ABSTRACT: Periphyton colonisation on artificial substrate (microscopic glass slides) was investigated from July to November 2007, in Lake Sakadaš (Danube River floodplain Kopacki rit, Croatia). Two different stations were chosen due to different post-flood conditions. The aim of the study was to follow temporal changes of nematode community composition and trophic structure in relation to periphyton biomass and bacterial abundance. In bryozoan-dominated periphyton (*Plumatella emarginata* Allman, 1844) nematodes were represented by 86 and 87% of total associated invertebrate fauna at S1 and S2 respectively. Total nematode abundance (up to 600 ind. 10 cm⁻² at one station and up to 1130 ind. 10 cm⁻² at another station) correlated significantly with the abundance (measured as CFUs – colony forming units) of copiotrophic and oligotrophic bacteria at one station (*r* = 0.963, 0.998, *P* < 0.05) and with organic and inorganic content of periphyton at another station (*r* = 0.891, 0.899, *P* < 0.05). Nematode trophic groups (epistrate feeders, chewers, detritus feeders and suction feeders) were equally developed at both stations except detritus feeders whose species richness and abundance were significantly higher at the S1. Epistrate feeders were the most abundant trophic group in nematode assemblages at both stations with *Chromadorina bioculata* being the dominant species. Change in dominance of epistrate feeders by chewers (*Brevibritulus stefanskii*) and suction feeders (*Crocodyrilaimus* sp.) coincided with the occurrence of flood pulse. Effect of flood pulse on nematode community structure was probably indirect, altering concentration of dissolved oxygen which chromadorids are sensitive to. The structure of nematode community developed through time differs between investigated stations indicating high sensitivity to bacterial abundance, periphyton biomass and *P. emarginata* mats which made the habitat more diverse and patchy.

KEY WORDS: periphyton, community dynamics, nematode functional structure, Lake Sakadaš, Danube River floodplain

1. INTRODUCTION

Periphyton is a complex community of microbiota (bacteria, algae, fungi, animals), and detritus that is attached to submerged substrates (*Azim et al.* 2005). This biocenotic unit develops on natural and artificial substrates in lotic and lentic ecosystems where its nature depends on light, nutrients, substrate type, water flow, predation and grazing (*Muelemans 1988*, *Van Dijk 1993*, *Hillebrand and Kahler 2001*, *Wetzel 2005*, *Peters et al. 2007*). Microorganisms in periphyton are in strong metabolic interdependence. Intense metabolic activity is based on the recycling of nutrients while produced...
organic matter is mostly respired by adjoining bacteria and protists (Wetzel 2005). Periphyton is also important carbon source for higher trophic levels in floodplain systems (Forsberg et al. 1993, Lewis et al. 2001).

The role of freshwater nematodes in periphyton nutrient cycling as primary and secondary consumers is unclear, although they are usually an abundant group of periphytic invertebrate fauna. At the same time, the evidence exists that freshwater nematodes could be regulated by nutrient competition (Michiels and Traunspurger 2005), and in that way represent a potential dead end in the food chain (Kuipers et al. 1981, Michiels et al. 2003). Nevertheless, there are scarce findings on the temporal development of free-living freshwater nematodes in periphyton, its species and trophic composition in parallel with the occurrence of other periphytic invertebrates, algal biomass, organic and inorganic content and bacterial abundance. The temporal change in relative abundance of trophic groups of nematodes could make possible the insight into the role of these organisms in periphyton nutrient cycling (Traunspurger 1997).

Despite the fact that periphyton community development was investigated in lotic and lentic ecosystems due to various abiotic and biotic factors, there is no information about the influence of the flood pulses on the periphytic nematode community structure, although it is well known that flood pulses are the driving force of the river – floodplain systems (Junk et al. 1989). Pereira et al. (2007) concluded that hydrological regime was the dominant factor for the abundance of periphytic meiofauna including nematodes.

The purpose of this investigation was to provide the data on temporal change in nematode community in relation to the change in periphyton biomass, and abundance of bacteria. Hence we examined nematode abundance, species richness and trophic composition. Particular interest was addressed to the flood pulse and its potential impact on the nematode community.

2. STUDY AREA

This study was carried out in Lake Sakadaš, the deepest water depression in the Kopački Rit floodplain. Lake Sakadaš is an open water system and exchanges water with Conakut Channel in the east, Novi Channel in the south and through the dam in the west (Fig. 1).

Fig. 1. Map of Lake Sakadaš with two sampling stations, S1 and S2. Grey shade areas represent shrubs of white willow (Salix alba L.) and common reed (Phragmites communis Trin.).
Floods enter the lake through Čonakut Channel. Kopački Rit is situated in the North-East part of Croatia in an angle between the River Drava and the Danube. During the investigation six floods occurred of different intensity at 9 to 14 days before sampling. Largest flood occurred in September prior to which the floodplain was isolated for 17 days (Fig. 3).

Present investigations were conducted at two stations, S1 and S2 (Fig. 1). These two stations are under the similar conditions during the flood but under different loading of draining water after flood. Temporary draining channel forms only at station S1 but not at S2. Draining from terrestrial zone lasted for at least two weeks after the main part of the flooding water was drawn back to the Lake Sakadaš.

We presumed that periphyton could differ between the stations in biomass and nematode community composition because draining water is rich in nitrate which is limiting nutrient in the Kopački Rit floodplain (Peršić et al. 2009). So draining water could be source of limiting nutrient which could locally (S1) stimulate primary production, i.e. periphyton development.

During investigation different groups of invertebrates occurred in periphyton. Beside nematodes which were most numerous group, oligochaetes, chironomid larvae, insect larvae (beside chironomids), chironomid pupae, cladocerans, copepods, ostracods, turbellarians and bryozoans (Plumatella emarginata Allman, 1844) were developed. P. emarginata colonies were already present in July and the thickness of their mat increased towards October with much denser coverage at S1 which provided here three – dimensional habitat for nematode assemblages.

3. MATERIAL AND METHODS

3.1. Sample collection

Colonization of periphyton on artificial substrate was investigated from July to November 2007 at two stations (S1 and S2). The stations were located in the vicinity, ca 10 m from the lake shore (Fig.1).

We decided to use microscopic glass slides (37.5 cm²) as an artificial substrate. Prior to submergence slides were washed in detergent and soaked in 1 M HCl overnight.
They were positioned vertically within the water column at the fixed depth of 25 cm in modified plastic slide-boxes. To compensate the constant change of the water level, appropriate slide-holder was constructed (Palijan 2010). The slides were exposed in water for one month (June 2007) prior to the first sampling (July 2007). Ten slides (three subsamples/pseudo-replicates for each determination) were collected per station/date, on monthly basis. Three slides for fauna analyses were fixed in the field with the 4% solution of formaldehyde. The following three slides were taken for chlorophyll determinations and the last three for determination of biomass (ash and ash free weight). The slides for determination of periphyton biomass were transported to the laboratory in lake water. One slide was taken for the bacteriological analyses. All slides were transported to the laboratory in separate containers and processed immediately after arrival.

3.2. Environmental variables

For determination of water properties one sample was collected per station/date with weighted stoppered bottle, ca 10 cm beneath the water surface. Concentration of dissolved oxygen, pH, electrical conductivity and water temperature were determined in situ with portable multimeter (Multi 340i/SET, WTW, Weilheim, Germany) as well as depth and transparency (Secchi disc depth) were measured. Water samples were collected in the vicinity of the slide-boxes for laboratory measurement of ammonia, nitrites, nitrates, total nitrogen, total phosphorus, total suspended solids (APHA 1985) and chlorophyll a concentrations (Strickland and Parsons 1968). Determination of periphyton chlorophyll concentrations, ash weight and ash free weight were conducted according to Strickland and Parsons (1968) and APHA (1999) after the slides were scraped off by a razor blade. Periphyton biomass was expressed per 10 cm². The heterotrophic nature of periphyton communities was described by calculating autotrophic index (AI), i.e. ratio of ash free weight and chlorophyll a concentration (APHA 1999).

3.3. Abundance of periphytic bacteria

Bacterial abundance in the samples was estimated by determination of colony forming units (CFUs). Slides were collected in glass bottles with sterile physiological solution, transported to the laboratory in a cooler and processed within 6 hours after collection. Periphyton was scraped off the slides by sterile razor blade, thoroughly mixed and further processed as suspension. Abundance of CFUs was determined by cultivation of 1 mL of suspension on two agar media with different carbon content to develop colonies of copiotrophic and oligotrophic bacteria. These two groups of heterotrophs have different controlling mechanisms, as it was found also in the Kopački Rit floodplain (Palijan and Fuks 2006, Palijan et al. 2007, 2008). Copiotrophs were cultivated on MPA plates and...
oligotrophs on MPA:10 poured in triplicate (Gorbensko 1961, Margolina 1989). The developed colonies were counted after three days (copiotrophs) and three weeks (oligotrophs) of incubation at 25°C and expressed as number of CFUs per 10 cm².

3.4. Nematode numbers and composition

For nematode analyses each glass slide was scraped off with razor blade on 24 μm mesh sieve and rinsed with tap water. Material which retained on the sieve was collected into glass bottle and fixed with 4% solution of formaldehide with Rose bengal addition. From scraped periphyton material of each slide all nematodes were counted and for taxonomic purpose 100 individuals were picked out randomly and processed according to Seinhorst (1959). Nematodes were determined to genera or species level under microscope (1000 × magnification, oil immersion, Carl Zeiss, Jena). Abundance of nematodes was expressed as number of individuals per 10 cm². Age structure of nematodes was determined for most abundant species, while the feeding-type classification of freshwater nematodes was adopted after Traunspurger (1997).

3.5. Statistical analyses

Because of the small sample size, reliable testing of normality could not be conducted, therefore all environmental variables except pH were log₁₀ transformed to fulfill the terms of parametrical statistical analysis. Nematode species that occurred only once in the sample were not removed from the analysis due to the low sampling effort. All statistical analyses were conducted using mean values for three collected slides (pseudoreplicates). So for each of measured variables we had only one (mean) value per station/date. Univariate statistical tests were conducted with Statistica v. 7.1 (StatSoft, Tulsa), while all tests were considered significant if $P < 0.05$.

Correlation analysis and t-test were conducted with month samples as replicates. The t-test was used to test the differences between stations in environmental variables and fauna abundance data (Zar 1999). For that purpose species data were log₁₀ (x+1) transformed. Correlation analysis was conducted by calculating Pearson coefficient between abundance of nematodes, biomass data and established number of CFUs.

To test for the differences in the nematode community structure between months we calculated global p-value by two-way analysis of similarities test with no replication (ANOSIM2), using Spearman rank correlation method and Bray-Curtis similarity measure (PRIMER v. 5.2.9., Clarke and Warwick 2001). Multivariate analyses of species data were conducted with untransformed data matrix to take into account the abundance of species. In order to eliminate the weight of species abundance, the analyses were re-run on the presence/absence data. In that way the samples were located in the ordination space on the basis of similarity in the species composition only.

4. RESULTS

4.1. Environmental variables

There was no statistically significant difference between the stations in periphyton biomass, chlorophyll $a$ concentration and autotrophic index. Nevertheless ash free weight and autotrophic index were constantly higher at S1 station, while chlorophyll $a$ concentrations were highest during September at both stations (Fig. 2). There was no statistically significant difference in physical, chemical and biological properties of water between the stations (i.e. dissolved oxygen, electrical conductivity, pH, water transparency, total suspended solids, ammonia, nitrites + nitrates, total nitrogen, total phosphorous and chl $a$ concentration), although concentration of total suspended solids was considerably higher at S2 station during the first month of investigation (Fig. 3). Dynamics of dissolved oxygen concentration was similar between the stations and the lowest values coincided with occurrence of flood (Fig. 3).

4.2. Abundance of periphytic bacteria

There was no significant difference in the abundance of CFUs between two stations. However, dynamics of CFUs from the two
stations was different. At S1 station maximal abundance was established in August while at S2 station in September (Fig. 2). In August, the abundance at S1 was considerably higher than at S2, while during the rest of the study period the abundance between the stations was similar.

There was no significant relationship of CFUs with periphyton biomass (organic and inorganic content and chlorophyll a concentration) except of copiotrophs with periphyton inorganic content at S2 station (Table 1).

4.3. Nematode community

Maximal nematode abundance was established in August, 599.5 ind. per 10 cm² and 1128.3 ind. per 10 cm² at S1 and S2 station respectively (Table 2). Abundance of nematodes between sites was not different significantly (t = −0.454, P = 0.332). However, nematode abundance significantly increased during investigation (ANOSIM2 untransformed ρ = 0.943, P = 0.037; Fig. 4), while species composition was not changed (ANOSIM2 presence/absence transformed ρ = −0.075, P = 0.6).

Total nematode abundance was correlated with abundance of CFUs at S1 station and with organic and inorganic periphyton content at S2 station (Table 1).

In total, 17 nematode species were recorded on the artificial substrates, 17 at S1 station and 13 at S2 station. The dominant species were Chromadorina bioculata, Brevitobrilus

Table 1. Reduced table of correlation coefficients (r) between periphyton nematode abundance, abundance of bacteria (CFUs- colony forming units) and periphyton variables from sampling stations S1 and S2 in Lake Sakadaš (see Fig. 1). All presented values are significant at P < 0.05. Chl a – chlorophyll a, AFW – ash free weight, AW – ash weight, TSS – total suspended solids, CFU – colony forming unit.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Chl a</th>
<th>AFW</th>
<th>AW</th>
<th>CFU Copiotrophs</th>
<th>CFU Oligotrophs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total nematode abundance</td>
<td>S1</td>
<td>0.963</td>
<td>0.998</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S2</td>
<td>0.973</td>
<td>0.899</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abundance of chewers</td>
<td>S1</td>
<td>0.974</td>
<td>0.989</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S2</td>
<td>0.971</td>
<td>0.992</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abundance of B. stefanskii juveniles</td>
<td>S1</td>
<td>0.964</td>
<td>0.992</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S2</td>
<td>0.971</td>
<td>0.992</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abundance of Crocodorylaimus sp. juveniles</td>
<td>S1</td>
<td>0.964</td>
<td>0.992</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S2</td>
<td>0.971</td>
<td>0.992</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AW</td>
<td>S1</td>
<td>0.892</td>
<td>0.892</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S2</td>
<td>–0.9</td>
<td>–0.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSS</td>
<td>S1</td>
<td>–0.9</td>
<td>–0.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S2</td>
<td>–0.9</td>
<td>–0.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 4. Dynamics of nematode community in five-month period of periphyton development: average total nematode abundance (ind. 10⁻² cm⁻²; line), relative abundance (% contribution to total numbers) of nematode trophic groups and of adults and juveniles for most abundant species (columns). EF – epistrate feeders, CH – chewers, DF – detritus feeders, SF – suction feeders.
Table 2. Mean number of individuals per 10 cm$^2$ (standard deviation) of periphytic nematodes at two stations S1 and S2 in Lake Sakadaš (see Fig. 1) for five-month period of periphyton development.

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S1</strong></td>
<td><strong>S2</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Jul.</strong></td>
<td><strong>Aug.</strong></td>
<td><strong>Sep.</strong></td>
</tr>
<tr>
<td><strong>Epistrate feeders:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chromadorina bioculata (Schultze in Carus, 1857), Wieser, 1954</td>
<td>27.3 (2.8)</td>
<td>289.7 (183.8)</td>
</tr>
<tr>
<td>Chromadorina viridis (Linstow, 1876) Wieser, 1954</td>
<td>0.7 (0.7)</td>
<td>2 (11.8)</td>
</tr>
<tr>
<td>Achromadora micoletzky (Stefanski, 1915) Van der Linde, 1938</td>
<td>1.4 (1.4)</td>
<td>28 (21.1)</td>
</tr>
<tr>
<td><strong>Chewers:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eutobrilus nothus Gagarin, 1989</td>
<td>1 (1.2)</td>
<td>4 (6.9)</td>
</tr>
<tr>
<td>Brevitobrilus stefanskii (Micoletzky, 1925) Tsalolikhin, 1991</td>
<td>3.1 (0.8)</td>
<td>103.9 (115.7)</td>
</tr>
<tr>
<td>Neotobrilus sp.</td>
<td>0.7 (0.9)</td>
<td>29.9 (15.8)</td>
</tr>
<tr>
<td><strong>Detritus feeders:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eumonhystera dispar (Bastian, 1865) Andrássy, 1981</td>
<td>0.1 (0.2)</td>
<td>2 (3.5)</td>
</tr>
<tr>
<td>Eumonhystera sp. 1</td>
<td>0.6 (1.1)</td>
<td>- (3.5)</td>
</tr>
<tr>
<td>Eumonhystera sp. 2</td>
<td>1.3 (0.9)</td>
<td>46 (30.8)</td>
</tr>
<tr>
<td>E. filiformis vulgaris group</td>
<td>0.8 (1.4)</td>
<td>- (1.5)</td>
</tr>
<tr>
<td>Plectus sp. 1</td>
<td>- (3.5)</td>
<td>2 (6.9)</td>
</tr>
<tr>
<td>Plectus sp. 2</td>
<td>- (3.5)</td>
<td>-</td>
</tr>
<tr>
<td>Aphanolaimus sp.</td>
<td>- (6.9)</td>
<td>-</td>
</tr>
<tr>
<td>Monhystera paludicola de Man, 1881</td>
<td>- (3.5)</td>
<td>-</td>
</tr>
<tr>
<td>Chronogaster sp.</td>
<td>0.1 (0.2)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Suction feeders:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prodorylaimus sp.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Crocodorylaimus sp.</td>
<td>1.3 (0.5)</td>
<td>119.9 (67.6)</td>
</tr>
<tr>
<td><strong>Number of individuals</strong></td>
<td>38.4</td>
<td>599.5</td>
</tr>
<tr>
<td><strong>Number of species</strong></td>
<td>1504.1</td>
<td>2645.4</td>
</tr>
</tbody>
</table>

stefanskii and Crocodorylaimus sp. (Table 2). The community of periphytic nematodes was characterized by the dominance of epistrate feeders at both stations throughout the study period except in September (Fig. 4). Abundance of epistrate feeders, chewers and suction feeders between stations was not significantly different (t = –0.99, P = 0.176; t = –0.28, P = 0.394 and t = 0.93, P = 0.191 respectively). Nevertheless, abundance of epistrate feeders and chewers was 2.5 and 1.5 times higher at S2 station respectively, while abundance of suction feeders was 4.5 times higher at S1 station. At the same time, detritus feeders were significantly more abundant at S1 station (5.5 times) (t = 1.91, P = 0.049) as well as presented...
with higher number of species. Abundance of chewers was significantly correlated with inorganic periphyton content at S1 station and with abundance of CFUs at S2 station (Table 1).

Highest abundance of dominant nematode species coincided with the maximal relative abundance of juveniles of corresponding nematode species, which is especially pronounced for *B. stefanskii* and *Crocodorylaimus* sp. (Fig. 4).

Abundance of juveniles of *B. stefanskii* and *Crocodorylaimus* sp. were significantly correlated with abundance of CFUs, both at S1 station. Juveniles of *Crocodorylaimus* sp. were also significantly correlated with periphyton organic content. Periphyton chl a concentration was negatively influenced by the concentration of total suspended solids only at S2 station (Table 1).

5. DISCUSSION


Periphytic nematode abundance established in this investigation resembled those established in other investigations on ceramic tiles (Peters et al. 2005) and glass slides/plates (Pieczyńska 1964). Pieczyńska and Spodniewska (1963) did not find any influence of different substrates introduced into the lake water (glass, wood and stone) on nematode abundance and community species composition. On contrary, the differences were noted on the same substrate but between different lakes or between different sites of the same lake; it was also found by Peters and Traunspurger (2005). In the present study such conclusions could be also drawn but with less accuracy because recorded differences in nematode abundance and trophic structure between stations, although considerable, were not statistically significant except for detritus feeders.

Colonization of new substrates by free-living nematodes starts immediately (Peters et al. 2005) or in the next few days after submergence of substrate (Pieczyńska 1964). From our own experience (data not shown), colonization of slides in Lake Sakadaš starts within three weeks after submergence of artificial substrate. This is due to the substantial distance (ca 10 m) of submerged slides from potential sources of nematodes what resulted with longer duration of water – column transport of nematodes described by Pieczyńska (1964) and defined by Peters et al. (2005). Source of nematodes in our investigation could be the littoral submerged plants (Vidaković and Palijan 2010) and eulitoral sediment (Bogut and Vidaković 2002), but not sediment underneath the slide-holders (data not shown). Longer duration of water – column transport of nematodes prior to initial development of nematode community is potential cause of rather low nematode abundance in the first month of investigation. During that time constant rate of colonization occurred which resulted in the increase of nematode abundance in the next month (August). Pieczyńska (1964) experimentally estimated that life cycle for species *Chromadorina bioculata* is 20 to 40 days. Such life cycle was not sufficient to ensure established high abundance of nematodes and Pieczyńska (1964) concluded that colonization must have been constantly occurring.

On contrary to development of *C. bioculata* juveniles, the development of *Brevitobrilus stefanskii* and *Crocodorylaimus* sp. juveniles was especially pronounced. Their abundance was considerably increased because of the intense reproduction during September. This was also the time of their dominance in the samples. It is interesting that during the dominance of *C. bioculata*, relative abundance of juveniles was much lower compared to juvenile relative abundance of *B. stefanskii* and *Crocodorylaimus* sp. Such result suggests that the development of populations of *B. stefanskii* and *Crocodorylaimus* sp. was
much more dependent on reproduction of primarily settled individuals than of *C. bioculata*. This higher proportion of adults of *C. bioculata* could be explained by the higher proportion of adult individuals among colonizers of new substrate (Pieczynska 1964), although Peters et al. (2005) have found higher abundance of juvenile individuals in the sedimentation experiment. It should also be noted that dynamics of *B. stefanskii* and *Crocodorylaimus* sp. was not similar at both sites and *Crocodorylaimus* sp., as well as suction feeders as a trophic group, achieved higher numbers at S1 station. We believe that such distribution could be the consequence of much denser coverage by bryozoans at S1 which had considerably attributed to the three – dimensionality of habitat. Consequently higher habitat complexity at station S1 supported higher abundance of this large nematode.

Peters et al. (2005) stressed the importance of species specific attributes involved in the successful colonization and persistence of periphyton species on the surface of substrate. It is noted that *C. bioculata* is attached to the substrate by secretion from the caudal glands (Meschkat 1934, Pieczynska 1964) and beside that by four cephalic setae (Croll and Zullini 1972). Those abilities enable stronger attachment to the substrate and enhance colonization of new substrate during the time of initial colonization when periphyton biomass is still small, and consequently habitat is less complex. Epistrate feeders as group could benefit from the fact that in initial stage of colonization food sources for nematodes are not abundant except bacteria and algae. *C. bioculata* prefers algae, mainly diatoms and to some lower extent chlorophytes as a source of food, while it does not have an impact on bacteria (Eßer 2006). In the present investigation we did not establish significant correlation between total nematode abundance or abundance of the trophic groups with periphyton chlorophyll a concentrations.

The lack of significant correlation relationship between *C. bioculata* abundance and periphyton chlorophyll concentration could be caused by constant colonization of the substrate by new individuals of that species (Pieczynska 1964). Consequently, it would result with decoupling from algal periphytic biomass since the increase of population would not be trophically related to algae. Lack of correlation (due to decoupling) between epistrate feeders and algal periphytic biomass could be partially explained by their dependence on oxygen concentration. It is known that chromadorids are oxyphilic (Micoletzky 1925, Mastitsky and Gagarin 2004). Therefore, constantly decreasing concentration of dissolved oxygen in surrounding water could have negative impact on abundance of epistrate feeders. They reached lowest abundance in parallel with lowest dissolved oxygen concentration during September in contrast to constantly increasing periphytic chlorophyll a concentration. As floods in the studied floodplain cause decrease in concentration of dissolved oxygen (Palijan and Fuks 2006, Palijan et al. 2008) it is plausible to suppose that low dissolved oxygen concentration was caused by flood pulse occurred in September.

Relationships between nematodes and organic and inorganic content in the periphyton and with bacterial abundance are more visible than the relationships with chlorophyll a concentration. The pronounced correlation of nematodes at S1 station with bacterial abundance and almost complete lack of it at S2 station could be the consequence of earlier bacterial maximum at S1 station. This could directly affect the development of populations of nematodes as their juveniles feed on bacteria, algae and their exudates (Jensen 1987). Our results agree with it as the significant positive correlation with bacteria was established for juveniles of *B. stefanskii* and *Crocodorylaimus* sp. only at S1 station. In the same time bacteria-feeding nematodes stimulate bacterial activity (Traunspurger et al. 1997) which leads to maximization of the amount of nematode food (gardening sensu Jensen 1987). Possible cause of such earlier development of bacteria at S1 station was higher content of organic matter and higher AI index at the very beginning of the investigation period compared to S2 station. Also, higher proportion of inorganic than organic content in periphyton at S2 at the beginning of investigation could have negative impact on invertebrate development (Graham 1988, Quinn et al. 1992). Probable cause of such increased amount of inorganic content at S2
during July was the difference of the concentration of total suspended solids on both stations (S1 = 16.98 mg L\(^{-1}\), S2 = 27.83 mg L\(^{-1}\)). The difference had disappeared next month. This obviously could have an impact on the amount of periphyton inorganic content at S2 station as periphyton successfully traps suspended particles (Graham 1988, Davies-Colley et al. 1992, Jowett and Biggs 1997). Also, concentration of total suspended solids at S2 was negatively correlated with periphytic chl \(a\) concentration. So that correlation suggests the impact of total suspended solids on periphyton at S2. What is the cause of that difference is not clear to us at this moment. Floods are considered to be source of particles for floodplains (Tockner et al. 1999). Possibly, cause of different dynamics of total suspended solids between stations was the flow pulse that occurred in July, 14 days before sampling. Due to its low hydrological impact the differences between stations became more expressed. Such assumption seems correct as during the flood pulse in September, which succesfully produce homogenization throughout the floodplain (Thomaz et al. 2007), the concentration of total suspended solids was simillar between stations. Increased amount of periphyton inorganic content in September at both stations could be the consequence of improved trapping of suspended solids by developed periphyton community, namely the \textit{P. emarginata} mats.

6. CONCLUSIONS

The results show that the species \textit{Chromadorina bioculata}, \textit{Brevitobrilus stefanskii} and \textit{Crocodorylaimus} sp. have been the successful colonizers of glass substrate introduced into Lake Sakadaš. Transient replacement of epistrate feeders as dominant feeding type with chewers or chewers and suction feeders was established in parallel with decreased dissolved oxygen concentration which coincided with the occurrence of flood pulse. Altogether it resulted in different coupling of nematodes with periphyton biomass and/or bacterial abundance at one or other station. Nematode abundance, species composition and trophic relations show temporal differences between investigated stations, indicating high sensitivity of periphytic nematode community to environmental properties, \textit{i.e.} periphytic bacteria abundance (S1 station) and periphyton inorganic and organic content (S2 station).

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