

their morphology and biology.

Tachinidae reared from tortricid hosts

Arrangement of species and nomenclature follows Herting & Dely-Draskovits (1993). The data refer to: date of collection of the host/ date of emergence (hatching) of the tachinid larva from the host/ date of eclosion of the adult tachinid.

1. *Nemorilla floralis* (FALLÉN, 1810)

Material: 2 ♂♂ ex *Rhopobota naevana* (Iași-A, 17.05.-3.06.-15.06.1992); 1 ♂, 4 ♀♀ ex *Acleris rhombana* (Iași-A, 17.05.-3.06.-15.-20.06.1992); 2 ♂♂, 2 ♀♀ ex *Archips rosanus* (Iași-A and Iași - B, 10.05. - 25.05. - 5.06.1994, 29.05.-12.06 - 16.06.1996 and 6.06. - 16.06.-21.06.1996); 1 ♂ ex *Adoxophyes orana* (Iași-A, 8.05.-24.05.-30.05.1994).

This common species occurs in central Europe from early May till mid of October. It not much specialized and parasitizes many Microlepidoptera (Tortricidae, Pyralidae, Oecophoridae, Hyponomeutidae, Glyphipterygidae, and Cochyliidae), and occasionally a few Macrolepidoptera. It is often recorded from *Archips rosanus*. Only one record each refers to the hosts *Rhopobota naevana* (LUCCHESI 1941, from Italy) and *Acleris rhombana* (MICZULSKI & KOSLINSKA 1976, from Poland). JANSSEN (1958) mentioned the nearly related *Nemorilla maculosa* as reared from *Adoxophyes orana* in Germany. It cannot be ruled out that, after a revision of the material, this record may turn out as belonging to the species mentioned above. *N. floralis* was known from Romania from the tortricids *Archips podana*, *Pandemis ribeana*, and *Tortrix viridana* (LEHRER & PASCOVICI 1966).

2. *Pseudoperichaeta nigrolineata* (WALKER, 1853)

Material: 5 ♂♂, 2 ♀♀ ex *Archips rosanus* (Iași-A and Iași-B, 6.06.-10.06.1996, 27.05.-1.-4.06.-30.05.-19.06.1997).

A species, which is often reared from various Microlepidoptera (mainly Tortricidae and Pyralidae, but also a few Oecophoridae and Hyponomeutidae). *Archips rosanus* is one of its main hosts. *P. nigrolineata* flies from early May till mid of September. It was already recorded from Romania by IONESCU, ZAMFIRESCU & NICULESCU (1964) as a parasitoid of *Ostrinia nubilalis* (Pyralidae).

3. *Eumea linearicornis* (ZETTERSTEDT, 1844)

Material: 1 ♂ ex *Archips rosanus* (Iași-B,

27.05.-30.05.1997).

The hosts of this common species are various Tortricidae (mainly *Archips* spp.), *Eurrhynx hortulata* (Pyralidae) and some Noctuidae from deciduous woods (mainly *Orthosia* spp. and *Cosmia* spp.). It is often recorded from *Archips rosanus*. *E. linearicornis* flies in several generations from mid of April till mid of October.

4. *Eurysthaea scutellaris* (ROBINEAU-DESVOIDY, 1848)

Material: 2 ♀♀ ex *Archips rosanus* (Iași-A and Iași - B, 12.06 - 13.06. - 17.06.1996, 18.06 - 19.06.1996).

This species is a parasitoid of Hyponomeutidae, less often also of some Tortricidae and Pyralidae. Furthermore a few Geometridae, Noctuidae and Arctiidae are occasionally recorded. *Archips rosanus* is already mentioned as host by BRANDE & VERBEKE (1949), CAPEK (1961), RADISSON & MASSON (1974) and MEY (1987). *E. scutellaris* can be collected in the field from the end of April till mid of September. It is known from Romania as a parasitoid of *Hyponomeuta* spp. (SUSTER 1939, CONSTANTINEANU 1954, CONSTANTINEANU & CIOCHIA 1964, PETCU 1968).

5. *Actia pilipennis* (FALLÉN, 1810)

Material: 3 ♂♂ ex *Ancylis selenana* (Iași-A, 26.06.-7.07.-11.-15.07.1993); 1 ♀ ex *Pandemis heparana* (Făgăraș, 18.06.-28.06.1997).

A. pilipennis has at least two generations from early May till end of September. Its hosts are Tortricidae (mainly *Tortrix* spp.); only occasionally a few other Microlepidoptera (Glyphipterygidae, Pterophoridae, Pyralidae) are recorded. *Pandemis heparana* was already known as host from Poland (MICZULSKI & KOSLINSKA 1976), whereas *Ancylis selenana* is a new host for this species. *A. pilipennis* was recorded from Romania by LEHRER & PASCOVICI (1966) as parasitoid of *Archips podana* and *Tortrix viridana*.

Discussion

The investigations have resulted in the obtention - out of the 28 tortricid species recorded - (DIACONU 1997 - a, b), of parasitoids from 18 hosts and, respectively, of tachinids from only 6 hosts (Table 2).

The role played by tachinids in limiting the populations of the six tortricids is quite reduced, compared with that of other systematic groups of parasitoids - Hymenoptera, especially. Thus, in

the case of *Archips rosanus* L., which is the most representative host for the tachinids obtained, the whole complex of larval and pupal parasitoids destroys about 34% of the total number of collected individuals, while the tachinids destroy only 5%. In addition, the *Nemorilla floralis* FALL. species evidences the highest polyphagy, being recorded from 4 hosts, while the other tachinids had been obtained from only 1-2 hosts.

The parasitization activity of such tachinids begins - under the climatic conditions of Iași - in the last ten days of May. This statement is supported by the fact that the main species forming the complex of tortricids pests of fruit bearing trees, *Hedya dimidioalba* RETZ. and *Hedya pruniana* HB., are not parasitized by tachinids, as they hibernate as immature larvae, and the larval stage ends before May 15-20. The

tortricids from which the tachinids have been obtained, usually hibernate either as eggs (*Archips rosanus* L., *Acleris rhombana* DEN. & SCHIFF, *Rhopobota naevana* HB.) or as mature larvae (*Ancylis selenana* GUEN.), so that the larval stage lasts till June-July or even until August-September for *Rhopobota naevana* HB. and *Ancylis selenana* GUEN. - which is due to their bivoltin biological cycle.

In the case of *Archips rosanus* L., too, tachinids are present only in the samples collected towards the end of the host's larval stage. Table 1 presents two cases of samples in Iași-B, in 1996 and 1997, which show the chronological succession of the parasitization. Most of the tachinids had been obtained from the samples in which the host was in the stage of mature larva.

Table 1

Chronological succession of tortricid's parasitization by tachinids

Nr.	collect. date	Archips rosanus		Parasitoids			
		stage at collect.	individ. nr.	total nr.	%	Tachinidae	
						nr.	%
1996							
1.	12.05	immature larva	39	-	-	-	-
2.	22.05	immature larva	15	-	-	-	-
3.	31.05	mature larva	19	7	37	-	-
4.	4.06	mature larva	13	3	23	-	-
5.	6.06	mature larva	30	22	73	3	10
6.	18.06	pupa	6	2	33	1	16
1997							
1.	12.05	immature larva	26	2	8	-	-
2.	20.05	immature larva	43	15	35	-	-
3.	27.05	mature larva	47	22	47	6	13
4.	10.06	pupa	21	7	33	1	5

The interspecific competition between tachinids and other groups of parasitoids is more obvious for *Nemorilla floralis* FALL., whose whitish eggs are deposited on the antero-dorsal surface of the larvae. In the sample collected in Iași-B on May 27, 1995, *Archips rosanus* L. larvae have been observed with at least one egg of this tachinid on their skin:

- From each of two living, mature larvae of the host, one nematode (probably *Hexameris* sp.) has been obtained; in this type of competition the nematode's success being assured by its body's cuticular covering;

- From three living, mature larvae, each with a living larva of *Phytodietus polyzonias* FOERST. (Hym., Ichneumonidae) on the external side, and from a dead larva, with two larvae of *Gonizonia* sp. (Hym., Bethyridae), adult parasitoids resulted, so that one may conclude that - in

such competitions - the external parasitoids destroy concomitantly with the host, the internal ones;

- Out of a living larva and a puparia resulted from an *Archips rosanus* L. pupa, adults of *Pseudoperichaeta nigrolineata* WALK. have been obtained. A possible explanation is that *P. nigrolineata* entered the body of the host larvae earlier thus *N. floralis*, so that the latter ones have been killed by *P. nigrolineata*.

REFERENCES

- BRANDE J. V. D. & VERBEKE J. 1949. De Parasieten van der Heggebladroller (*Cacoecia rosana* L.). - Meded. LandbHoogeschool Gent 14: 169 - 174.
- CAPEK M. 1961. Verzeichnis der Parasiten, die

- aus schädlichen Insekten an der Forschungsanstalt der Forstwirtschaft in B. Stiavnica erzogen wurden. Teil II - Wirte der Tachinen - Tachinidae (Diptera). - Ved. Pr. Vyzk. Úst. Les. Hospod., Banskej Stiav. 2: 233 - 240.
- CHAMBON J. P. 1986. Les tordeuses nuisibles en arboriculture fruitière. I.N.R.A., Paris.
- CONSTANTINEANU M. I. 1954. La teigne des feuilles du prunier (*Hyponomeuta padella* L.) et les insectes parasites qui s'attaquent à elle en la R. P. R. (Ichneumonidae et Tachinidae). - Revue Univ. Inst. Politehn. Iași 1: 219 - 228.
- CONSTANTINEANU M. I. & CIOCHIA V. 1964. Insectes parasites dans la teigne des feuilles du prunier (*Hyponomeuta padella* L.) dans les environs de la ville de Mangalia, région de Dobrogea. - Anal. Șt. Univ. "Al. I. Cuza", Iași, (Biol.) 10: 271 - 282.
- DIACONU A. 1997 a. The complex of leafrollers (Lep.: Tortricidae) in the apple-tree. Lucr. St. Univ. Agr. Med. Veter. "I.I. de la Brad", Iași. 40: 342-347.
- DIACONU A. 1997 b. New contributions to the knowledge of the leafrollers (Lep.: Tortricidae) of the fructiferous-trees. (in rom.). Bul. St., Ser. Biol., Univ. Pitești. 1: 161-167.
- HERTING B. & DELY-DRASKOVITS A. 1993. Family Tachinidae. - In: SOÓS, A. & PAPP, L. (eds.): Catalogue of Palearctic Diptera 13: 118 - 624.
- IONESCU M. A., ZAMFIRESCU A. & NICULESCU F. 1964. Cercetări asupra paraziților și prădătorilor la *Pyrausta nubilalis* (HÜBNER), Lepidoptera-Pyralidae. - Studii Cerc. Biol. (Ser. Zool.) 16: 73 - 85.
- JANSSEN M. 1958. Über Biologie, Massenwechsel und Bekämpfung von *Adoxophyes orana* FISCHER V. ROESLERSTAMM. - Beitr. Ent. 8: 291 - 324.
- LEHRER A. Z. & PASCOVICI V. 1966. Fichier bio-écologique et morphologique de Diptères entomophages obtenus d'élevage I-VI. - Cah. Nat. 22: 35 - 41.
- LUCCHESI E. 1941. Contributi alla conoscenza dei lepidotteri del melo. III. *Acrolita naevana* HB. - Boll. Lab. Ent. agr. Filippo Silvestri 5: 1 - 60.
- MEY W. 1987. Der Parasitenkomplex des Heckenwicklers, *Archips rosana* (LINN.), im Havelländischen Obstbaugbiet. - Beitr. Ent. 37: 159 - 167.
- MICZULSKI B. & KOSLINSKA M. 1976. Parasites of the leaf rollers (Tortricidae) occurring in apple orchards in some regions of Poland. - Polskie Pismo Entomol. 46: 165 - 178.
- PATOCKA J. 1977. Beitrag zur Kenntnis der Puppen der Wickler aus der Tribus Archipini (Lepidoptera, Tortricidae). Entomol. Nachr., Dresden, 21(6): 81-85.
- PATOCKA J. 1983. Zur Puppenmorphologie und -taxonomie der Dendrophilen Arten aus der Tribus Eucosmini (Lepidoptera, Tortricidae). Vest. cs. Spolec. Zool., Praha, 47(3): 184-208.
- PETCU I. P. 1968. Beitrag zur Kenntnis des Parasitenkomplexes der Lepidopteren *Yponomeuta evonymellus* L. (Yponomeutidae), aus dem Gebiete von Iași. - Anal. Șt. Univ. "Al. I. Cuza" (Biol.) 14: 327 - 337.
- RADISSON A. & MASSON J. M. 1974. Tachinaires de Basse-Provence et leurs hôtes. - Bull. Soc. Entomol. Fr. 79: 109 - 112.
- ȘUSTER P. M. 1939. Über die Raupenfliegen (Tachiniden) Rumäniens. - Verh. 7. int. Kongr. Entomol. 1: 413 - 431.
- SWATSCHEK B. 1958. Die Larvalsystematik der Wickler (Tortricidae und Carposinidae). Acad.-Verlag, Berlin, 3.

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Efficiency of tachinids in limiting the host populations

Nr.	Places	Period of collection	HOST		PARASITOIDS																	
			Species	Nr. of individ.	All parasitoids			Tachinidae						A. pilipennis								
					nr.	%	nr.	%	nr.	%	N. floralis	P. nigrolineata	E. linearicornis	Eur. scutellaris	A. pilipennis							
1.	Iași-A	21.04-1.06.1992	Rh. naevana	313	24	7.7	2	0.6	2	0.6	-	-	-	-	-	-	-	-	-	-		
2.	Iași-A	21.04-17.05.1992	Ac. rhombana	34	5	14.7	5	14.7	5	14.7	-	-	-	-	-	-	-	-	-	-		
3.	Iași-A	16.06-4.08.1993	An. selenana	386	246	63.7	4	1.0	-	-	-	-	-	-	-	-	-	-	-	4	1.0	
4.	Iași-A	10.04-19.07.1994	Ad. orana	90	17	18.9	1	1.1	1	1.1	-	-	-	-	-	-	-	-	-	-	-	
5.	Iași-B	10-15.05.1994	Ar. rosanus	20	8	40.0	1	5.0	1	5.0	-	-	-	-	-	-	-	-	-	-	-	
6.	Iași-A	29.05-21.06.1996	Ar. rosanus	22	13	59.1	3	13.6	2	9.1	-	-	-	-	-	-	-	-	-	1	4.6	
7.	Iași-B	12.05-18.06.1996	Ar. rosanus	122	34	27.9	4	3.3	1	0.8	2	1.6	-	-	-	-	-	-	-	1	0.8	
8.	Iași-B	12.05-10.06.1997	Ar. rosanus	137	46	33.6	7	5.1	1	0.7	5	3.7	1	0.7	0.7	-	-	-	-	-	-	
9.	Făgăraș (BV)	18.06.1997	Pa. heparana	5	2	40.0	1	20.0	-	-	-	-	-	-	-	-	-	-	-	-	1	20.0
				TOTAL	1129	395	35.0	28	2.5	13	1.2	7	0.6	1	0.1	2	0.2	5	0.4	5	0.4	

HOSTS: - Rh. naevana = *Rhopobota naevana* HB.

- Ac. rhombana = *Acleris rhombana* DEN. & SCHIFF.

- An. selenana = *Ancylis selenana* GUEN.

- Ad. orana = *Adoxophyes orana* FISCH. V. ROSL.

- Ar. rosanus = *Archips rosanus* L.

- Pa. heparana = *Pandemis heparana* DEN. & SCHIFF.

PARASITOIDS:

- N. floralis = *Nemorilla floralis* FALL.

- P. nigrolineata = *Pseudoperichaeta nigrolineata* WALK.

- E. linearicornis = *Eumea linearicornis* ZETT.

- Eur. scutellaris = *Eurysphaea scutellaris* ROB. - DESV.

- A. pilipennis = *Actia pilipennis* FALL.