THE INFLUENCE OF PREDATORS ON THE FORMING OF SPECIES DIVERSITY OF ZOOPLEUSTON OF SOME WATER ECOSYSTEMS OF THE ŁĘCZNA-WŁODAWA LAKELAND

Wojciech Pińka

Katedra Hydrobiologii i Ichtiobiologii
Akademia Rolnicza, ul. Akademicka 13, 20-950 Lublin

Summary. The studies were conducted within two lakes and two subsided ponds situated in the Łęcza-Włodawa Lake District. In the studied water bodies 73 zooplanktonic taxa were found to occur, the highest number of taxa - 44 occurred in Lake Uściewierz, the lowest one - 24 - in the depression reservoir Szczecin. The highest values of frequency (35-40%) were found in Lake Uściewierz and the depression reservoir Nadrybie, the lowest one - from 10% to 19% - occurred in Lake Piaseczno and the depression reservoir Szczecin. The obtained results showed that within water bodies with escalating pressure of predators the species diversity of zoopleuston was also high.

Key words: shallow littoral, zoopleuston, richness of species, predation

INTRODUCTION

Zoopleuston is one of the specific ecological assemblages occurring in shallow littoral associated with the water surface. This assemblage is typical of small water bodies and a well developed shallow lake littoral. The development of littoral zone as well as pressure from predators influence the species structure of zoopleuston [Oscarson 1987]. The aim of this paper was to estimate the influence of the pressure of predators on species diversity of zoopleuston.

STUDY AREA, MATERIAL AND METHODS

The studies were conducted within two lakes and two depression reservoirs situated in the Łęcza-Włodawa Lake District. They were as follows: mesotrophic Lake Piaseczno, slightly eutrophic Lake Uściwierz and two eutrophic depression reservoirs Szczecin and Nadrybie [Radwan et al. 1997, Radwan and Kornijów 1998]. The studies were conducted in the years 2000-2002 from April to November. The samples were taken in shallow littoral from the depth of 0.1 m to 0.5 m and from the area of 0.25 m² with the use of metal frame. The following planktonic organisms were picked from samples: aquatic insects representing 4 orders: Diptera, Coleoptera, Heteroptera, Collembola as well as predators like dragonfly larvae and fish. The pressure of predators was estimated on the basis of numbers and frequency of dragonfly larvae and fish in pleustonic samples.
**Fig. 1.** Number of taxa of zooplankton in examined lakes and depression reservoirs of the Łęczna-Włodawa Lake District (years 2000-2002)

**Rys. 1.** Liczba taksonów zooplanktonu w badanych jeziorach i zbiornikach zapadliskowych Pojezierza Łęczyńsko-Włodawskiego (lata 2000-2002)

**Fig. 2.** Frequency of predators (Odonata and Fishes) in zooplanktonic complexes in examined lakes and depression reservoirs of the Łęczna-Włodawa Lake District (years 2000-2002)

**Rys. 2.** Częstość występowania drapieżników (Odonata i Fishes) w próbach zooplanktonu w badanych jeziorach i zbiornikach zapadliskowych Pojezierza Łęczyńsko-Włodawskiego (lata 2000-2002)
RESULTS

In the studied water bodies of the Łęczna-Włodawa Lake District 73 zoopleustonic taxa were found to occur. They belonged to the following orders of aquatic insects: water bugs (Heteroptera aquatica) – 30 species, aquatic beetles (Coleoptera aquatica) – 48 species, springtails (Collembola) – 2 species, and dipterans (Diptera) – 3 species. The highest number of taxa - 44 – occurred in Lake Uściwierz, the lowest one - 24 – in the depression reservoir Szczecin (Fig. 1).

In the examined lakes and in the depression reservoir Nadrybie the highest numbers of species were found among two orders Coleoptera and Heteroptera – from 15 to 25 species. The smallest number – three species only – belonged to Diptera and only two represented Collembola. However, in the depression reservoir Szczecin the species composition of zoopleuston was as follows: 17 species belonged to Heteroptera, 4 – to Coleoptera, two species – to Diptera and only one species to Collembola order (Fig. 1).

In the water bodies of the Łęczna-Włodawa Lake District a clear influence of predators on species richness of zoopleuston was observed. Frequency of predators was clearly diversified. The highest values of 35-40% were found in Lake Uściwierz and the depression reservoir Nadrybie. Considerably lower values of frequency (from 10% to 19%) occurred in Lake Piaseczno and the depression reservoir Szczecin (Fig. 2). The number of predators was <1 ind. per m² and it showed no higher diversity between the examined water bodies.

The obtained results showed that in the water bodies of the Łęczna-Włodawa Lake District with high pressure of predators the species diversity of zoopleuston was also high.

DISCUSSION

In foreign literature there is much information about the influence of predators upon zoopleuston [Chenriksen and Oscarson 1971, Blois-Heulin et al. 1990, Johnson D. M., 1991, Pierce and Hinrichs 1997]. They showed that fish preferably eat pleuston insects belonging to Nepomorpha, particularly their larval form. Species structure of aquatic Heteroptera can be changed due to the pressure of fish [Oscarson 1987]. A similar influence of predators on the species structure of zoopleuston was also found in Lake Uściwierz and the depression reservoir Nadrybie, in which the larvae of Corixinae and Notonectinae families occurred in small numbers. Probably, they were eaten up intensively by fish.

CONCLUSIONS

On the basis of the obtained results it can be concluded that in the studied water bodies a clear influence of predators on the species structure of zoopleuston was found. The highest diversity of zoopleuston occurred in water bodies with a higher pressure of predators – in Lake Uściwierz and the depression reservoir Nadrybie.
REFERENCES


Wpływ drapieżników na kształtowanie się różnorodności gatunkowej zoopleustonu wybranych zbiorników wodnych pojezierza łęczyńsko-włodawskiego

Streszczenie: Badania prowadzono w latach 2000-2002 w dwóch jeziorach i dwóch zbiornikach zapadliskowych położonych na Pojezierzu Łęczyńsko-Włodawskim. W badanych zbiornikach wodnych stwierdzono występowanie 73 taksonów zoopleustonu, największa w jeziorze Uściwierz - 44 taksony, najmniejsza w zbiorniku zapadliskowym Szczecin - 24 taksony. Najwyższa frekwencja drapieżników, wynosząca od 35 do 40% występowała w jeziorze Uściwierz oraz w zbiorniku zapadliskowym Nadąbly, najniższa, od 10 do 19%, w jeziorze Piaseczno i zbiorniku zapadliskowym Szczecin. Uzyskane wyniki badań wskazują, że w zbiornikach wodnych poddanych analizującej się presji drapieżników występowała również wysoka różnorodność gatunkowa zoopleustonu.

Słowa kluczowe: płytki litoral, zoopleuston, różnorodność gatunkowa, drapieżnictwo