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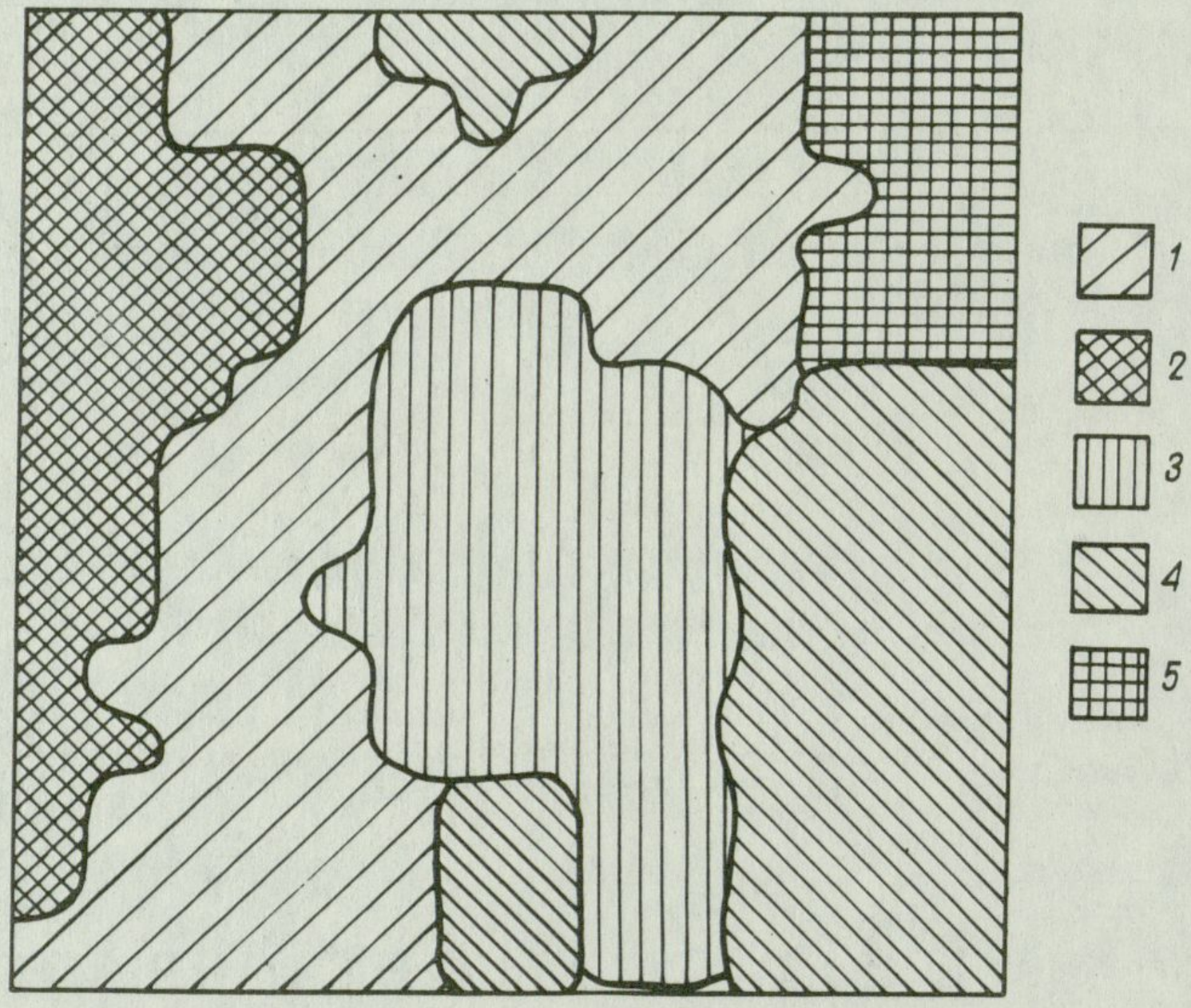
NUMBERS OF SMALL RODENTS IN FIVE PLANT ASSOCIATIONS

Five plant associations were identified on a 4 hectare study area. Three rodent species: *Clethrionomys glareolus* (Schreb.), *Apodemus agrarius* (Pall.), and *Apodemus flavicollis* (Melch.) have been trapped with the use of CMR techniques. The distribution of captures of resident and ephemeral individuals in individual associations and its changes under different density of animals were analyzed.

Studies were carried out in the Kampinos Forest in forests adjacent to the Field Station, Institute of Ecology at Dziekanów Leśny near Warsaw. On the four hectare area there were identified five plant associations: 1) *Salici-Franguletum* and *Carici elongatae–Alnetum*, 2) *Tilio-Carpinetum*, 3) *Pino-Quercetum I*, 4) *Pino-Quercetum II*, 5) *Vaccinio myrtilli-Pinetum molinietosum* (Traczyk H., Traczyk T. 1965) (Fig. 1). On Figures 2 and 3, and Table II plant associations are denoted with the above given numbers. The greatest portion of the area was taken by the first association (34%), the smallest one – by the fifth association (7%). Study area is characterized by a high level of ground waters. In *Salici-Franguletum* the ground water occurs on the surface during almost 9 months of a year. In places depressed and seriously flooded there is developed the association *Carici elongatae-Alnetum*. In *Tilio-Carpinetum* the soil is characterized by an obvious ascension of water upwardly during

periods of its abundance. *Pino-Quercetum* is characterized with at lowest situated ground water table, when compared with all other associations of the area (Traczyk H., Traczyk T. 1965).



, Fig. 1. Distribution of habitats within the study area

1 – Salici-Franguletum and *Carici elongatae-Alnetum 2 – Tilio-Carpinetum, 3 – Pino-Quercetum I, 4 – Pino-Quercetum II, 5 – Vaccinio myrtilli-Pinetum molinietosum*

Captures on the discussed area have been carried out since 1956 until 1962. Three rodent species were represented most numerously: *Clethrionomys glareolus* (Schreb.), *Apodemus agrarius* (Pall.), and *A. flavicollis* (Melch.). CMR (capture-marking-release) techniques was used, animals have been captured in wooden live traps once a week, oat being used as a bait.

Materials coming from three years: 1959, 1960, and 1961 were taken for analysis. Table I presents numbers of species captures during individual years. The 1959 was characterized by the high number of all three rodent species, *A. agrarius* occurring in masses. In 1960 there occurred a heavy decline in numbers of all three species, especially that of *A. agrarius*. *C. glareolus* occurred relatively most numerously. In 1961 the proportion of *A. agrarius* and *A. flavicollis* captures in relation to *C. glareolus* has been still declined, although they were quantitatively a little bit more numerous than during the previous year. The number of *C. glareolus* captures attained its highest level for the three years.

The distribution of captures of the species in individual plant communities, its changes under different density of animals during different seasons of year

Number of captures according to species during the years of study

Tab. I

Species	Years					
	resident			ephemeral		
	1959	1960	1961	1959	1960	1961
C. glareolus	1,312	788	1,514	151	129	196
A. agrarius	2,367	230	262	283	71	48
A. flavicollis	711	226	309	154	71	71

and with various dynamics of numbers during the mentioned three years have been analyzed. The number of *C. glareolus* captures during all years was the highest in *Tilio-Carpinetum* and the lowest in *Vaccinio myrtilli-Pinetum molinietosum* (Fig. 2). For *Apodemus agrarius* the highest number of captures occurred in *Salici-Franguletum* and *Vaccinio myrtilli-Pinetum molinietosum*, while the lowest one – in *Tilio-Carpinetum*. In the case of *A. flavicollis* no greater differences in the number of captures in individual habitats were recorded but the number fluctuated in various years.

The number of captures per catching point of habitat had for *C. glareolus* and *A. agrarius* in 1959 and 1960 an obviously reversed direction – the number of *C. glareolus* captures decreased, while the number of *A. agrarius* captures increased from the second to fifth habitat (Fig. 2). The first habitat, *Salici-Franguletum* and *Carici elongatae-Alnetum* is characterized by a high level of numbers for these two species. Differences in the number of captures in individual habitats are statistically significant for *C. glareolus* in 1959 and 1960 between the second habitat and each of remaining ones and between the first habitat and the fourth and fifth one. In 1961 the difference was statistically significant only between the second and fifth habitat.

For *A. agrarius* in 1959 and 1960 the difference between the second habitat and the first and fifth one is statistically significant, while in 1961 – between the fifth and third and between the first and second habitat.

In the case of *A. flavicollis* in 1959 differences in the number of captures in habitats are statistically unsignificant. In 1960 the difference between the first and third habitat was statistically significant, while in 1961 – between the fifth one and the second and third.

For the given area one can accept that during years of low numbers of definite species animals are being trapped in all habitats with some prevalence, however, for habitats optimal for some reasons (in the case of *A. agrarius* – the first community – *Salici-Franguletum* and the fifth one – *Vaccinio myrtilli-Pinetum molinietosum*, while in the case of *C. glareolus* – the second com-

munity – *Tilio-Carpinetum*). Along with the increase in density there increases the number of captures in all habitats, but the direction of the course of differences between habitats is maintained.

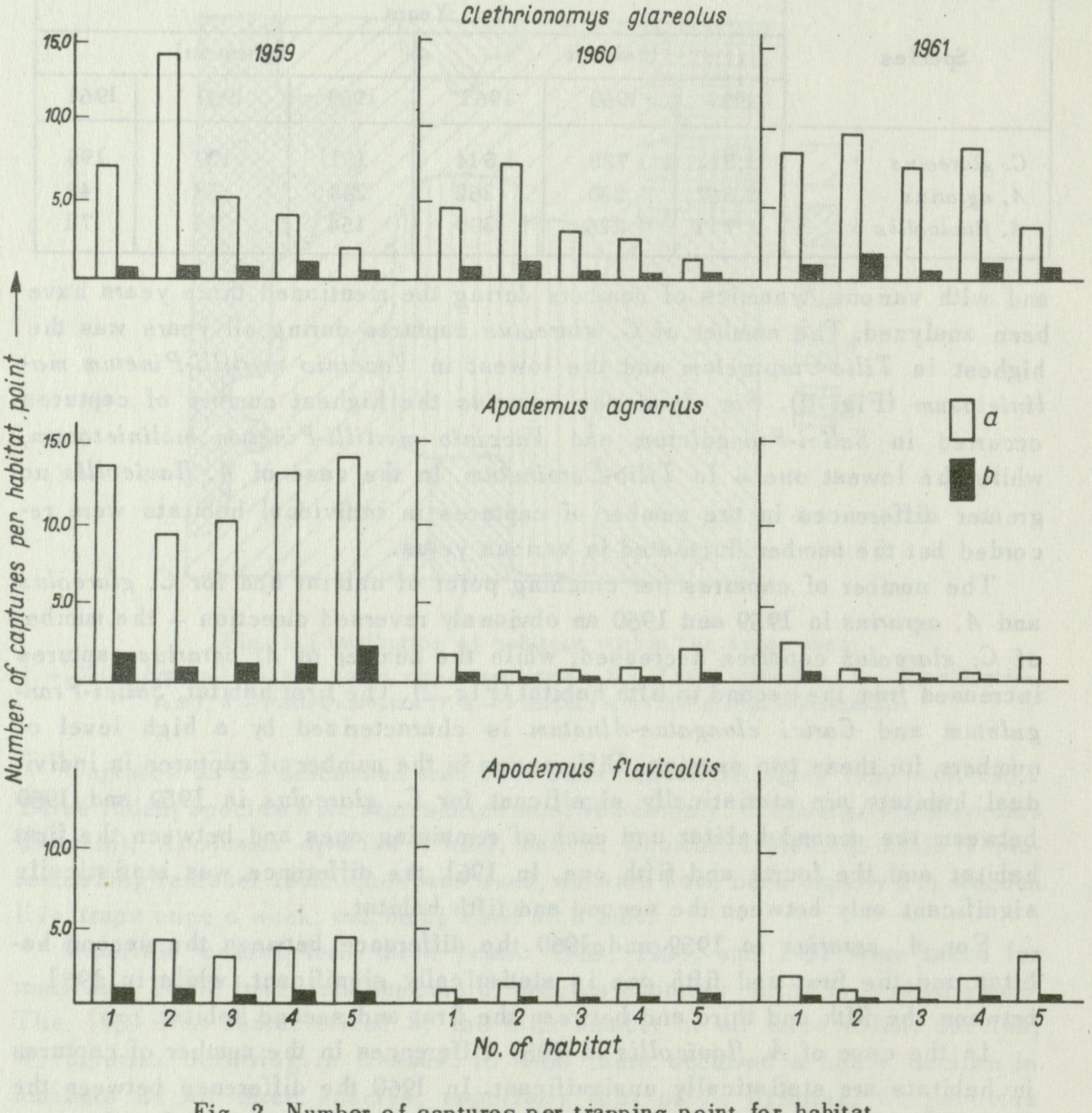


Fig. 2. Number of captures per trapping point for habitat
a – resident, *b* – ephemeral; *1, 2, 3, 4, 5* – see Fig. 1

The number of captures of ephemeral individuals, i.e. those trapped only once, per trapping point in a habitat has by far more uniform pattern in individual communities, almost independent from the number of resident individuals (Fig. 2).

Fig. 3. Seasonal change in numbers of captures of resident animals (per trapping point in habitat)

a – C. glareolus, b – A. agrarius, c – A. flavicollis; *1, 2, 3, 4, 5* – see Fig. 1

On the Figure 3 there is presented the course of changes in numbers of captures per trapping point for individual habitats and species with year divided into quarters according to seasons: *I*st quarter – December, January, February, *II*nd quarter – March, April, May, *III*rd quarter – June, July, August, and the *IV*th quarter – September, October, November.

C. glareolus only in *Tilio-Carpinetum* attains more or less similar level during subsequent years. In *Salici-Franguletum* fluctuations are higher, while in *Pino-Quercetum I* the number of the species captures increases along with the increase in numbers. In *Pino-Quercetum II* following to the two years long period of a low number the level of *C. glareolus* captures is increased in 1961. In *Vaccinio myrtilli-Pinetum molinietosum* after a very high number during the second quarter of 1959 the number of *C. glareolus* rapidly declines and maintains itself at a very low level with a slight increase during the autumn of 1961, when the general number of this species is increased on the whole area.

A. agrarius following to 1959, when it dominates in numbers in all habitats, during following years in all ones is maintained at a low level. The number of *A. flavicollis* captures is rather low in all habitats, except of 1959.

Number of resident in definite habitat

Tab. II

No. of habitat		*C. glareolus*					*A. agrarius*					*A. flavicollis*				
		1	*2*	*3*	*4*	*5*	*1*	*2*	*3*	*4*	*5*	*1*	*2*	*3*	*4*	*5*
Resident per point during a year	Year															
	1959	0.8	1.7	0.5	0.6	0.07	1.5	0.8	1.0	1.5	2.2	0.6	0.6	0.4	0.5	0.8
	1960	0.7	0.8	0.3	0.4	0.3	0.3	0.03	0.05	0.06	0.3	0.1	0.2	0.4	0.4	0.2
	1961	0.9	1.7	0.5	0.9	0.6	0.5	0.2	0.02	0.2	0.3	0.3	0.1	0.1	0.3	0.6

During years with a low abundance of *A. agrarius* in all habitats there are rather few captures of resident individuals and it would seem that environmental preferences are poorly marked. Since, however, the size of an area and the more that of individual habitats permits each individual to be captured within a short time on opposite ends of the area, the sole number of captures in habitat provides too weak evaluation of the number of animals resident to it. There were attempts to identify resident animals in a definite habitat while accepting that if 75% of captures of a definite individual occurs in given habitat, it is resident to it. The identification of animals resident to given habitat makes it possible to avoid partially in the estimation of the number of captures for peripheral habitats errors related to edge effect (Pelikan, Zejda, Holišova 1964, Chełkowska, Ryszkowski 1966, 1967). Rather sharp

criterion for residence curtailed the material, but enabled a clear comparison of the number of animals resident to individual habitats. Table II illustrates the number of resident animals converted per trapping point for a habitat for individual species and years. The data reveal that differences in habitat preferences are quite distinct also during periods with low numbers of animals. For *A. agrarius* during 1960 and 1961 – 81 and 70% of all identified animals are resident to *Salici-Franguletum* and *Carici elongatae-Alnetum* and to *Vaccinio myrtilli-Pinetum molinietosum*. It was also in these habitats where 77% of *A. agrarius* individuals trapped were identified as juvenile.

It may be assumed that habitats for some reasons optimal for a species provide it with basis during years with low numbers from which it spreads to other habitats along with the increase in numbers.

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LICZEBNOŚĆ DROBNYCH GRYZONI W PIĘCIU ZBIOROWISKACH ROŚLINNYCH

Streszczenie

Na powierzchni 4-hektarowej wyróżniono pięć zbiorowisk fitosocjologicznych: 1. Ols i łozowisko (*Salici-Franguletum* i *Carici elongate-Alnetum*), 2. Grąd niski (*Tilio-Carpinetum*), 3. Bór mieszany niski (*Pino-Quercetum I*), 4. Bór mieszany (*Pino-Quercetum II*), 5. Bór wilgotny (*Vaccinio myrtilli-Pinetum molinietosum*).

Łowiono metodą CMR trzy gatunki gryzoni: *Clethrionomys glareolus* (Schreb.), *Apodemus agrarius* (Pall.), *Apodemus flavicollis* (Melch.).

Na podstawie materiałów z trzech lat zanalizowano rozmieszczenie złowień osobników osiadłych i efemerycznych, czyli złowionych tylko jeden raz w poszczególnych zbiorowiskach i zmiany tego rozmieszczenia przy różnym zagęszczeniu zwierząt.

Liczba złowień osiadłych *C. glareolus* we wszystkich trzech latach jest największa w grądzie niskim a najmniejsza w borze wilgotnym. Liczba złowień osiadłych *A. agrarius* największa jest w olsie i borze wilgotnym. W przypadku *A. flavicollis* istotnych różnic nie udało się zauważyć.

Złowienia osobników efemerycznych układają się o wiele bardziej równomiernie w poszczególnych środowiskach.

Wyróżnienie osobników osiadłych w konkretnych środowiskach wykazało wyraźne różnice w preferencji środowiskowej także w latach o bardzo niskiej liczebności *A. agrarius*. W olsie i borze wilgotnym razem złowiono 81 i 70% osobników wyróżnionych jako osiadłe i 77% osobników młodych i bardzo młodych.

Można przypuszczać, że te właśnie środowiska (ols z łozowiskiem i bór wilgotny) z jakichś względów optymalne dla *A. agrarius*, stanowią dla tego gatunku bazę, w której osiedla się, rozmnaża i skąd rozprzestrzenia się na inne środowiska wraz ze wzrostem liczebności.

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