

Light-attracted insects in Lithuanian pine stands

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In 1992, three Lithuanian districts (Kaunas, Ignalina and Varėna) were researched to evaluate entomocomplex of light-attracted insects, their vertical distribution, trophic specialization and seasonal flight dynamics.

During the experiment, light traps were placed in pine crowns and at the height of 2 m above the ground. Over 300 insect species from 11 orders were caught; 55% of all species were Lepidoptera. Over 200 species of moths were trapped.

In the *vacciniosa* type pine stand, 92% of all trapped phytophagans feed on broad leaf and herbs. Needle-feeding insects made up only 1% of the phytophagans. The number of moths captured by the traps placed in crowns was significantly less than the number captured at 2 m. The seasonal flight dynamics of moths at the two heights was similar.

Key words: entomocomplex, light trap, Scots pine.

Introduction

Today unstable forest ecosystems are increasingly infested with pests. The more detailed knowledge we have of the entomocomplexes of these systems, the easier it will be to solve forest protection problems. Model branches, chemical agents and grass – cut by entomologic scope methods as well as different attractive traps enabled a broad variety of insect to be sampled from Lithuanian pine stands. However, there is little information on nocturnal insects in pine stands. In 1992, using light traps, light – attracted insects were caught during the flying season in Kaunas, Ignalina and Varėna *vacciniosa*-type pine stands.

Materials and methods

In the middle of the simple light trap (4 in every locality) is a 200 W electric bulb (Litvinova, 1985; Fasulati, 1971). Once in the traps, attracted insects fell into collectors and were killed by ether or chloroform. To get a wide variety of samples, traps were placed in pine crowns (about 12 m above the ground) and below the crowns (about 2 m above the ground), hanging them in Pairs in distances of 50 m from one another. Light were turned on after sunset for 6 hours. Traps were checked monthly. At each of the regions chosen, 5 samples were taken. Insects were identified using the taxonomic (Pileckis, 1984; Kazlauskas, 1988) of the Lithuanian Forest Research Institute.

Results

Over 300 insect from 11 orders were caught. As we supposed, *Diptera* were the most numerous insects in the traps. Due to the lack of describers, this tribe was not analysed in depth. However, the bulk consisted of the *Culicidae* and *Tipulidae* families.

Nearly 55% of all captured species were lepidoptera (Fig.1). Roughly 80% of all moths were Noctuidae and Geometridae. In all 200 moth species were found, including dangerous Lepidopterous pests such as: *Lymantria monacha* L., *Dendrolimus pini* L., *Bupalus piniarius* L., and *Panolis flammea* Schiff. The richest with species made up 80% of all moths collected.

In addition to faunistic research, an attempt was made to determine if different light-attracted insects fly at a different heights. Figure 2 shows the changes in trapped moth numbers during the season. The data of all three regions are averaged. In July and August, the highest number of insects and insect orders was found, which agrees with data from an analysis of pine crowns carried out in 1990. This agreement is absent when comparing moth dynamics in pine crowns and the understory (Fig.2). Fewer insects were trapped in the canopy layer than at 2 m. The seasonal flight dynamic is similar at both heights.

This study was to determine if *Vaccinium pinetum* is visited only by pine-related insect species. Species captured by the light traps were distributed by trophic specialization

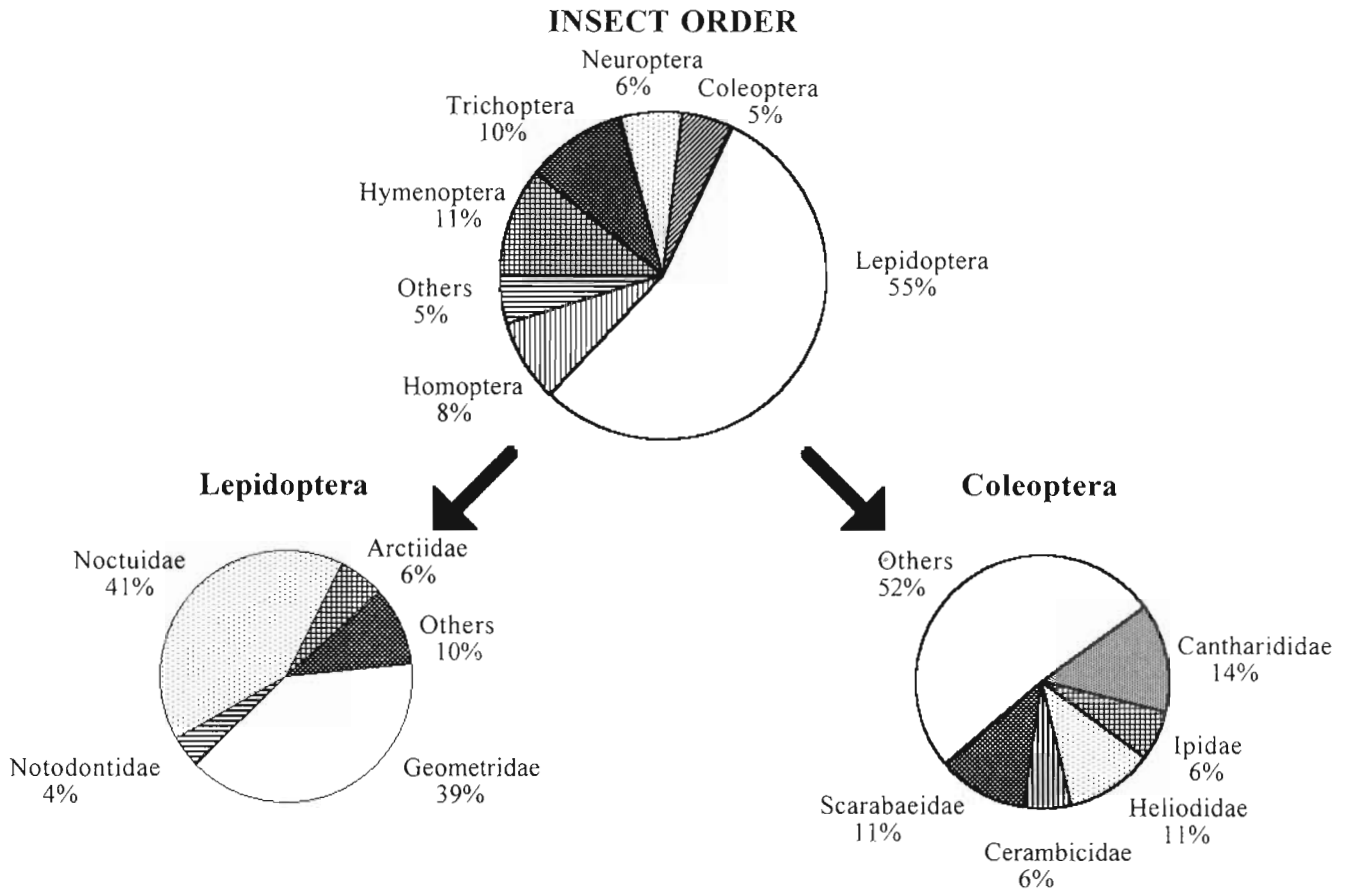


Fig. 1. Light-attracted insects in Lithuanian pine stands, 1992

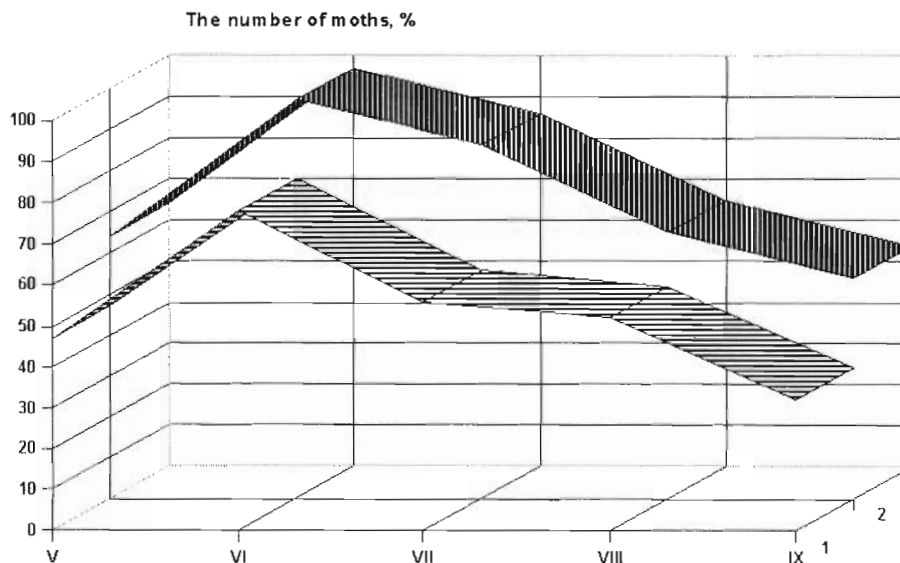


Fig. 2. The seasonal flight dynamics of *Lepidoptera* (1 – 2 m above the ground, 2 – in pine crowns)

(Table 1). It was further revised to show what the insects feed upon.

Table 1. Light-attracted pine insects' composition, %

No	Insect groups	Insect account month					Lithuania's districts		
		V	VI	VII	VIII	IX	Ignalina	Kaunas	Varėna
	Order								
1	Lepidoptera	53	80	14	59	35	60	51	61
2	Hymenoptera	13	12	19	8	14	12	6	11
3	Trichoptera	1	1	14	12	33	12	12	5
4	Neuroptera	2	2	3	6	17	1	13	9
5	Homoptera	13	2	34	12	0	3	8	5
6	Coleoptera	16	2	7	3	0	6	4	5
	Others	1	1	8	1	1	7	5	4
	Trophic groups								
1	Phytophagans <i>gnawing</i>	54	77	56	57	37	54	43	59
2	<i>sucking</i>	14	3	21	14	1	4	21	6
3	Entomophagans <i>predators</i>	9	4	18	22	35	19	10	19
4	<i>parasites</i>	14	13	4	1	22	10	15	9
5	Saprophagans	2	2	1	2	2	2	1	2
	Others	7	2	1	4	2	10	10	5

Distribution of phyto- and entomophagans insects in different heights in the forest is unequal. Phytophagans are more frequent in the lower layer (68%), while in the pine canopy they compose 52%. Corresponding numbers for entomophagans are 16 and 27%. This can be explained by the fact that 92% of all phytophagans collected are grass – and leaf – feeding insects, and such plants, are in the understory. Needle-feeding insects made up only 1% of the phytophagans captured (Fig.3).

Discussion and Conclusions

Actually, light traps after several additional experiments can be used to evaluate forest biocenosis' resistance to insect invasions.

The most prevalent species in our investigations were: *Ancyliis badiana* L., *Eupitecia* sp., *Eilema complana* L., *Pterophoridae* sp., *Lomaspilis marginata* L., *Cabera exanthemata* Sc., *C. pusaria* L., *Perizoma affinitatum* Steph., *Lymantria dispar* L. A total of 13 moth families were found. The same number of families of the 2 nd by species *Coleoptera* tribe were found. What is wonderful is that light traps, made for trapping moths, collected 14 families of beetles, some species of which *Curculionidae*, *Ipidae* and *Elateridae* are the pests. The most prevalent poliphagans were *Dolopius marginatus* L.

A number of entomophagans were collected by traps: *Cantharididae* – 14%, *Coccinellidae* – 6%, and also *Carabidae* and *Staphylinidae*. *Ephemeroptera*, *Plecoptera*, and *Trichoptera*, all insects not typical for pine stands, were also captured.

In regard to trophic group distribution in the sites and forest layers analysed, entomophagans make up 27% on

average. The percent of insects collected depends on the collection region: in Varėna – 65%, in Ignalina – 58%, in Kaunas – 64%. In Kaunas the trophic diversity of light – attracted insects is higher and ecological niches better filled. Based on this observation, it is possible to say that pine stand ecosystem in this region is stabler than in other regions.

This shows once more that improper use of insecticides on needle-feeding pests can kill a number of subdominant insects species having a high importance in the Forming of forest biocenosis.

During trapping sessions, over 300 insect species from 11 orders were collected. The majority of insects were caught in July and August. Dominant was *Lepidoptera* (55% of species). Over 200 species of moth were captured. The number of moths collected in canopy is much less those collected below, and seasonal dynamics in both layers is similar.

Among phytophagans, 92% are composed of insects that feed on grass and leaves. Insects that feed on needles made up only 1%.

Entomophagans, on average, make up 27% of all insects captured. They prefer to fly in the pine canopy. The percent of phytophagans in different regions differs a little: in Varėna – 65%, in Ignalina – 58%, in Kaunas – 64%.

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TROPHIC GROUPS

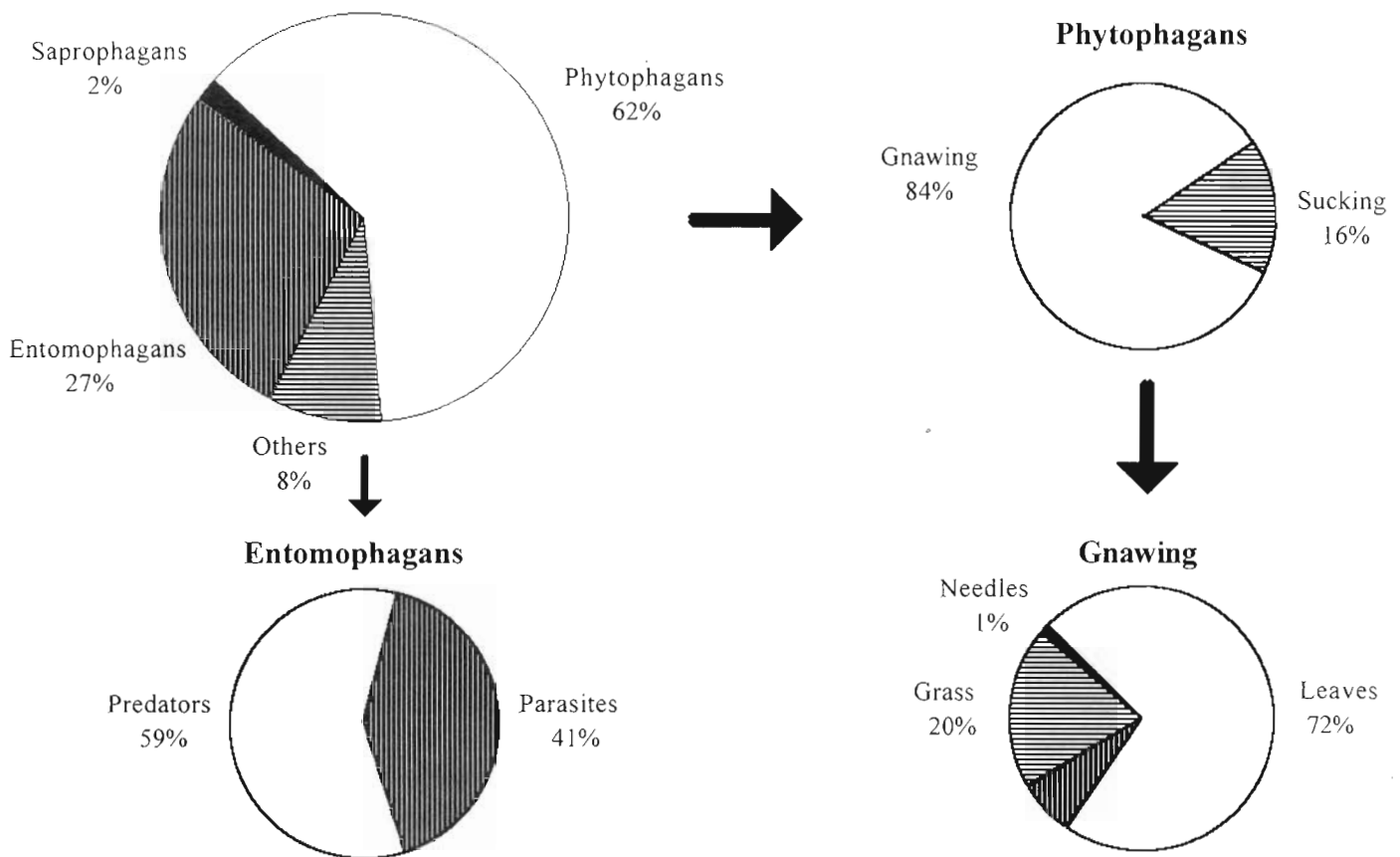


Fig. 3. Insect trophic groups

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СВЕТОМ ПРИВЛЕКАЕМЫЕ НАСЕКОМЫЕ В СОСНЯКАХ ЛИТВЫ

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Резюме

С целью установления комплекса насекомых, привлекаемых светом, распределения их по ярам леса, трофической специализации и сезонной динамики, в 1992 г. был поставлен эксперимент в трёх районах Литвы (Варена, Игналина и Каунас). Световые ловушки были развешены в брусничных сосняках в кронах сосен и на высоте двух метров.

Во время учётов собрано 300 видов насекомых, принадлежащих к 11 отрядам. К отряду *Lepidoptera* принадлежали 55% (200 видов) насекомых. Большинство из них были собраны нижними ловушками, однако сезонная их динамика - почти неразличается.

Из собранных насекомых 92% были фитофаги, питающиеся листьями древесных и травянистых растений. Хвоегрызущие насекомые составили только 1%.

Ключевые слова: энтомокомплекс, световая ловушка, сосняк брусничный.