Short Communications

ZOOPLANKTON OF SMALL PONDS IN INTEGRATED FISH AND DUCK PRODUCTION IN BIÉ PROVINCE, ANGOLA

KALOUS L., KURFÜRST J., PETRTÝL M., HOLÍKOVÁ P., TREFIL P.

Abstract

We studied the zooplankton community structure in a set of 2 small shallow ponds in integrated fish and duck production system in Bié province, Angola. The objective was to evaluate quality of natural food resources for farmed fish. We present the results in the percentage of the occurrence of respective groups or species. Dominant component of the zooplankton was small cladoceran Moina macrocopa that represents 95% resp. 93% of all sampled specimens. Other identified species of cladocerans were Ceriodaphnia setosa and Chydorus sphaericus. Rotifers were represented by species Brachionus falcatus and Asplanchna priodonta. Copepods were not classified.

Key words: zooplankton, ponds, integrated, production, *Tilapia rendalli*, *Moina macrocopa*, Angola

INTRODUCTION

The plankton community is composed of phytoplankton (primary producers) and zooplankton (secondary producers). The phytoplankton presents biological wealth of the water body and form the base of food chain in ponds (Pokorný et al., 2005). Zooplankton is a principal component of food for omnivorous fish that are usually farmed in extensive aquaculture (Brummett, Noble, 1995). Primary production in such systems ensures through secondary production the growth of fish. The abundance and composition of the zooplankton depends on actual state of the water body and is linked to other limnological characteristics (Devetter. Seďa, 2000). Anyhow the knowledge of composition and abundance is important characteristic that should be taken in account in calculation regarding fertilizing, stocking density and in general pond management. The zooplankton is commonly divided to following groups Rotifers (Rotatoria), Cladocerans (Cladocera) and Copepods (Copepoda). Composition of zooplankton is in close relation to farmed fish and the presence of suitable zooplankton species is essential for successful farming.

The presented study is focused on composition of zooplankton and its evaluation for its suitability as food source for Tilapia monoculture within integrated fish and duck production system in Bié province, Angola.

MATERIALS AND METHODS

Study site

The locality is situated in the province Bié in central Angolan plateau in the altitude of 1 586 m.a.s.l. GPS: S 12°36.289' E 17°04.139'. Ponds are 8 m wide and 12 m long with the average depth of 1.5 m. The plankton was collected in two ponds. In each pond are kept 15 ducks that are housed in the closed vicinity of ponds and to which they have permanent access. Due to very low concentration of nutrition in the waters of Bié Province ponds are fertilized regularly once per week with fermented organic material with quantity of approx. 1.5 kg per pond. Each pond is stocked by fish in density of approx. 30 specimens of local Redbreast tilapia (*Tilapia rendalli*) of individual weight from 5 to 50 g.

Sampling

Samples were collected once in May and once in October 2007 from each pond by plankton net (mesh size 0.21 mm) according to Hrbáček et al. (1972). Qualitative samples were obtained by 5 hauls of plankton net across each pond. Concentrated plankton were fixed in 70% ethanol and transported to laboratory and stored in the fridge for at least 4 months in temperature of 5°C.

Analyses

Identification was realised by usage of Sedgewick Rafter Counting Cell Slide with binocular microscope Olympus BX41 with 60 X–200 X magnification. Identification is based on following works: Šrámek-Hušek (1953), Bartoš (1959), Šrámek-Hušek et al. (1962), Dussart et al. (1984), Dumont (1994), Kořínek (2005), Přikril (2006).

RESULTS AND DISCUSSION

In both samples of zooplankton from May and from October 2007 dominate small cladoceran *Moina macrocopa* representing 95% and 93% of all zooplan-

kton specimens, respectively. This species lives usually in small warm water bodies also in periodical waters with variable water level (puddles and small pools). Reproduction of *M. macrocopa* is polycyclic and it is usually found in high abundance. Within cladocerans can be *M. macropoda* considered as small species growing up to 1.4 mm. Geographical distribution of *M. macrocopa* is concentrated to tropics and subtropics (Smirnov, 1976; Petrusek, Černý, 2000).

M. macrocopa is also utilized in fish farming for feeding of fish and its aquacultural production is also known (Tamaru et al., 2001).

In both samples together with dominant *M. macrocopa* we found also small proportion of two other cladocerans *Ceriodaphnia setosa* and *Chydorus sphaericus*. Both of these species have no significant effect of fish food structure of zooplankton.

Rotifers (*Rotatoria*) were represented by species *Brachionus falcatus* and *Asplanchna priodonta*. Representatives of the genus *Brachionus* have pan-global distribution and presented determined species *B. falcatus* occurs mainly in eutrophic water bodies (Bartoš, 1959). Genus *Asplanchna* can be also classified as cosmopolitan with wide area of distribution. *A. priodonta* is predatory rotifer that is able to rich size of 1.5 mm. The abundance of this species increased in October up to 5% of all specimens of zooplankton.

Copepods (*Cyclopidae*) were recorded in marginal number and only in copepodite stage in May, however, their increased abundances and females with eggs were recorded In October. No nauplii occurred in both samples. Copepods were represented by families *Cyclopidae* and *Diaptomidae* with very low abundance with no significant effect of fish food structure of zooplankton.

Larval stage of chironomids (*Chironomidae, Diptera*) was found in the sample from October. Although chironomids are typical representative of zoobenthos that is an important source of natural fish food (Pokorný *et al.,* 2005) their first developmental stages called larvulae have a dispersal role and usually swim in water column for a few days after hatching (Armitage at al., 1995).

The crucial role as a source of food for zooplankton in two ponds of integrated fish and duck production was recognised by chlorococcal algae *Scenedesmus quadricauda*, which can be considered as important food despite spines on its body. Grazing deterrent depends on the relative size of the grazer and algae (Bergquist et al., 1985).

Main component of fish food is small cladoceran *Moina macrocopa* that significantly dominate of whole plankton community. Besides low species diversity we considered present composition of zooplankton suitable for farming of Redbreast tilapia.

Tab. 1: Species diversity of zooplankton – May 2007

Group	Species	Relative abundance (%)	Notes
Cladocera	*Moina macrocopa*	95	
	Ceriodaphnia setosa	2	
	Chydorus sphaericus	<1	
Rotatoria	*Asplanchna priodonta*	1	
	Brachionus falcatus	2	
Copepoda	*Cyclopidae sp.*	<1	Copepodite stages

Phytoplankton was mainly represented by chlorococcal algae *Scenedesmus quadricauda* and cyanobacterium *Gomphosphaeria noegeliana*.

Tab. 2: Species diversity of zooplankton – October 2007

Group	Species	Relative abundance (%)	Notes
Cladocera	*Moina macrocopa*	93	
Rotatoria	*Asplanchna priodonta*	5	
	Brachionus falcatus	1	
Copepoda	*Cyclopidae sp.*	1	Copepodite stages and females with eggs
Insect	*Chironomidae*	<1	Larval stages

Phytoplankton was mainly represented by cyanobacterium *Microcystis sp.*

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Corresponding author:

Ing. Lukáš Kalous, Ph.D.
Department of Zoology and Fisheries, Faculty of Agrobiology,
Food and Natural Resources,
Czech University of Life Sciences Prague,
165 21 Praha 6 – Suchdol, Czech Republic
e-mail: kalous@af.czu.cz