Folia faunistica Slovaca, 2011, 16 (2): 97–101 ISSN 1335-7522

PSYLLIDS (HEMIPTERA, PSYLLOIDEA) INHABITING THE CANOPY AND SHRUB LAYER OF AN OAK AND HORNBEAM FOREST IN BÁB NEAR NITRA (SLOVAKIA)

Pavel Lauterer

Moravian Museum, Department of Entomology, Hviezdoslavova 29a,
CZ 627 00 Brno – Slatina, Czech Republic; [ento.laut@volny.cz]

Abstract: Psyllids inhabiting the canopy and shrub layer in an oak and hornbeam forest in Báb near Nitra were studied within the International Biological Program (IBP) in 1971. The insects were collected by beating from branches of *Quercus petraea, Carpinus betulus, Acer campestre, Cornus mas, Crataegus monogyna* and *Prunus spinosa* (50 strokes per tree species, 25 strokes per shrub species) at 11 sampling dates from late April to late September. Six psyllid species in 1,253 specimens were found, among which *Rhinocola aceris* (Linnaeus) prevailed (1,021 exs.; 81.5 %) followed by *Cacopsylla peregrina* (Foerster) (212 exs., 16.9 %). The remaining four species were represented in low numbers (making a total of 20 exs.; 1.6 %). It is suggested that the beating method is not suitable for obtaining a complete psyllid species spectrum, especially when used in summer.

Key words: Hemiptera, Psylloidea, canopy, shrub layer, Báb forest near Nitra, southern Slovakia, faunistics.

INTRODUCTION

Within a state research project "Investigation of the secondary production in the oak and hornbeam forest near Báb", J. Kleinert investigated the community of arthropods inhabiting the forest canopy. The investigation was undertaken in 1971 as a part of the International Biological Program (IBP) and took place in a lowland xerothermic oak and hornbeam forest in Báb in southern Slovakia. The material of Hemiptera: Auchenorrhyncha and Psylloidea collected during the project was taken over by the Slovak National Museum, Bratislava. The results on the Auchenorrhyncha were later published by Janský et Okáli (1984). Late Dr. I. Okáli from the Department of Entomology of that museum kindly submitted to me the material of Psylloidea for evaluation.

The forest under study lies near the village of Báb (14 km west of the city of Nitra) between the Danube Lowland and the foothills of the Považský Inovec Hills, at altitudes of 170–210 m. It is a remnant of a previously larger forest in an intensively farmed landscape, protected as a State Nature Reserve. A general description of the study area was published by Jurko (1970) and the prevailing climatic conditions were described by Smolen (1970). Kubíček et Brechtl (1970) described the locality from the viewpoint of forest typology. The study area belongs to a region with warm and dry climate, mild winters, rather long periods of sunlight and prevailingly northern air currents. The following forest types occur in the locality: Fageto-Quercetum, Carpineto-Aceretum, and Corneto-Quercetum. The tree layer mostly consists of *Carpinus betulus, Quercus petraea, Acer campestre, Quercus robur*, and less frequent *Q. cerris*. The shrub layer is dominated by *Carpinus betulus*, besides frequent *Acer campestre, Cornus mas, Quercus petraea, Ligustrum vulgare*, and *Crataegus monogyna*. The herb layer (which was not the object of the study) was formed by a nitrophilous vegetation with prevailing *Urtica dioica*.

MATERIAL AND METHODS

The underlying material was collected by beating from *Quercus petraea, Carpinus betulus, Acer campestre, Cornus mas, Crataegus monogyna* and *Prunus spinosa* branches on eleven sampling dates throughout the vegetation season between late April and late September (approximately every two weeks). A total of 66 collections was made. Fifty strokes on higher branches (about 3 m above the

Table 1. Abundance and dominance of different groups of Homoptera on individual host plants in Báb, collected by the beating method.

Plant species	Homoptera	Auchenorrhyncha		Psylloidea		other Sternorrhyncha	
	no. exx.	no. exx.	%	no. exx.	%	no. exx.	**%**
Quercus petraea	1791	1044	58.29	122	6.82	625	34.9
Carpimus betulus	2670	1256	47.04	275	10.3	1139	42.66
Acer campestre	9700	2956	30.47	359	3.7	6385	65.82
Cornus mas	2099	574	27.35	132	6.29	1393	66.36
Crataegus monogyna	3235	412	12.74	267	8.25	2556	79.01
Prunus spinosa	1443	491	34.09	98	6.79	854	59.18
Total	20937	6733	32.16	1253	5.98	12952	61.86

ground) were used for each tree species and sampling date, while 25 strokes per plant species and sampling date were applied on low shrubs. The insects falling down from branches were captured on a 1 m^2 sheet. This method provided mutually comparable results (Kleinert 1976).

The total of the material of adult psyllids was mounted and is deposited in the collections of the Slovak National Museum in Bratislava.

RESULTS AND DISCUSSION

The beating method, employed in this study area, yielded a total of 84,433 arthropod specimens, of which about one fourth (20,938 exs.; 24.8 %) belong to the former order Homoptera. Psyllids counted for 1,253 exs from this number, which corresponds to 5.98 % of the Homoptera total and 1.46 % of all arthropods. Data on the abundance and dominance of different groups of Homoptera are given in table 1. The seasonal dynamics of psyllid species on different plants are presented in table 2. The greatest relative numbers of psyllids among Homoptera were recorded on *Carpinus betulus*, but in absolute numbers most psyllid specimens were caught on *Acer campestre*, which is the host plant of the eudominant psyllid Rhinocola aceris (1,021 exs.; 81,5 % of all Psylloidea; 367 ♂, 654 ♀). Adults of this species were frequently found also on the other tree and shrub species under study. *Cacopsylla peregrina* was another dominant species (212 exs.; 16.9 % of all Psylloidea; 122 ♂, 90 ♀). It was present on all tree and shrub species which were sampled, except *Prunus* spp., and dominated on its host plant, *Crataegus* spp. The remaining four psyllid species were recorded in low numbers only (20 exs. in total; 1.6 % of all Psylloidea).

***Rhinocola aceris* (Linnaeus)** has one generation annually. First larval instar overwinters in buds of Acer spp., mainly A. campestris. From the expanding buds the larvae gradually move and concentrate on young leaves or on the sprouts and later move onto the lower surface of leaves. Adults emerge in early spring, sometimes as early as in April, otherwise during the first decade of May. Vondráček (1957) summarised published data and wrote that the species does not abandon its host plant unless compelled to and that the only note on summer migrations of *R. aceris* to other tree species (Taxus baccata) was made by Pussard (1932). The material from Báb indicates that also *R. aceris* sometimes migrates to other woody plants similarly to the species of the subgenus *Cacopsylla*. Also the traditional opinion in older literature that males die soon after copulation is doubtful as we found numbers of males in the end of August and in the first decade of September. *R. aceris* made up for over 90 % of the specimens on all plants sampled except for *Crataegus monogyna* (less than 35 %). On Acer campestre it was almost the only species recorded (98.3 %). It is probable that this abundance is a result of the collecting method. The species was found on its host plants from 11 May, and the migration to other woody plants apparently began around 25 May; the adults then moved back to *Acer campestre* probably during the first decade of August. First mature eggs were found in females in the last decade of August and more regularly in the first decade of September.

***Cacopsylla peregrina* (Foerster)** is a very common ubiquitous species, monophagous on various *Crataegus* species and monovoltine. It overwinters in the egg stage on the bark of young twigs, mainly on brachyblasts. The larvae emerge in early spring during budding, they suck on buds, young leaves, flowers and leaf stalks. When the species occurs on the host in large numbers, leaves become wrinkled, turn to brown and black and the inflorescences fall of. Adults appear in late May and early June, suck on the host plant for about one week and then spread in the parapause stage to other tree and shrub species in the surroundings. The adults return to the host plants in late August when the coloration of fe-

Table 2. Abundance of psyllid species on each sampled plant species and sampling date, and total values.

	11.5.71	25.5.71	11.6.71	24.6.71	7.7.71	27.7.71	9.8.71	20.8.71	8.9.71	28.9.71	Total sexes	Total	%
Quercus petraea													
Rhinocola aceris		7♂ 1♀	7♂ 12♀	10♂ 14♀	13♂ 11♀	2♂ 11♀	1♂ 6♀				40♂ 55♀	95	77.87
Cacopsylla peregrina		2♂		1♂ 4♀		3♂ 4♀	4♂ 6♀				10♂ 14♀	24	19.67
Cacopsylla mali		1♂									1♂	1	0.82
Cacopsylla ulmi				1♀							1♀	1	0.82
Trioza urticae				1♀							1♀		
Total		11	19	31	24	20	17					122	
Carpinus betulus													
Rhinocola aceris		11♂ 29♀	30♂ 80♀	22♂ 40♀	10♂ 33♀	1♂ 6♀	1♂ 2♀				75♂ 190♀	265	96.36
Cacopsylla peregrina			1♀	2♂	2♂ 2♀		1♂	1♂			6♂ 3♀	9	3.27
Cacopsylla mali				1♂							1♂	1	0.36
Total		40	111	65	47	7	4	1				275	
Acer campestre													
Rhinocola aceris	14♂ 40♀	14♂ 11♀	14♂ 20♀	25♂ 18♀	9♂ 17♀	60♂ 39♀	10♂ 27♀	5♂ 15♀	8♂ 5♀	2♀	159♂ 194♀	353	98.33
Cacopsylla peregrina			1♂	1♂	1♀	1♀	1♀				2♂ 3♀	5	1.39
Cacopsylla mali								1♂			1♂	1	0.28
Total	54	25	35	44	27	100	38	21	13	2		359	

Table 2. Continued.

	11.5.71	25.5.71	11.6.71	24.6.71	7.7.71	27.7.71	9.8.71	20.8.71	8.9.71	28.9.71	Total sexes	Total	%
Cornus mas													
Rhinocola aceris			31♂ 49♀	6♂ 9♀	2♂ 20♀	1♂ 7♀					40♂ 85	125	94.70
Cacopsylla peregrina			1♂	1♀		1♂					2♂ 1♀	3	2.77
Cacopsylla mali				3♀							3♀	3	2.77
Cacopsylla ulmi			1♂								1♂	1	0.76
Total			82	19	22	9						132	
Crataegus monogyna													
Rhinocola aceris		5♂ 21♀	7♂ 13♀	7♂ 14♀	4♂ 14♀	7♀		1♂			24♂ 69♀	93	34.83
Cacopsylla peregrina		15♂ 18♀	19♂ 21♀	14♂ 4♀	15♂ 7♀	34♂ 15♀		5♂ 4♀			102♂ 69♀	171	64.05
Cacopsylla mali					1♀	1♀					2♀	2	0.75
Cacopsylla ulmi				1♂							1♂	1	0.37
Total		59	60	40	41	57		10				267	
Prunus spinosa													
Rhinocola aceris		14♂ 8♀		15♂ 32♀		21♀					29♂ 61♀	90	91.84
Cacopsylla pruni				5♂ 3♀							5♂ 3♀	8	8.16
Total		22		55		21						98	
Total psyllids	54	157	307	254	161	214	59	32	13	2		1253	

males turns brown. The females oviposit onto the host plants during September and October. In the locality studied, the species predominated only on its host plant (64.05 %), it was also common on *Quercus petraea* (19.7 %), only few specimens were found on the other plant species. On *Prunus* spp., *C. peregrina* occured quite exceptionally, the same as I observed in many collections in southern Moravia.

***Cacopsylla mali* (Schmidberger)** is one of the most abundant psyllids in Central Europe and is often a serious pest of the apple trees. Its biology is very similar to that of *C. peregrina*, especially in the spreading onto other tree and shrub species during the summer parapause stage. The species apparently came to the Báb forest from the surrounding cultivated orchards.

***Cacopsylla ulmi* (Foerster)** has been, until recently, among very abundant species in Central Europe. It also has a similar biology as *C. peregrina*, including the seasonal migration to the broad-leaved trees and shrubs in the parapause stage. The species is monophagous on *Ulmus* spp., which were largely destroyed by the elm blight disease in the last century and this psyllid has become scarcer and fairly local. Scarce individuals recorded here indicate that a few elms survived on the locality under study.

The host plants of ***Cacopsylla pruni* (Scopoli)** are *Prunus* spp., *Armeniaca, Persica* and probably a few other closely related genera. The adults spend most of time on shelter plants – conifers. They leave the host plants in the last 1–2 weeks after the last moulting and move to conifers. There they spend the summer and overwinter and later in late March and April they move on various broad-leaved woody species and only in another two weeks they reach their host plants by active flight. After copulation, females oviposit on the host plants from late March till mid-June. Adults of the new generation appear from the beginning to late June. The species is a vector of the phytoplasma causing the European Stone Fruit Yellow disease.

***Trioza urticae* (Linnaeus)** is monophgous on *Urtica* spp., on which it occurs in large numbers especially in the understorey of floodplain forests and on soils rich in nitrogen. Adults overwinter without diapause in the forest undergrowth, in leaf litter, occasionally also on coniferous trees. The species is abundant throughout central Europe and its finding in the shrub and tree layers is only accidental.

DISCUSSION

The psyllid fauna of the locality under study appears quite poor in species (6 spp), although the psyllids were recorded in fairly large numbers (1,253 exs.). Auchenorrhyncha collected in the same project were more abundant both in species (75 spp.) and specimens (6,733 exs., Janský & Okáli 1984). It is remarkable that certain very common species were not found on their host plants, e.g. *Cacopsylla melanoneura* and *C. affinis* on *Crataegus* or *Trioza remota* on *Quercus*. These three species overwinter in the adult stage and their maximum numbers on the host plants can be found from mid-February to late April, at which time, however, no sampling was made in Báb. Psyllids are rarely attracted by artificial light at night, therefore they were not collected in light traps installed in the Báb forest as well, though Auchenorrhyncha were collected by this method numerously (58 spp., 3,353 exs.; Janský & Okáli 1989). For comparison, in a similar IBP project carried out in the floodplain forest near Lednice (Czech Republic), psyllids were more abundant both in species and specimens, apparently because the herbaceous layer was also studied and more collecting methods were used (Lauterer in prep). Generally, the beating method seems to be not very suitable for collecting jumping plant-lice at higher temperatures, as adults mostly respond by jumping off and flying away when disturbed. The results are thus hardly comparable with those obtained e.g. for beetles (Kleinert 1976). The psyllid larvae hold very firmly to the substrate and cannot be effectively collected by beating.

LITERATURE

Janský V & Okáli I, 1984: Korunová fauna cikádiek dubovo-hrabového lesa v Bábe pri Nitre (Hom., Auchenorrhyncha). *Práce Slov. entomol. spol. SAV, Bratislava*, 4: 57-63.

Janský V & Okáli I, 1989: Cikádky (Auchenorrhyncha) dubovo-hrabového lesa v Bábe pri Nitre získané metodou svetelného lapača. *Zbor. Slov. nár. Múz, Prír. Vedy, Bratislava*, 35: 75–90.

Jurko A, 1970: Subject, problems and goals of the Báb research project. In: Research Project Báb, *Progr. rep. 1. Bratislava,* pp. 9–13.

Kleinert J, 1976: Survey of Arthropoda planticola with regard on Coleoptera in Querco-Carpinetum. *Entomol. Probl., Bratislava*, 13: 31–42.

Kubíček F & Brechtl J, 1970: Typological investigation of the Báb forest near Nitra. In: Res. Project Báb, *Progr. rep. 1, Bratislava.* pp. 65–70.

Pussard R, 1932: Contribution a' l' étude de la nutrition des psyllides. Présence de salive dans les tissus de la plante hotê et son importance. *Bull. Soc. ent. France, Paris*, 37: 292–297.

Smolen F, 1970: Climatic appraisal of the Báb research site environmental. In: Res. Project Báb, *Progr. rep. 1, Bratislava*. pp. 15–22.

Vondráček K, 1957: Mery – Psylloidea. Fauna ČSR 9. *NČSAV Praha*, pp. 1–431.

Doručené (Submitted): 20.1.2011
Prijaté (Accepted): 29.8.2011
Vyšlo (Published) online: 30.8.2011