Relationships Between Bacterioplankton, Zooplankton and Environmental Factors in Fertilized and Non-fertilized Carp Fishponds

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Abstract: The shifts in bacterioplankton number, biomass and size structure were investigated in two ponds with carp polyculture, manured with organic fertilizer, and two non-fertilized ones. Relationships between bacterioplankton, zooplankton and environmental factors, explained in “microbial food web” and the “trophic cascade” conceptions, were studied. Bacterioplankton abundance distribution in four size groups of freeliving and one group of attached on detritus particles bacterial cells was established with clear prevalence of the smallest size group, 0.25-0.4 μm. The applied statistical analyses showed relationships between abundances of bacterial size groups, on one hand, and cladocerans biomass, the number of Moina sp. and two environmental factors, pH and temperature, on the other.

Key words: bacterioplankton size structure, microbial food web, trophic cascade, organic fertilizer.

Introduction

Bacterioplankton is the most abundant community in the pelagial. However, its significance in trophic interactions has been underestimated. For a long time the aquatic bacteria have been considered only decomposers of the dead organic matter. After a series of investigations (AZAM et al. 1983, PORTER et al. 1988, SHERR, SHERR 2007), a new conception about the trophic relations and the role of the microbial communities in the processes of energy transfer and nutrient recycling has been suggested. According to that hypothesis, the microbial food web presents an additional food chain, named “microbial loop”, situated between the elements of the classical grazer food chain phytoplankton – zooplankton. It consists of heterotrophic bacteria, autotrophic picoplankton, heterotrophic nanoflagellates (HNF), ciliates, microzooplankton (rotifers) and mesozooplankton (cladocerans and copepods). The main food source in this web is dissolved organic carbon (DOC), mainly produced by phytoplankton, therefore, phytoplankton is included as a part of the microbial food web. As a result of investigations in lakes of different trophic state, it has been found that the importance of the microbial food web decreases in favour of the classical food chain when the trophy and pH are increasing (ŠTRAŠKRABOVÁ et al. 1999). According to

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