Original Article

DISTRIBUTION AND SEASONAL VARIATION OF Ephemeroptera, Plecoptera AND Trichoptera (Arthropoda: Insecta) IN DIFFERENT AQUATIC ENVIRONMENTS OF A CERRADO AREA, STATE OF MINAS GERAIS, BRAZIL

DISTRIBUIÇÃO E VARIAÇÃO SAZONAL DE Ephemeroptera, Plecoptera E Trichoptera (Arthropoda: Insecta) EM DIFERENTES AMBIENTES AQUÁTICOS DE UMA ÁREA DE CERRADO, MINAS GERAIS, BRASIL.

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ABSTRACT: The composition and diversity of aquatic insect fauna can be influenced by several factors such as substrate type, availability of allochthonous material, biotic interactions, among others. This occurs because these organisms have different adaptations to environmental characteristics of aquatic systems. The aim of this work was to evaluate the distribution and seasonal variation of immature insects of the Ephemeroptera, Plecoptera and Trichoptera orders in different environments at a Cerrado area in Uberlândia - MG. Sampling was performed in August 2007 (dry season) and February 2008 (rainy season), in three types of environment (stream in gallery forest, stream in vereda and in a pond) at “Reserva do Clube de Caça e Pesca Itororó”. The insects were sampled using artificial substrates. We collected a total of 205 insects, 96 in the dry season and 109 in the rainy season. Differences in the abundance of insects among environments were recorded only for Ephemeroptera. Despite distinct characteristics of each environment the abundance of organisms and the richness of genera were similar among sampling sites and between seasons. However, there was a variation in the composition of organisms in each environment.

KEYWORDS: EPT. Aquatic insects. Vereda

INTRODUCTION

There are 3154 species of invertebrates recorded in Brazilian inland waters, with prediction as to the existence of about 8000 species not yet reported (ROCHA, 2002). The aquatic macroinvertebrates usually have benthic habits living at the bottom of continental water bodies. These organisms represent a group of major ecological importance, since they occur in both lentic and lotic environments (MERRITT; CUMMINS, 1996), represent an important food source for fish, constitute valuable indicators of environmental degradation, and influence nutrient cycling, primary productivity and decomposition (WALLACE; WEBSTER, 1996).

The composition and diversity of aquatic macroinvertebrate communities may be influenced by several factors such as type of substrate, availability of allochthonous material, water flow, temperature, disturbances, and biotic interactions (WARD et al., 1995; TANG et al., 2010). These factors vary temporally and spatially and, therefore, are expected to determine significant changes in diversity and structure of aquatic communities (BISPO; OLIVEIRA, 2007).

Among macroinvertebrates, some aquatic insect groups are important because they are sensitive to environmental disturbances and occur mainly in clean and well oxygenated waters. Because of these characteristics, they are often considered good indicators of water quality (ROSEMBERG; RESH, 1993). The use of these bioindicators is more efficient than the measurement of physical and chemical parameters (eg. temperature, pH, dissolved oxygen), which is usually performed to evaluate water quality. This is because these organisms allow for an integrated assessment of ecological effects caused by multiple sources of pollution (HOLT, 2011).

Immature insects of the Ephemeroptera, Plecoptera and Trichoptera orders (commonly called EPTs) are benthic organisms sensitive to pollution, and have been widely used as bioindicators in environmental monitoring programs (WALLACE; ANDERSON, 1996). Among the aquatic insects, these orders are especially well represented in streams of low and medium orders (BISPO;

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OLIVEIRA, 2007). EPT assemblages may have temporal variations in composition and in relative abundance in response to changes in environmental factors or, simply, due to features of their life cycles (BISPO; OLIVEIRA, 1998).

For the development of any biomonitoring program it is necessary to investigate some basic ecological aspects of the organisms that are intended to be used as bioindicators (EATON, 2003). One of the main aspects that must be evaluated from the perspective of community ecology is the species composition and spatial-temporal variation of organisms in different types of environments.

Studies of composition and spatial variation of EPTs in streams of tropical regions are increasing (BISPO; OLIVEIRA, 1998; BISPO et al., 2004; BISPO; OLIVEIRA, 2007; CRISCI-BISPO et al., 2007; RIGHI-CAVALLARO et al., 2010;). However, in the Brazilian Savanna (Cerrado), which is composed by different vegetation types, and each of them with bodies of water with different structures, this issue has not been well understood.

In the city of Uberlândia (Minas Gerais) some remnants of Cerrado vegetation are found. Some of these areas present different kinds of aquatic environments with a high diversity of aquatic insects that are still not investigated very much (GUIMARÃES et al., 2009). Three types of environments are generally found, each with specific characteristics: streams in vereda (a kind of wetland), stream in gallery forest and in permanent and temporary ponds. The aim of this study was to evaluate the distribution and seasonal variations of immature insects of the Ephemeroptera, Plecoptera and Trichoptera orders in different aquatic environments of a Cerrado area. Our first hypothesis is that there is a high abundance, richness and diversity of genera of EPTs in the dry season in all environments – once this pattern has been found in different studies due to the highest physical stability of the habitat in this season, since the hydrological change during rainy periods, as a result of the water flow increase, leads to populational displacement, causing a homogenized effect, thus reducing environmental gradients (OLIVEIRA et al., 1997; KIKUCHI; UIEDA, 1998; HUAMANTINCO; NESSIMIAN, 1999; RIBEIRO; UIEDA, 2005; SHUVARTZ et al., 2005). The second hypothesis is that in the gallery forest a great richness, diversity and abundance of EPTs is found in relation to other environments, reflecting the great habitat complexity (more heterogeneous surrounding vegetation and, therefore, a more diverse supply of allochthonous materials). And the third hypothesis is that the faunal composition differs among the environments as they have physical characteristics which are also differentiated.

MATERIAL AND METHODS

Study area

The study was performed at “Clube de Caça e Pesca Itororó” natural reserve, a private conservation area. It is an area of 127 ha, located in the western portion of Uberlândia (Figure 1), with dominance of the Cerrado sensu stricto physiognomy in the high areas and formations of Campo Sujo and Vereda in the lowest areas (CABRAL, 1995).

The climate of Uberlândia is Aw (megathermic), according to the Köppen classification, with two well defined seasons: a dry, from May to August and a rainy season from November to March. The average annual rainfall is 1600 mm, with high incidence in the months of December and January (ROSA et al., 1991).

The vereda of the reserve is about 4 km long and drained by the Lageado Stream (ARAÚJO, 2003). Along the vereda there are two areas of gallery forest swamp, where the stream acquires characteristics quite different from the upstream area. The stream flows into an artificial pond with high abundance of aquatic macrophytes, mainly *Pontederia parviflora* and *Heteranthera* sp. (Pontederiaceae) (PINESE, 2008).

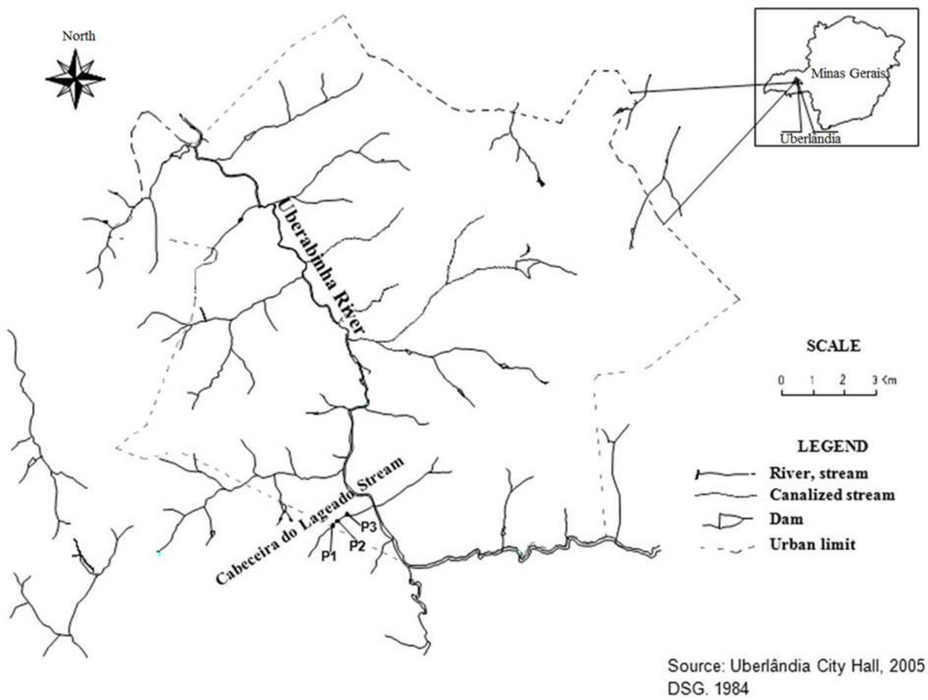

Figure 1. Map of the hydrographic network of the city of Uberlândia, Minas Gerais, Brazil. Sampling points in Lageado Stream located in "Clube de Caça e Pesca Itororó" reserve. P1 – *Vereda* (18°59'33" S, 48°18'12" W). P2 – Gallery Forest (18°59'23" S, 48°18'07" W). P3 – Pond (18°59'00" S, 48°17'43" W).

Sampling and processing

In the three aquatic environments - stream in vereda area (Fig 1 - P1), stream in gallery forest area (Fig 1 - P2) and pond (Fig 1 - P3) - immature EPTs were sampled using artificial substrates constructed with polietiltereftalate bottles (PET) and loofah (*Luffa cylindrica* fruit M. Roem - Cucurbitaceae), according to protocol established by VOLKMER-RIBEIRO et al. (2004). The authors emphasize that this sampler was reliable for detection of seasonal and spatial differences ofmacroinvertebrate communities.

To measure possible seasonal variations of EPT fauna, we established two sampling periods, the first between July 31 and September 05, 2007 (dry season) and the second between January 29 and March 05, 2008 (rainy season). Thus, the artificial substrates remained 36 days in the field for EPT colonization in both seasons. Eight artificial substrates (samples) were placed in each of the three environments in each sampling period. At the time of the artificial substrate removal were performed measurements of surface water temperature, pH, electric conductivity (with portable digital meter) and dissolved oxygen (Winkler method).

The artificial substrates were removed from the streams using a D-net and placed in individual plastic bags with a 5% formalin solution. In the laboratory the artificial substrates were washed in flowing water under a 0.25 mm mesh sieve. The EPTs found in each artificial substrate were separated and fixed in 70% etanol. Under stereomicroscope, the insects were identified at order and family levels using specific identification keys (COSTA et al., 2006; CALOR, 2007; LECCI; FROEHLICH, 2007; MARIANO; FROEHLICH, 2007) and subsequently at genus level with the help of a specialist.

Data analysis

For each sample we calculated the total abundance and the genus richness, as well as the Shannon-Wiener diversity index and the Pielou evenness for the genus, considering all the orders together. These parameters were compared between sampling periods and among environments, using a two factor Analysis of Variance (two-way ANOVA). When significant differences were detected, the Tukey test for multiple comparisons was applied. The significance level of 5% was considered in all tests. The data were evaluated for normality and homoscedasticity and when necessary appropriately transformed in order to meet the ANOVA assumptions (ZAR, 1999).

The similarities among samples were evaluated using Non-metric Multidimensional Scaling (nMDS) and Unweighted Pair Group Method with Arithmetic average (UPGMA), using the Bray-Curtis index (CLARKE; WARWICK, 2001). The samples were analyzed for differences in faunal composition among habitats and sampling periods, through Analysis of Similarities (ANOSIM). The PRIMER 5 software (Plymouth Routines in Multivariated Ecological Research) was used to perform the multivariate analysis and ANOSIM.

RESULTS

In relation to the physical and chemical parameters, we found that for the dry season there was no wide variation of temperature, pH, dissolved oxygen and water electric conductivity among the three sampled environments. In the rainy season, however, there was a variation in water electric conductivity, with the lowest value observed in gallery forest (8.00 µS/cm) and the highest value in pond (36.00 µS/cm) (Table 1).

Comparing the parameters of each sampling points between the two seasons (Table 1) we recorded the highest values of water temperature and dissolved oxygen concentration in the three points at the rainy season. The pH had no major variations between seasons. For electric conductivity we recorded a wide variation in values between the sampling sites independent of season.

Table 1. Physical and chemical variables recorded in the water sampling sites (Vereda, Gallery Forest and Pond) in the "Clube de Caça e Pesca Itororó" reserve, Uberlândia - MG, Brazil, 2008, during the dry and rainy seasons.

Sites	Season	Temperature (°C)	pH	Dissolved Oxygen (mg/l)	Electric conductivity (µS/cm)
Vereda	Dry	17.2	5.60	4.10	6.00
	Rainy	21.6	5.90	7.70	15.00
Gallery Forest	Dry	17.2	5.60	3.10	10.00
	Rainy	25.0	5.25	6.80	8.00
Pond	Dry	16.4	5.70	2.50	8.00
	Rainy	22.5	5.56	6.20	36.00

In both sampling periods we collected 205 immature insects of Ephemeroptera, Plecoptera and Trichoptera, represented by 13 families and 22 different genera. In the dry season 96 (47.08%) specimens were sampled and in the rainy season, 109 (52.92%). In dry season 61.45% of the organisms were represented by Ephemeroptera, 4.18% by Plecoptera and 34.37% by Trichoptera, and in the rainy season, they were 45.87%, 1.84 % and 52.29% respectively.

Ten families of EPTs were found in vereda, seven in gallery forest and also seven in pond. Leptophlebiidae, Perlidae, and Hydropsychidae were the most abundant families of Ephemeroptera, Plecoptera and Trichoptera, respectively, for all samples. We found 14 genera of EPTs in vereda, nine in gallery forest and eight in pond (Table 2).

Table 2. Abundance (mean ± standard error) of immature forms of aquatic insect orders Ephemeroptera, Plecoptera and Trichoptera in the dry season (D) and rainy (R) in the Pond, Vereda and Gallery Forest area in the "Clube de Caça e Pesca Itororó" reserve, Uberlândia - MG, Brazil, 2008. n=8

Order	Family	Genera	Season	POND	FOREST	VEREDA
EPHEMEROPTERA	Baetidae	*Apobaetis*	R	-	-	-
			D	0.3 ± 0.81	-	-
		Cloeodes	R	-	1.3 ± 2.00	-
			D	-	-	-
		Spiritiops	R	-	-	-
			D	-	0.1 ± 0.40	-
		Aff. *Spiritiops*	R	0.1 ± 0.40	-	-
			D	0.3 ± 0.47	-	-

	Polymitarcyidae	*Campsurus*	R	-	-	-
			D	0.30 ± 0.53	-	-
	Caenidae	*Caenis*	R	0.5 ± 0.86	-	0.1 ± 0.40
			D	0.1 ± 0.40	-	-
	Leptophlebiidae	*Thraulodes*	R	-	3.2 ± 3.50	0.4 ± 0.85
			D	-	5.1 ± 6.18	0.3 ± 0.81
		Ulmeritus	R	-	-	-
			D	-	0.1 ± 0.40	0.3 ± 0.53
	Euthyplociidae	*Campylocia*	R	-	-	0.3 ± 0.53
			D	-	-	0.3 ± 0.53
	Leptohyphidae	*Leptohyphodes*	R	-	-	-
			D	-	-	0.1 ± 0.40
		Tricorythodes	R	-	0.1 ± 0.40	0.3 ± 0.53
			D	-	0.1 ± 0.40	0.1 ± 0.40
PLECOPTERA	Perlidae	*Anacroneuria*	R	-	0.3 ± 0.53	-
			D	-	0.3 ± 0.53	0.3 ± 0.81
TRICHOPTERA	Hydropsychidae	*Leptonema*	R	-	-	-
			D	-	-	0.1 ± 0.40
		Macronema	R	0.4 ± 0.85	-	-
			D	0.8 ± 1.18	-	-
		Smicridea	R	-	1.0 ± 1.83	1.6 ± 3.34
			D	-	-	0.8 ± 1.33
	Leptoceridae	*Nectopsyche*	R	0.1 ± 0.40	0.1 ± 0.40	-
			D	0.1 ± 0.40	-	0.3 ± 0.53
		Aff. *Nectopsyche*	R	-	-	-
			D	-	0.1 ± 0.40	-
	Hydroptilidae	*Dicaminus*	R	-	-	0.1 ± 0.40
			D	-	-	-
		Oxyethira	R	0.4 ± 0.59	-	1.8 ± 2.18
			D	-	-	-
	Odontoceridae	*Barypenthus*	R	-	-	-
			D	-	-	-
		Marilia	R	-	0.5 ± 0.61	0.6 ± 1.21
			D	-	0.1 ± 0.40	0.4 ± 0.59
	Philopotamidae	*Dolophilodes*	R	-	-	0.3 ± 0.81
			D	-	-	-
	Polycentropodidae	*Nyctiophylax*	R	0.1 ± 0.40	-	-
			D	0.1 ± 0.40	-	-
		Polycentropus	R	0.1 ± 0.40	-	-
			D	1.4 ± 3.29	-	-

The genera *Apobaetis*, similar of *Spiritiops* (Ephemeroptera: Baetidae), *Campsurus* (Ephemeroptera: Polymitarcyidae), *Macronema* (Trichoptera: Hydropsychidae), *Nyctiophylax* and *Polycentropus* (Trichoptera: Polycentropodidae) were only found in the pond. The genera *Spiritiops*, *Cloeodes* (Ephemeroptera: Baetidae) and the genus similar to *Nectopsyche* (Trichoptera: Leptoceridae) were present exclusively in the gallery forest. In relation to vereda, the genera found exclusively in this environment were *Campylocia* (Ephemeroptera: Euthyplociidae), *Leptohyphodes* (Ephemeroptera: Leptohyphidae), *Leptonema* (Trichoptera: Hydropsychidae), *Dicaminus* (Trichoptera: Hydroptilidae) and *Dolophilodes* (Trichoptera: Philopotamidae).

Despite the differences in genus composition, there were no significant differences for the richness of genera, neither between seasons, nor among the sampling sites (Figure 2).

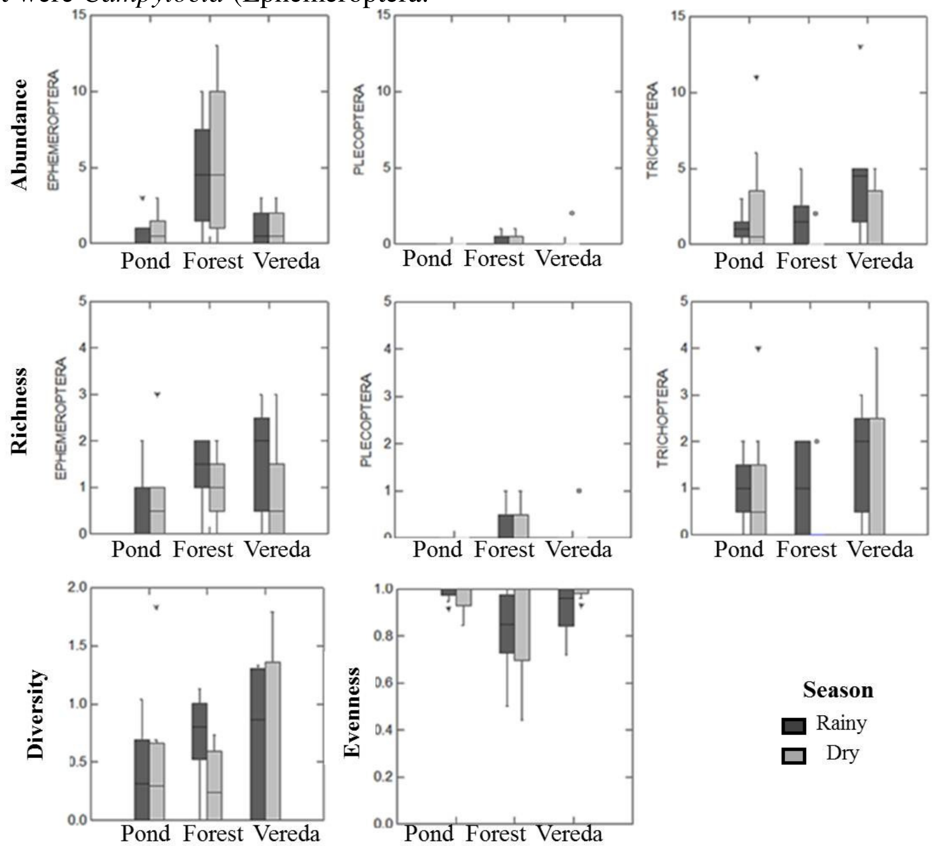

Figure 2. Genera richness, abundance of organisms (Ephemeroptera, Plecoptera and Trichoptera), diversity indices (Shannon-Wiener) and evenness (Pielou), for the sampling sites (Pond, Gallery Forest and *Vereda*) in the two sampling periods (Rainy and Dry).

Regarding the abundance of organisms, however, Ephemeroptera order was the only one that showed a significant difference among sites, being more abundant in the gallery forest in both dry and rainy seasons, but no seasonal variation was observed (Fig 2). No significant differences among sites and sampling periods were observed for Shannon-Wiener diversity index (Table 3). For Pielou evenness, there was no difference between seasons but a significant difference was observed among sampling sites (Table 3). The environment with the lowest evenness in both seasons was the gallery forest. The *vereda* showed the highest evenness in the dry season and the pond, in the rainy season (Figure 2).

The overall results of the similarity analysis (ANOSIM) indicated a moderate difference in the occurrence of genera of EPTs among environments, but no difference was observed between sampling periods (Table 4). Considering the pairwise tests among environments, there was a greater difference between pond and gallery forest and minor differences between vereda and gallery forest and between vereda and pond (Table 4).

Table 3. Results of analysis of variance of two factors (two-way ANOVA) for richness of genera, abundance of organisms, diversity index (Shannon-Wiener) and evenness of Ephemeroptera, Plecoptera and Trichoptera for comparisons between sampling periods (dry and wet) and between sampling environments (Vereda, Pond and Forest) in the “Reserva do Clube de Caça e Pesca Itororó”, Uberlândia - MG, Brazil. 2008.

ANOVA		**Between sampling periods**			**Between sampling áreas**		
		df	**F**	**p**	**df**	**F**	**P**
Richness	Ephemeroptera	1. 42	11.2460	0.2952	2. 42	20.8850	0.1347
	Plecoptera	1. 42	0.2258	0.6422	2. 42	29.3550	0.0625
	Trichoptera	1. 42	15.5560	0.2170	2. 42	16.8000	0.1971
Abundance	Ephemeroptera	1. 42	0.2224	0.6446	2. 42	123.6050	0.0002
	Plecoptera	1. 42	0.5385	0.5262	2. 42	16.1540	0.2094
	Trichoptera	1. 42	17.1430	0.1948	2. 42	23.1250	0.1096
Diversity		1. 42	0.9666	0.6676	2. 42	0.5643	0.5781
Evenness		1. 42	0.5245	0.5203	2. 42	51.8710	0.0097

The ordination diagram - MDS (Fig 3-A) and the cluster of similarity (Fig 3-B) indicate a tendency of the environments to form distinct groups.

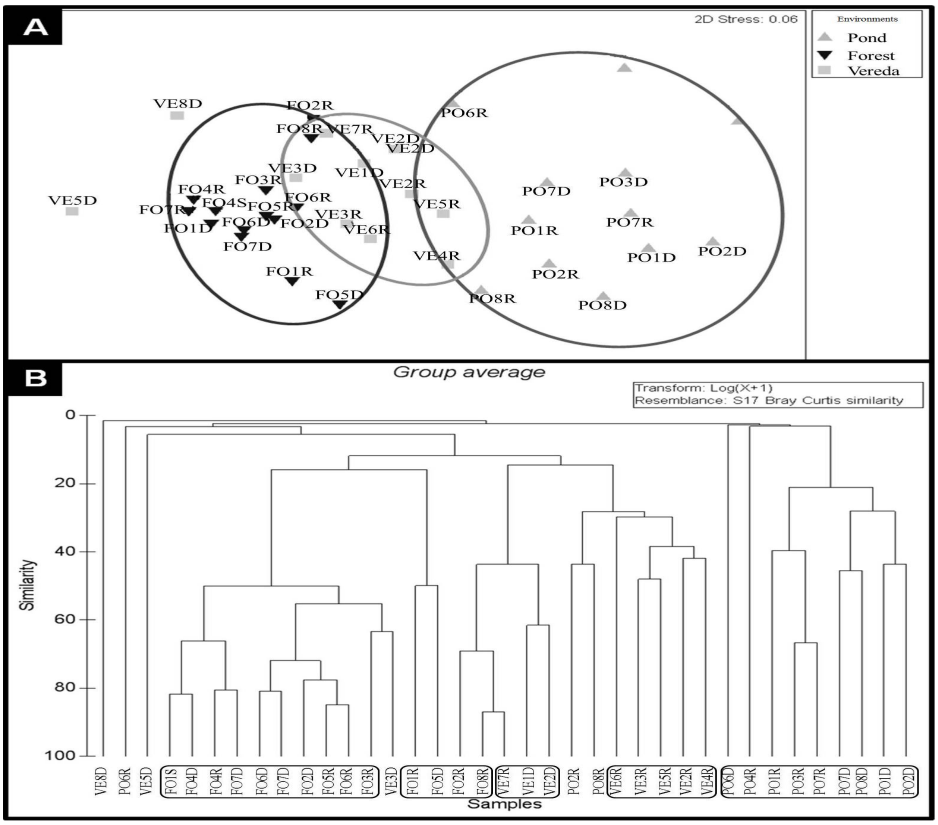

Figure 3. Results of ANOSIM two factors and paired tests for similarities between sampling sites and sampling seasons. A- NMDS diagram. B- Similarity cluster. B – D: Dry; R: Rainy. 1-8: indicate the number of replicates.

Table 4 Results of ANOSIM two-factor and tests paired to the similarities between environments and periods of collection with respect to the EPT fauna present in the "Clube de Caça e Pesca Itororó" reserve, Uberlândia - MG, Brazil, 2008.

Global Tests	Sites	R= 0,457	(p<0,01)
ANOSIM	Periods	R= 0,102	(p>0,05)

Paireds Tests (Sites)	Pond	Forest	Vereda
Pond	x	0,611 (p<0,01)	0,370 (p<0,01)
Forest	x	X	0,382 (p<0,02)
Vereda	x	X	X

DISCUSSION

In the environments studied, the effect of seasonality on the physico-chemical variables was not so pronounced. As in other studies conducted in tropical first order streams, the values of water temperature fluctuations were reduced (HUAMANTINCO; NESSIMIAN, 1999). WOLF et al., 1998 have indicated that the temperature does not seem to be a key factor in the structure and distribution of aquatic organisms in the tropics. The pH also has reduced fluctuations indicating slightly acidic water, certainly as a result of the humic acid influence of vereda soils (LESPC; ANDRADE PAULA, 2006). The dissolved oxygen showed slight seasonal variation as a result of high rainfall values found in the rainy season. Electric conductivity, a variable with the highest seasonal variation, presented itself in the pond and in the Vereda the highest values in the rainy season. This may be due to the carrying of allochthonous material that occurs during the first rains after the dry months; this pattern was also found by HUAMANTINCO and NESSIMIAN (1999).

In tropical regions a decrease in the number of organisms in the rainy season is common, whether by environmental disturbances caused by heavy rainfall or by reducing the aggregation of organisms due to the water level increase (BISPO et al., 2004). However, our hypothesis that this pattern would apply to the Cerrado aquatic environments investigated has been refuted. All biological variables tested did not have high seasonal variations, unlike the patterns found by other researchers in tropical streams (OLIVEIRA et al., 1997; SHUVARTZ, 2005CRISCI-BISPO et al., 2007;).

Our data indicate a stability of EPT assemblages between dry and rainy seasons. This fact is probably related to the slight slope of the sampling sites minimizing water flow variation between dry and rainy seasons that would eventually influence the distribution of organisms. EPT stability is also associated with small seasonal variation of the physical and chemical water parameters evidenced in our study. In addition, the riparian vegetation may have acted as a buffer of possible impacts of direct rain on water bodies studied. Our data corroborate those of GUIMARAES et al., (2009) that showed no difference in benthic macroinvertebrate metrics between the dry and rainy seasons in vereda streams. This study highlights the importance of abundant herbaceous vegetation surrounding the margins both in dry and rainy season for greater stability.

The second hypothesis in which we predicted that the gallery forest would have high richness, diversity and abundance of EPTs in relation to other environments has been confirmed only for Ephemeroptera independent of seasonality. The significantly high abundance of Ephemeroptera in the gallery forest is mainly due to the high abundance of *Thraulodes* (Leptophlebiidae). This genus has a scraper habit and is common in Neotropic mountain streams. The species of this genus are common in stream rapids (CRISCI-BISPO[b] et al., 2007). This fact is in accordance with the traits of water flow in the gallery forest, which is more intense than in the vereda, thereby creating rapids in stream stretches. Possibly due to the high abundance of this genus in relation to others in the Forest we found significantly lower values of evenness.

Although the comparison of abundance, richness and diversity did not show major differences among environments, the results of the similarity analysis (ANOSIM) and the genus composition of each sampling site indicate a trend of environments in sheltering different genera. Our data suggest that the three environments investigated, although different in physical structure, are of equal importance to the maintenance ofthe EPT fauna. Although numerically there is no difference among them in relation to the entomofauna studied, they provide different ecological services since their composition is different, as can be seen in the nMDS diagram.

The genus *Anacroneuria* (Plecoptera: Perlidae), for example, was only present in vereda and in gallery forest, probably because Plecoptera are usually found only in environments with abundant oxygen (PENNAK, 1978). In this sense, the absence of *Anacroneuria* in the pond may be related to the lower amount of dissolved oxygen observed in this environment. Among the Trichoptera, the presence of genus *Smicridea* only in the lotic environments may also be related to the water flow of these environments. The occurrence of leaf litter retained in these lotic areas could also favor this genus (HUAMANTINCO; NESSIMIAN, 1999). Among Ephemeroptera, the presence of *Campsurus* only in the pond is probably due to the digging habit of these organisms that usually occur in soft substrates and are also associated with low current environments (EDMUNDS et al., 1976).

A remarkable aspect observed in our study is the high family richness found in the pond. Among the five families of Trichoptera that inhabit lentic environments in Brazil (OLIVEIRA, 2006), four have been found in the studied pond, showing this is an important aquatic environment for the local entomofauna. Certainly, the presence of macrophytes in the pond contributes to the colonization and establishment of a rich community because macrophytes provide a high diversity of habitats, offering substrate for periphyton and sheltering and nesting areas for aquatic and terrestrial animals (MITCHELL, 1974).

Our results indicate that despite the different characteristics of each aquatic environment, the abundance of organisms and the richness of genera were similar. However, there was an important variation in the composition of EPTs among the investigated environments.

We evidenced a remarkable diversity in the the EPT assemblage investigated (since there was quite representativity of the EPT Brazilian fauna: 60%, 37% and 50% of Ephemeroptera, Trichoptera and Plecoptera families existing in Brazil, respectively). One of the consequences of this information is one more argument to justify the need for conservation of the Cerrado remnants which still exist and are increasingly being transformed into pastures and crops. Each and every remnant meso habitat that compose it are unique when one considers the ecological services that each provides to the benthic fauna and thus directly influencing the composition and maintaining the diversity of this fauna.

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RESUMO: A composição e diversidade da fauna de insetos aquáticos podem ser influenciadas por vários fatores, como tipo de substrato, disponibilidade de material alóctone, interações bióticas, entre outros. Isso ocorre porque esses organismos têm diferentes adaptações às características ambientais dos sistemas aquáticos. O objetivo deste trabalho foi avaliar a distribuição e variação sazonal de insetos imaturos das ordens Ephemeroptera, Plecoptera e Trichoptera em diferentes ambientes de uma área de Cerrado em Uberlândia - MG. A amostragem foi realizada em agosto de 2007 (estação seca) e fevereiro de 2008 (período chuvoso), em três tipos de ambiente (córrego de mata de galeria, córrego em vereda e em uma lagoa) na "Reserva do Clube de Caça e Pesca Itororó". Os insetos foram amostrados utilizando substratos artificiais. Foi coletado um total de 205 insetos, 96 na estação seca e 109 na estação chuvosa. As diferenças na abundância de insetos entre os ambientes foram registradas apenas para Ephemeroptera. Apesar das características distintas de cada ambiente a abundância de organismos e a riqueza de gêneros foram semelhantes entre os locais de amostragem e entre estações. No entanto, houve uma variação na composição de organismos em cada ambiente.

PALAVRAS-CHAVE: EPT. insetos aquáticos. Vereda.

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