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Ground-dwelling spiders (Arachnida, Araneae) in different vegetational formations in a Neotropical floodplain

Aranhas de solo (Arachnida, Araneae) em diferentes formações vegetacionais em uma planície de inundação Neotropical

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Abstract

Spiders are generalist predators distributed in a wide variety of species found in tropical ecosystems, including wetlands such as the Brazilian Pantanal. We evaluated the composition, abundance and richness of ground-dwelling spider assemblage along a vegetation mosaic in the Brazilian Pantanal. For the evaluation, 30 transects were spaced 1 km apart in a 5 x 5 km^2 area according to RAPELD methodology. Each sample point was characterized by a transect with five pitfall traps, which remained installed for eight days. A total of 724 spiders, distributed in 28 families and 50 species were collected. Lycosidae, Gnaphosidae and Salticidae showed the highest abundance, and Salticidae, Linyphiidae and Lycosidae had the highest richness. No differences were observed in the composition, abundance and richness of ground-dwelling spiders between the sampled vegetation units, however, the dominance of Lycosidae and Gnaphosidae highlighted a close association with vegetation formations composed of grasses, *murundu* fields and pasture. Hunting spiders were more prevalent than weavers in all vegetation types. Results demonstrate that the different vegetation types found within the Pantanal are similarly favorable environments to maintain the species richness of spiders in this important Brazilian wetland.

Keywords: behavioral guilds, biodiversity, edaphic fauna, wetlands.

Resumo

Aranhas são predadoras generalistas e apresentam elevada variedade de espécies em ecossistemas tropicais, incluindo áreas úmidas, como o Pantanal brasileiro. Avaliou-se a composição, abundância e riqueza da assembleia de aranhas de solo em um mosaico vegetacional no Pantanal brasileiro. Para a avaliação, foram demarcados 30 transectos, espaçados 1 km, em uma área de 5 x 5 km^2, segundo a metodologia RAPELD. Cada ponto amostral consistiu em um transecto com cinco armadilhas *pitfall* instaladas durante oito dias. Um total de 724 aranhas, distribuídas em 28 famílias e 50 espécies, foram coletadas. Lycosidae, Gnaphosidae e Salticidae foram mais abundantes, enquanto Salticidae, Linyphiidae e Lycosidae, as de maior riqueza. Não foram observadas diferenças na composição, abundância e riqueza de aranhas de solo entre as unidades vegetacionais amostradas. Entretanto, a dominância de Lycosidae e Gnaphosidae evidenciou uma estreita associação dessas aranhas com formações vegetacionais ricas em gramíneas, como os campos de murundus e as pastagens. As aranhas caçadoras predominaram sobre as tecelãs em todas as fitofisionomias. Os resultados evidenciam que as diferentes fitofisionomias do Pantanal são igualmente favoráveis à manutenção da riqueza de espécies de aranhas nessa importante área úmida brasileira.

Palavras-chave: áreas úmidas, biodiversidade, fauna edáfica, guildas comportamentais.

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Introduction

Wetlands are composed of a complex of aquatic habitats, marsh land, and in the case of floodplains, rivers, such as in the Pantanal of Mato Grosso, Brazil. In addition to these habitats, large transition zones between aquatic and terrestrial environments are common (Junk *et al.*, 2006). The Pantanal occupies approximately 140,000 km^2 of the Upper Paraguay River Basin and its tributaries (Harris *et al.*, 2005), and is characterised by seasonal variations in the hydrological regime with alternating wet and dry periods (Heckman, 1998). Due to the low drainage capacity during the aquatic phase, the plains are flooded by overflowing rivers. During the terrestrial phase, they become completely dry (Junk and Nunes-da-Cunha, 2005; Junk *et al.*, 2006).

The geological and geomorphological history of the Pantanal, its location along the margins of three major phytogeographical areas, and the influence of its main tributaries, together results in a high diversity of vegetation types and habitats (Nunes-da-Cunha and Junk, 1999). These features give the Pantanal a highly heterogeneous landscape, consisting of a mosaic of forests, savannahs and grasslands (Silva *et al.,* 2000) which provide habitat for a wide variety of plant and animal species, particularly invertebrates (Adis and Junk, 2002; Battirola *et al*., 2009, 2010; Marques *et al*., 2011; Nunes-da-Cunha and Junk, 2014).

Spiders comprise a significant proportion of species diversity in terrestrial environments (Coddington and Levi, 1991; Totti *et al*., 2000; Dias *et al*., 2010), and represent one of the most diverse and abundant groups of organisms on the planet with approximately 46,000 species described (World Spider Catalog, 2016). They are generalist predators and perform important functions within natural ecosystems as regulators of insect and other invertebrate populations (Foelix, 1996). The richness and dominance of this taxon in these environments is associated with spatial heterogeneity and habitat structure, determined by plant community composition of different strata (Raizer and Amaral, 2001; Castilho *et al*., 2005), amount and structure of undergrowth and litter (Souza, 2007), and environmental conditions such as seasonality (Battirola *et al*., 2010, 2016).

Despite the large number of studies carried out in Brazil, research related to spider assemblages in wet areas such as the Pantanal are still scarce (Battirola *et al*., 2004, 2010, 2016; Castilho *et al*., 2005; Raizer *et al*., 2005; Marques *et al*., 2007). Considering the importance of biodiversity studies involving groups such as Araneae, this study contributes to the knowledge of ground-dwelling spider richness at northern region of the Pantanal of Mato Grosso, and evaluated the distribution of composition, abundance and richness of this assemblage in a vegetation mosaic in a floodplain during the dry season, including *murundu* fields, pastures and forested areas.

Material and methods

Study area

This study was conducted between September and October 2007, in the Pantanal of Cuiabá-Bento Gomes-Paraguaizinho, called Pantanal of Poconé (16°15' and 17°54' S, 56°36' and 57°56' W), Nossa Senhora do Livramento, Mato Grosso, Brazil (Figure 1). The climate in this region is Tropical Savannah, Köppen climate classification category Aw, characterised by dry summers and wet winters, with temperatures ranging between 22°C and 32°C (Hasenack *et al*., 2003). Annual rainfall varies between 1,000 and 1,500 mm (Junk *et al.*, 2006). The regional seasonality is determined by four periods, dry season, rising water, high water and receding water, which define the alternation between terrestrial and aquatic phases in this region (Heckman, 1998).

The wetland vegetation is characterised by a mosaic of forests, savannahs and grasslands, with the occurrence of homogeneous groups or monodominance (Nunes-da-Cunha and Junk, 2014), incorporating the compositional floristic elements of adjacent phytogeographic provinces such as the Cerrado, Amazon and the Gran Chaco (Adámoli, 1982; Silva *et al*., 2000; Junk *et al*., 2006). The sampling area covered a range of habitats classified according to Veloso *et al.* (1991), PCBAP (1997), and Santos *et al.* (2004), and involved five major vegetation types locally known as *landizal*, *cambarazal* and *cordilheira*, *murundu* fields and pastures, described below. *Landizal*, *cambarazal* and *cordilheira* were grouped as one landscape unit called "forested areas".

Landizal areas are characterised by low, continuous canopy ranging between 3-7.5 m in height, usually associated with watercourses (Nunes-da-Cunha *et al.*, 2007). This stratum is dominated by *Licania parvifolia* Huber (Chrysobalanaceae), *Calophyllum brasiliense* Cambess (Gutiferae), *Calypthranthes eugenioides* Camb. (Myrtaceae) and *Mabea* sp. (Euphorbiaceae). *Cambarazal* areas constitute a homogeneous and dense formation dominated by *Vochysia divergens* Pohl (Vochysiaceae), the height of which ranges from 5-18 m (Silva *et al*., 2000), being considered a colonising species of natural wetlands in the Pantanal of Poconé (Prance and Schaller, 1982; Nascimento and Nunes-da-Cunha, 1989). The areas named *cordilheiras* are characterised by ground elevations of one to two meters above field level, being covered by savannah or forest vegetation that does not directly suffer the effects of periodic inundation (Nunes-da-Cunha and Junk, 1999; Guarim *et al*., 2000).

Murundu fields are natural fields with portions of higher ground and micro elevations regionally called *murundus* (Ponce and Nunes-da-Cunha, 1993). These areas are apparently the result of Isoptera (Hexapoda) activity in the construction of termite mounds (Heckman, 1998).

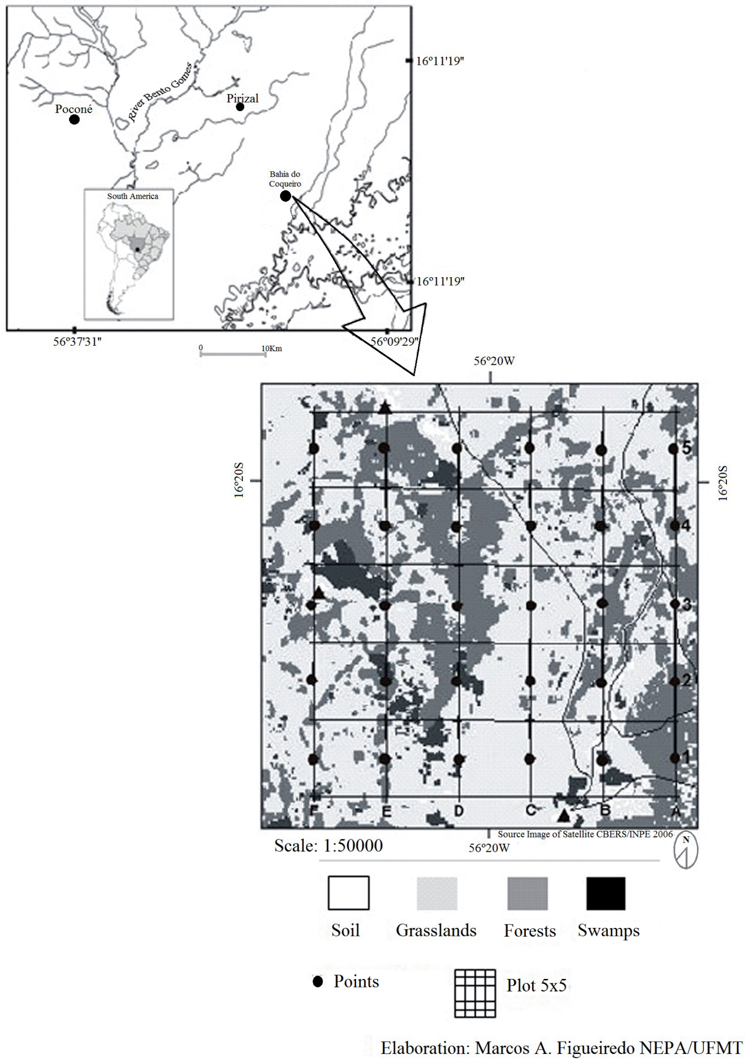

Figure 1. Map of the study area with 5x5 km sampled sites, in accordance with RAPELD methodology, in the northern region of the Brazilian Pantanal. A-F represent the transects.

Pastures are natural areas characterised by the predominance of *mimoso* grass, *Axonopus purpusii* (Mez) Chase (Gramineae), perennial vegetation resistant to temporary submersion for six months (Nunes-da-Cunha and Junk, 2014). It has a wide distribution, occurring in savannahs, along the margins of bays (permanent and temporary) and mainly in seasonal grassland areas in sandy areas of the Pantanal. Introduced pasture in this region primarily consists of *Brachiaria humidicola* (Rendle) Schweick (Poaceae), forming pastures not renewed periodically (Nunes-da-Cunha and Junk, 2014).

Methods

Ground-dwelling spider assemblages were sampled using pitfall traps (Adis, 2002). These traps consisted of a polyethylene bottle, 20 cm in height with a 5-6 cm circular aperture that was buried in the soil to intercept organisms traversing the ground. The traps were protected by plastic covers (20 x 20 cm) supported upon four metal rods to prevent interference from leaves, branches and rain. Traps, containing 250 ml of alcohol solution, detergent and 4% formalin, were installed within a 5 x 5 km area containing 30 transects, each 250 m in length, spaced 1 km apart in accordance with the RAPELD methodology. This method, according to Magnusson *et al.* (2005), allows unbiased estimates of the distribution, abundance, biomass and biogeography of species between sites (Figure 1). Each sample point was characterised by a 250 m long transect, along which five traps were distributed and remained installed for eight days, totalling 150 samples. Among the 30 sample units, 10 were located within forested areas, 11 in *murundu* fields, and nine in pasture areas.

Samples were transported to the Laboratório de Ecologia e Taxonomia de Artrópodes Terrestres (LETA), Instituto de Biociências, Universidade Federal de Mato Grosso. Spiders were separated from other arthropods and identified to the taxonomic level of family, following the classification proposed by Brescovit *et al.* (2002). Adult individuals were identified to genus and/or species level at the Laboratório Especial de Coleções Zoológicas, Instituto Butantan - SP, where the reference material is deposited. Behavioural guilds were determined according to Höfer and Brescovit (2001) and Dias *et al.* (2010).

Data analysis

The ground-dwelling spider composition was evaluated based on the data ordering of the assemblage abundance (quantitative) and occurrence (presence-absence) (qualitative) by Non-Metric Multidimensional Scaling (NMDS), to reduce the dimensionality of data from multiple species (Clarke, 1993). Dissimilarity between the sampling units was calculated using the association matrix through the Bray-Curtis and Sørensen index. Multivariate Analyses of Variance (MANOVA) were used to test for average differences in Araneae assemblage composition, with the two axes of NMDS in relation to the variable vegetation types (forested areas, *murundu* fields and pastures). Analyses of Variance (ANOVA) were used to compare, individually, abundance and richness of Araneae between vegetation types. The normality of the data was tested by Shapiro-Wilk. For the evaluation of species richness nonparametric estimate methods Jackknife 1 and Bootstrap were adopted. MANOVA and ANOVA analyses were performed using the free software R 2.12.1 (R Core Team, 2013), Vegan package (Oksanen *et al.*, 2014).

Results

A total of 724 spiders were captured among the studied vegetation types, consisting of 269 adults (37.1%) and 455 juveniles (62.9%) distributed in 28 families and 50 species. Among the adults, 72.3% were male and 27.7% female. Lycosidae (n=314; 43.4%) was the predominant family, followed by Gnaphosidae (n=74; 10.2%), Salticidae (n=60; 8.3%), Corinnidae (n=57; 7.9%) and Ctenidae (n=53; 7.3%) (Table 1). Among the 28 families, 9 were composed of immature individuals only (Amaurobiidae, Anyphaenidae, Clubionidae, Palpimanidae, Sparassidae, Tetragnathidae, Theraphosidae, Thomisidae and Zoridae).

With respect to species richness, Salticidae and Linyphiidae (8 spp.; 16.0% of total species each) and Lycosidae (5 spp; 10.0%) corresponded to the predominant families with 42% of total species richness within assemblages. The families Araneidae, Ctenidae, Hahniidae, Titanoecidae, Miturgidae, Oxyopidae, Pisauridae, Trechaleidae, Caponiidae and Pholcidae were each represented by only one species (20% of total richness). The Jackknife 1 analysis estimated a total of 72 spider species throughout the study area, while the Bootstrap analysis indicated a species richness of 59 species, showing that 69.4% and 84.7%, respectively, of the estimated species were captured during the study (Figure 2). Among the 50 species sampled, *Hogna pardalina* (Bertkau, 1880) (n=58; 8%, Lycosidae), *Apopyllus silvestrii* (Simon, 1905) (n=37; 5.1%; Gnaphosidae), *Aillutticus raizeri* Ruiz & Brescovit, 2006 (n=16; 2.2%; Salticidae) and *Orthobula* sp. (n=15; 2.1%; Corinnidae) were the most abundant (Table 1).

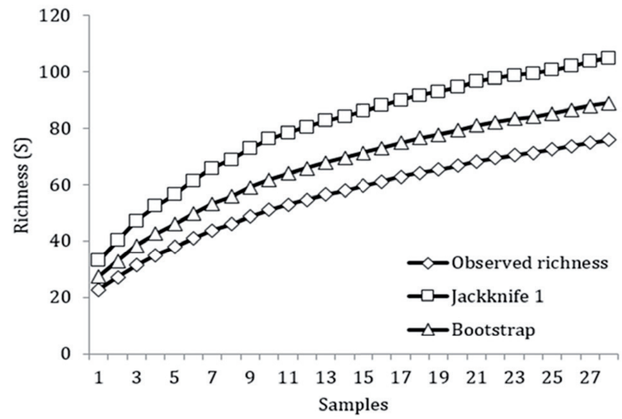

Figure 2. Observed and estimated species richness (Jackknife 1 and Bootstrap) for ground-dwelling spider assemblage in the northern region of the Brazilian Pantanal.

No differences were observed in the composition of ground-dwelling spiders between the three evaluated landscape units, in terms of assemblage abundance (MANOVA, $F_{2,27}$ = 1.80; P = 0.14), and occurrence (presence-absence of species) (MANOVA, $F_{2,27}$ = 1.30, P = 0.28). No differences were observed individually in distribution of abundance (ANOVA, $F_{2,27}$ = 0.51, P = 0.60): 276 individuals (38.1%) were sampled in forested areas, 242 individuals (33.4%) in *murundu* fields and 206 individuals (28.5%) in pastures. Regarding observed richness of ground-dwelling spiders, no differences were detected between the vegetation formations (ANOVA, $F_{2,27}$ = 0.10, P = 0.90): 33 species were observed in pasture areas, 27 species in *murundus* and 25 species in forested areas.

Lycosidae, Ctenidae, Salticidae and Corinnidae were predominant in forested areas (68.5% of the total), while Lycosidae and Gnaphosidae had the highest abundance in *murundu* fields and pastures (52.1% and 57.3% of the total, respectively). Across all landscape types, *H. pardalina* and *A. silvestrii* were the most abundant species. Only nine species were present in all habitats (18%), 12 were sampled exclusively in pastures (24%), six in forested areas, and another six in *murundu* fields (12% each).

Table 1. Araneae abundance in different vegetation types (pasture, *murundu* fields and forested areas) sampled in September and October 2007, in the northern region of the Brazilian Pantanal. * AH – Aerial hunters; DAA – Diurnal aerial ambushers; DSWW – Diurnal space web-weavers; GR – Ground runners; GW – Ground weavers; NAA – Nocturnal aerial ambushers; NGA – Nocturnal ground ambushers; NGH – Nocturnal ground hunters; NGR – Nocturnal ground runners; OW – Orb-weavers; ** Immature specimens (not identified at genus or species level).

Taxa	Vegetation			Total	Guilds*
	Pastures	*Murundu* fields	Forested areas		
Amaurobiidae					
**	-	-	1	1	GW
Anyphaenidae					
**	-	-	1	1	AH
Araneidae					
Alpaida veniliae (Keyserling, 1865)	2	-	-	2	OW
**	1	-	-	1	OW
Caponiidae					
Nops sp.	1	-	-	1	NGH
**	-	-	1	1	NGH
Clubionidae					
**	-	-	1	1	AH
Corinnidae					
Castianeira sp.1	1	-	2	3	GR
Castianeira sp.2	-	-	1	1	GR
Falconina sp.	2	6	4	12	GR
Meriola sp.	1	-	-	1	GR
Orthobula sp.	-	10	5	15	GR
**	5	11	9	25	GR
Ctenidae					
Centroctenus ocelliventer (Strand, 1909)	3	1	-	4	NGA
**	7	19	23	49	NGA
Gnaphosidae					
Apopyllus iheringi (Mello-Leitão, 1943)	1	1	-	2	GR
Apopyllus silvestrii (Simon, 1905)	5	21	11	37	GR
Camillina sp.	1	1	1	3	GR
Eilica sp.	3	2	-	5	GR
**	6	13	8	27	GR
Hahniidae					
Hahniidae 1	7	1	1	9	GW
**	-	1	1	2	GW
Linyphiidae					
Pseudotyphistes sp.	3	-	1	4	DSWW
Agyneta sp.1	-	2	1	3	DSWW
Agyneta sp.2	1	-	-	1	DSWW
Linyphiidae 1	-	-	1	1	DSWW
Linyphiidae 2	3	1	-	4	DSWW
Linyphiidae 3	1	-	-	1	DSWW
Linyphiidae 4	-	1	-	1	DSWW
Linyphiidae 5	2	-	-	2	DSWW
**	3	1	3	7	DSWW
Lycosidae					
Allocosa sp.	3	-	-	3	NGH
Lycosa carbonelli Costa & Capocasale, 1984	2	-	-	2	NGH
Hogna pardalina (Bertkau, 1880)	24	19	15	58	NGH
Arctosa ausseri (Keyserling, 1877)	1	1	-	2	NGH
Molitorosa molitor (Bertkau, 1880)	-	1	-	1	NGH
**	72	67	109	248	NGH

Table 1. Continuation.

Taxa	Vegetation			Total	Guilds*
	Pastures	*Murundu* fields	Forested areas		
Miturgidae					
Teminius insularis (Lucas, 1857)	1	1	2	4	GR
**	-	1	1	2	GR
Oonopidae					
Hexapopha sp.	1	3	2	6	NGH
Neoxyphinus sp.	-	1	1	2	NGH
Oonops sp.	1	1	1	3	NGH
Scaphiella sp.	-	3	1	4	NGH
**	3	5	8	16	NGH
Oxyopidae					
Peucetia aff. *rubrolineata*	-	1	-	1	AH
**	1	3	-	4	AH
Palpimanidae					
**	-	2	-	2	NGH
Pholcidae					
Mesabolivar sp.	-	-	1	1	DSWW
Pisauridae					
Thaumasia sp.	-	3	-	3	NGA
**	-	1	-	1	NGA
Prodidomidae					
Prodidomidae 1	1	-	-	1	GR
**	-	-	1	1	GR
Salticidae					
Aillutticus raizeri Ruiz & Brescovit, 2006	2	7	6	15	NGR
Freya chapare Galiano, 2001	2	2	-	4	NGR
Freyinae 1	-	1	-	1	NGR
Freyinae 2	-	-	1	1	NGR
Neonella aff *nana* Galiano, 1988	1	-	1	2	NGR
Romitia sp.	1	-	-	1	NGR
Sitticinae 1	1	1	-	2	NGR
Tullgrenella guayapae Galiano, 1970	-	-	1	1	NGR
**	7	13	12	32	NGR
Indeterminated	-	1	-	1	NGR
Sparassidae					
**	1	-	2	3	NAA
Tetragnathidae					
**	5	2	3	10	OW
Theraphosidae					
**	1	-	1	2	NGA
Theridiidae					
Dipoena sp.	-	1	-	1	DSWW
Euryopis sp.	2	-	-	2	DSWW
Steatoda sp.	-	-	1	1	DSWW
**	2	4	7	13	DSWW
Thomisidae					
**	-	1	1	2	DAA
Titanoecidae					
Goeldia sp.	-	3	4	7	GW
**	-	-	1	1	GW
Trechaleidae					
Paradossenus minimus (Mello-Leitão, 1940)	1	-	-	1	NAA

Table 1. Continuation.

Taxa	Vegetation			Total	Guilds*
	Pastures	*Murundu* fields	Forested areas		
**	3	-	1	4	NAA
Zodariidae					
Cybaeodamus aff. *meridionalis*	3	-	8	11	GR
Leprolochus sp.	5	-	5	10	GR
**	-	-	1	1	GR
Zoridae					
**	-	1	2	3	GR
Abundance (adults)	89	98	82	269	
Abundance (immature specimens)	117	144	194	455	
Total	**206**	**242**	**276**	**724**	

Descriptive evaluation of behavioural guilds identified 10 groupings. Hunting spiders (n=645; 89.1%) were predominant over weavers (n=79; 10.9%). Nocturnal ground hunters (n=349; 48.2%), ground runners (n=164; 22.7%) and nocturnal ground runners (n=60; 8.3%) represented the main groups of hunting spiders. Among the weavers identified were diurnal space web weavers (n=46; 6.3%), ground weavers (n=20; 2.7%) and orb weavers (n=13; 1.8%). Hunting spiders were most abundant in the forested areas (n=250; 38.7% of total hunters), followed by *murundus* (n=221; 34.3%) and pasture (n=174; 24 %), while the weavers were more numerous in pasture areas (n=32; 40.5% of total weavers), followed by forested areas (n=26; 32.9%) and *murundu* fields (n=21; 26.6%).

Discussion

Despite the specific structural conditions of each vegetation formation (*e. g.* Junk *et al.*, 1989, 2006; Tissiani *et al.*, 2015), abundance, species richness and composition of ground-dwelling spider assemblages did not show any differences between forested areas, pasture, and *murundu* fields. In addition to the similar distribution between vegetation types, the spider assemblage composition is also comparable to those obtained in surveys conducted in the same region of the Pantanal (Castilho *et al*., 2005; Raizer *et al*., 2005; Battirola *et al*., 2010; Marques *et al*., 2010, 2011), except for the dominance of Lycosidae and Gnaphosidae. The groups in behavioural guilds, although have not been statically evaluated, show heterogeneous distribution between weavers and hunting spiders, and high prevalence of hunting spiders in all vegetational formations, as registered in other habitats of the Pantanal of Poconé (Castilho *et al*., 2005; Battirola *et al*., 2010).

The structural variation between habitats can affect the distribution of resources to the fauna, considering that it offers a three-dimensional array of substrates, physical and chemical, wet and dry, exposed or not, which directly receive the sun's energy (Erwin, 2013). Areas with high complexity in the vegetation can present a larger variety of prey or more diversified sites for spiders to build traps and shelters (Cardoso *et al*., 2011). However, the similarity between the patterns of ground-dwelling spiders assemblages may be associated to the fact that the landscape formation of the Pantanal's flood plains occurs in a mosaic arrangement (Silva *et al.*, 2000; Nunes-da-Cunha and Junk, 2014), where abrupt changes between vegetation types allows units of different vegetation types to exist within close proximity to one another. Therefore these vegetation types are subject to the same variations and influences from floods, soil type, moisture and temperature, allowing the occurrence of spider assemblages with similar structure, due to the proximity with these habitats.

The occurrence of many grassed areas within the assessed mosaic landscape, especially *murundus* and pastures, is one of the factors responsible for the dominance of Lycosidae and Gnaphosidae in the assemblage composition. Weeks and Holtzer (2000) found these same families within habitats formed by this type of vegetation. The Lycosidae are cosmopolitan and vary greatly in size (Foelix, 1996); they are characterised as typical ground-dwelling spiders. Jocqué and Alderweireldt (2005) showed that Lycosidae co-evolved with the formation of grass/fields and dispersed concurrently with the expansion of this vegetation type, as evidenced by the high abundance of these spiders in open habitats with low vegetation, as well as low frequency in dense forests, agreeing with the results observed in this study, where a high abundance of these spiders was found in open habitats.

For Jocqué and Dippenaar-Schoeman (2007), Gnaphosidae behaviour is similar to the Lycosidae, occurring in a wide variety of habitats. The Gnaphosidae are engaged in nocturnal activity, and their foraging tactics resemble those used by Lycosidae (Weeks and Holtzer, 2000), facilitating colonisation of open areas such as fields and pastures (Jocqué and Dippenaar-Schoeman, 2007). These spiders select their microhabitats according to available moisture, litter and presence of herbaceous vegetation (Cady, 1984). Studies conducted in forested areas in the same region of the Pantanal showed lower activity and species richness of these families compared to pasture and *murundu* fields evaluated in this study, further demonstrating the interaction between these spiders with open vegetation areas (Castilho *et al*., 2005; Battirola *et al*., 2010).

The total sampled species in our study conducted in a mosaic of vegetation formation is higher than species richness recorded in surveys conducted in monodominant forest in the same Pantanal region, such as areas with *Attalea phalerata* Mart. (Arecaceae) (Castilho *et al.*, 2005; Marques *et al.*, 2011) and *Vochysia divergens* Pohl. (Vochysiaceae) (Battirola *et al.*, 2010). This high species richness is probably related to the variation in vegetation types occurring in the study area. The Salticidae, Linyphiidae and Lycosidae families showed higher species richness in this study. In addition to the large representation of these families in numbers of species, it was possible to identify and make the first record of *Aillutticus raizeri* (Salticidae) in the northern region of the Pantanal of Mato Grosso. This species was previously recorded only in the Pantanal of Mato Grosso do Sul (Ruiz and Brescovit, 2006), and is possibly endemic to the Pantanal, since there are no records in any other regions of Brazil. Other Salticidae also recorded for the first time in this region were *Freya chapare* Galiano, 2001, previously known only to Bolívia and Goiás State (Brazil) (Galiano, 2001), and *Tullgrenella guayapae* Galiano, 1970, previously recorded only in Argentina (Platnick, 2014).

Due to seasonal structural alterations in the system caused by flood pulse in flood-prone areas such as the Amazon and Pantanal, ground-dwelling species may behave differently in response to environmental conditions, such as by using of trunks and canopies in vertical migration behaviour, or in horizontal movement along the ground following the flood line (Adis, 1981, 1997; Höfer, 1997). These movements cause assemblages that occupy seasonally flooded areas to come into contact with those who occupy non-floodable habitats. Although this study was conducted in the Pantanal during the dry season, it is possible to infer that the *murundu* fields and forested areas mountain ranges act as places of refuge for edaphic organisms, since these areas are not directly affected by seasonal flooding (*e. g.* Nunes da Cunha *et al*., 2007; Battirola *et al*., 2009; De Morais *et al*., 2013). This movement would allow the occurrence of species from both wetland habitats and non-floodable habitats in one place, increasing the similarity between assemblages, even in different habitats and seasonal periods.

In general, abundance, species richness and composition of ground-dwelling spider assemblages did not present differences between forested areas, pasture, and *murundu* fields. However ground-dwelling spider assemblage showed relatively high species richness in the three analysed vegetation types and high similarity between them. In this study Lycosidae and Gnaphosidae dominance was associated with grassed areas, characterising this assemblage and indicating the importance of this kind of habitat in the region of the Pantanal to the maintenance requirement of the vegetational mosaic and for the conservation of Pantanal biodiversity.

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