina* are very rare species in Lithuania; *Liriomyza intonsa* and *Phytoliriomyza arctica* are rare insects in natural habitats, their distribution was supplemented with new data. Mines of *Liriomyza strigata* were most abundant in closed systems, *L. bryoniae* being less abundant. In total, 93 dipterous miners of 5 families were identified in closed system habitats during 1997 and 1999–2003. 55% of the species discovered were found also on vegetation outside, and these 51 dipterous miner species in closed habitats made 36% of all species discovered in greenhouse surroundings in 2001–2003 (Ostrauskas et al., 2003). Since greenhouses in Lithuania are systems not closed enough (they have no insect nets on windows or wind fences), the nearest vicinity (outside territories) can serve as a reservation for pests of plants cultivated inside. The list of dipterous miners in Lithuanian greenhouse areas up to 2003 contained 174 species of 7 families.

Key words: dipterous miners, sticky traps, Lithuania, greenhouse area

INTRODUCTION

The tomato leaf miner *Liriomyza bryoniae* (Kaltenbach, 1858) was a quarantine species for Lithuania (Lietuvos..., 2000) and for Europe (Quarantine..., 1997). This species was found in open territories of Lithuania (Pakalniškis et al., 2000), but only some data were available about the distribution of *L. bryoniae* in closed systems of the country (Neèajeva et al., 2003; Taluntytė 2001; Taluntytė, 2002). On the other hand, *Liriomyza trifolii*, also a quarantine species, was intercepted in 2002 with imported *Gypsophila* (Ostrauskas, 2002). Thus, a survey was organised for searching economically important *Liriomyza* species in a relatively warm habitat of closed systems.

Many species (as well as individuals) of dipterous miners that stick to the traps are not related to plants cultivated or weeds growing inside and get into greenhouses from the environment. A retroactive connection with the vicinity of greenhouses is noticeable, too (Ostrauskas et al., 2003).

The present study is aimed at analysis of usual fauna of mining Diptera in closed systems of Lithuania and their relationship with the environment.

MATERIALS AND METHODS

In total, 2356 colour sticky traps produced by the AgriSense company (USA) and Hombio firm (Belgium) were used in industrial and temporary greenhouses from late May to late August in 1997 and 1999–2003. The crops were vegetables (10 plant species), spice, strawberries, ornamentals (30 species). The majority of traps were set on tomato (37% of all traps) and on cucumber (30%). In total, greenhouse plants of 238 companies and private farmers were searched for mining dipterans during six years throughout Lithuania, and 17% of growers' closed systems were investigated for 3 or more years. The other kind of material, the majority of dipterans, were determined according to the mines formed by larvae *in situ*, and the plants were determined at the site in greenhouses

during the same investigation period. Part of samples – mines (104) in plant leaves (tomato, cucumber, capsicum and eggplant) – were delivered by inspectors to the Phytosanitary Research Laboratory for rearing larvae till adult stage. In total, 433 mines from 62 growers were checked. Both methods (trapping and dipteran identification by mines) were used in closed system crops of 249 growers.

The genitalia of miner adults were mounted according to the published method (Spencer, 1981). A number of Agromyzidae specimens (females belonging to certain groups of 6 genera) could not be determined correctly in the absence of early stages or imago males.

The frequency of dipterous miners (%) was counted as a ratio of the number of sticky traps with one species caught to the quantity of all used catch plates. The Menhinick index (R) for evaluation of species abundance and the Sørensen coefficient (S) for evaluation of similarity of species composition were used (Ludwig, Reynolds, 1988).

RESULTS

The frequency of *Liriomyza bryoniae* was the highest among all dipterous miner species found using traps in greenhouses with 8 cultivated crops (Table 1). In total, individuals of tomato leaf miner specimens made 52% of all specimens. The tomato leaf miner was found in greenhouses of 1 grower in 1997, of 5 in 1999, of 12 in 2000, of 26 in 2001, of 24 in 2002, of 26 in 2003, in total of 70 growers during six years, and it made 29% of all investigated growers. Forty-five new localities and 10 new administrative districts were added to the list of the distribution of *L. bryoniae* in Lithuania. The increased number of sites depended on the number of traps used and not on the species spreading.

Chromatomyia horticola, *Liriomyza phryne*, *Agromyza albipennis*, *L. taraxaci*, *L. congesta*, *Hydrellia griseola*, *L. soror*, *Phytomyza wahlgreni* were second most frequent in sticky traps after *L. bryoniae*. *Amauromyza luteiceps* and *Pseudonapomyza moraviae* are new species for Lithuania. *Liriomyza labanoro* and *Phytomyza ferina* are very rare in Lithuania (Pakalniškis et al., 2000), their host plants and biology are not known. *Liriomyza obliqua* is also very rare (Pakalniškis et al., 2000), and its first host plant has been determined recently (Ostrauskas et al., 2005). *Liriomyza intonsa* and *Phytoliriomyza arctica*, rare insects in natural habitats (Pakalniškis et al., 2000), were found, too. New sites of findings were added to the list of species distribution in Lithuania: Kazokai (Molėtai district) for *Liriomyza labanoro*; Daugai, Lelionys and Panemuninkai (Alytus district), Kvietiniai (Klaipėda district), Laibiðkiai (Ukmergė district), Ruoðėiai (Kėdainiai district), Ðiauliai for *L. intonsa*; Laibiðkiai (Ukmergė district) and Kėdainiai (Kėdainiai district) for *L. obliqua*; Laibiðkiai

(Ukmergė district) for *Phytomyza ferina*; Punia (Alytus district) for *Phytoliriomyza arctica*.

There were 77 species found on tomato crops and 53 species on cucumber. Distinctly purer fauna was obtained on capsicum (21), *Lilium* (20), 11 mixed flowers (11), *Rosa* (10), *Gerbera* (7), *Dianthus* and *Alstroemeria* (4), *Brassica* (cabbage), *Laurus*, *Lavandula* (3), *Begonium* and *Chrysanthemum* (2), over *Cucurbita* (zucchini), *Lactuca* (lettuce), *Solanum* (eggplant), spice and not specified vegetables (1). Many insect species (Table 1) do not attack plants cultivated in greenhouses according to the published data (Ivinskis et al., 2000; Spencer, 1973; Spencer, 1990), they were non-target species trapped in greenhouses, or some weeds growing inside could be the hosts (pure crop management). In total, 92 species from 4 families of dipterous miners were discovered during six years of trapping.

Mines of *Liriomyza strigata* were most abundant (51% of all mines found) in greenhouses, and they were determined on 9 genera of plants (Table 2). *L. bryoniae* was less abundant (25% of all mines), found on three crops in 37 growers' greenhouses. *Chromatomyia horticola* mined mostly *Cucumis* and *Lycopersicon*, other plant genera were attacked by this species occasionally. These three species of dipterans could influence the crop quality, especially damaging plant sets (Beiger, 1989; Spencer, 1973). Parasitic wasps attacked 16 larvae (6 of *Liriomyza strigata* and 10 of *Chromatomyia horticola*) according to our rearing data (15% of miners in leaves delivered to the laboratory). In total, 8 species belonging to 3 families of dipterous miners were determined from mines. Three species were connected with crop and 7 species were determined on weeds.

When we summarized the data of both methods applied, *Liriomyza bryoniae* was found in 81 industrial and temporary greenhouses (32.5%), and individuals of tomato leaf miner made 49% of all specimens. The majority of *Liriomyza bryoniae* localities were discovered only once, 12 sites – 2 years, 4 sites – 3 years and 2 sites – 4 years. The *L. bryoniae* sites in greenhouses were detected in all 10 Lithuanian State Plant Protection Service regions. There were in total 93 dipterous miners of 5 families identified in closed system habitats. The list of dipterous miners contained 51 species discovered in greenhouse vicinity (Ostrauskas et al., 2004). It made 55% of all species trapped in greenhouses and 36% of all species in greenhouse vicinity discovered during 2001–2003.

DISCUSSION

There were even 85 species of dipterous miners discovered in the temporary greenhouses. The natural ground is often used here, and it is one of the insect sources; also weeds can remain here comparatively abundant and variegated in some years, attracting and occasionally breeding the miners. Usually

Table 1. List of dipterous miners caught with sticky traps in Lithuanian greenhouses during 1997 and 1999–2003

FAMILY, <i>species</i>	Frequency (%)	Number of specimens	Crop
AGROMYZIDAE			
<i>Agromyza albipennis</i> Meigen	1.40	44	<i>Cucumis, Lycopersicon, Capsicum, Lilium Chrysanthemum</i>
<i>Agromyza filipendulae</i> Spencer	0.04	1	<i>Lycopersicon</i>
<i>Agromyza frontella</i> (Rondani)	0.04	1	<i>Lycopersicon</i>
<i>Agromyza lucida</i> Hendel	0.04	1	<i>Lycopersicon</i>
<i>Agromyza mobilis</i> Meigen	0.17	5	<i>Capsicum, Cucumis, Lycopersicon, Begonium, not specified flowers</i>
<i>Agromyza nigrella</i> (Rondani)	0.21	5	<i>Lycopersicon, Rosa</i>
<i>Agromyza nigripes</i> Meigen	0.25	11	<i>Capsicum, Cucumis, Lycopersicon, Gerbera</i>
<i>Agromyza nigrociliata</i> Hendel	0.08	2	<i>Cucumis</i>
<i>Agromyza rondensis</i> Strobl	0.13	3	<i>Gerbera, Rosa</i>
<i>Agromyza</i> spp. ♀♀	0.68	20	<i>Capsicum, Cucumis, Lycopersicon, Lilium, Petunia</i>
<i>Amauromyza chenopodivora</i> Spencer	0.42	26	<i>Capsicum, Cucumis, Lycopersicon, Alstroemeria</i>
<i>Amauromyza labiatarum</i> (Hendel)	0.04	1	<i>Lilium</i>
<i>Amauromyza luteiceps</i> (Hendel)	0.04	4	<i>Capsicum, Cucumis, Lycopersicon</i>
<i>Amauromyza monfalconensis</i> (Strobl)	0.30	7	<i>Brassica, Cucumis, Lycopersicon, Cucurbita (zucchini)</i>
<i>Aulagromyza tridentata</i> (Loew)	0.04	1	<i>Cucumis</i>
<i>Calycomyza artemisiae</i> (Kaltenbach)	0.08	2	<i>Capsicum, Cucumis, Lycopersicon, not specified flowers</i>
<i>Cerodontha atra</i> (Meigen)	0.21	6	<i>Lycopersicon</i>
<i>Cerodontha caricicola</i> (Hering)	0.08	2	<i>Lycopersicon</i>
<i>Cerodontha denticornis</i> (Panzer)	0.42	10	<i>Cucumis, Lycopersicon, Rosa</i>
<i>Cerodontha fasciata</i> (Strobl)	0.04	1	<i>Lycopersicon</i>
<i>Cerodontha fulvipes</i> (Meigen)	0.13	3	<i>Lycopersicon</i>
<i>Cerodontha incisa</i> (Meigen)	0.30	7	<i>Cucumis, Lycopersicon, Lilium</i>
<i>Cerodontha lateralis</i> (Macquart)	0.21	6	<i>Cucumis, Lycopersicon, Lilium</i>
<i>Cerodontha morosa</i> (Meigen)	0.04	1	<i>Lycopersicon</i>
<i>Cerodontha muscina</i> (Hendel)	0.81	19	<i>Cucumis, Lycopersicon</i>
<i>Cerodontha pygmaea</i> (Meigen)	0.21	6	<i>Cucumis, Lycopersicon</i>
<i>Cerodontha superciliosa</i> (Zetterstedt)	0.08	2	<i>Lycopersicon</i>
<i>Cerodontha suturalis</i> (Hendel)	0.04	1	<i>Lycopersicon</i>
<i>Cerodontha</i> spp. ♀♀	0.04	2	<i>Lycopersicon</i>
<i>Chromatomyia horticola</i> (Goureau)	4.03	138	<i>Capsicum, Cucumis, Lactuca (lettuce), Lycopersicon, Chrysanthemum, Dianthus, Gerbera, Laurus, Lavandula, Lilium, Rosa, not specified flowers</i>
<i>Liriomyza artemisicola</i> de Meijere	0.17	5	<i>Cucumis, Lycopersicon</i>
<i>Liriomyza bryoniae</i> (Kaltenbach)	9.25	1525	<i>Capsicum, Cucumis, Lycopersicon, Solanum (eggplant), not specified spices and vegetables, Alstroemeria, Lilium, Rosa, not specified flowers</i>
<i>Liriomyza cannabis</i> Hendel	0.04	1	<i>Lycopersicon</i>
<i>Liriomyza centaureae</i> Hering	0.04	1	not specified flowers
<i>Liriomyza congesta</i> (Becker)	1.06	41	<i>Brassica, Cucumis, Lycopersicon, Dianthus, Gerbera, Laurus, Lavandula, Lilium, not specified flowers</i>
<i>Liriomyza endiviae</i> Hering	0.04	1	<i>Cucumis</i>
<i>Liriomyza eupatorii</i> (Kaltenbach)	0.13	3	<i>Cucumis, Lycopersicon</i>
<i>Liriomyza flaveola</i> (Fallén)	0.17	4	<i>Cucumis, Lycopersicon</i>

<i>Liriomyza graminivora</i> Hering	0.04	1	<i>Lycopersicon</i>
<i>Liriomyza hampsteadensis</i> Spencer	0.04	1	<i>Cucumis, Lycopersicon</i>
<i>Liriomyza hieracivora</i> Spencer	0.04	2	<i>Lycopersicon</i>
<i>Liriomyza infuscata</i> Hering	0.04	1	<i>Lycopersicon</i>
<i>Liriomyza intonsa</i> Spencer	0.64	25	<i>Capsicum, Cucumis, Lycopersicon</i>
<i>Liriomyza labanoro</i> Pakalniškis	0.04	1	<i>Lycopersicon</i>
<i>Liriomyza obliqua</i> Hendel	0.08	2	<i>Lycopersicon</i>
<i>Liriomyza phryne</i> Hendel	1.44	45	<i>Capsicum, Cucumis, Lycopersicon, Lilium, Rosa</i>
<i>Liriomyza pisivora</i> Hering	0.13	3	<i>Cucumis, Lycopersicon, Gerbera</i>
<i>Liriomyza ptarmicae</i> de Meijere	0.25	6	<i>Lycopersicon, Alstroemeria, Rosa, not specified flowers</i>
<i>Liriomyza sonchi</i> Hendel	0.21	5	<i>Cucumis, Lycopersicon, not specified flowers</i>
<i>Liriomyza soror</i> Hendel	0.98	34	<i>Capsicum, Cucumis, Lycopersicon, Laurus, Lavandula, Lilium</i>
<i>Liriomyza</i> spp. ♀♀	9.59	542	<i>Capsicum, Cucumis, Lactuca, Lycopersicon, not specified vegetables, Celosia, Chrysanthemum, Gerbera, Lavandula, Lilium, Petunia, Rosa, Rosmarinus, not specified flowers</i>
<i>Liriomyza strigata</i> (Meigen)	0.21	6	<i>Cucumis, Lycopersicon, Dianthus</i>
<i>Liriomyza taraxaci</i> Hering	1.15	39	<i>Brassica, Capsicum, Cucumis, Lycopersicon, Lilium, Rosa</i>
<i>Liriomyza violicaulis</i> Hering	0.04	1	<i>Lycopersicon</i>
<i>Melanagromyza aeneoventris</i> (Fallén)	0.08	2	<i>Capsicum, Cucumis, Lycopersicon</i>
<i>Melanagromyza albocilla</i> Hendel	0.04	1	<i>Capsicum, Cucumis, Lycopersicon</i>
<i>Melanagromyza dettmeri</i> Hering	0.04	1	<i>Lycopersicon</i>
<i>Melanagromyza lappae</i> (Loew)	0.08	2	<i>Lycopersicon</i>
<i>Melanagromyza oligophaga</i> Spencer	0.04	1	<i>Lycopersicon</i>
<i>Melanagromyza pubescens</i> Hendel	0.13	3	<i>Capsicum, Cucumis, Lycopersicon, Lilium</i>
<i>Melanagromyza</i> spp. ♀♀	0.51	13	<i>Capsicum, Cucumis, Lycopersicon, Lilium, Rosa</i>
<i>Napomyza lateralis</i> (Fallén)	0.08	2	<i>Cucumis, Lycopersicon</i>
<i>Ophiomyia alliariae</i> Hering	0.04	1	<i>Lycopersicon</i>
<i>Ophiomyia cunctata</i> (Hendel)	0.21	5	<i>Cucumis, Lycopersicon, Lilium</i>
<i>Ophiomyia curvipalpis</i> (Zetterstedt)	0.08	2	<i>Lycopersicon</i>
<i>Ophiomyia disordens</i> Pakalniškis	0.04	1	<i>Lycopersicon</i>
<i>Ophiomyia galii</i> Hering	0.04	1	<i>Lycopersicon</i>
<i>Ophiomyia labiatarum</i> Hering	0.08	2	<i>Capsicum, Cucumis, Lycopersicon</i>
<i>Ophiomyia nasuta</i> (Melander)	0.04	1	<i>Lycopersicon</i>
<i>Ophiomyia ononidis</i> Spencer	0.08	2	<i>Lycopersicon</i>
<i>Ophiomyia orbiculata</i> (Hendel)	0.21	5	<i>Capsicum, Cucumis, Lycopersicon</i>
<i>Ophiomyia pulicaria</i> (Meigen)	0.47	14	<i>Cucumis, Lycopersicon, Rosa, not specified flowers</i>
<i>Ophiomyia</i> spp. ♀♀	0.13	3	<i>Lycopersicon</i>
<i>Phytoliriomyza arctica</i> (Lundbeck)	0.08	2	<i>Lycopersicon, Dianthus</i>
<i>Phytoliriomyza dorsata</i> (Siebke)	0.13	3	<i>Capsicum, Cucumis, Lycopersicon, Lilium</i>
<i>Phytoliriomyza melampyga</i> (Loew)	0.04	1	<i>Cucumis</i>
<i>Phytoliriomyza perpusilla</i> (Meigen)	0.08	2	<i>Lycopersicon</i>
<i>Phytoliriomyza</i> sp.	0.04	1	<i>Cucumis</i>
<i>Phytomyza albipennis</i> Fallén	0.08	2	<i>Cucumis, Gerbera</i>
<i>Phytomyza brischkei</i> Hendel	0.04	1	<i>Cucumis</i>
<i>Phytomyza clematidis</i> Kaltenbach	0.04	1	<i>Cucumis</i>
<i>Phytomyza crassiseta</i> Zetterstedt	0.04	1	<i>Capsicum, Cucumis, Lycopersicon</i>
<i>Phytomyza fallaciosa</i> Brischke	0.08	2	<i>Lilium</i>
<i>Phytomyza ferina</i> Spencer	0.04	1	<i>Lycopersicon</i>
<i>Phytomyza heringiana</i> Hendel	0.04	1	<i>Lycopersicon</i>
<i>Phytomyza lappae</i> Goureau	0.04	1	<i>Lilium</i>

Table 1 (continued)

FAMILY, <i>species</i>	Frequency (%)	Number of specimens	Crop
AGROMYZIDAE			
<i>Phytomyza plantaginis</i> Robineu-Desvoidy	0.04	1	<i>Cucumis</i>
<i>Phytomyza pullula</i> Zetterstedt	0.21	5	<i>Cucumis, Lycopersicon</i>
<i>Phytomyza ranunculi</i> (Schrank)	0.08	2	<i>Cucumis</i>
<i>Phytomyza rufipes</i> Meigen	0.38	9	<i>Capsicum, Cucumis, Lycopersicon, Lilium</i>
<i>Phytomyza</i> spp. ♀♀	0.76	18	<i>Capsicum, Cucumis, Lycopersicon, Lilium</i>
<i>Phytomyza spinaciae</i> Hendel	0.08	2	<i>Lycopersicon</i>
<i>Phytomyza wahlgreni</i> Rydén	0.93	47	<i>Cucumis, Lycopersicon, Begonium, Gerbera, Rosa, not specified flowers</i>
<i>Pseudonapomyza atra</i> (Meigen)	0.42	10	<i>Capsicum, Cucumis, Lycopersicon, Lilium</i>
<i>Pseudonapomyza moraviae</i> Ėernô	0.04	1	<i>Cucumis</i>
<i>Pseudonapomyza</i> spp. ♀♀	0.55	14	<i>Capsicum, Cucumis, Lycopersicon, Rosa</i>
DROSOPHILIDAE			
<i>Scaptomyza flava</i> (Fallén)	0.04	1	<i>Lycopersicon</i>
<i>Scaptomyza graminum</i> (Fallén)	0.25	7	<i>Cucumis, Lycopersicon, Lilium</i>
EPHYDRIDAE			
<i>Hydrellia griseola</i> (Fallén)	1.06	30	<i>Cucumis, Lycopersicon, Lilium, not specified flowers</i>
TEPHRITIDAE			
<i>Acidia cognata</i> (Wiedemann)	0.21	15	<i>Cucumis, Lycopersicon, Alstroemeria</i>

Table 2. Dipterous miners determined according to the mines formed by larvae *in situ* in greenhouses or reared up to imago from plant parts delivered from greenhouses to the laboratory

FAMILY, <i>species</i>	Number of mines/specimens	Crop or plant genus as hosts	Year
AGROMYZIDAE			
<i>Chromatomyia horticola</i> (Goureau)	94	<i>Antirrhinum, Capsella, Chrysanthemum, Cucumis, Galinsoga, Lactuca, Lycopersicon, Rudbeckia, Senecio, Sonchus, Taraxacum</i>	2001–2003
<i>Liriomyza bryoniae</i> (Kaltenbach)	108	<i>Capsicum, Cucumis, Lycopersicon</i>	1999–2003
<i>Liriomyza congesta</i> (Becker)	2	<i>Trifolium, Medicago</i>	2003
<i>Liriomyza sonchi</i> Hendel	1	<i>Sonchus</i>	2003
<i>Liriomyza strigata</i> (Meigen)	222	<i>Brassica, Capsicum, Chrysanthemum, Cirsium, Cucumis, Datura, Lycopersicon, Physocarpus, Solanum</i>	2002–2003
ANTHOMYIIDAE			
<i>Pegomyia hyosciami</i> (Panzer)	1	<i>Chenopodium</i>	2003
<i>Pegomyia</i> spp.	3	<i>Chenopodium, Rumex</i>	2003
DROSOPHILIDAE			
<i>Scaptomyza flava</i> (Fallén)	1	<i>Armoracia</i>	2003
<i>Scaptomyza graminum</i> (Fallén)	1	<i>Stellaria</i>	2003

some trees, vegetable gardens and parterre are present in the nearest reaches, too. So the species abundance of mining dipterans was found here to being $R = 2.07$, containing mostly species ordinary in Lithuanian country settlements.

In the industrial greenhouses 47 species were discovered ($R = 1.77$), the majority of them being *Agromyza*, *Cerodontha* and *Liriomyza* grass miners, and 2 species feeding on *Taraxacum* (*Liriomyza taraxaci*, *Phytomyza wahlgreni*) must be noted as abundant al-

so. That should reflect the more specific and monotonous fauna of the short grassland surrounding the greenhouses.

Thus, the species discovered in industrial and in temporary greenhouses were not similar ($S = 0.56$), but the distribution of 9 species (Table 2) reproducing inside on crops and sparse weeds does not allow to reveal any difference of this kind.

Every glass (polyethylene) construction can serve for further insects as a refuge or work as a trap attractive for more light and warmth, as well as like a Malaise trap, forming an artificial wall (obstacle) with windows (entrances into the glasshouse).

Nevertheless, the species compositions discovered in closed systems were not similar ($S = 0.43$) to species composition in open habitats (greenhouse surroundings). Thus, part of species that represent the richer ($R = 2.94$) vicinity fauna very probably get into greenhouses and stick to the traps more frequently than other dipterous leaf miners, and that can depend on species behaviour as well. For example, mines of *Liriomyza strigata* were more frequent and abundant than of *L. bryoniae*, but the number of the first species imagines stuck to the traps was miserable. Since greenhouses in Lithuania are systems not closed enough (no insect nets on windows or wind fences), the nearest vicinity (outside territories) can serve as a reservation for pests of plants cultivated inside.

The total list of dipterous miners in the areas of Lithuanian greenhouses up to 2003 contained 174 species of 7 families.

CONCLUSIONS

1. The species of dipterous miners found in closed systems generally represent the common fauna of Lithuanian townships and farmstead fauna, but some very rare species detected here cannot be called accidental, although their biology is usually unknown.

2. Many of the species sticking to the traps are not related to the plants cultivated or common weeds growing inside, and get into greenhouses from the environment.

3. Since greenhouses in Lithuania are not closed systems (no insect nets on windows or wind fences), the nearest surroundings can serve as a reservation for pests of plants cultivated inside.

4. The attractivity of coloured sticky traps is evidently different for certain dipterous miners, and a complex of methods is desirable in pest research.

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References

1. Beiger M. Miniarki (Agromyzidae) – szkodniki roślin uętykowych. *Seria Zoologia*. Wydawnictwo naukowe UAM w Poznaniu, 1989. Vol. 16. P. 1–97.
2. Ivinskis P., Pakalniškis S., Jonaitis V. Structure and distribution of trophic relations of different groups of insects in various ecosystems. In: Jonaitis V. (ed.). *The Inter-Ecosystematic Relationships of Insects and Their Dynamics*. Institute of Ecology, 2000. Vol. 11. P. 226.
3. Lietuvos Respublikos ūkio ministro 2000 11 20 šakymas Nr. 315: Dėl karantininių organizmų, augalų, augalinių produktų ir kitų objektų sąrašo patvirtinimo ir 1998 12 28 šakymo Nr. 321 pripažinimo netekusiu galios. *Valstybės žinios*. 2000. Nr. 102. P. 59.
4. Ludwig J. A., Reynolds J. F. *Statistical Ecology. A Primer on Methods and Computing*. New York–Singapore: John Wiley & Sons, 1988.
5. Neėajeva L., Mackevičius J., Grigaliūnas J., Taluntytė L. (eds.). *Augalų apsauga. 2002 metų veiklos apžvalga*. Vilnius: VAAT, 2003.
6. Ostrauskas H. Džlumamėgė minamūsė išauginta Lietuvoje. *Baltasis gandra*. 2002. Nr. 5–6. P. 28–29.
7. Ostrauskas H., Pakalniškis S., Taluntytė L. The species composition of plant mining dipterous (Insecta: Diptera) of greenhouse surroundings in Lithuania. *Ekologija*. 2003. Nr. 3. P. 3–11.
8. Ostrauskas H., Pakalniškis S., Taluntytė L. Dipteran leafminers in the vicinity of glasshouses and plant markets in Lithuania. *OEPP/EPPO Bulletin*. 2005. N 34.
9. Pakalniškis S., Rimdaitė J., Sprangauskaitė-Bernotienė R., Butautaitė R., Podėnas S. Checklist of Lithuanian Diptera. *Acta Zoologica Lituanica*. 2000. Vol. 10. N 1. P. 3–58.
10. Quarantine Pests for Europe. *Data Sheets on quarantine pests for the European Union and for the European and Mediterranean Plant Protection Organization*. CAB International. Paris, 1997.
11. Spencer K. A. Agromyzidae (Diptera) of economic importance. *Series Entomologica*. 1973. Vol. 9. P. 1–418.
12. Spencer K. A. A revisionary study of leaf-mining flies (Agromyzidae) of California. *Univ. Calif., Div. Agric. Sciences*, Spec. Publ. 1981. 3273. P. 1–489.
13. Spencer K. A. Host Specialization in the World Agromyzidae. *Series Entomologica*. 1990. Vol. 45. P. 1–444.
14. Taluntytė L. 2000 metais Fitosanitarinių tyrimų laboratorijoje atliktų tyrimų suvestinė. In: Gođovskienė J. (ed.). *Augalų apsauga*. VAAT. Vilnius, 2001. P. 22–27.
15. Taluntytė L. Fitosanitarinių tyrimų laboratorijos tyrimų 20001 metais suvestinė. In: Gođovskienė J. (ed.). *Augalų apsauga. Apžvalga 2001*. VAAT. Vilnius, 2002. P. 26–29.

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**MINUOJANTIEJI DVISPARNIAI, APTIKTI LIETUVOS
ŪLŪNAMIŪ PLOTUOSE**

S a n t r a u k a

Minuojantys dvisparniai ieškoti ūldarose sistemose (pramoniniuose ir laikinuose ūltnamiuose), naudojant kljines gaudyklės bei tiriant minuotus augalus. *Liriomyza bryoniae* buvo daŭniausia iđ viso aptiktŵ minuojanėiŵ dvisparniŵ ūltnamiuose pakabintose gaudyklėse. Kitos daŭnos gaudyklėse rŵdys buvo đios: *Chromatomyia horticola*, *Liriomyza phryne*, *Agromyza albipennis*, *Liriomyza taraxaci*, *Liriomyza congesta*, *Hydrellia griseola*, *Liriomyza soror*, *Phytomyza wahlgreni*. Nustatytos naujos Lietuvai rŵdys – *Amauomyza luteiceps* ir *Pseudonapomyza moraviae*. *Liriomyza labano-*

ro, *L. obliqua* ir *Phytomyza ferina* – labai retos rŵdys Lietuvoje; *Liriomyza intonsa* ir *Phytoliriomyza arctica* – reti vabzdŭiai natūraliose cenozeėe, jŵ paplitimas papildytas naujais duomenimis. *Liriomyza strigata* minos buvo daŭniausiai aptinkamos, reėiau pasitaikė *Liriomyza bryoniae* minos. Iđ viso 1997 ir 1999–2003 m. Lietuvos ūltnamiuose surastos 93 minuojanėiŵ dvisparniŵ rŵdys, priklausanėios 5 đeimoms. Đio sarađo 55% rŵdiŵ aptikta ūltnamiŵ iđorėje augusiuose augaluose, ir đi 51 rŵdis sudarė 36% viso rŵdiŵ, suregistruotŵ ūltnamiŵ aplinkoje 2001–2003 m. (Ostrauskas ir kt., 2003). Kadangi ūltnamiai Lietuvoje – nepakankamai ūldaros sistemos (ant langŵ nėra vabzdŭiŵ tinkleliŵ ar oro srovės ūpuolaidŵ), ūltnamiŵ aplinka gali būti kenkėjŵ rezervacija, turinti atakos viduje auginamiems augalams. Iđ viso ūltnamiŵ plotuose iki 2003 m. imtinai nustatytos 174 minuojanėiŵ dvisparniŵ rŵdys, priklausanėios 7 đeimoms.