

ELIGIUSZ NOWAKOWSKI

CLICK BEETLES (*COLEOPTERA*, *ELATERIDAE*) OF MOIST  
MEADOWS ON THE MAZOVIAN LOWLAND

## ABSTRACT

The present work provides an account of the species composition, zoogeographical and ecological elements and dominance structure of the click beetle communities on the studied moist meadows of the Mazovian Lowland. Fourteen species were recorded to occur on the examined areas. Three basic types of dominance structure were distinguished in the examined wireworm communities on the moist meadows, namely, the community with the eudominant *Agriotes sputator* and 1-2 subdominating species, the community with the eudominant *Agriotes obscurus* and 1-3 subdominating species, and the assumed third community with the eudominant *Selatosomus latus* and 4 accompanying species.

## INTRODUCTION

Elaterids are one of significant families of beetles in land biocoenoses. Their larvae and imagines account for two distinct elements of zoocoenosis. The larvae, whose development cycle lasts several years, inhabit either dead wood at various stages of decomposition (dendrophilous species) or the soil environment (soil species). There also may be distinguished a group of species, which may be found in soil as well as in decaying wood. The soil species, being the subject matter of the present work, form a group much diversified as regards their habitational and feeding requirements. Considering the habitational requirements, the soil species may be divided into three groups, namely, ubiquitous, forest, and open area groups, whereas considering the food habits, the trophic guilds of predators, pantophages and rhizophages may be distinguished. Several rhizophagous species are crop and forest pests. Due to their usually numerous contribution to soil macrofauna (amounting to 30%, *Formicidae* excluded), wireworms constitute a fundamental structural element of soil fauna.



The objective of the present paper was a manifold analysis of the species composition and structure of the soil elater communities on moist meadows (*Arrhenatheretum medioeuropaeum*) of the Mazovian Lowland, considering the habitat, soil and form of land management.

Literature provides fairly plentiful data on the click beetle communities of meadow environments in Poland. Nowakowski (1981) described soil communities of two Mazovian moist meadows, located at Białoleka Dworska, one spreading on a site of linden-oak-hornbeam forest habitat (*Tilio-Carpinetum*), the other — on a site of a carr (*Circaeo-Alnetum*), from where the author reported 11 species. Previously Nowak (1971) reported only 2 elater species from these two types of meadows. Two works concern the region of Wielkopolska. Szyfter (1955), apart from describing communities of crop fields, also gave an account on the structure of a community of a fallow located on bog soil, recording 4 species there. An attempt of a more comprehensive analysis of the species composition and structure of wireworm communities was undertaken by Piekarczyk (1966) on the basis of studies carried out at 36 research stands. The author examined the dependence of the species composition and abundance of wireworms on the form of grassland exploitation and the genetic type of soil as well as the dependence of their community abundance on the chosen parameters of soil characteristic in the studied environments, such as mechanical composition, reaction, etc. The author reported 13 species from the soil of regular grasslands, 10 species from the soil of leys and 7 species from grasslands set on former crop lands. As regards the genetic type of soil, the author reported 12 species from muck-bog soils, 12 species from soils of blackearth type and 7 species from podzol soils. Notwithstanding a thorough soil characteristic, the quoted work lacked a phytosociological analysis of the studied sites, hence it was impossible to define the species composition of wireworm communities with regard to types of meadows. The only information that could be deduced from the discussed work was that a majority of grasslands located on muck-bog soils and on black-earth ranked among wet meadows (the class *Molinietea*). The accounts of species composition and structure of click beetle communities of meadow environments in the province of Lublin may be found in the works by Pawelska (1951) and Honczarenko (1959, 1962a, 1970). Pawelska (1951) recorded 5 species on an "arid meadow" on loessial soil, 3 species on a "peat meadow" on wet peat and 2 species on a "strath (riverside) pasture", i.e. altogether 8 species in the 3 environments under studies. Honczarenko (1959) reported 13 species from a meadow spreading along the Bystrzyca River, though the author did not supply a complete phytosociological description of 8 studied sites, which, undoubtedly ranked among wet meadows of the class *Molinietea* or, even of the class *Phragmitetea*. In a subsequent work (1970), Honczarenko recorded 18 species on various types of meadows and soded wastelands (35 research stands), however, the author did not provide a detailed geobotanic characteristic of the studied



sites. The last of the quoted works concerning the province of Lublin (Honczarenko 1962a) examined the structure of wireworm communities of xerothermic swards (the class *Festuco-Brometea*). An account on the species composition and structure of click beetle communities of the meadows on the Pomerania Lakeland may be found in the works by Honczarenko (1962b, 1964). The former described click beetle communities of meadow environments located on peat and muck soils, providing a detailed geobotanic characteristic of the studied environments, and recording 13 species to have occurred there. The latter work recorded 11 species occurring on a fallow and two meadow areas (leys). The region of Lower Silesia was dealt with in the work by Sowińska (1975). The author conducted studies on a fallow and two waterlogged meadows, in the course of which 9 *Elateridae* species were recorded.

From the above review of the Polish literature on click beetle communities of meadow environments and soddied fallows it follows that only in the case of three works (Honczarenko 1959, 1962b; Nowakowski 1981), the described plant communities may be classified as those of moist meadows. The remaining works concern other types of meadows (mainly wet meadows).

#### THE SITE, METHODS, MATERIAL

The studies were carried out on three fertile mown meadows at Klembów, Chylice and Białołęka Dworska (site B), on a fallow in Białołęka Dworska (site A) and on a grazing meadow in Zbroszki. A detailed geobotanic characteristic of the sites in question may be found in the work by Kotowska and Okołowicz (1989). All the plant communities were classified to association of the moist meadow (*Arrhenatheretum medioeuropaeum*). Nonetheless, the sites differed considerably in the mechanical composition of soil as well as in the form of meadow management.

The studies were conducted at Klembów in 1980–1981, whereas at Chylice — in 1982–1983. Ten soil samples of 1 m<sup>2</sup> in total area were taken 3 times a vegetation season (in spring, late summer, autumn). The samples were subsequently extracted in a large Tullgren extractor. From both sites in Białołęka Dworska 10 samples were hand-taken 5 times a season in 1980–1981, by means of a soil sample split corer of 0.017 m<sup>2</sup> cross-section area.

Moreover, in the present paper the use was made of all the material of *Elateridae* concurrently sampled by complementary methods, i.e. by means of Barber's traps, entomological sweep-net, Moericke traps placed in the herb layer or attached to pegs, as well as of the material from individual sampling. The complementary material, made up of 21 imagines, provided the only data for analyses of click beetle community on the meadow at Zbroszki, where no other form of



sampling was exercised. Altogether about 2,000 specimens were sampled, including 800 larvae. The sampled material was almost entirely identified to the species level.

#### SPECIES COMPOSITION

Fourteen click beetle species were reported from the soil of the studied meadows of the Mazovian Lowland (Tab. 1). The meadow at Chylice turned out to be environment most abundant in click beetles, as 9 species were recorded there. A similar number of species had been formerly reported from the meadow C on the site of a linden-oak-hornbeam forest in Białoleka Dworska and from the meadow D at a marshy meadow (a site of a carr) therein, namely 9 and 10 species respectively (Nowakowski 1981). On the several-year-old meadows A and B in Białoleka, 6 species were recorded, whereas on the most fertile mown meadow at Klembów only 5 species occurred. It is likely that the small number of species reported from this site was related to a high moisture content in soil of this meadow (Kotowska, Okołowicz 1989). On the basis of complementary material only, 5 species were considered to occur on the grazing meadow at Zbroszki (Tab. 1).

According to the four-degree Tischler's scale, the species absolutely constant in zoocoenoses of the moist meadows of the Mazovian Lowland were *Adelocera murina*, *Agriotes sputator*, and *A. obscurus*. *Agriotes lineatus* and *Pseudathous niger* were constant species ( $50\% < C \leq 75\%$ ). The group of accessory species ( $25\% < C \leq 50\%$ ) included: *Selatosomus latus*, *Cidnopus pilosus*, *C. aeruginosus*, *Oedostethus quadripustulatus*, *Pseudathous hirtus*, *Athous haemorrhoidalis*, *Dalopius marginatus* and *Adrastus pallens*. *Negastrius pulchellus* was an accidental species ( $C \leq 25\%$ ).

The similarity of the species composition of the click beetle communities in particular sites under studies was estimated on the basis of Sørensen's formula. The examined wireworm communities differed greatly in their species composition, as indicated by relatively low values of the similarity index (Fig. 1).

#### ZOOGEOGRAPHICAL ANALYSIS

All the click beetle species reported from the examined meadows are natural elements of the Mazovian Lowland fauna. The following zoogeographical elements were recorded to occur in the studied sites: Holarctic, Palearctic, Euro-Siberian and European. Neither South-Euro-Siberian nor Submediterranean elements (i.e. stenothermal species) (Tab. 2) were recorded on the studied moist meadows, though they may be found on the Mazovian Lowland.



Table 1. Species composition, density (d) and percentage of *Elateridae* in moist meadow soils of the Mazovian Lowland (d in ind./m<sup>2</sup>; + — data obtained by other methods)

Locality	Klembów		Białoleka								Chylice		Zbroszki
			A		B		C		D				
Species	d	%	d	%	d	%	d	%	d	%	d	%	
<i>Adelocera murina</i> (L.)	—	—	+	—	+	—	1.25	1.44	0.63	1.42	2.33	6.45	+
<i>Selatosomus latus</i> (F.)	—	—	3.44	6.45	1.72	75.10	1.25	1.44	—	—	—	—	—
<i>Cidnopus pilosus</i> (Leske)	0.54	12.00	—	—	—	—	17.50	20.14	—	—	—	—	—
<i>Cidnopus aeruginosus</i> (Ol.)	—	—	0.57	1.07	≤0.58	≤24.90	—	—	—	—	+	—	—
<i>Cidnopus</i> sp.	—	—	—	—	—	—	—	—	0.63	1.42	—	—	—
<i>Oedostethus quadripustulatus</i> (F.)	1.62	36.00	—	—	—	—	—	—	—	—	+	—	+
<i>Negastrius pulchellus</i> (L.)	—	—	—	—	—	—	—	—	—	—	+	—	—
<i>Pseudathous niger</i> (L.)	—	—	6.31	11.83	—	—	+	—	0.63	1.42	1.33	3.68	—
<i>Pseudathous hirtus</i> (Herbst)	—	—	—	—	—	—	0.63	0.73	0.63	1.42	—	—	—
<i>Athous haemorrhoidalis</i> (F.)	—	—	—	—	—	—	+	—	1.25	1.44	≤0.63	≤1.42	—
<i>Agriotes sputator</i> (L.)	0.36	8.00	43.03	80.66	0.58	24.90	60.00	69.06	6.25	14.07	—	—	+
<i>Agriotes obscurus</i> (L.)	1.98	44.00	+	—	—	—	3.13	3.60	24.38	54.90	31.83	88.05	+
<i>Agriotes lineatus</i> (L.)	+	—	—	—	+	—	0.63	0.73	3.75	8.45	0.33	0.91	—
<i>Agriotes</i> sp.	—	—	—	—	—	—	1.25	1.44	3.13	7.05	—	—	—
<i>Dalopius marginatus</i> (L.)	—	—	—	—	—	—	—	—	4.38	9.87	0.33	0.91	—
<i>Adrastus pallens</i> (F.)	—	—	—	—	—	—	—	—	+	—	+	—	+
Total	4.50		53.35		2.30		86.89		44.41		36.15		—
N species	5		6		6		9		10		9		5

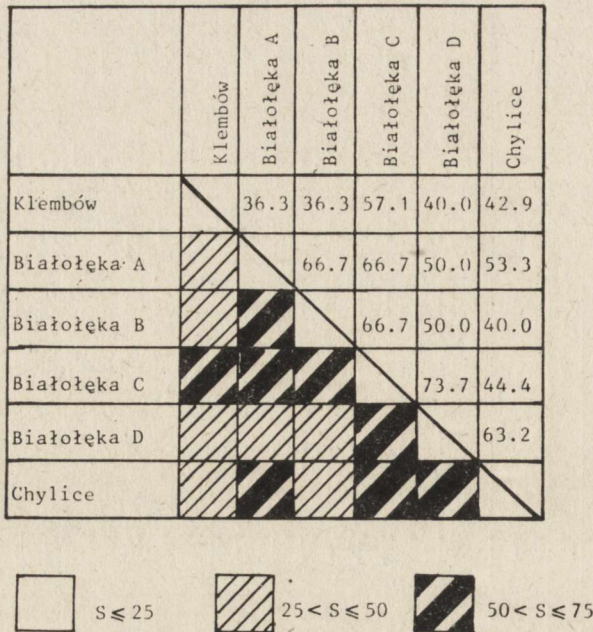


Fig. 1. A diagram of similarity of species composition of click beetle communities in moist meadow soils of Mazovia

Table 2. Zoogeographical composition of moist meadow elaterofauna and elaterid species of Mazovia (N — number of species)

Element	Mazovian Lowland		Moist meadow communities	
	N	%	N	%
Holarctic	4	10.3	2	14.3
Palearctic	9	23.1	6	42.9
European	13	33.3	4	28.6
Euro-Siberian	10	25.6	2	14.3
South-Euro-Siberian	1	2.6	—	—
Submediterranean	2	5.1	—	—
Total	39	100.0	14	100.1

As compared to the elaterofauna of the entire Mazovian Lowland, the proportion of the Palearctic element on the moist meadow communities was almost twice as high; also the proportion of the Holarctic element was higher. Much lower was the proportion of the Euro-Siberian element as well as of the European one, i.e. of the group of usually stenotopic species of a considerably lower range of ecological amplitude. The ratio in question was even more pronounced while



the dominance structure was taken into consideration, as the ever dominating species included Palearctic species of the genus *Agriotes* L. (*A. sputator* or *A. obscurus*) or *Selatosomus latus* or, in the case of the Klembów meadow community, Holarctic *Oedostethus quadripustulatus*.

#### ECOLOGICAL CHARACTERISTICS

In consideration of the above-mentioned classification of click beetles according to the ecological amplitude of their occurrence (Burakowski, Nowakowski 1981; Nowakowski 1981, 1985), the following ecological groups were distinguished among them on the moist meadows of the Mazovian Lowland: ubiquitous (eurytopic) specie, polytopic, oligotopic and stenotopic species of open areas and polytopic forest species (Tab. 3). The latter group consisted of one species only, namely, *Dalopius marginatus*, which occurred on two sites, i.e. on the meadow at Chyllice and on the meadow D at Białołęka.

Proportions of particular ecological elements in the moist meadow elaterofauna differed from those estimated for the entire Mazovian Lowland. An obvious

Table 3. Ecological composition of moist meadow elaterofauna and the elaterid species of Mazovia (N — number of species)

Criterion	Element		Mazovian Lowland		Moist meadow communities	
			N	%	N	%
Ecological amplitude	Ubiquitous (eurytopic)		4	10.3	4	28.6
	of forests	Polytopic	6	15.4	1	7.1
		Stenotopic	11	28.2	—	—
	of open areas	Polytopic	6	15.4	4	28.6
Oligotopic		4	10.3	3	21.4	
Stenotopic		8	20.5	2	14.3	
Trophic type	Predators		6	15.4	2	14.3
	Pantophagous		24	61.5	8	57.1
	Rhizophagous		9	23.1	4	28.6
Abundance	Locally abundant		2	5.1	2	14.3
	Numerous		8	20.5	5	35.7
	Scarce		14	35.9	6	42.9
	Sporadic		15	38.5	1	7.1
Expansiveness	Expansive		1	2.6	1	7.1
	Stable		37	94.9	13	92.9
	Recessive		1	2.6	—	—



decrease was noted in the proportion of the forest species to the meadow communities (from 43.6% on the Mazovian Lowland down to 7.1% on the moist meadows). Also the proportion of stenotopic open area species to meadow communities was smaller as compared to the value estimated for the entire Mazovian Lowland (a decrease from 20.5% to 14.3%). However, the proportion of polytopic and oligotopic open area species was almost two times higher on the moist meadows, whereas the proportion of ubiquitous species was almost three times higher on meadows than on the Mazovian Lowland (Tab. 3).

A complex problem of food habits of wireworms was discussed in an earlier work (Burakowski, Nowakowski 1981). As it was already mentioned above, the group is heterogeneous. It may be divided into three basic groups, i.e. predators, pantophages and rhizophages, though the authors are discordant as to the exact classification of species or genera to particular groups. No significant differences were noted in the proportion of particular trophic groups to the moist meadow click beetle communities and to the entire Mazovian elaterofauna (Tab. 3). However, the percentage of the particular groups varied when the community dominance structure was considered. On the sites, where the species of the genus *Agriotes* dominated (Klembów, Chylice, Białoleka — the A, C, D meadows), the percentage of rhizophages ranged between 52–90%. On the meadow B at Białoleka the community dominance structure was different than elsewhere and the proportion of rhizophages amounted to 25%. The predators of the communities on a majority of the studied sites accounted for about 2%, only at Chylice and on the moist meadow on a site of a carr (site D) in Białoleka it ranged 7–11%.

The species abundance and expansiveness was the last criterion considered in the present paper in analysing the ecological significance of species in biocoenosis. In the moist meadow communities of the Mazovian Lowland 2 species, i.e. *Agriotes obscurus* and *Adrastus pallens* were recorded to be locally abundant, 5 species were numerous, 6 species were scarce and 1 species, i.e. *Negastrius pulchellus*, was sporadic. Hence, out of 10 species occurring in the greatest numbers on the Mazovian Lowland, 7 were noted to occur on the studied meadows (Tab. 3).

The elaterofauna of the moist meadows was made up of one expansive species (*Agriotes sputator*) and thirteen stable species, according to the classification assumed for the Mazovian Lowland (Tab. 3).

#### DOMINANCE STRUCTURE

In the analysis of the click beetle community dominance structure on the Mazovian moist meadows under studies, only these species were taken into account on which adequate quantitative data had been acquired. All the species reported from the sites with complementary methods were ordered to the group of accompanying species.



The following dominance classes were distinguished: eudominants (over 50%), dominants (15–50%), subdominants (5–15%) and recedents (accompanying species) (below 5%). Due to a specific character of the group, the limits of particular classes were set higher than those usually accepted.

It was noted that a considerable diversity of the studied sites with regard to the community species composition corresponded to a similar diversity in their dominance structures. At least 3 basic types of communities could be distinguished (Tab. 1). The first community type, noted for the eudominant *Agriotes sputator* and 1–2 subdominating species, was observed to occur in the soil of the fertile meadow (site C) on a site of a linden-oak-hornbeam forest in Białołęka Dworska, described by Nowakowski (1981), and on the fallow (site A). The subdominant in the meadow C community was *Cidnopus pilosus* and in the site A community — *Pseudathous niger* and *Selatosomus latus*. In the course of some earlier research carried out in the urbicoenosis of Warsaw it had been found out that this type of community should have been regarded as characteristic for fertile moist meadows and primary to the city environment (Nowakowski 1985). The second community type was observed on the mown meadow at Chylice and on the moist meadow on the site of a carr in Białołęka (site D). The eudominant of this community was *Agriotes obscurus* and the subdominant — *Adelocera murina* in Chylice and *Agriotes sputator*, *A. lineatus* and *Dalopius marginatus* in Białołęka. An assumed intermediate type of community occurred at Klembów. The species dominating there included *Agriotes obscurus* and *Oedostethus quadripustulatus*, while the subdominants were the species characteristic of the first type of community, namely *Agriotes sputator* and *Cidnopus pilosus*. Most striking was a high proportion of *Oe. quadripustulatus* in this community, i.e. the species formerly defined as accessorial to meadow communities and occurring scarcely there. Its numerous occurrence in this site resulted from a high water content in soil (Kotowska, Okołowicz 1989), for the species in question seems to be bound to fertile humid soils and may be regarded as indicatory of the processes of soil gleying.

The third community type was observed in the soil of the several-year-old mown meadow at Białołęka (site B). The eudominant in this community was *Selatosomus latus*, the subdominants were *Agriotes sputator* and *Cidnopus aeruginosus*. Due to the recorded scarceness of larvae in soil and scantiness of compiled data it is questionable whether the assumed community dominance structure covers the actual one (Tab. 1).

#### ABUNDANCE

The studied areas differed in the wireworm abundance. The greatest density value was estimated for the soil of the C moist meadow in Białołęka, namely 86.9 ind./m<sup>2</sup>, and a somewhat lower value — for the soil of the fallow (site A) —



53.4 ind./m<sup>2</sup>. The values calculated for the several-year-old mown meadows at Chylice and Białołęka (site D) were alike and amounted to 36.0 and 44.4 ind./m<sup>2</sup> respectively. A very low larvae density was noted on the meadow at Klembów and on a several-year-old mown meadow at Białołęka (site B), i.e. 4.5 and 2.3 ind./m<sup>2</sup> respectively (Tab. 1). The present findings corroborate the assumption put forward by Honczarenko (1959, 1964, 1970) and more precisely evidenced by Piekarczyk (1966) that the abundance of wireworms on newly set meadows was several times lower than on regular grasslands.

#### SUMMARY

The examined elater communities of the studied areas were noted to be much diversified as regards their species composition, dominance structure, trophic structure and abundance. The most abundant environments were the mown meadow at Chylice and two meadows at Białołęka Dworska (sites C and D) (Nowakowski 1981), where 9–10 species were recorded; 5–6 species were reported from the remaining sites under studies.

Altogether 14 species were reported to occur in the click beetle communities of the Mazovian moist meadows. The absolutely constant species in zoocoenoses of the moist meadows were *Adelocera murina*, *Agriotes sputator* and *A. obscurus*, the constant species were: *Agriotes lineatus* and *Pseudathous niger*. The remaining 9 species ranked among accessorial species.

As compared to the Mazovian elaterofauna, the moist meadow elaterofauna was marked for a higher percentage of Palaearctic and Holarctic species and for a two times smaller proportion of European species. The observed relations were even more clear when the click beetle community dominance structure was taken into account. From the comparison of the percentage of the distinguished ecological element it followed that the proportion of polytopic and oligotopic open area species to moist meadow communities was almost two times higher, while that of ubiquitous species — three times higher. On the other hand, the proportion of stenotopic open area and forest species to moist meadow communities was several times lower. Moreover, it was found out that almost three times higher was the proportion of locally abundant species and almost two times higher that of numerous species in meadow communities, whereas five times smaller was the proportion of sporadic species. The proportion of the distinguished trophic groups to the meadow elaterofauna and to the entire Mazovian elaterofauna differed only slightly, if ever. However, if the dominance structure of a community was taken into consideration it turned out that the dominating group (75–90%) on a majority of sites was that of rhizophages. Only on two sites their proportion was lower, accounting for 52% of the Klembów community and 25% of the B meadow community at Białołęka.



It follows from the data presented above that click beetles should be regarded as relatively sensitive indicators of the soil mechanic composition, the processes advancing in soil and certain changes in environment brought about by cultivation. The information may be drawn from the species composition of a community, its dominance structure and abundance. The community marking fertile heavier soils includes the eudominant *Agriotes sputator*, while the subdominant occurrence depends on the age of grassland. Hence, *Cidnopus pilosus* is the subdominant on regular grasslands, while *Selatosomus latus* and *Pseudathous niger* replace it as subdominating on recently set grasslands. Furthermore, *S. latus* is an indicator of silty and clayey soils. The community with the eudominant *Agriotes obscurus* and with *Dalopius marginatus* is characteristic of humid light sandy alluvial soils. The presence of *Oedostethus quadripustulatus* points to improper water conditions in soil (the process of soil gleying). The age of grassland is revealed by the larvae abundance in soil. On newly set meadows they occur in much smaller numbers than on regular grasslands and fallows.

Polska Akademia Nauk  
Instytut Zoologii  
ul. Wilcza 64, 00-679 Warszawa

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## SPRĘŻYKOWATE (COLEOPTERA, ELATERIDAE) ŁĄK ŚWIEŻYCH NIZINY MAZOWIECKIEJ

### STRESZCZENIE

W glebach badanych łąk świeżych Niziny Mazowieckiej stwierdzono występowanie 14 gatunków sprzążków glebowych. Badane zgrupowania wykazują duże zróżnicowanie pod względem składu gatunkowego, struktury dominacyjnej i troficznej oraz liczebności. Gatunkami absolutnie stałymi w zgrupowaniach sprzążków łąk świeżych są *Adelocera murina*, *Agriotes sputator* i *A. obscurus*, gatunkami stałymi zaś *Agriotes lineatus* i *Pseudathous niger*. W porównaniu do ogółu gatunków sprzążków glebowych Niziny Mazowieckiej największy udział procentowy wśród sprzążków łąk mają gatunki holarktyczne i palearktyczne o szerokiej skali plastyczności ekologicznej. Gatunki te są zarazem ubikwistyczne lub poli- i oligotopowe terenów otwartych oraz występują masowo lokalnie lub licznie. Wyraźnie mniejszy jest udział procentowy gatunków o zasięgu europejskim, stenotopowych terenów otwartych i występujących sporadycznie. Nie występują tu z oczywistych względów gatunki leśne poza jednym politopowym gatunkiem *Dalopius marginatus*, który utrzymuje się na dwóch łąkach świeżych w siedlisku łąkowym. Znikome różnice występują przy porównywaniu udziałów procentowych wyróżnionych grup fagicznych wśród gatunków sprzążków łąk i ogółu gatunków glebowych na Mazowszu. Przy uwzględnieniu liczebności gatunku w zgrupowaniu największy udział procentowy mają ryzofagi — ponad 50%, zwykle 75–90%, udział pantofagów waha się w granicach 8–25%, a form drapieżnych 2–11%.

W glebach badanych łąk są reprezentowane co najmniej dwa typy zgrupowań. Pierwszy typ zgrupowania, z eudominantem *Agriotes sputator* i subdominantem *Cidnopus pilosus* lub *Selatosomus latus* i *Pseudathous niger*, występuje na żyznych cięższych glebach. Drugi typ, z eudominantem *Agriotes obscurus* i subdominantami *Agriotes sputator*, *Adelocera murina* i *Agriotes lineatus*, jest charakterystyczny dla łąk świeżych na wilgotnych madach piaszczystych. Występuje tu także politopowy gatunek leśny *Dalopius marginatus*. Pośredni typ zgrupowania stwierdzono na łące świeżej w Klembowie, cechującej się niekorzystnymi stosunkami wodnymi w glebie. Dominuje tu obok *Oedostethus quadripustulatus* *Agriotes obscurus*, ale subdominantami są gatunki dominujące



w pierwszym typie zgrupowania — *Agriotes sputator* i *Cidnopus pilosus*. Skąpy materiał ilościowy zebrany na kilkuletniej łące kośnej nie pozwala na pewne wyodrębnienie tu następnego typu zgrupowania z eudominantem *Selatosomus latus*.

Zestawienie danych charakterystyki geobotanicznej badanych środowisk łąkowych, ze składem gatunkowym zgrupowań sprężyków, strukturą dominacyjną zgrupowań i liczebnością wskazują, że sprężyki glebowe są czułym wskaźnikiem składu mechanicznego gleby, niektórych procesów glebowych i czasu użytkowania.

## ЖУКИ-ЩЕЛКУНЫ (COLEOPTERA, ELATERIDAE) МАЗОВЕЦКОЙ НИЗМЕННОСТИ

### РЕЗЮМЕ

В работе представлен анализ видового состава, зоогеографических элементов, экологических элементов и структуры доминирования в сообществах жуков-щелкунов, встречающихся на свежих лугах Мазовецкой низменности. Констатировано 14 видов рассматриваемых жуков. Выделены 3 основных типа структуры доминации в сообществах жуков-щелкунов в свежих лугах: с евдоминантным *Agriotes sputator* с 1—2 видами субдоминирующими, с евдоминантным *Agriotes obscurus* с 1—3 субдоминирующими видами и, по-видимому, 3-ий тип с евдоминантным *Selatosomus latus* с 4 сопутствующими видами.