LEAF-MINING INSECTS ENCOUNTERED IN THE FOREST RESERVE OF HÂRBOANCA, VASLUI COUNTY

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Abstract. As a result of a series of studies conducted within the Forest Reserve of Hârboanca (Vaslui) between June 2005 and October 2006, there were identified 60 species of leaf-mining insects, belonging to 14 families, from three different orders: Lepidoptera (83%), Diptera (12%) and Hymenoptera (5%). The "mines" caused by the larvae of these insects were identified on 34 different species of hosting plants, mostly wooden plants. The leaf-mining Lepidoptera and Hymenoptera larvae are more likely to grow on wooden plants, while those belonging to the Diptera order prefer herbaceous plants. One of the species, *Phyllonorycter issikii* (Kumata) found here was signaled for the first time in Romanian fauna, while other ten species were encountered for the first time in Moldavia.

Keywords: leaf-mining insects, Forest Reserve of Hârboanca, Romanian, fauna.

Rezumat. Insecte miniere semnalate în Rezervaţia Forestieră Hârboanca (Vaslui). În urma studiilor efectuate în Rezervaţia Forestieră Hârboanca (Vaslui) în perioada iunie 2005 - octombrie 2006 s-au identificat 60 de specii de insecte miniere care aparţin la 14 familii, grupate în 3 ordine: Lepidoptera (83%), Diptera (12%) şi Hymenoptera (5%). Minele provocate de larvele insectelor miniere au fost identificate pe 34 de specii de plante-gazdă, majoritatea fiind de esenţă lemnoasă. Larvele lepidopterelor şi himenopterelor miniere se dezvoltă mai mult pe plantele lemnoase, în schimb dipterele preferă plantele ierboase. O specie, *Phyllonorycter issikii* Kumata este nouă pentru fauna României şi zece specii de insecte miniere sunt semnalate pentru prima dată în Moldova.

Cuvinte cheie: insecte miniere, Rezervaţia Forestieră Hârboanca, România, fauna.

Introduction

The Forest of Hârboanca is situated on the right-side slope of the Bârlad Valley and it represents the typical vegetation island very common in the past in the Central Moldavian Plateau (Fig. 1).

Figure 1. The area and location of the Hârboanca Forest Reserve.

The Reserve was initiated because of the presence of all known oak species of Romania – except for *Quercus frainetto* Ten. and *Quercus cerris* L. – with the main goal of studying the genesis of hybrid oak species.

Quercus speciosa, *Q. pseudpubescens* and *Q. pudesis* var. *vasluiensis* are the hybrid oak species identified by the researchers C. Dobrescu and I. C. Constantinescu in this reserve (Dobrescu, 1969).

The Hârboanca Reserve is situated in the intermediary area between forests and sylvosteppe. The trees level is composed of *Quercus robur* L., *Q. petraea* Liebl., *Fraxinus angustifolia* Vahl., *F. excelsior* L., *Tilia tomentosa* Mnch., *T. plathyphyllos* Scop., *Carpinus betulus* L., *Quercus pedunculiflora* C. Koch., *Acer campestre* L., *Ulmus minor* Mill. etc., while the bush layer is represented by *Acer tataricum* L., *Viburnum lantana* L., *Cornus mas* L., *Corylus avellana* L., *Crataegus monogyna* Jacq., *Amygdalus nana* etc. The herbaceous flora is dominated by *Brachypodium sylvaticum* Beauv., *Viola jordanii* Hanry, *Dianthus membranaceus* Borb., *Inula ensifolia* L., *Iris hungarica* W. and K., *I. brandzae* Prod., *Cytisus austriacus* L. (Dobrescu, 1969).

The reserve also hosts a very interesting fauna that was more scarcely studied. Research studies regarding biology, ecology and the systemic of Ichneumonides were conducted in this area by M. I. Constantineanu and L. Gr. Ţâţan. Besides the invertebrates (arthropodes and molluscs), vertebrates can also be found (e.g. *Rana esculenta* L., *Bufo bufo* L., *Lacerta agilis* l., *L.* viridis L., *Dendrocopus major* L., *Garrulus glandarius* L., *Turdus merula* L., *Apodemus sylvaticus* L., *Vulpes vulpes* L., *Sus scrofa* L. etc.) (Constantineanu & Ţâţan 1952).

Materials and Methods

The sampling material consists of excavated leaves, collected in the vegetating periods between June 2005 and October 2006. The adult insects resulted in laboratory from the observation of the collected larvae were identified, catalogued and studied carefully, according to their manner of attack. The categorizing of the species took into account both the characteristics of the "mines", as well as the morphology of adult insects.

Results and Discussion

Our research leads to the identification of 60 leaf-mining species belonging to 14 families of the orders Lepidoptera, Diptera and Hymenoptera. The attached table (Table 1) presents the 60 identified species alongside with their hosting plants.

From the table we can see that the species *Phyllonorycter issikii* Kumata, 1963 is completely new to the Romanian fauna, while other 10 species are signaled for the first time in Moldavia: *Bucculatrix ulmella* Bechstein & Scharfenberg, 1805; *Coleophora limosipennella* Duponchel, 1843; *C. solitariella* Zeller, 1849; *Acrocercops brongniardella* Fabricius, 1798; *Caloptilia semifascia* Haworth, 1828; *Phyllonorycter lantanella* Scrank, 1802; *P. lautella* Zeller, 1846; *P. tenerella* Joannis, 1915; *Ectoedemia albifasciella* Heinemann, 1871; *E. heringi* Toll, 1934.

Out of the 60 leaf-mining species mentioned, 50 belong to the Lepidoptera order, representing 83% of the total, 7 species belong to the Diptera order, meaning 12% of the total, and the remaining 3 species, belonging to the Hymenoptera order, represent 5% of the total.

Table 1. Leaf-mining insects encountered in the Forest Reserve of Hârboanca.

Crt. No.	Family	Leaf-mining species	Hosting plant species
Lepidoptera			
1.	Bucculatricidae	*Bucculatrix ulmella* Zeller, 1848 *	*Quercus robur*
2.	Choreutidae	*Millieria dolosalis* (Heydenreich, 1851)	*Aristolochia clematitis*
3.	Coleophoridae	*Coleophora ahenella* Heinemann & Wocke, 1877	*Cornus mas*
			Viburnum lantana
4.		*Coleophora hemerobiella* (Scopoli, 1763)	*Prunus spinosa*
5.		*Coleophora limosipennella* (Duponchel, 1843) *	*Carpinus betulus*
			Ulmus minor
6.		*Coleophora saxicolella* (Duponchel, 1843)	*Chenopodium album*
7.		*Coleophora serratella* (Linnaeus, 1761)	*Carpinus betulus*
8.		*Coleophora solitariella* Zeller, 1849 *	*Stellaria holostea*
9.	Elachistidae	*Elachista megerlella* (Hübner, 1810)	*Brachypodium sylvaticum*
10.	Gelechiidae	*Chrysoesthia drurella* (Fabricius, 1775)	*Chenopodium album*
11.		*Chrysoesthia sexgutella* Thunberg, 1794	*Chenopodium album*
12.	Gracillariidae	*Acrocercops brogniardella* (Fabricius, 1798) *	*Quercus dalechampii*
13.		*Caloptilia alchimiella* (Scopoli, 1763)	*Quercus robur*
14.		*Caloptilia semifascia* (Haworth, 1828) *	*Acer campestre*
15.		*Caloptilia syringella* (Fabricius, 1794)	*Fraxinus excelsior*
16.		*Parectopa robiniella* Clemens, 1859	*Robinia pseudoacacia*
17.		*Parornix carpinella* (Frey, 1861)	*Carpinus betulus*
18.		*Phyllonorycter acerifoliella* (Zeller, 1839)	*Acer campestre*
19.		*Phyllonorycter esperella* (Goeze, 1783)	*Carpinus betulus*
20.		*Phyllonorycter harisella* (Linnaeus, 1761)	*Quercus dalechampii*
21.		*Phyllonorycter heegeriella* (Zeller, 1848)	*Quercus petraea*
			Quercus robur
22.		*Phyllonorycter issikii* (Kumata, 1963) **	*Tilia cordata*
			Tilia plathyphyllos
23.		*Phyllonorycter lantanella* (Scrank , 1802) *	*Viburnum lantana*
24.		*Phyllonorycter lautella* (Zeller, 1846) *	*Quercus dalechampii*
25.		*Phyllonorycter messaniella* (Zeller, 1846)	*Carpinus betulus*
26.		*Phyllonorycter platanoidella* (De Joannes, 1920)	*Acer platanoides*
27.		*Phyllonorycter robiniella* (Clemens, 1859)	*Robinia pseudoacacia*
28.		*Phyllonorycter roboris* (Zeller, 1839)	*Quercus robur*
			Quercus petraea
29.		*Phyllonorycter schreberella* (Fabricius, 1871)	*Carpinus betulus*
			Ulmus minor
30.		*Phyllonorycter spinicolella* (Zeller, 1846)	*Prunus spinosa*
31.		*Phyllonorycter tenerella* (De Joannis, 1915)*	*Carpinus betulus*
32.	Heliozelidae	*Antispila treitschkiella* (Fischer von Rösslerstamm, 1843)	*Cornus mas*
			Cornus sanguinea
33.	Incurvariidae	*Incurvaria pectinea* Haworth, 1828	*Carpinus betulus*
34.	Lyonetiidae	*Lyonetia prunifoliella* (Hübner, 1796)	*Prunus spinosa*
35.	Nepticulidae	*Ectoedemia agrimoniae* (Frey, 1858)	*Agrimonia procera*
36.		*Ectoedemia albifasciella* (Heinemann, 1871) *	*Quercus robur*
37.		*Ectoedemia heringi* (Toll, 1934) *	*Quercus robur*
38.		*Stigmella aceris* (Frey, 1857)	*Acer campestre*
39.		*Stigmella carpinella* (Heinemann, 1862)	*Carpinus betulus*
40.		*Stigmella centifoliella* (Zeller, 1848)	*Rosa canina*
41.		*Stigmella prunetorum* (Stainton, 1855)	*Prunus spinosa*
42.		*Stigmella roborella* (Johansson, 1971)	*Quercus robur*
43.		*Stigmella tiliae* (Frey, 1856)	*Tilia plathyphyllos*
44.	Psychidae	*Apterona helicoidella* (Vallot, 1827)	*Viola jordanii*
45.	Tischeriidae	*Emmetia angusticolella* (Duponchel, 1843)	*Rosa canina*
			Rosa gallica
46.		*Emmetia heinemanni* (Wocke, 1871)	*Agrimonia procera*
47.		*Emmetia marginea* (Haworth, 1828)	*Rubus caesius*

Crt. No.	Family	Leaf-mining species	Hosting plant species
48.		*Emmetia gaunacella* (Duponchel, 1843)	*Prunus spinosa*
49.		*Tischeria eckebladella* (Bjerkander, 1795)	*Quercus dalechampii*
			Quercus petraea
			Quercus pubescens
			Quercus robur
			Quercus virgiliana
50.		*Tischeria decidua* Wocke, 1876	*Quercus robur*
Diptera			
51.	Agromyzidae	*Amauromyza morionella* (Zetterstedt, 1848)	*Balota nigra*
52.		*Chromatomyia horticola* (Goureau, 1851)	*Clinopodium vulgare*
53.		*Liriomyza congesta* (Becker, 1903)	*Medicago sativa*
			Vicia faba
			Onobrychis viciifolia
54.		*Liriomyza strigata* (Meigen, 1830)	*Lapsana communis*
55.		*Phytomyza agromyzina* Meigen, 1830	*Cornus sanguinea*
56.		*Phytomyza lappae* Goureau, 1851	*Arctium lappae*
57.		*Phytomyza obscura* Hendel, 1920	*Clinopodium vulgare*
Hymenoptera			
58.	Thentredinidae	*Metallus lanceolatus* (C G Thomson, 1870)	*Geum urbanum*
59.		*Metallus pumilus* (Klug, 1814)	*Rubus caesius*
60.		*Profenusa pygmaea* (Klug, 1816)	*Quercus dalechampii*
			Quercus petraea
			Quercus robur
			Quercus virgiliana

* - were observed and signaled for the first time in Moldavia.
** - is new to the Romanian fauna.

The 50 species of Lepidoptera identified are further categorized in 12 families, of which the most common is the Gracillariidae family, with 20 species – that is 40% of the leaf-mining Lepidoptera, followed by the Nepticulidae family, with 9 species – 18% of the Lepidoptera, then the Tischeriidae and Coleophoridae families, each with 6 species – and each with a proportion of 12% within the leaf-mining Lepidoptera, the remaining families being represented by only one or two species (Fig.2).

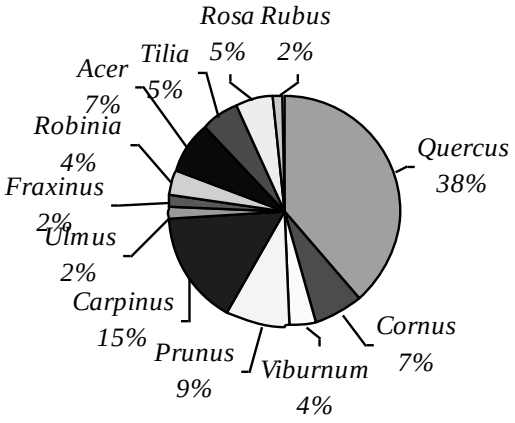

Figure 2. The representation spectrum of the leaf-mining Lepidoptera collected from the Hârboanca Forest Reserve.

The 60 leaf-mining species of insects identified in the Reservation of Hârboanca have attacked a number of 34 species of hosting plants from 17 different families, belonging to the following orders: Aristolochiales, Asterales, Caryophyllales, Cornales, Dipsacales, Fabales, Fagales, Lamiales, Malvales, Oleales, Poales, Rosales, Sapindales, Urticales and Violales.

Out of the 34 species of hosting plants, 20 belong to the wooden species (trees and bushes) – representing 59% of the total and the remaining 14 species – that is 41% of the total – are herbaceous plants.

On a closer look onto the preference for the wooden plants manifested by the larvae of the leaf-mining insects, we can see that they have attacked mainly species of *Quercus*. No less than 22 species of leaf-mining insects have attacked the *Quercus* species – that is 38% of the studied species of insects. The next most attacked species of plant is *Carpinus betulus*, which is attacked by 9 species, representing 15% of the total; then follows the *Prunus spinosa*, attacked by 5 leaf-mining species, meaning 9% of the total; the species of Acer and *Cornus*, attacked each by 4 species – 7% of the total, *Robinia* by 2 species – 4%, while *Rubus*, *Fraxinus* and *Ulmus* each by 1 species, that is 2% (Fig. 3).

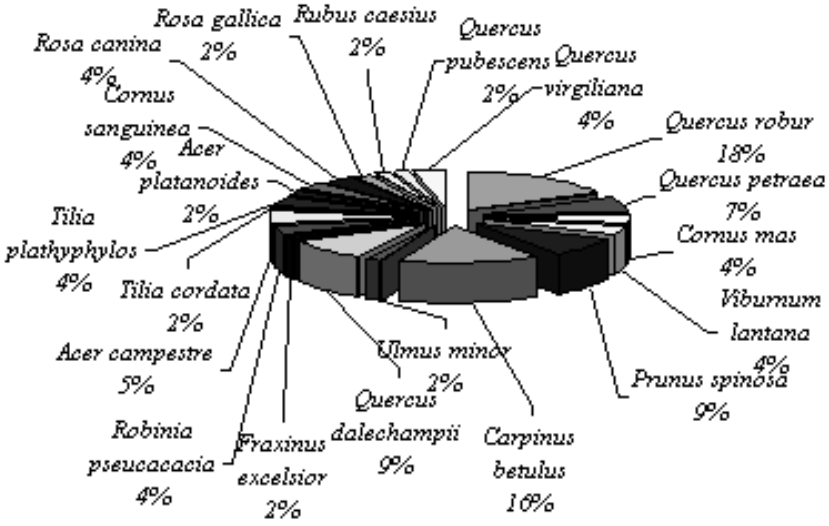

Figure 3. The percentage representation of wooden plants attacked by leaf-mining insects in the Hârboanca Reserve.

As stated before, a number of 14 herbaceous plants, belonging to 9 families of the orders Aristolochiales, Asterales, Chenopodiales, Caryophyllales, Fabales, Lamiales, Poales, Rosales and Violales, have also been attacked by 18 species of leaf-mining insects: *Chenopodium album* is attacked by 3 leaf-mining species, *Agrimonia procera* and *Clinopodium vulgare* each by 2 species, the remaining ones being attacked by one species each (Fig. 4).

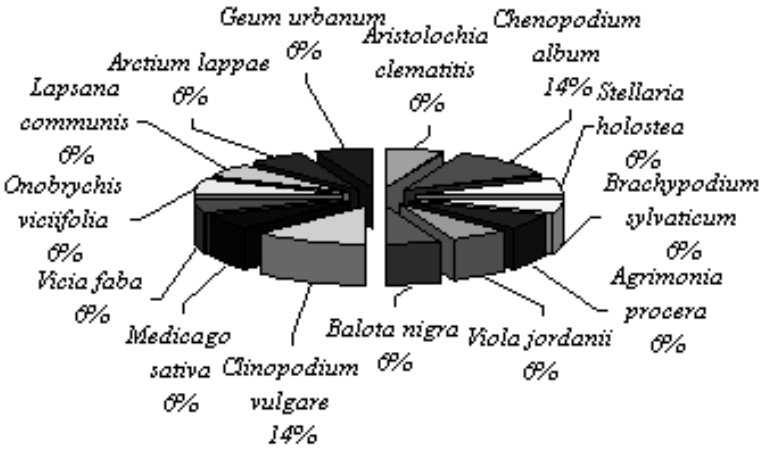

Figure 4. The percentage representation of herbaceous plants attacked by leaf-mining insects in the Hârboanca Reserve.

Conclusions

This paper presents the results of the research regarding the species of leaf-mining insects that attack the various species of plants encountered in the Forest Reserve of Hârboanca – Vaslui.

The research studies made between June 2005 and October 2006 resulted in the identification of 60 species of leaf-mining insects that attack a number of 34 species of hosting plants.

The leaf-mining species belong to 14 families of the orders Lepidoptera, Diptera and Hymenoptera. In the paper the leaf-mining species are listed alongside with their hosts. One of the leaf-mining species is completely new to the Romanian fauna, *Phyllonorycter issikii* Kumata, while 10 other species are signaled and observed for the first time in the Moldavian region.

Taking into account that such studies have never been conducted before in the Hârboanca Reserve, the data in the present paper is highly important for better and more complex knowledge of this protected environment.

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