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Communities of noctuids (*Lepidoptera, Noctuidae*) of linden-oak-hornbeam forests of the Mazovian Lowland

[With 4 tables in the text]

Abstract. 90 *Noctuidae* species were recorded to occur in linden-oak-hornbeam forests of the Mazovian Lowland. Communities of *Noctuidae* populating various stands of linden-oak-hornbeam forests vegetation had a similar species composition and dominance structure, but differed in abundance (3.0–40.0) and the number of species (18–84). The dominants included: *Cosmia trapezina*, *Trachea atriplicis*, *Apamea monoglypha*, *Polia nebulosa*, *Mesapamea secalis*, *Amphipyra pyramidea*, *Conistra vaccinii*, *Orthosia cruda* and *O. stabilis*. *Noctuidae* communities of linden-oak-hornbeam forests were subject to modifying factors, which included: the size of a given stand of linden-oak-hornbeam forests vegetation and the degree of diversity (mosaic) of the surrounding areas.

INTRODUCTION

With respect to the number of species, noctuids rank among the most abundant moth families in Poland. Their larvae and imagines, fairly differed in their body structure, nutritive and habitat preferences, are often of ecological significance as consumers in plant communities where they occur.

The state of studies on the occurrence of noctuids on the area of Poland is unsatisfactory as there is a lack of updated works dealing with *Noctuidae* fauna in natural plant communities in various regions of Poland. The area of the country has been examined only fragmentarily. Southern and northern parts of Poland have been quite well investigated and described, whereas the central part of the country calls for a thorough research.

So far the studies completed in central Poland were concentrating on Warsaw and its environs. They had been conducted, more or less systematically, since the beginning of the 20th century (SLASTSHEVSKY 1911) till the end of the sixties

(ADAMCZEWSKI 1936, 1937, 1939–1948, 1947, 1950, 1951, 1962, 1964, 1966, KRECZMER 1910, 1911, KREMKY 1924, NIESIOŁOWSKI 1928, PATRYN 1937, 1939, 1947).

A systematic zoocoenological research is presently carried out on the Mazovian Lowland, focusing on various groups of insects, *Noctuidae* included (WINIARSKA 1981, 1982, 1987). Apart from recording the species composition of communities occurring in natural and transformed habitats on the Mazovian Lowland, the examinations aim also at determining inter-relations between particular trophic groups of insects and attempt to predict changes likely to proceed in entomofauna under ever-growing anthropogenic pressure. A precise account of the aim and range of the studies may be found in the work by BAŃKOWSKA and GARBARCZYK (1989).

The present work was completed in the Institute of Zoology, PAS, within the framework of the research issue in the subject group MR II-3.02 „Fauna of Mazovian linden-oak-hornbeam forests”. The aim of the present studies was a multifold characteristic of *Noctuidae* communities in linden-oak-hornbeam forests on the Mazovian Lowland; furthermore, an attempt was made to distinguish a characteristic community of linden-oak-hornbeam forests.

THE SITE OF STUDIES

The study sites were located in the Dębina reserve near Klembów, Modrzewina reserve near Belsk, Cyganka reserve near the locality of Truskaw in the Kampinoska Forest, in the forest district at Radziejowice and in the King Jan III Sobieski reserve on the outskirts of Warsaw at the Praga-Południe district.

1. Dębina natural reserve. A strict reserve set up in 1934, spreading near locality of Klembów, south-east of Warsaw. It occupies the area of 51.2 ha. The area of the site assigned for studies amounted to 6.8 ha. The tree stand composed of oaks and hornbeams, undergrowth — mainly of hornbeams. The shrub layer was made up of hazel, rowan, hornbeam and alder buckthorn. The herb layer was formed of species typical of fertile linden-oak-hornbeam forests. Long-lasting reserve protection of these areas conducted to preservation of natural character of the forest complex.

2. Modrzewina nature reserve. A strict reserve occupying the area of 286.6 ha, located in Mała Wieś near Belsk. It was set up in 1959 in order to preserve a unique on Mazovia stand of Polish larch – *Larix polonica* RAC. The site assigned for studies had 1.2 ha area. The tree stand was composed of oaks, larches and hornbeams. The undergrowth included oak, hornbeam and linden. The species structure of the herb layer, although rather poor, was typical of linden-oak-hornbeam forests. Synanthropization related to tourism and recreation was not observed to have any significant effect on the habitat.

3. Cyganka nature reserve. A strict reserve in the Kampinoski National Park, located nearly the locality of Truskaw. An area of 1.8 ha was chosen for zoocoenological studies, situated in the habitat of linden-oak-hornbeam forest. The tree

atand was dominated by oaks, hornbeams, elms and birches. The shrub layer was poorly developed, made up of alder buckthorn, rowan and evonymus. Despite distinct traces of degradation in the herb layer and distortion of tree stand due to war damages and mismanagement, the vegetation plot in question was classified to an association of a character of linden-oak-hornbeam forest.

4. Radziejowice forest district. Composed of a complex of high and low linden-oak-hornbeam forest, enhancing about 250 ha, located near Mszczonów. Vegetation of the site chosen for zoocoenological studies was marked for a well-developed tree stand composed of oaks, hornbeams and man-planted pine trees. The shrub layer, typical of linden-oak-hornbeam forest, was made up of young hornbeam and oak as well as hazel, alder buckthorn, maple and evonymus. The herb layer was relatively poor in species, with a marked contribution of accompanying species of pine wood habitats. The dominating were the species of communities of linden-oak-hornbeam forest.

5. King Jan III Sobieski nature reserve. Located within the range of Warsaw city, in the district of Praga-Południe, set up in 1952. It remains under partial protection, the protected area occupying 113.5 ha. The habitat type of the forest was defined as fresh pine wood, mixed pine wood in places, with plots of linden-oak-hornbeam and thermophilous oak forests. The examined site was of 7.4 ha area, grown with 130 years old oaks and lindens. The undergrowth occupied 30% of the area. The shrub layer was typical of linden-oak-hornbeam forest, composed of young oak, hornbeam, hazel, alder buckthorn, maple and evonymus. The herb layer was made up of species typical of communities of linden-oak-hornbeam forest.

A general characteristic of the studied plant communities can be found in the work by MATUSZKIEWICZ (1981), while a detailed description of the study sites and phytosociological characteristic of vegetation was supplied by KOTOWSKA and NOWAKOWSKI (1989).

MATERIAL AND METHODS

The basic material included about 8 thousand noctuid imagines, which were sampled on the above-listed study sites in 1974–1982.

The most numerous material (over 7 thousand specimens) was sampled in Moericke yellow pan traps, which were hung in the canopy layer and placed on the ground on each study site. The traps were in use throughout the vegetative season, i. e. since April till October. The trapped material was systematically taken out every 7 days on the average, and preserved in alcohol. A detailed description of the sampling method is supplied in the work by BAŃKOWSKA and GARBARCZYK (1989).

Sampling of imagines was also practiced by means of luring traps, which attracted insects with light and aromatic bait (of beer and fruit). However, these traps were made use of irregularly during the time of studies and the material thus sampled

served the purpose of acquiring some additional data on the species structure of noctuid communities and was disregarded in estimates of abundance of particular species.

Data on species composition of *Noctuidae* communities on particular sites were arranged according to the systematic order worked out by HEINICKE and NAUMANN (1980–1982). Each of the species occurring in the examined communities was subject to an additional characteristic classifying it to a proper zoogeographical element.

Zoogeographical analysis of *Noctuidae* communities was, on principle, based on the division of Western Palaearctic put forward by REBEL (1931), updated and modified, among others, by KOSTROWICKI (1953). In the present studies also Holarctic element was singled out, as an additional one, which included noctuid species defined as Holarctic by HRUBY (1964) and HEINICKE and NAUMANN (1980–1982). Generally the group comprised common destructive agricultural pests (e. g. *Agrotis ipsilon*), whose occurrence is not limited to Palaearctic.

Abundance of particular species was estimated on the basis of material caught in Moericke traps. It was expressed as the relative abundance index (n), denoting the number of specimens of noctuid imagines caught in 10 traps over 10 days. As a measure of species constancy in *Noctuidae* communities of natural linden-oak-hornbeam forest, TISCHLER's scale (1949) was employed, classifying a species as common whenever it occurred in at least four out of the five examined communities.

In interpreting data the use was made of indices applied in zoocenology (ODUM 1977) and biogeography (KENKEL, BOOTH 1987).

RESULTS

Noctuidae communities of linden-oak-hornbeam forests

Species composition and dominance structure

90 species of *Noctuidae* were recorded to occur in linden-oak-hornbeam forests of the Mazovian Lowland, out of which 17 species, i. e. 18.9% ranked among constant species. The constant species included: *Agrotis segetum*, *A. exclamationis*, *Noctua pronuba*, *Discestra trifolii*, *Mamestra brassicae*, *M. thalassina*, *M. suasa*, *Orthosia cruda*, *O. populeti*, *O. gracilis*, *O. stabilis*, *O. incerta*, *Conistra vaccini*, *Amphipyra pyramidea*, *Trachea atriplicis*, *Cosmia trapezina* and *Mormonia spona*.

The constant species made up a group fairly diversified as regards their habitat and nutritive preferences, although a majority of them numbered among typical forest species.

Agrotis segetum and *A. exclamationis* – the species of steeper origin, which turned up on the area under studies in the Neolithic period. They preferingly feed on weeds,

as their larvae infest mainly the roots of grasses of the family *Poaceae*. They occur in various habitats, yet markedly select crop fields and vegetable gardens. Considered as pests.

Noctua pronuba — apobiont (a synanthropic species of local origin), whose larvae infest various herbaceous plants. This eurytope descends from forest communities and occurs everywhere, though is most frequently found in orchards and vegetation of a park character.

Discestra trifolii — the species occurring on open areas, its larvae feeding on herbaceous plants.

Mamestra brassicae — native species, polyphage of herbaceous plants. It occurs in various plant communities, although decidedly prefers crop fields (agricultural pest).

Mamestra thalassina — apobiont coming from forest habitats and living in leafy and mixed forests, gardens and plant communities of a park type. Its larvae infest various tree species, although they are also found on herbaceous plants (KOCH 1958).

Mamestra suasa — native species, occurring mostly on open areas. Its larvae feed on herbaceous plants.

Orthosia cruda — native forest species, larvae feed on leaves of various species of deciduous trees, as linden, oak, hornbeam, elm.

Orthosia populeti — native forest species, oligophage of *Populus* sp.

Orthosia gracilis — species occurring in various types of wooded areas. It is also found in more humid plant communities in open areas. Its larvae infest various species of herbaceous plants.

Orthosia stabilis and *O. incerta* — the species characteristic of linden-oak-hornbeam forests, although also occurring in other forest communities. The larvae feed on leaves of oaks, lindens, beeches and poplars.

Conistra vaccinii — a forest species linden-oak-hornbeam forests, polyphage of deciduous trees.

Amphipyra pyramidea — the species of forest origin, apobiont living in tree habitats. The larvae infest trees, e. g. oak, linden, elm, willow.

Trachea atriplicis — apobiont, which turned up on the area under studies in Neolithic period. It came from marshy plant communities. Presently it occurs in many other habitats, although notably prefers humid areas. The larvae feed on various species of herbaceous plants.

Cosmia trapezina — forest species regarded as characteristic of linden-oak-hornbeam forests. Its larvae infest leaves of such trees as oaks, linden and elms.

Mormonia spona — forest species occurring primarily in oak and linden-oak-hornbeam forests; oligophage of various species of the genus *Quercus*.

The constant species of *Noctuidae* communities in linden-oak-hornbeam forests comprised both dominants as well as inabundant species (Tab. I). Typical forest species (e. g. *C. trapezina*, *O. cruda*, *O. stabilis*) usually occurred abundantly and dominated in particular communities, although there were exceptions, e. g. *O. incerta*. The species preferring open areas (e. g. *A. segetum* and *A. exclamationis*)

usually occurred inabundantly, their share in the community most frequently not exceeding 1% (Tab. I).

Noctuidae communities occurring in linden-oak-hornbeam forests of the Mazovian Lowland betrayed both similarity as well as a number of differences in their species composition and dominance structure. Certain distinctiveness of noctuid communities in particular plots of linden-oak-hornbeam forests resulted mainly from peculiar local habitat conditions on each of the studied sites.

Dębina reserve. In the Dębina reserve 18 noctuid species occurred, the community being the poorest in species of all the studied *Noctuidae* communities in linden-oak-hornbeam forests (Tab. I). It was made up mostly of typical forest species, in an overwhelming majority constant in communities of *Noctuidae* of linden-oak-hornbeam forests on the Mazovian Lowland, as *C. trapezina*, *O. stabilis*, *O. incerta*, *C. vaccinii*.

The species composition of noctuid fauna in the Dębina reserve was determined by a number of factors, out of which habitat conditions were the most decisive. The stand of vegetation in the Dębina reserve was made up of typical linden-oak-hornbeam forest — humid and dark, of high compactness of the canopy layer, well-developed underbrush and little diversified habitat conditions. The community of *Noctuidae* on this study site was primarily composed of species typical of leafy forests and small number of accidental species indicated that it was poorly penetrated by noctuids from other plant communities (Tab. I).

Among the species composing this community only one decidedly dominated, namely, *Cosmia trapezina*. The percentage contribution of its abundance accounted for as much as 63.3% and was by 10 times greater than that of the most abundant among the remaining species (Tab. I). Fairly abundant (3–7%) species included *N. pronuba*, *M. brassicae*, *O. stabilis*, *M. pallens*, *C. vaccinii*, *A. pyramidea*, *E. paleacea* — mostly the species of linden-oak-hornbeam forests or occurring in various types of leafy forests.

Modrzewina reserve. 44 noctuid species occurred on this study site. They included all the constant species of *Noctuidae* communities from linden-oak-hornbeam forests, which accounted for about 30% of the fauna in the Modrzewina reserve (Tab. I).

The examined plot was a typical linden-oak-hornbeam forest. It spread on an area which could be termed as mosaic-like, as in the proximity there were crop fields, orchards and human settlements.

The community of *Noctuidae* from the Modrzewina reserve was pronouncedly dominated by 3 species, namely, *Cosmia trapezina*, *Trachea atriplicis* and *Xestia c-nigrum*. Their contribution accounted for over a half of the community abundance, amounting to about 60%. Abundance of the dominating species, i. e. *C. trapezina*, was several times greater than that of the subdominants, i. e. *T. atriplicis* and *X. c-nigrum* (Tab. I). A prevailing dominance and high abundance of *C. trapezina*, a linden-oak-hornbeam species, was recorded in each of the studied communities of *Noctuidae*.

The group of subdominants included species not classified to forest fauna. *T. atriplicis* is a species occurring in very many plant communities, being fairly numerous everywhere. *X. c-nigrum* is a common species of various plant communities in xeric open areas, its larvae being polyphages of many species of herbaceous plants. The species is considered a destructive agricultural pest and its abundance in the examined site resulted, most likely, from the proximity of crop fields.

Abundance of the remaining species was several times smaller than of the dominating group, ranging from less than 0.1% to 5.4% (Tab. I). More abundant species included only *Acrionicta rumicis* and *Apamea monoglypha*. *A. rumicis* is a common species bound, primarily, to various plant communities of open areas. Its larvae feed on various species of herbaceous plants. Sporadically they may also infest shrub leaves. *A. monoglypha* ranks among common species of xeric open areas, although it may also occur in forests. Since June till September its larvae feed on roots of plants of the family *Poaceae*.

The group of species whose abundance accounted for less than 1% of the community abundance, made up 58.3% of fauna of the Modrzewina reserve. Only two species, i. e. *Amphipoea fucosa* and *Diachrysia chrysitis*, did not occur on any other studied sites in linden-oak-hornbeam forests of the Mazovian Lowland.

A. fucosa is a rather rarely occurring species of humid meadows; its larvae feed on herbaceous plants since May till July (showing preference for the family *Poaceae*). *D. chrysitis* is a common species of various plant communities of open areas, its larvae being polyphages which feed on herbaceous plants (KOCH 1958, HRUBY 1964).

Cyganka reserve. 41 noctuid species were recorded on this study site (Tab. I). They comprised all the constant species, which accounted, similarly as in case of the Modrzewina reserve, for about 30% of fauna.

Vegetation in the Cyganka reserve was reckoned as a typical linden-oak-hornbeam forest, the habitat conditions resembling those in the site described above, except for the fact that the plot of linden-oak-hornbeam forest vegetation was considerably smaller there than in the Modrzewina reserve.

The following two species dominated the community in question: *Cosmia trapezina* and *Trachea atriplicis*. Percentage contribution of their abundance amounted to about 60% (Tab. I). The most abounding species, i. e. *Cosmia trapezina*, decidedly outnumbered not only the other species in the community but also the subdominant (*T. atriplicis*). Percentage contribution of its abundance was three times greater than that of *T. atriplicis*.

Beside the dominating species, the community in question was composed of a group of species whose abundance accounted for 2–6%. The group included 7 species, i. e. *P. nebulosa*, *M. thalassina*, *O. stabilis*, *O. gracilis*, *C. vaccinii*, *A. pyramidea* and *E. lucipara*. All the species of this group, similarly as *C. trapezina*, are bound to forest habitats and almost all of them rank among constant species. The community from the Cyganka reserve was the second community (that from the

Dębina reserve being the first one) in which an overwhelming majority of dominants was contributed by forest species.

The species of abundance not exceeding 1% made up about 60% of fauna. The group of these species was much diversified with respect to nutritive and habitat requirements. Only 1 species, *Minucia lunaris*, occurred solely in the Cyganka reserve. It is a rare forest species, known as oak monophage.

Radziejowice forest district. On this site 84 noctuid species were recorded, i. e. over 90% of *Noctuidae* fauna of linden-oak-hornbeam forests (Tab. I). Such a large number of species was not recorded in any other community under studies.

Linden-oak-hornbeam forest at Radziejowice spreads in a mosaic area, composed of plots of natural linden-oak-hornbeam forest vegetation, marshy vegetation and antropogenized environments. Compactness of the canopy layer was little, the forest being well light-penetrated, the more so as linden-oak-hornbeam vegetation was patchy.

The community was dominated by 3 species, namely: *Cosmia trapezina*, *Trachea atriplicis* and *Apamea monoglypha*. Abundance of these three species made up 48.9% of total community abundance, the abundance of the dominant (*C. trapezina*) being several times higher than that of the subdominants (Tab.I). The dominance structure was approximate to that of the communities from the Modrzewina and Cyganka reserves. *C. trapezina*, a typical linden-oak-hornbeam forest species, markedly outnumbered *T. atriplicis*, the latter being not a characteristic species of this plant community.

Apart from the dominants, the community of noctuids from the linden-oak-hornbeam forest at Radziejowice comprised also a small group of species, which could be termed as fairly abundant, for percentage contribution of their abundance ranged from 2.4% to 6.4% (Tab. I). The group included: *Agrotis exclamationis*, *Noctua pronuba*, *Anaplectoides prasina*, *Xestia triangulum*, *Polia nebulosa*, *Amphipyra pyramidea* and *Mesapamea secalis*. A majority of them ranked among polyphages, whose larvae infest the outside or inside of herbaceous plants, except for *P. nebulosa* and *A. pyramidea*, whose larvae feed on various species of trees. Only some of the species listed above were constant for *Noctuidae* communities of linden-oak-hornbeam forests.

Habitat requirements of most species belonging to this group were alike. Usually they do not occur in forest habitats, as they prefer plant communities of open areas, due, among others, to the occurrence range of their host plants.

A large number of species alien the fauna of linden-oak-hornbeam forests yet composing the community in question seemed likely to be related to a diversity of vegetation complex at the forest district in Radziejowice. The whole area penetrated by species coming from various plant communities, therefore apart from the species constantly occurring in linden-oak-hornbeam forests, there also appeared accidental species. It was evidenced, among others, by a large number of accessorial species (of usually little specimen abundance). It was estimated that as many as 63 species (i. e.

Table I. Occurrence and abundance of *Noctuidae* in the *Tilio-Carpinetum* forests of the Mazovian Lowland (*n* — abundance index, + — species recorded only with auxiliary methods)

No	Species	Dębina res.		Modrzewina res.		Cyganka res.		Radziejowice		King Sobieski res.	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
1	2	3	4	5	6	7	8	9	10	11	12
1	<i>Euxoa tritici</i> (L.)	—	—	+	—	+	—	+	—	—	—
2	<i>Euxoa nigricans</i> (L.)	—	—	—	—	+	—	+	—	—	—
3	<i>Agrotis segetum</i> (DEN. e SCHIFF.)	+	—	0.07	0.4	+	—	0.39	1.0	+	—
4	<i>Agrotis exclamationis</i> (L.)	+	—	+	—	0.02	0.3	0.96	2.4	+	—
5	<i>Ochropleura plecta</i> (L.)	—	—	0.25	1.4	—	—	+	—	—	—
6	<i>Noctua pronuba</i> L.	0.14	3.6	0.29	1.6	0.03	0.4	1.82	4.6	—	—
7	<i>Noctua fimbriata</i> SCHREB.	—	—	—	—	—	—	0.02	0.1	—	—
8	<i>Spaelotis ravida</i> (DEN. et SCHIFF.)	—	—	—	—	—	—	0.02	0.1	—	—
9	<i>Graphiphora augur</i> (FABR.)	—	—	—	—	—	—	0.02	0.1	—	—
10	<i>Lycophotia porphyrea</i> (DEN. et SCHIFF.)	—	—	—	—	—	—	—	—	0.02	0.5
11	<i>Diarsia brunnea</i> (DEN. et SCHIFF.)	—	—	0.47	2.6	—	—	0.27	0.7	—	—
12	<i>Diarsia rubi</i> (VW.)	—	—	0.10	0.5	—	—	+	—	—	—
13	<i>Xestia c-nigrum</i> (L.)	—	—	1.99	10.9	—	—	+	—	—	—
14	<i>Xestia triangulum</i> (HUFN.)	—	—	0.16	0.9	—	—	1.34	3.4	—	—
15	<i>Xestia baja</i> (DEN. et SCHIFF.)	—	—	0.16	0.9	—	—	0.04	0.1	—	—
16	<i>Xestia xanthographa</i> (DEN. et SCHIFF.)	—	—	0.13	0.7	—	—	0.04	0.1	—	—
17	<i>Anaplectoides prasina</i> (DEN. et SCHIFF.)	+	—	0.03	0.2	0.04	0.5	1.50	3.8	—	—
18	<i>Discestra trifolii</i> (HUFN.)	+	—	+	—	+	—	0.06	0.2	+	—
19	<i>Polia hepatica</i> (CL.)	—	—	—	—	—	—	0.02	0.1	—	—
20	<i>Polia nebulosa</i> (HUFN.)	—	—	0.03	0.2	0.32	4.7	1.93	4.9	—	—
21	<i>Mamestra brassicae</i> (L.)	0.14	3.6	0.49	2.7	0.04	0.6	0.34	0.9	0.03	0.9
22	<i>Mamestra persicariae</i> (L.)	—	—	0.17	0.9	—	—	0.07	0.2	—	—
23	<i>Mamestra contigua</i> (DEN. et SCHIFF.)	—	—	0.03	0.2	—	—	0.03	0.1	—	—
24	<i>Mamestra w-latinum</i> (HUFN.)	—	—	—	—	—	—	0.02	0.1	—	—

Noctuidae of linden-oak-hornbeam forests

Tab. I – cont.

1	2	3	4	5	6	7	8	9	10	11	12
25	<i>Mamestra thalassina</i> (HUFN.)	0.04	1.1	+	—	0.43	6.2	0.10	0.3	0.05	1.5
26	<i>Mamestra suasa</i> (DEN. et SCHIFF.)	—	—	0.48	2.6	0.02	0.3	0.08	0.2	+	—
27	<i>Mamestra oleracea</i> (L.)	—	—	—	—	—	—	0.03	0.1	—	—
28	<i>Orthosia cruda</i> (DEN. et SCHIFF.)	0.04	1.1	0.07	0.4	+	—	0.02	0.1	0.59	19.5
29	<i>Orthosia populeti</i> (FABR.)	+	—	+	—	+	—	0.01	0.1	+	—
30	<i>Orthosia gracilis</i> (DEN. et SCHIFF.)	—	—	+	—	1.31	1.9	+	—	0.20	6.6
31	<i>Orthosia stabilis</i> (DEN. et SCHIFF.)	0.20	5.0	0.15	0.8	0.30	4.3	0.13	0.3	0.13	4.3
32	<i>Orthosia incerta</i> (HUFN.)	+	—	+	—	0.02	0.3	0.04	0.1	0.05	1.6
33	<i>Orthosia munda</i> (DEN. et SCHIFF.)	—	—	—	—	0.02	0.3	—	—	0.14	4.8
34	<i>Mythimna turca</i> (L.)	—	—	—	—	—	—	0.04	0.1	—	—
35	<i>Mythimna ferrago</i> (FABR.)	—	—	—	—	—	—	0.02	0.1	—	—
36	<i>Mythimna albipuncta</i> (DEN. et SCHIFF.)	—	—	—	—	—	—	0.02	0.1	—	—
37	<i>Mythimna pallens</i> (L.)	0.14	3.6	—	—	0.02	0.3	0.07	0.2	—	—
38	<i>Cucullia umbratica</i> (L.)	—	—	—	—	0.02	0.3	0.01	0.1	—	—
39	<i>Cucullia scrophulariae</i> (DEN. et SCHIFF.)	—	—	+	—	+	—	+	—	—	—
40	<i>Dichonia aprilina</i> (L.)	—	—	—	—	0.07	1.0	0.04	0.1	—	—
41	<i>Eupsilia transversa</i> (HUFN.)	—	—	0.03	0.2	0.04	0.5	—	—	0.02	0.7
42	<i>Conistra vaccinii</i> (L.)	0.26	6.6	0.04	0.2	0.17	2.5	0.16	0.4	0.10	3.4
43	<i>Agrochola circellaris</i> (HUFN.)	—	—	0.03	0.2	0.07	1.0	1.12	0.3	—	—
44	<i>Xanthia citrigo</i> (L.)	—	—	—	—	—	—	0.22	0.6	—	—
45	<i>Moma alphiun</i> (OSB.)	—	—	—	—	—	—	0.41	1.0	—	—
46	<i>Acronicta megacephala</i> DEN. et SCHIFF.)	—	—	0.03	0.2	—	—	0.16	0.4	—	—
47	<i>Acronicta aceris</i> (L.)	0.04	0.9	—	—	—	—	0.06	0.2	—	—
48	<i>Acronicta psi</i> (L.)	—	—	0.10	0.5	—	—	0.04	0.1	—	—
49	<i>Acronicta rumicis</i> (L.)	—	—	0.99	5.4	—	—	0.12	0.3	—	—
50	<i>Cryphia fraudatricula</i> (HBN.)	—	—	—	—	—	—	0.02	0.1	—	—
51	<i>Amphipyra pyramidea</i> (L.)	0.25	6.2	0.16	0.9	0.18	2.5	1.59	4.0	0.69	23.0
52	<i>Amphipyra tragopoginis</i> (CL.)	—	—	0.22	1.2	0.02	0.3	0.14	0.3	—	—

53	<i>Dipterygia scabriscula</i> (L.)	—	—	—	—	0.06	0.8	0.18	0.4	—	—
54	<i>Rusina ferruginea</i> (ESP.)	—	—	—	—	—	—	0.05	0.1	—	—
55	<i>Trachea atriplicis</i> (L.)	0.06	1.4	3.07	16.8	1.11	16.1	4.51	11.4	0.03	1.0
56	<i>Euplexia lucipara</i> (L.)	—	—	0.21	1.2	0.27	3.9	0.28	0.7	—	—
57	<i>Ipimorpha subtusa</i> (DEN. et SCHIFF.)	—	—	—	—	—	—	0.06	0.2	—	—
58	<i>Enargia paleacea</i> (ESP.)	0.14	3.6	—	—	—	—	0.50	1.3	—	—
59	<i>Enargia ypsilon</i> (DEN. et SCHIFF.)	—	—	—	—	—	—	0.01	0.1	—	—
60	<i>Cosmia affinis</i> (L.)	—	—	—	—	0.02	0.3	0.07	0.2	—	—
61	<i>Cosmia trapezina</i> (L.)	2.50	63.3	6.34	34.7	3.03	43.7	11.44	28.9	0.90	30.2
62	<i>Apamea monoglypha</i> (HUFN.)	—	—	0.62	3.4	0.04	0.5	3.41	8.6	—	—
63	<i>Apamea sublustris</i> (ESP.)	—	—	—	—	—	—	0.09	0.2	—	—
64	<i>Apamea crenata</i> (HUFN.)	—	—	0.07	0.4	—	—	0.07	0.2	—	—
65	<i>Apamea remissa</i> (HBN.)	—	—	—	—	—	—	0.11	0.3	—	—
66	<i>Apamea anceps</i> (DEN. et SCHIFF.)	—	—	—	—	—	—	0.13	0.3	—	—
67	<i>Apamea sordens</i> (HUFN.)	—	—	—	—	0.04	0.5	0.05	0.1	—	—
68	<i>Apamea scolopacina</i> (ESP.)	—	—	—	—	—	—	0.06	0.1	—	—
69	<i>Apamea pabulatricula</i> (BRAHM)	—	—	—	—	—	—	0.10	0.3	—	—
70	<i>Apamea ophiogramma</i> (ESP.)	—	—	—	—	—	—	0.02	0.1	—	—
71	<i>Oligia strigilis</i> (L.)	—	—	—	—	—	—	0.09	0.2	—	—
72	<i>Oligia latruncula</i> (DEN. et SCHIFF.)	—	—	—	—	—	—	0.31	0.8	—	—
73	<i>Mesoligia furuncula</i> (DEN. et SCHIFF.)	—	—	—	—	—	—	0.09	0.2	—	—
74	<i>Mesapamea secalis</i> (L.)	—	—	0.32	1.7	0.07	0.9	2.53	6.4	—	—
75	<i>Amphipoea fucosa</i> (FRR.)	—	—	0.19	1.1	—	—	—	—	—	—
76	<i>Charanyca trigrammica</i> HUFN.	—	—	—	—	0.02	0.3	0.09	0.2	—	—
77	<i>Hoplodrina blanda</i> (DEN. et SCHIFF.)	—	—	—	—	—	—	0.04	0.1	—	—
78	<i>Caradrina morpheus</i> (HUFN.)	—	—	—	—	0.04	0.5	0.02	0.4	—	—
79	<i>Axylia putris</i> (L.)	—	—	0.07	0.4	—	—	0.08	0.2	—	—
80	<i>Bena prasinana</i> (L.)	—	—	—	—	—	—	1.11	2.8	—	—
81	<i>Diachrysa chrysitis</i> (L.)	—	—	0.03	0.2	—	—	—	—	—	—
82	<i>Autographa gamma</i> (L.)	—	—	0.16	0.9	0.02	0.3	0.01	0.1	—	—
83	<i>Mormonia sponsa</i> (L.)	—	—	0.52	2.8	0.12	1.8	0.80	2.0	0.06	2.14

Tab. I – cont.

1	2	3	4	5	6	7	8	9	10	11	12
84	<i>Catocala fraxini</i> (L.)	—	—	—	—	—	—	0.21	0.5	—	—
85	<i>Catocala nupta</i> (L.)	—	—	—	—	0.03	0.5	0.26	0.6	—	—
86	<i>Catocala promissa</i> (DEN. et SCHIFF.)	—	—	—	—	—	—	0.24	0.6	—	—
87	<i>Ephesia fulminea</i> (SCOP.)	—	—	—	—	—	—	0.01	0.1	—	—
88	<i>Minucia lunaris</i> (DEN. et SCHIFF.)	—	—	—	—	0.02	0.3	—	—	—	—
89	<i>Lygephila cracca</i> (DENN. et SCHIFF.)	—	—	—	—	—	—	0.02	0.1	—	—
90	<i>Scoliopteryx libartix</i> (L.)	—	—	—	—	0.10	1.4	0.01	0.1	—	—

Table II. Parameters of the community structure for noctuid moths in the *Tilio-Carpinetum* forests of the Mazovian Lowland (N — number of species, *n* — abundance index, *d* — species richness)

Plot Parametr	Dębina res.	Modrzewina res.	Cyganka res.	Radziejowice	King Sobieski res.
N	18	44	41	84	19
<i>n</i>	4.0	18.0	7.0	40.0	3.0
<i>d</i>	3.4	20.6	12.7	82.0	3.7

80% of the community) had abundance not exceeding 1%; out of which 30 were sampled only at this study site (Tab. I). The group of the least abundant species was very diversified with respect to their nutritive and habitat preferences (Tab. I).

King Jan III Sobieski reserve. 19 noctuid species were recorded on this study site, the community being the poorest in species (Tab. I). The constant species accounted for about 70% of the fauna of this reserve.

Linden-oak-hornbeam forest vegetation covered a relatively small plot there and was surrounded by plant communities of pine woods, which are rather poor with respect to the number of noctuid species occurring in them. Moreover, the vegetation was much penetrated by people, as it lay on the outskirts of Warsaw.

The community was dominated by 3 species, whose total abundance made up over 70% of the community abundance. The dominating species were *C. trapezina*, *A. pyramidea* and *O. cruda* (Tab. I). All of them are forest species constant in Noctuidae communities of linden-oak-hornbeam forests.

Disproportions in abundance of the remaining species were slight and only 3 species, i. e. *L. porphyrea*, *M. brassicae* and *E. transversa*, occurred at abundance not exceeding 1%. The first species was recorded only on this study site is classified to rare forest species (monophage on *Calluna vulgaris*). The second species is a common polyphage of herbaceous plants, preferring plant communities of arid open areas. Frequently it is a pest of garden crops. The third is a forest species whose larvae feed on tree leaves.

Diversity of communities

Noctuidae communities occurring in natural linden-oak-hornbeam forests on the Mazovian Lowland were similar in their species composition and dominance structure, yet differed in their specimen abundance and the number of species composing them (Tab. II).

The number of noctuid species making up particular communities ranged from 18 to 84. Considering the following order of the examined sites: Radziejowice forest district — Modrzewina reserve — Cyganka reserve — King Jan III Sobieski reserve — Dębina reserve, 3 groups could be distinguished, comprising communities made up of:

- about 20 species (King Jan III Sobieski, Dębina reserves)
- about 40 species (Modrzewina, Cyganka reserves)
- about 80 species (Radziejowice forest district)

Differences in specimen abundance of particular communities were much greater than differences in the number of species. In case of the extreme pair (King Jan III Sobieski reserve — Radziejowice), the difference was 13-fold (3.0–40.0 respectively).

The nature of changes in abundance of all the communities under comparison resembled that in the species number (Tab. II). Considering the order of the sites: Radziejowice — Modrzewina reserve — Cyganka reserve — King Jan III Sobieski reserve — Dębina reserve, the values of relative abundance index amounted to: 40.0 — 18.0 — 7.0 — 3.0–4.0 respectively (Tab. II).

Table III. Values different indices of similarity of species composition and of the index of dominance structure (1 — Radziejowice, 2 — Modrzewina res., 3 — Cyganka res., 4 — King Sobieski res., 5 — Dębina res.)

Index Plot × plot	Indices of species composition				Index of dominance structure
	after JACCARD-SÖRENSEN	after RUSSEL-RAO	after ROGERS-TANIMOTO	after SOKAL-MITCHENER	after MORISTA
1 — 2	65,60	19,07	25,40	40,50	0,88
1 — 3	60,80	17,90	25,80	41,00	0,87
1 — 4	29,30	8,40	29,70	45,80	0,63
1 — 5	35,30	9,70	29,20	45,20	0,71
2 — 3	63,50	18,90	25,40	40,60	0,91
2 — 4	50,80	15,60	26,70	42,20	0,61
2 — 5	41,90	13,80	27,50	43,10	0,77
3 — 4	60,00	17,60	34,40	41,20	0,69
3 — 5	50,80	16,80	26,30	41,60	0,88
4 — 5	75,70	21,30	24,50	39,30	0,70

Among the compared communities there were such which had an alike number of species and specimen abundance as well as others, in which different relations between the analyzed parameters were observed. A similar specimen abundance and number of species marked the community from the Dębina and King Jan III Sobieski reserves, which were composed of 18–19 species, while the values of relative abundance index amounted to 4.0–3.0. A different interrelation was noted between the communities from the Modrzewina and Cyganka reserves, where an approximate number of species (44–41) did not correspond to their abundance (a 2.5-fold difference: 18–7.0).

The value of species diversity index (d) varied accordingly to changes in species composition and abundance (Tab. II). It was the highest (82,0) in case of the community from Radziejowice, which comprised the greatest number of species, smaller (20,6) for the community from the Modrzewina reserve, still smaller (12,7) for the community from the Cyganka reserve, which had an approximately the same number of species but was two times less abundant than the former. The lowest value of the examined parameter (3,7 and 3,4) was estimated for the poorest communities, which had an alike number of species and abundance, i. e. the ones from the Dębina and King Jan III Sobieski reserve (Tab. II).

Despite differences in the number of species constituting particular *Noctuidae* communities of linden-oak-hornbeam forests, there was noted an apparent similarity in the species composition of the compared communities, as reflected by the values of JACCARD-SÖRENSEN, RUSSEL-RAO, ROGERS-TANIMOTO and SOKAL-MITCHENER similarity indices (Tab. III). In seven out of 10 considered cases, similarity indices assumed values exceeding (for JACCARD-SÖRENSEN and RUSSELL-RAO indices) or smaller than (for ROGERS-TANIMOTO and SOKAL-MITCHENER indices) 50% of the maximal value.

Only in case the three following pairs: the communities from King Jan III Sobieski reserve and Radziejowice, the ones from the Dębina reserve and Radziejowice and those from the Dębina and Modrzewina reserves, the values of similarity indices were markedly lower (Tab. II). In case of the first and the second pair, the compared communities differed highly in the number of species (by as much as 5-times). The difference was explicitly captured in the values of similarity indices, notwithstanding the fact that almost all the species recorded in the King Jan III Sobieski and Dębina reserves occurred also in the community at Radziejowice. In the third pair under comparison, i. e. the communities from Dębina and Modrzewina reserves, the value of the examined index could be termed as subthreshold.

Differences in the number of species constituting the compared communities, at their marked similarity of species composition, resulted primarily from specific habitat conditions of each of the studied linden-oak-hornbeam forest. The plots of linden-oak-hornbeam forest vegetation assigned for studies differed in their micro-climatic conditions, size, neighbourhood (proximity of other plant communities) and a number of other factors. It was noted that the communities from linden-oak-hornbeam forests growing in a mosaic environment were more abundant regarding their number of species and specimens than the communities occurring on areas of a more homogenous vegetation. An extreme pair in this respect were the communities from the forest at Radziejowice (84 species, abundance 40.0) and from Dębina reserve (18 species, abundance 4.0). Noctuid fauna on two plots of linden-oak-hornbeam forest vegetation of fairly similar habitat conditions (the Modrzewina and Cyganka reserves) comprised an approximate number of species (44–41), yet its abundance seemed to depend on the very size of the plot. The community from the Cyganka reserve, where the stand of linden-oak-hornbeam forest vegetation was rather narrow, was two-times less abundant than that from the Modrzewina reserve, where the plot of linden-oak-hornbeam forest was much wider (community abundance amounted to 7.0 and 18.0 respectively).

Similarity of species composition of the compared communities was coupled with a very close similarity of their dominance structure. Despite notable differences in the number of species and specimen abundance of the compared communities, for each of the examined pair of communities the MORISITA index of dominance structure similarity assumed values in the interval 0.61–0.91, i. e. markedly above the 0.5 threshold value (Tab. III).

The greatest similarity in dominance structure marked the communities which were the richest in species, namely from the Modrzewina and Cyganka reserve (0.91) as well as from the forest district at Radziejowice and Cyganka reserve, whereas the least similar, although considerably above the 0.5 limit value, were the communities from the Modrzewina and King Jan III Sobieski reserves (Tab. III).

Divergencies in dominance structure issued from different percentage contribution of species to particular communities. The core of each community included the same species of a fairly similar percentage contribution (Tab. I). The factor differentiating particular communities was the number of accessorial species, i. e. the

species whose abundance did not excel 1%. The community at Radziejowice was in 80% made up of these inabundant species, the communities from Modrzewina and from Cyganka reserves — only in 60%, while the communities from Dębina and King Jan III Sobieski reserve — merely in 0.2% (Tab. I).

Furthermore, similarity of dominance structure of the compared communities sprang from the recurrent sequence of species in the pattern: — dominant — subdominants — accessorial species. The dominance pyramid in *Noctuidae* communities in linden-oak-hornbeam forests was as follows:

		Dominant	
<i>Cosmia trapezina</i>	28.90–63.33%	of abundance of particular communities	
		Subdominants	
Communities abounding in species:			
<i>Trachea atriplicis</i>	11.38–16.80%	of abundance of	particular communities
<i>Apamea monoglypha</i>	0.52– 8.62%	”	”
<i>Polia nebulosa</i>	0.17– 4.68%	”	”
<i>Mesapamea secalis</i>	0.94– 6.40%	”	”
Communities inabundant in species:			
<i>Amphipyra pyramidea</i>	6.22–23.02%	”	”
<i>Orthosia cruda</i>	0.94–19.47%	”	”
<i>Conistra vaccinii</i>	3.35– 6.55%	”	”
<i>Orthosia stabilis</i>	4.25– 5.03%	”	”

All the communities, regardless their number of species and specimen abundance, were dominated by *Cosmia trapezina* — a typical forest species. On the other hand, the group of subdominants differed in its species composition in particular communities. The communities made up of a large number of species (in the forest district at Radziejowice, Modrzewina and Cyganka reserves) had a group of subdominants composed of species much diversified in their ecological and nutritive preferences. The communities inabundant in species (in the Dębina reserve, King Jan III Sobieski reserve), the group of dominants included almost exclusively forest species.

Noctuid communities from linden-oak-hornbeam forests were dominated by species of a wide zoogeographical range (Holarctic and Euro-Siberian), which accounted for about 77% (Tab. IV). Euro-Siberian species made up 53.4% and Holarctic — 23.3% of the communities.

The contribution of species classified to Euro-Caucasian, European, Submediterranean, Sub-Pontic and Pontomediterranean elements, was markedly smaller. Euro-Caucasian species accounted for 11.1% and European — for 3.3%. The total contribution of the other species, i. e. Submediterranean, Sub-Pontic and Pontomediterranean amounted barely to 8.9% (Tab. IV).

It was observed that in the noctuid communities of linden-oak-hornbeam forests on the Mazovian Lowland, almost $\frac{1}{4}$ of the recorded 90 species, i. e. 17, ranked among constant species, while 13 of them occurred on all the studied sites. The group

of constant species included dominants (e. g. *C. trapezina*, *T. atriplicis*) as well as species occurring inabundantly in all the communities, e. g. *A. exclamationis*.

In each of the examined communities the constant species constituted a community core of recurrent dominance structure. Certain modifications of the core seemingly resulted from habitat conditions, attributing to distinctiveness of a given site. All the communities were dominated by *C. trapezina*, whose percentage contribution ranged from 28.9% to 63.3% of the community abundance. The dominating species markedly outnumbered subdominants (usually by several times). In the communities abounding in species (from the forest district at Radziejowice, Modrzewina reserve and Cyganka reserve) the subdominants included: *T. atriplicis*, *A. monoglypha*, *X. c-nigrum* and *M. thalassina*. These species differed in their nutritive and habitat preferences. In the communities made up of small number of species (from the Dębina reserve and King Jan III Sobieski reserve) the subdominants ranked among typical forest species, namely, *A. pyramidea*, *O. cruda* and *C. vaccinii*.

SUMMARY AND DISCUSSION

Noctuidae communities populating various stands of linden-oak-hornbeam forest vegetation on the Mazovian Lowland had a similar species composition and recurrent dominance structure. Similarity of species composition ranged from 29.3% to 75.7%, whereas similarity of dominance structure — from 0.61 to 0.91.

The constant species in noctuid communities from linden-oak-hornbeam forest were: *Agrostis segetum*, *A. exclamationis*, *Noctua pronuba*, *Discestra trifolii*, *Mamestra brassicae*, *M. thalassina*, *M. suasa*, *Orthosia cruda*, *O. populeti*, *O. gracilis*, *O. stabilis*, *O. incerta*, *Conistra vaccinii*, *Amphipyra pyramidea*, *Trachea atriplicis*, *Cosmia trapezina* and *Mormonia sponsa*. An overwhelming majority of these species ranked

Table IV. Proportions of zoogeographical elements in *Noctuidae* of the *Tilio-Carpinetum* forests of the Mazovian Lowland (N — number of species)

		Zoogeographical element						
		Holarctic	Euro-Siberian	Euro-Caucasian	European	Submediterranean	Sub-Pontic	Pontomediterranean
<i>Noctuidae</i> in the <i>Tilio-Carpinetum</i> forests	N	21	48	10	3	4	3	1
	%	23,3	54,4	11,1	3,3	4,5	3,3	1,1

among fauna of leafy forests, while some, e. g. *O. stabilis* or *O. incerta*, were characteristic of linden-oak-hornbeam forests.

In each of the community, constant species formed a „core” of recurrent dominance structure. In all the communities species recorded as constant usually numbered among dominants and subdominants.

All the communities were dominated by *Cosmia trapezina* — a species characteristic of linden-oak-hornbeam forests. Percentage contribution of its abundance accounted for 28.9%–63.3%. In three, out of the five studied communities, i. e. in the Modrzewina, Cyganka reserves and in the forest district at Radziejowice, the subdominants were, among others: *T. atriplicis*, *A. monoglypha* and *M. thalassina*. In the other two communities, i. e. in the Dębina and King Jan III Sobieski reserves, the subdominants were *A. pyramidea*, *O. stabilis* and *C. vaccinii*.

Apart from the constant species, each community comprised also species occurring solely in a given stand of linden-oak-hornbeam forest vegetation as well as accidental species, the latter occurring in the greatest number in communities from sites located on areas of diversified vegetation cover.

Contrary to species composition and dominance structure, specimen abundance of communities as well as the number of species making them up, were not likely to be considered parameters characterizing *Noctuidae* fauna of linden-oak-hornbeam forests. It seems that the number of species and specimen abundance of a community were determined not only by the very type of plant community but also by other factors, such as climatic conditions in a given vegetative season, the area of the plot covered by a given plant community or diversity (mosaic) of the surrounding areas.

Constancy of species composition of the studied communities and recurrent pattern of dominance structure are the premises for assuming that in linden-oak-hornbeam forests on the Mazovian Lowland there occurs a community of *Noctuidae* characteristic of this plant community.

The assumption of a distinctive character of *Noctuidae* communities in linden-oak-hornbeam forests, as compared other plant communities, seems to be supported by the results of studies conducted in marshy woods and moist pine woods some years ago. Noctuid communities from those habitats had different species composition and dominance structure (WINIARSKA 1981), none of them resembling communities of *Noctuidae* from linden-oak-hornbeam forests. Preliminary survey of data from the studies presently carried out in pine woods seems to further corroborate the assumption of a distinct character of *Noctuidae* communities in various plant communities.

A community characteristic of typical linden-oak-hornbeam forest is likely to be composed of a small number of species (about 20–25) and is inabundant (about 4.0). It is made up of species of a wide zoogeographical range (mainly Euro-Siberian element), primarily bound to plant communities of leafy forests, although several species may also occur in other types of vegetation. The dominating are the forest species, such as *A. pyramidea*, *O. cruda*, *O. stabilis*, or *C. vaccinii*, headed by *C. trapezina*, a linden-oak-hornbeam forest species.

An example of a community typical of linden-oak-hornbeam forest seemed the community of *Noctuidae* from the Dębina reserve. The community had all the characteristic traits, namely, it comprised a small number of species (18), mainly forest ones, and was inabundant (4.0). The dominating were *C. trapezina*, *C. vaccinii*, *O. stabilis* and *A. pyramidea*. Accidental species were few and their contribution to the community abundance was tiny.

The communities recorded to occur in other stand of linden-oak-hornbeam forest vegetation, were, most likely, modifications of the community characteristic of linden-oak-hornbeam forest. The more a given plant community differed from a typical linden-oak-hornbeam forest, the more the *Noctuidae* community populating it was dissimilar to the characteristic community of linden-oak-hornbeam forest.

The basic modifying factors were, among others, the compositions and structure of vegetation, the area a given stand of linden-oak-hornbeam forest vegetation, the degree of diversity (mosaic) of the surrounding areas and the pressure of nearby human settlements. The modifying agents include also historic factors (KOSTROWICKI 1956, TROJAN 1975, 1980), yet in case of the examined communities they seemed to be of hardly any significance.

The factors which were the most decisive of the structure of *Noctuidae* communities in linden-oak-hornbeam forests were: the degree of diversity of the areas adjacent to the examined stand of linden-oak-hornbeam forest vegetation and pressure of the human settlements.

The noctuid communities occurring in stands of linden-oak-hornbeam forest vegetation spreading in moist area were marked for their high specimen abundance and large number of species. They were primarily composed of constant species in *Noctuidae* fauna of linden-oak-hornbeam forests, yet they also comprised a number of species migrating from adjoining areas, which obviously increased the number of species in a community as well as the community abundance. For this reason the group of subdominants in these communities included species bound to other plant communities, e. g. *Apamea monoglypha* — an open areas species, a polyphage living in roots of herbaceous plants, or *X. c-nigrum* — an open area species, polyphage of herbaceous plants. The discussed features were characteristic of, e. g. the community from the forest district at Radziejowice.

Noctuid communities occurring in homogeneous stand of linden-oak-hornbeam forest vegetation, or in those surrounded with forest communities of little diversified vegetation, were fairly inabundant and comprised a small number of species. They were made up primarily of constant species, characteristic of *Noctuidae* fauna of linden-oak-hornbeam forests, the contribution of migrant being small. The dominants in these stands of linden-oak-hornbeam forest vegetation ranked almost exclusively among forest species. The discussed traits featured, e. g. the community from the Dębina reserve.

The changes in *Noctuidae* communities brought about by the other, apparently most significant modifying factor, i. e. the pressure of human settlements, are the subject of a separate research, its findings to be published subsequently.

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STRESZCZENIE

[Tytuł: Zgrupowanie sówek (*Lepidoptera*, *Noctuidae*) lasów grądowych Niziny Mazowieckiej]

Badania dotyczące zgrupowań *Noctuidae* występujących w naturalnych lasach grądowych Niziny Mazowieckiej prowadzono w latach 1974–1982 w rezerwacie Dębina koło Klembowa, rezerwacie Modrzewina koło Belska, rezerwacie Cyganka koło wsi Truskaw w Puszczy Kampinoskiej, w obwodzie leśnym Radziejowice i w rezerwacie im. Króla Jana III Sobieskiego na peryferiach dzielnicy Warszawa–Praga Południe. Materiał zebrano przy użyciu pułapek Moerickego (metoda podstawowa) i pułapek wabiących — świetlnych i zapachowych (metody dodatkowe). Zebrano około 8 tysięcy imagines sówek.

W lasach grądowych Niziny Mazowieckiej stwierdzono 90 gatunków sówek. Wśród nich 17 gatunków określono jako stałe dla badanych zgrupowań. Były to: *Agrostis segetum*, *A. exclamationis*, *Noctua pronuba*, *Discestra trifolii*, *Mamestra brassicae*, *M. thalassina*, *M. suasa*, *Orthosia cruda*, *O. populeti*, *O. gracilis*, *O. stabilis*, *O. incerta*, *Conistra vaccinii*, *Amphipyra pyramidea*, *Trachea atriplicis*, *Cosmia trapezina*, *Mormovia sponsa*.

Zgrupowania *Noctuidae* zasiedlające różne płaty roślinności grądowej miały podobny skład gatunkowy (29.3–75.7%) i strukturę dominacyjną (0.61–0.91), różniły się natomiast liczebnością (3.0–40.0) i liczbą gatunków (18–84).

Dominantem we wszystkich zgrupowaniach była *Cosmia trapezina*. Udział procentowy jej liczebności wynosił 28,9% do 63,3%. Subdominantami w trzech na pięć badanych zgrupowań tzn. w rezerwacie Modrzewina, Cyganka i obwodzie leśnym Radziejowice były między innymi: *T. atriplicis*, *A. monoglypha* i *M. thalassina*. Subdominantami w dwóch pozostałych zgrupowaniach tzn. w rezerwacie Dębina i im. Króla Jana III Sobieskiego były: *A. pyramidea*, *O. stabilis* i *C. vaccinii*.

Poza gatunkami stałymi w skład każdego zgrupowania wchodziły również gatunki występujące tylko na określonym płacie roślinności grądowej oraz gatunki przypadkowe, których najwięcej stwierdzono w zgrupowaniach środowisk położonych na obszarach o zróżnicowanej roślinności.