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TARGET AND NON-TARGET MOTH SPECIES CAPTURED BY PHEROMONE TRAPS FOR SOME FRUIT TORTRICID MOTHS (LEPIDOPTERA)

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Abstract

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Efficiency of the synthetic sexual pheromones for five tortricid species, viz. *Grapholita funebrana* Treitschke, 1835, *G. janthinana* (Duponchel, 1835), *G. lobarzewskii* (Nowicki, 1860), *G. molesta* (Busck, 1916), and *Pandemis heparana* (Denis & Schiffermüller, 1775), was evaluated in two areas in the SE part of the Czech Republic. The lures for *G. funebrana* produced by the Pherobank showed a higher selectivity and efficiency than those by the Propher. On the contrary, pheromones for *G. molesta* by the Propher are more effective than those by the Pherobank. Besides the target species, 29 non-target tortricid species and 25 other Lepidoptera species were captured. The number of non-target tortricid species was comparable by the attractants for all species (15–17 spp.), except *Pandemis heparana* (only 7 spp.). The most abundant non-target Tortricidae were *Cnephasia stephensiana* (Doubleday, 1849), *Hedya pruniana* (Hübner, 1799), and *Epiblema cirsiana* (Zeller, 1843). *Cacoecimorpha pronubana* (Hübner, 1799) was recorded in outdoor conditions of the Czech Republic for the first time. *Celypha rosaceana* (Schläger, 1847) was found as new for Moravia. *Oegoconia novimundi* (Busck, 1915) (Autostichidae) was attracted by the lures for *Grapholita funebrana* and *G. molesta* in unusually high number of specimens.

Keywords: pheromone traps, Tortricidae, non-target species, orchards

INTRODUCTION

Intensive research of insect pheromones with the possibility of their use in plant protection has been conducted since the 70s of the 20th century (e.g. Sziráki, 1978, Hrdý *et al*., 1979b, 1989, 1994). Sexual pheromones enable to determine accurate pest abundance (economic injury levels) and facilitate to ascertain the occurrence time for the most correct timing of any control intervention. From the 70s, the method known as mating disruption also develops, in which the sexual pheromones are used to direct control of certain pest species (e.g. Hrdý *et al*., 1990, Angeli *et al*., 2007, Falta *et al*., 2008, Bohnenblust *et al*., 2011). Therefore, efforts are being developed to synthesize the most selective artificial sexual attractants. On the other hand, due to chemical admixtures (contaminations) in synthetic lures, and to similarities in composition of sexual pheromones of some both close or distant insect species, the pheromone traps can detect the presence of some less important, formerly overlooked pests (e.g. Hrdý and Krampl, 1977, Hrdý *et al*., 1979a). In addition, the pheromone traps targeted for pests may reveal occurrence of many non-target and often rare species, whereby they can contribute to the faunistic knowledge of any area (e.g. Krampl, 1981, Hrdý and Krampl, 1982).

The three-year research (2013–2015) of the efficiency of the synthetic sexual pheromones for five tortricid pests of fruit trees was performed in two areas in the SE part of the Czech Republic.

The aims of this research were 1) to evaluate the effectiveness of pheromones for the selected target species, 2) to check the presence of less important or potential orchard pests in the study areas (esp. *Grapholita janthinana* and *G. lobarzewskii*), and 3) to determine the attractiveness of the attractants for non-target species and to ascertain their species composition. The effectiveness of pheromones is meant as attractiveness of a pheromone for the respective target species in this case ("if it ever works"), and at the same time, as the higher (highest) number of captured specimens of the target species if comparing different pheromones for the same target species ("a better effectiveness").

MATERIALS AND METHODS

Pheromone lures

Synthetic sexual attractants were provided by the Propher s.r.o., Březová u Zlína (CZ) for five tortricid pest species: *Grapholita funebrana* (GF), *G. janthinana* (GJ), *G. lobarzewskii* (GL), *G. molesta* (GM), and *Pandemis heparana* (PH). Lures based on different proportions of (Z)-8-dodecen-1-ol acetate and (E)-8-dodecen-1--ol-acetate, often with other minor components are attractive for the first four species (more details, e.g. Hrdý *et al*., 1979b, 1989, 1997), and (Z)-11-tetradecen-l-yl acetate + (Z)-9-tetradecen-l-yl acetate (95:5) were identified for *P. heparana* (Frerot *et al*., 1982). For comparison, pheromone lures for *G. funebrana* (GFP) and *G. molesta* (GMP) were also used from the Pherobank (NL). The exact ratio of compounds for individual lures is not public. The delta traps (Propher) were used, and the pheromone lures were replaced monthly. The capacity of the sticky bottoms is limited by the number of both target and non-target specimens. Therefore they were changed in one or two week intervals, depending on the number of captured specimens, to avoid loss of the trap efficiency. The pheromone traps were installed between May 10 and mid-September.

Study areas

The research was conducted in two areas of the Czech Republic in 2013–2015. The pheromone traps were installed especially in stands of fruit trees, but also in other habitats to evaluate occurrence of non-target species.

Ruda – cadastre of the village Ruda near Velké Meziříčí, district Žďár nad Sázavou, faunistic square 6662, 565 m a.s.l., mean annual temperature 7,2 °C, mean annual rainfall 610 mm; locality A ("orchard"): extensive stands of fruit trees in the village, without chemical treatment, predominantly with *Prunus domestica, P. insititia, P. avium, P. cerasus, Malus domestica,* and *Pyrus communis*; traps baited with GF, GJ, GL, GM in 2013–2015; locality B ("shrubbery"): shrubby habitat with *Crataegus* sp., *Prunus spinosa*, *Rosa canina*, individual forest trees (*Betula pendula, Corylus avellana*, etc.), adjacent meadows; GF, GJ, GL in 2014 and 2015; locality C ("forest"): a mixed forest with *Quercus petraea*, *Picea abies*, individually *Prunus avium,* etc., adjacent meadows; GF, GM in 2014 and 2015, PH in 2015.

Zlámanec – cadastre of the village Zlámanec, district Zlín, faunistic square 6871, 274–286 m a.s.l., mean annual temperature 8,7 °C, mean annual rainfall 615 mm; locality A ("orchard"): extensive orchards in the surroundings of the village, without chemical treatment, especially with *Prunus domestica, P. insititia,* and *Malus domestica;* GF, GFP, GJ, GL, GM, GMP in 2013–2015, PH in 2015; locality B ("shrubbery"): shrubby habitat with *Crataegus* sp., *Prunus spinosa*, *Rosa canina*, gone wild *Prunus domestica*, *P. insititia,* and other fruit trees, adjacent forest especially with *Quercus petraea, Carpinus betulus,* and *Fagus sylvatica;* GF, GJ, GL, GM, in 2014 and 2015; locality C ("forest"): a margin of the predominantly deciduous forest (Carpathian oak and hornbeam forest), especially with *Quercus petraea*, *Carpinus betulus*, *Acer pseudoplatanus,* and *A. campestre*, and adjacent meadows (esp. of *Arrhenatherion*); GF, GM in 2014 and 2015.

Evaluation of the material

The captured material was continuously processed in the usual way. Determinations were confirmed by examination of the genitalia in the most cases (KOH used), using the monograph by Razowski (2001). The important voucher specimens are deposited in the department of plant protection of the Mendel University in Brno. The nomenclature of the registered species follows Laštůvka and Liška (2011).

RESULTS AND DISCUSSION

Target Tortricidae

Grapholita funebrana Treitschke, 1835

Generally known pest of plums and other *Prunus* species. High numbers of specimens were captured in all traps of both study areas, the most captured species during our research, 3316 ex. totally. Synthetic pheromones for this species produced by the Pherobank showed a higher selectivity and slightly higher efficiency than lures by the Propher company. The pheromone for *G. molesta* is due to the similar chemical composition also applicable for G. *funebrana,* with about 0.5–10 times lower efficiency during our investigations. *Grapholita funebrana* was quite sporadically captured also by the pheromone for *G. janthinana* and *G. lobarzewskii* (Tab. I).

Grapholita janthinana (Duponchel, 1835)

Characteristic species of thermophilous bushes with *Crataegus* spp. which is probably the preferred host plant (e.g. Razowski, 2001). More specimens were only caught, when the pheromone traps were placed in the shrub with *Crataegus* (especially

localities B in both areas, from the late May to mid-August). Low number of specimens collected in orchards shows a little relationship of this species to the fruit trees. Individual specimens were also captured by the traps for *G. funebrana*, *G. molesta*, and *G. lobarzewskii*. This is in some contrast to the results by Hrdý *et al*. (1997), who collected it in high numbers direct in the orchard.

Grapholita lobarzewskii (Nowicki, 1860)

Relatively rare species with trophic relation predominantly to *Prunus* species (Razowski, 2001), only with several published records from the Czech Republic (e.g. Laštůvka, 1993, Hrdý *et al*., 1997); occasionally mentioned as a pest of fruit trees (e.g. Sauter and Wildbolz, 1989). Only 30 specimens were captured during three years of research (none, 15 and 15), mostly in the study area of Zlámanec, in June, some specimens in the first half of July. One specimen was caught by the trap for *G. molesta*.

Grapholita molesta (Busck, 1916)

Important pest, especially of *Prunus persica* and other *Prunus* species, introduced from Asia in many parts of the world (e.g. Razowski, 2001, Laštůvka, 2010). Occurrence and distribution of this species in the Czech Republic was studied by Hrdý *et al*. (1979a, 1994). The species is more thermophilous than very similar and widespread *G. funebrana*. Only 52 specimens were captured during three years (8, 39, and 5), mostly in the study area of Zlámanec, 4 in the area of Ruda; 36 of them by the GM pheromone, 13 by the GF pheromone, 2 specimens by GL and one by GJ. Contrary to *G. funebrana*, pheromones for this species produced by the Propher company are probably more effective than those by the Pherobank (none specimen of *G. molesta* was captured by GMP).

Pandemis heparana (Denis & Schiffermüller, 1775)

Widespread Palaearctic species, polyphagous on trees, mentioned as occasional pest in orchards (Razowski, 2001). None specimen was captured during the research, therefore the effectiveness of the lure could not be evaluated (it is not clear, if the lure is not attractive for the target species, or if the species was not present in the study areas).

Non-target Tortricidae

The chemical compositions of sexual attractants in larger species groups of *Grapholita* Treitschke, 1829, *Pammene* Hübner, 1825, and some other genera can be often characterized by a small difference in the ratio of individual compounds (cf., e.g. Hrdý *et al*., 1979b, 1989, 1997). Due to this similarity, many non-target species have been captured together with the target pests. E.g. Sziráki (1978) captured 26 non-target tortricid species on the sexual attractant for *Grapholita molesta*, Hrdý *et al*. (1979b, 1989) registered 19 and 38 species using various pheromones, Hrdý *et al*. (1997) caught 7 non-target species on *Grapholita janthinana* and *G. lobarzewskii* pheromones, and Hrudová (2003) collected 4 non-target species in the pheromone traps for fruit tortricids.

We could register 29 non-target tortricid species (or 33 species in total, because the most of the target species responded to other pheromones as non-target) in two areas during three-year research using the sexual pheromones for five tortricid species (*Grapholita funebrana, G. janthinana, G. lobarzewskii, G. molesta,* and *Pandemis heparana*) (Tab. I). The number of non-target tortricid species was comparable by the pheromone attractants for all species (15–17 spp.), except *Pandemis heparana* (7 spp.). Two species (*Cnephasia stephensiana, Epiblema cirsiana*) were attracted by all used pheromones (but the first of them only by GF from Propher, not by GFP), three species by four of them (*Grapholita funebrana, Hedya pruniana, Pammene albuginana*), and, on the other hand, 16 species by only one of them. *Celypha rosaceana, Cnephasia pasiuana, Epiblema junctana, Gypsonoma dealbana, Notocelia incarnatana, Philedonides lunana, P. rhombicana,* and *Strophedra weirana* were not registered by the previous authors in the pheromone traps with lures for these five species (cf., esp. Sziráki, 1978, Hrdý *et al*., 1979, 1989, 1997). The differentiation of *Epiblema cirsiana* and *E. scutulana* (Denis & Schiffermüller, 1775) is not easy, and the previous authors determined the species captured in the pheromone traps as *E. scutulana*. It is possible that both species are lured into the traps, but the most specimens in our material showed the external characters of *E. cirsiana*.

Only four captured non-target species can have a relationship to the fruit trees, viz. *Cacoecimorpha pronubana* (pest of ornamental and fruit trees), *Cydia pomonella* (apparently an accidental capture by pheromone for *Grapholita molesta*), *Hedya nubiferana* (occasional pest of *Malus*), and *H. pruniana* (occasional pest especially of *Prunus* spp.). The remaining species are polyphagous on herbaceous plants (*Agapeta zoegana*, *Celypha striana, Cnephasia pasiuana, C. stephensiana, Philedonides lunana, P. rhombicana*), or on trees (*Gypsonoma dealbana, Pammene spiniana, Strophedra weirana*), oligophagous (*Celypha rosaceana, Epiblema cirsiana* – both on Asteraceae; *Dichelia histrionana – Abies, Picea*; *Dichrorampha sedatana – Chrysanthemum, Tanacetum; Gypsonoma minutana, G. oppressana* – both *Populus* and *Salix*), or monophagous (*Epiblema junctana – Inula*; *Pammene aurana – Heracleum; Pammene albuginana, P. amygdalana, P. argyrana, P. gallicolana, P. giganteana* – all five species in Cynipidae galls on *Quercus*, *P. fasciana – Quercus*, *P. suspectana – Fraxinus*) (biology of species see, e.g. Razowski, 2001).

The number of non-target species increases with the heterogeneity of the surrounding habitats, and, on the other hand, abundance of the target pest species decreases with increasing distance from orchards. Therefore the species composition of captured Tortricidae can be different also in pheromone traps located not too far each other. The number both of non-target species and specimens

clearly declined in order of habitats orchard – shrubs – forest in the area of Zlámanec (Fig. 1, Tab. II), which is interesting and inconsistent with occurrence of the host plants of non-target species. Something similar was not observed in the area of Ruda.

Records of two species are remarkable and require comments.

Cacoecimorpha pronubana (Hübner, 1799) – Moravia or., Zlámanec (6871), 10.vi.2015, 1 ♂, orchard (locality A), in the pheromone trap for PH, 17.vi.2015, 1 ♂, shrubby habitat (locality B), in the pheromone trap for GM, K. Jakubíková leg., Z. Laštůvka det. et coll. Species widespread in southern Europe from Portugal to Greece, and in SW Asia; in central Europe autochthonous probably only in Switzerland. Introduced and naturalized in several western European countries, in North America and southern Africa (Razowski, 2001, cf. also Ostrauskas *et al*., 2008). Larva is broadly polyphagous on numerous herbaceous and woody plants, known as a pest of ornamental plants. In the Czech Republic recorded only as an casual greenhouse pest (Šumpich *et al*., 2009). First outdoor occurrence in the Czech Republic.

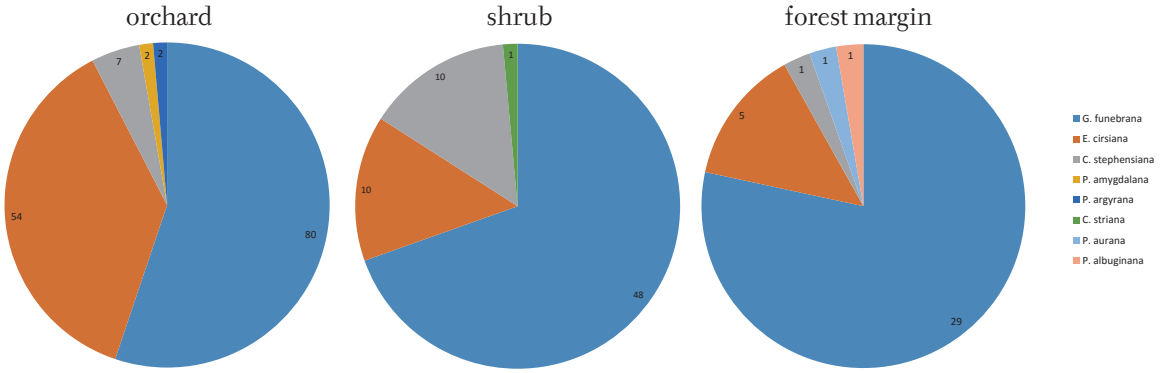
Celypha rosaceana Schläger, 1847 – Moravia occ., Ruda (6662) (Komínková and Šefrová, 2014), next specimens from the same locality: 29.vi.2014, 1 ♂ (GF trap), 13.vii.2014, 1 ♂ (GL), 20.vii.2014, 1 ♂ (GM), 27.vii.2014, 1 ♂ (GJ), J. Komínková leg., Z. Laštůvka det. Species with Eurosiberian distribution, in central Europe not known from Poland and Hungary, larva develops on various Asteraceae (Razowski, 2001). In the Czech Republic reliably recorded from northern Bohemia (Maršík, 2004, Šumpich *et al*., 2013). First specimens in Moravia were registered during this research (Komínková and Šefrová, 2014).

Other Lepidoptera species

In total, 25 species from other families of Lepidoptera were registered in the pheromone traps for the selected Tortricidae during our research (Tab. III). Most of them were caught in one or in a very small number of specimens and their capture can by random, e.g. they could only use the traps as a shelter. But the uneven distribution of specimens in the traps indicates that captures of some species may not be accidental. Furthermore, some species are repeatedly captured in similar researches of other authors (cf., e.g. Hrdý *et al*., 1979b, 1989). Two species with the extremely high numbers of captured specimens deserve comments.

Euspilapteryx auroguttella Stephens, 1835 (Gracillariidae) – Moravia centr., Ruda (6662), 31.v.–26.vii.2015, 282 ♂♂ (PH trap) (31.vi. 3 ♂♂, 1.–14.vi. 52 ♂♂, 15.–28.vi. 68 ♂♂, 29.vi.–12.vii. 117 ♂♂, 13.vii.–26.vii. 42 ♂♂), 31.v.2015, 1 ♂ (GL trap), J. Komínková leg., Z. Laštůvka det.; Moravia or., Zlámanec (6871), 3.vi.–12.vii.2015, 177 ♂♂ (PH trap), K. Jakubíková leg., Z. Laštůvka det.; the species shows the clear relation to the pheromone for *Pandemis heparana*, only one specimen was registered in the trap for *Grapholita lobarzewskii* (cf. also Hrdý *et al*., 1989); species with wide Palaearctic distribution, common in the whole area of the Czech Republic, the larva mines leaves of *Hypericum* spp. (De Prins and De Prins, 2016).

Oegoconia novimundi (Busck, 1915) (Autostichidae) – Moravia or., Zlámanec (6871), 19.vi.–28.viii.2013, 638 ♂♂ (GF trap 615 ♂♂, GM 22 ♂♂, GJ 1♂) (19.–26. vi. 11 ♂♂, 27.vi.–3.vii. 3 ♂♂, 4.–10.vii. 38 ♂♂, 11.–17. vii. 27 ♂♂, 18.–24.vii. 39 ♂♂, 25.–31.vii. 126 ♂♂, 1.–7.viii. 185 ♂♂, 8.–14.viii. 77 ♂♂, 15.–21.viii. 131 ♂♂, 22.–28.viii. 1 ♂), 7.vi.–23.viii.2014, 394 ♂♂ (GF 11 ♂♂, GM 383 ♂♂) (7.–14.vi. 2 ♂♂, 15.–21.vi. 4 ♂♂, 22.–28.vi. 8 ♂♂, 29.vi.–6.vii. 13 ♂♂, 7.–12.vii. 20 ♂♂, 13.–19.vii. 58 ♂♂, 20.–26.vii. 134 ♂♂, 27.vii.–2. viii. 131 ♂♂, 3.–9.viii. 12 ♂♂, 10.–16.viii. 7 ♂♂, 17.–23.viii. 5 ♂♂), 18.vi.–12.viii.2015, 25 ♂♂ (GF 4 ♂♂, GM 21 ♂♂), all K. Jakubíková leg., Z. Laštůvka det.; the species shows a distinct relation to the synthetic sexual attractants for *Grapholita funebrana* and *G. molesta*, one specimen was captured by the trap for *Grapholita janthinana*. The high number of collected specimens is surprising. *Oegoconia novimundi* is described from North America, but it is apparently of the European origin, known from several countries of western, central and southern Europe (e.g. Huemer, 1998, Landry *et al*., 2013). Only two specimens were so far recorded in the Czech Republic, in Zlín (2005) and in the environs of Lanžhot (2009) (Šumpich *et al*., 2010). The larva develops on died organic materials and leaf-litter. The high number of captured specimens may be associated with a hayloft and woodshed close to the pheromone traps. Hrdý *et al*. (1989) captured several specimens of *Oegoconia quadripuncta* (Haworth, 1828) using the sexual attractant for *G. funebrana*. This record very probably refers to *O. uralskella* Popesu-Gorf & Capuse, 1965, but it cannot be excluded that it was *O. novimundi*.



1: *Differences in species composition of target and non-target Tortricidae in various habitats in the pheromone trap for the same target species (G. funebrana); study area of Zlámanec, 2014*

I: *List of captured Tortricidae with numbers of specimens in the traps for individual target species; abbreviations see Materials and Methods, R – species captured only in the area of Ruda, Z – only in the area of Zlámanec*

Species	GF	GFP	GJ	GL	GM	GMP	PH	Note
Agapeta zoegana (Linnaeus, 1767)							2	R
Cacoecimorpha pronubana (Hübner, 1799)					1		1	Z
Celypha rosaceana (Schläger, 1847)	2		1	1	1			R
Celypha striana (Denis & Schiffermüller, 1775)	1		1					
Cnephasia pasiuana (Hübner, 1799)			4					R
Cnephasia stephensiana (Doubleday, 1849)	1158		81	45	701	19	7	
Cydia pomonella (Linnaeus, 1758)					2			Z
Dichelia histrionana (Frölich, 1828)							4	R
Dichrorampha sedatana (Busck, 1906)				1				R
Epiblema cirsiana (Zeller, 1843)	86	2	32	2	30	10	4	
Epiblema junctana (Herrich-Schäffer, 1856)	9		1					
Grapholita funebrana Treitschke, 1835	1896	642	8	1	289	480		
Grapholita janthinana (Duponchel, 1835)	6		52	2	3			
Grapholita lobarzewskii (Nowicki, 1860)				29	1			
Grapholita molesta (Busck,1916)	13		1	2	36			
Gypsonoma dealbana (Frölich, 1828)				5				
Gypsonoma minutana (Hübner, 1799)							4	R
Gypsonoma oppressana (Treitschke, 1835)				1				R
Hedya nubiferana (Haworth, 1811)							37	
Hedya pruniana (Hübner, 1799)	99		8	1	148	4		
Notocelia incarnatana (Hübner, 1800)	1							R
Pammene albuginana (Guenée, 1845)	11	10	4	1	2	2		
Pammene amygdalana (Duponchel, 1842)	4				10			
Pammene argyrana (Hübner, 1799)	6	1			1	2		
Pammene aurana (Fabricius, 1775)	2		2	1	10			Z
Pammene fasciana (Linnaeus, 1761)					1			Z
Pammene gallicolana (Lienig & Zeller, 1846)	1				2			
Pammene giganteana (Peyerimhoff, 1863)			2					Z
Pammene spiniana (Duponchel, 1843)	1		5	1	8			
Pammene suspectana (Lienig & Zeller, 1846)	2		1		1			
Philedonides lunana (Thunberg, 1784)				2				R
Philedonides rhombicana (Herrich-Schäffer, 1851)			3	35				Z
Strophedra weirana (Douglas, 1850)				1				Z

II: *Numbers of species/specimens of Tortricidae in the pheromone traps for Grapholita funebrana and G. molesta in individual habitats in the area of Zlámanec*

Pheromone / habitat		orchard	shrubbery	forest
Grapholita funebrana	2014	6/147	4/69	5/37
	2015	6/161	5/69	3/15
Grapholita molesta	2014	7/146	4/37	3/13
	2015	4/73	7/85	6/55
Total		12/527	9/260	9/120

III: *Other Lepidoptera species captured in the pheromone traps for fruit trees Tortricidae*

Species	GF	GJ	GL	GM	PH
Acronicta psi (Linnaeus, 1758) (Noctuidae)	1				
Acronicta rumicis (Linnaeus, 1758) (Noctuidae)	9				
Alcis repandata (Linnaeus, 1758) (Geometridae)	1				
Autographa gamma (Linnaeus, 1758) (Noctuidae)			1		
Bryotropha terrella (Denis & Schiffermüller, 1775) (Gelechiidae)		1			
Depressaria chaerophylli Zeller, 1839 (Depressariidae)		4	1		
Dypterygia scabriuscula (Linnaeus, 1758) (Noctuidae)			1		
Ematurga atomaria (Linnaeus, 1758) (Geometridae)			1		
Euspilapteryx auroguttella Stephens, 1835 (Gracillariidae)			1		459
Hypena proboscidalis (Linnaeus, 1758) (Erebidae)	3			1	
Hypena rostralis (Linnaeus, 1758) (Erebidae)	1				
Hypochalcia ahenella (Denis & Schiffermüller, 1775) (Pyralidae)				1	
Ligdia adustata (Denis & Schiffermüller, 1775) (Geometridae)				1	
Mesoligia furuncula (Denis & Schiffermüller, 1775) (Noctuidae)	1				
Mesapamea secalella Remm, 1983 (Noctuidae)	2			1	
Mesapamea secalis (Linnaeus, 1758) (Noctuidae)				1	
Noctua fimbriata (Schreber, 1759) (Noctuidae)					14
Oegoconia novimundi (Busck, 1915) (Autostichidae)	630	1		426	
Oligia latruncula (Denis & Schiffermüller, 1775) (Noctuidae)			1		
Philereme transversata (Hufnagel, 1767) (Geometridae)				1	
Polia nebulosa (Hufnagel, 1766) (Noctuidae)					1
Pterophorus pentadactyla (Linnaeus, 1758) (Pterophoridae)				1	
Recurvaria leucatella (Clerck, 1759) (Gelechiidae)		1			
Xanthia icteritia (Hufnagel, 1766) (Noctuidae)				1	
Zygaena ephialtes (Linnaeus, 1767) (Zygaenidae)					1

CONCLUSION

Efficiency of the synthetic sexual pheromones for five tortricid species, pests of fruit trees, viz. *Grapholita funebrana*, *G. janthinana*, *G. lobarzewskii*, *G. molesta,* and *Pandemis heparana* was tested with the following results:

1. The lures for the first four species showed good efficiency for the target species; none specimen of *P. heparana* was captured, thus the attractant efficacy could not be evaluated.
2. The lures for *G. funebrana* produced by the Pherobank showed a higher selectivity and efficiency than those by the Propher.
3. The lures for *G. molesta* by the Propher are probably more effective than those by the Pherobank.
4. The lures for *G. funebrana* and *G. molesta* act reciprocally for both species, only with slightly lower efficiency.
5. 29 non-target tortricid species and 25 other Lepidoptera species were captured.
6. The number of non-target tortricid species was comparable by the pheromone attractants for all species (15–17 spp.), except *Pandemis heparana* (7 spp.).

7. The most abundant non-target species were *Cnephasia stephensiana*, *Epiblema cirsiana,* and *Hedya pruniana*.
8. *Cacoecimorpha pronubana* was recorded in outdoor conditions of the Czech Republic for the first time.
9. *Celypha rosaceana* was found as new for Moravia.
10. *Oegoconia novimundi* (Autostichidae) was attracted by the attractants for *Grapholita funebrana* and *G. molesta* in unusually high number of specimens.
11. The sticky bottoms of the traps should be changed in appropriate intervals depending on the number of specimens captured to avoid loss of the trap efficiency.

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