Original Article

TREE COMMUNITY STRUCTURE IN A NEOTROPICAL SWAMP FOREST IN SOUTHEASTERN BRAZIL

ESTRUTURA DA COMUNIDADE ARBÓREA EM UMA FLORESTA PALUDOSA NO SUDESTE BRASILEIRO

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ABSTRACT: The study aimed evaluates the tree structure in a swamp forest in southeastern Brazil and compare with other studies. All individuals with perimeter at breast height ≥10 cm were sampled at 0.22 hectares. We recorded 39 species included in 26 botanical families. *Richeria grandis*, *Xylopia emarginata*, *Protium heptaphyllum*, *Tapirira guianensis* and *Calophyllum brasiliensis* showed the highest importance values, and are characteristics of the Brazilian swamp forests. These forests are restricted in permanently waterlogged land and showed peculiar floristic composition and structure, differing of the others woody physiognomies of the Cerrado Domain. Floristic and structural comparisons with other swamp forests showed a clear distinction between Distrito Federal and Triângulo Mineiro forests with those of the São Paulo state and south of Minas Gerais. This suggests some floristic and structural heterogeneity related to geographical distance between surveys and relation with phytogeografic patterns for each swamp forest.

KEYWORDS: Alluvial forests. Floristic and structural comparisons. Phytogeography. Phytosociology. Wetland forests.

INTRODUCTION

According to Ribeiro e Walter (2001), gallery forests accompanying small streams in Central Brazil. These physiognomies are intrusions both of the Atlantic and Amazon rainforest, with floristic links that are distinguished depending on the location of each one along the Cerrado domain (OLIVEIRA-FILHO; RATTER 1995). Two subtypes of gallery forests may be recognized due the particular environmental features, such as topography and height of the water table. The non-flooded, which occur on well drained soils and flooded gallery forest (RIBEIRO; WALTER, 2001; 2008). These latter are also commonly referred as swamp forests, wetland forests, alluvial forests or yet hygrophilous forests, always established on poorly drained soils i.e. hydromorphic soil, subject to the presence of surface water permanently (TORRES et al., 1994; RODRIGUES, 2000). Appear in floodplains or flooded plains, headwaters or margin of the rivers or lakes, and it may also occur in depressions, where the water saturation of the soil is a consequence of the water tables outcrops (IVANAUSKAS et al., 1997). Nevertheless they present physiognomic, floristic and structural peculiarities, differing from the other forest types, including non-flooded alluvial forests (RODRIGUES, 2000; ALLEN et al., 2005; SILVA et al., 2007).

The swamp forests play an important role in protection of the water riversides. These are considered how permanent preservation sites by the new Brazilian Forest Code, as the other alluvial forests formations. However, the range of at least 30 m, established by the law over the riversides, it is not always effective for the protection of all its floristic and structural complexity, even when the legislation is respected (SILVA JUNIOR, 2001).

The swamp forests have species able to germinate and grow in water saturation conditions and consequent of oxygen scarcity (FERREIRA; RIBEIRO, 2001). This flooding condition is one of the main physical factors that select the occurrence of species, making a strong selective pressure and promoting a low richness and plant diversity, with the incidence of a few species adapted to this environment in a fine scale (TORRES et al., 1994; KOPONEN et al., 2004). Therefore, these forests tend to have high structural similarity due to the prevalence of a few characteristics species, although floristic comparisons between swamp forests have been varied, with a marked floristic heterogeneity in a regional scale (TEIXEIRA; ASSIS, 2005; TEIXEIRA et al., 2008). So, is well known that these forests are less diverse, but floristically distinct among them and especially among the surrounding seasonal forests and other alluvial forests (MARQUES et al., 2003; SILVA et al., 2007).

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Although still incipient, floristic and tree structure studies in Brazilian swamp forests have been made in the recent years, mainly in the state of São Paulo (TORRES et al., 1994; COSTA et al., 1997; IVANAUSKAS et al., 1997; TONIATO et al., 1998; PASCHOAL; CAVASSAN, 1999; MARQUES et al., 2003; TEIXEIRA e ASSIS, 2005). In central Brazil the studies was made by Guarino e Walter (2005) in Distrito Federal. In Minas Gerais, there are two studies in the southern of the state (ROCHA et al., 2005; LOURES et al. 2007) and one in the Triângulo Mineiro (NOGUEIRA; SCHIAVINI, 2003), where these formations occur with frequency. Nevertheless are in constant threat due to the deforestation, caused by farming, hydroelectric enterprises and other diverse anthropogenic causes. Regarding this, floristic comparisons in swamp forests at different localities practically do not exist (SILVA et al., 2007).

This study aimed to examine the tree community structure of a swamp forest in southeastern Brazil. Floristic comparisons were made and we discussed possible changes in floristic and structural in these forests related to the latitudinal gradient (of the state of São Paulo to the Distrito Federal).

MATERIAL AND METHODS

Study site: The study was carried in Parque Municipal do Sabiá (PMS), located in the urban perimeter of Uberlândia, Triângulo Mineiro, Brazil (18°54’52 "S; 48°14'02" W). The PMS has an area of 185 hectares, of which about 35 are occupied by remnants of native vegetation. The altitude varies around 890 m of the sea level, and has a seasonal climate with two well-defined seasons, one with a hot and rainy summer, especially in December and January, and another with cold and dry winter, especially in June and July. Other physical aspects of the PMS are shows in Guilherme e Nakajima (2007).

According to Guilherme et al. (1998) the remnant is represent by the seasonal semideciduous forest, woody savanna (‘cerradão’), and vegetation with fluvial influence (*sensu* IBGE, 2012), and this covers both the swamp forest and the ‘veredas’ (hydromorphic lands recognized by the presence of palm tree *Mauritia flexuosa* L.f.). The swamp forest investigated permeates almost the entire course of the Jataí stream. Several sections of this stream are poorly drained, forming a diffuse water system, and providing this marshy condition. The swamp forest also has an evident transition region with the seasonal semideciduous forest, which presents gradual transitions with two ‘cerradões’ spots. There are strong human evidence inside the remnant, especially in the seasonal forest and ‘cerradões’, while the conditions of constant water saturation keeps the swamp forest more restrict to visitations and, therefore, more conserved. In general, these forests are characterized by the canopy dominated by a few species; with emphasize *Xylopia emarginata* Mart., due its peculiar crow architecture (coniferous format). The understory vegetation has different densities, dominated by small woody species, especially of the families Melastomataceae, Rubiaceae and Piperaceae.

Tree structure and data analysis: The survey comprised the period from April 1994 to March 1995. It was used 22 plots of 100 m^2 (5 × 20m), demarcated systematically (with intervals of at least 10m each other plot) along the main drainage line of the Jataí stream, totaling 0.22 hectares.

We identified and measured the estimated height and circumference of all non-climbing woody plants (trees and shrubs) with perimeter at breast height (PBH), occurring in the plots with a PBH ≥10 cm. Voucher specimens were collected and the species identification was made with literature, specialists assistance and comparisons with the collections of the *Herbarium Uberlandensis* (HUFU), here the material are lodged. The species were grouped in families recognized by the Angiosperm Phylogeny Group (APG III, 2009).

The phytosociological relative parameters of density, frequency and dominance, and the importance value (IV) were calculated for whole survey and for each species (MUELLER-DOMBOIS; ELLENBERG, 1974). To determine the species diversity indexes were calculated Shannon diversity (H’) and the Pielou evenness (J') in natural logarithmic base (BROWER; ZAR, 1984). Analyzes were made using the electronic Excel spreadsheet.

To assess the floristic and structure similarity between the swamp forest and other physiognomies (seasonal semideciduous forest and two ‘cerradões’) studied in the PMS (*sensu* GUILHERME; NAKAJIMA 2007) were used the Jaccard (qualitative) and Morisita (quantitative) similarity indices, respectively.

Floristic comparison between ten Brazilian swamp forests were also performed by the cluster hierarchical analysis, employing the UPGMA method (Unweighted Pair Groups Method using Arithmetic average) and the Jaccard similarity index. The grouping analysis was based on the data of species presence/absence. We compared the present survey with five swamp forests in São Paulo state, two in Minas Gerais and two in Distrito Federal (Table 1). To check the species distribution of abundance, was used the detrended correspondence analysis (DCA), which allows an indirect analysis of gradients (HILL; GAUCH, 1980). We made a species abundance matrix, expressed by the absolute density (total number of individuals per hectare), in order to minimize the sampling effort among the swamp forests compared. For both analysis were eliminated the taxa with inaccurate identification, i.e. only at the genera and/or family level. From 248 species, 152 (61%) were exclusive of one of the ten surveys and excluded from the analysis, since no contribute to the qualitative and quantitative comparison between sites (*sensu* KENT; COKER, 1992). The synonyms were revised following Oliveira Filho (2006), and analysis were made in PC-ORD for Windows program, version 4.14 (McCUNE; MEFFORD, 1999).

Table 1. Sites, geographic coordinates (S, W), altitude (Alt.), rainfall (Pluv.) and temperature (Temp.) annual average, floristic data, individual inclusion criteria (diameter or perimeter at breast height) and the size sampling on the swamp forests in the Southeast and Central Brazil. * Data not supplied.

Sites	S, W	Alt.	Rainfall (mm)	Temp. (ºC)	Species number	H’	Inclusion Criteria	Area (ha)	Reference
Campinas, SP (1)	22º55 ’, 47º05'	660	1371	21.6	33	2.45	DBH ≥ 5 cm	0.87	Torres et al. (1994)
Itatinga, SP (2)	23º17’,48º38’	570	*	18.0	39	2.75	PBH ≥ 15 cm	1.00	Ivanauskas et al. (1997)
Campinas, SP (3)	22º49’,47º06’	600	1382	21.6	55	2.80	PBH ≥ 10 cm	0.20	Toniato et al. (1998)
Brotas, SP (4)	22º16’,48º06’	470	1421	22.0	51	2.81	DBH ≥ 5 cm	0.36	Marques et al. (2003)
Rio Claro, SP (5)	22º21’,47º28’	640	1456	22.1	49	2.10	PBH ≥ 15 cm	0.45	Teixeira e Assis (2005)
Brasília, DF (6)	15º35’,48º10’	*	*	*	60	2,.9	DBH ≥ 3 cm	0.80	Guarino e Walter (2005)
Brasília, DF (7)	15º55’,48º02’	*	*	*	53	2.84	DBH ≥ 3 cm	0.80	Guarino e Walter (2005)
Coqueiral, MG (8)	21º09 ’, 45º28	810	1493	19.3	99	3.50	PBH ≥ 15.7 cm	0.32	Rocha et al. (2005)
Uberlândia, MG (9)	18º52’,48º14’	860	*	*	33	2.28	PBH ≥ 15 cm	0.62	Nogueira e Schiavini (2003)
Uberlândia, MG (10)	18º54’,48º14’	890	1550	22.0	39	2.69	PBH ≥ 10 cm	0.22	Current Study

RESULTS

Tree structure: Throughout the survey were recorded 756 individuals, distributed in 39 species and 26 botanical families, resulting in a total estimated density and basal area of 3436 ind.ha^{-1} and 31.0 m^2.ha^{-1}, respectively. The diversity index was estimated at 2.69 and the evenness index in 0.73. This value indicates that few species highlighted in the survey, predominantly *Richeria grandis*, *Protium heptaphyllum* and *Xylopia emarginata*. This species encompassed 52% of all individuals, 67% of the total basal area and 48% of the IV. These three species put their respective families, Phyllanthaceae (one species), Burseraceae (one species) and Annonaceae (two species), with the highest values in these three parameters. Melastomataceae and Rubiaceae (four species each) contributed with the greatest richness of the survey, and Fabaceae showed one species (*Inga vera*) with only two individuals.

Richeria grandis and *Protium heptaphyllum* showed the higher density, frequency, dominance and IV (Table 2). Among the other species with greater IV, *Xylopia emarginata, Tapirira guianensis* and *Caloplyllum brasiliense* highlighted due to the high basal areas and consequent dominance. *Guarea kunthiana* and *G. macrophylla* had high levels of

IV, mainly because of the high density and frequency of their individuals. These seven species contributed with 70.8% of the total IV in swamp forest of the PMS.

Table 2. Tree structure parameters of species sampled in Parque do Sabiá swamp forest, Uberlândia, MG. NI = number of individuals; BA = basal area (m^2), P = number of plots; DR = relative density (%); DoR = relative dominance (%); FR = relative frequency (%); IV = importance value (%). The species are listed in descending order of total IV. * Exclusive species of the swamp forest in Parque do Sabiá.

Species	NI	BA	P	DR	DoR	FR	IV
Richeria grandis Vahl *	160	2.442	22	21.2	35.8	8.6	65.6
Protium heptaphyllum (Aubl.) Marchand	153	1.298	22	20.2	19.0	8.6	47.9
Xylopia emarginata Mart. *	83	0.833	20	11.0	12.2	7.8	31.0
Tapirira guianensis Aubl.	52	0.530	21	6.9	7.8	8.2	22.9
Guarea kunthiana A. Juss.	44	0.244	20	5.8	3.6	7.8	17.2
Calophyllum brasiliense Cambess. *	26	0.523	13	3.4	7.7	5.1	16.2
Guarea macrophylla Vah *	37	0.083	14	4.9	1.2	5.5	11.6
Ilex cf. *cerasifolia* Reissek *	20	0.073	10	2.7	1.1	3.9	7.6
Myrsine guianensis Aubl.	14	0.059	10	1.9	0.9	3.9	6.6
Cyathea delgadii Sternb. *	17	0.102	7	2.3	1.5	2.7	6.5
Styrax acuminatus Pohl	11	0.046	9	1.5	0.7	3.5	5.7
Miconia theaezans (Bonpl.) Cogn. *	20	0.050	4	2.7	0.7	1.6	5.0
Miconia elegans Cogn. *	11	0.024	7	1.5	0.4	2.7	4.6
Aniba heringeri Vattimo-Gil *	9	0.040	6	1.2	0.6	2.3	4.1
Cecropia pachystachya Trécul	9	0.036	6	1.2	0.5	2.3	4.1
Magnolia ovata (A. St .- Hil.) Spreng. *	8	0.037	6	1.1	0.5	2.3	3.9
Ilex brasiliensis (Spreng.) Loes *	14	0.034	4	1.9	0.5	1.6	3.9
Symplocos nitens (Pohl) Benth.	8	0.020	6	1.1	0.3	2.3	3.7
Pseudolmedia laevigata Trécul	5	0.086	4	0.7	1.3	1.6	3.5
Clusia criuva Cambess. *	7	0.014	6	0.9	0.2	2.3	3.5
Ferdinandusa speciosa Pohl *	7	0.033	5	0.9	0.5	2.0	3.4
Croton urucurana Baill. *	3	0.033	3	0.4	0.5	1.2	2.1
Xylopia aromatica (Lam.) Mart.	3	0.032	3	0.4	0.5	1.2	2.0
Tapirira obtusa (Benth.) J. D. Mitch.	4	0.014	3	0.5	0.2	1.2	1.9
Cybianthus glaber A. DC. *	3	0.016	3	0.4	0.2	1.2	1.8
Dendropanax cuneatus (DC) Decne. and Planch. *	3	0.016	3	0.4	0.2	1.2	1.8
Ouratea castaneifolia (DC) Engl. *	2	0.024	2	0.3	0.4	0.8	1.4
Chomelia pohliana Müll.Arg. *	3	0.010	2	0.4	0.2	0.8	1.3
Posoqueria latifolia (Rudge) Roem. and Schult. *	2	0.012	2	0.3	0.2	0.8	1.2
Hedyosmum brasiliense Miq. *	5	0.008	1	0.7	0.1	0.4	1.2
Miconia cuspidata Mart. ex Naudin	2	0.006	2	0.3	0.1	0.8	1.1
Persea cf. *venosa* Nees *	2	0.004	2	0.3	0.1	0.8	1.1
Coussarea hydrangeifolia (Benth.) Müll. Arg.	2	0.003	2	0.3	0.0	0.8	1.1
Inga vera Willd.	2	0.015	1	0.3	0.2	0.4	0.9
Terminalia glabrescens Mart. *	1	0.010	1	0.1	0.2	0.4	0.7
Diospyros inconstans Jacq. *	1	0.004	1	0.1	0.1	0.4	0.6
Daphnopsis racemosa Griseb *	1	0.002	1	0.1	0.0	0.4	0.6
Maprounea guianensis Aubl.	1	0.001	1	0.1	0.0	0.4	0.5
Tococa formicaria Mart. *	1	0.001	1	0.1	0.0	0.4	0.5

Floristic and structural similarities: Of 167 tree species registered in forest remnants of the PMS, the swamp forest engulfed 39 species, of which 25 were exclusive this physiognomy (Table 2). This resulted in extremely low values of floristic and structural similarities between the swamp forest and the physiognomies of seasonal semideciduous forests and two 'cerradões' that comprise the remnant (Table 3).

Table 3. Floristic (†) and structural (‡) similarities between the swamp forest and other forest physiognomies (*sensu* GUILHERME e NAKAJIMA, 2007) in Parque do Sabiá, Uberlândia, MG. SSF: seasonal semideciduous forest.

	Swamp Forest	SSF	'cerradão' 1	'cerradão' 2
Swamp Forest	_	0.04 ‡	0.01 ‡	0.02 ‡
SSF	0.11 †	_	0.17 ‡	0.50 ‡
'cerradão' 1	0.03 †	0.15 †	_	0.52 ‡
'cerradão' 2	0.07 †	0.29 †	0.43 †	_

The cluster hierarchical analysis (UPGMA) of the ten swamp forests compared (Table 1), indicated the formation of two different groups (Figure 1). One of them was composed by the two surveys of the Distrito Federal (DF) and two of the Triângulo Mineiro (TM), including this study. In this group, the forest of the DF showed fusion level around 55% with the forests of TM, and these two subgroups are very similar to each other. The other group included the swamp forests of the São Paulo state (SP) and the survey of Coqueiral, in the south of Minas Gerais, at the fusion level around 25%. Coqueiral presented the fusion level around 70% in relation to two other sites of SP (sites 1 and 2 - Table 1).

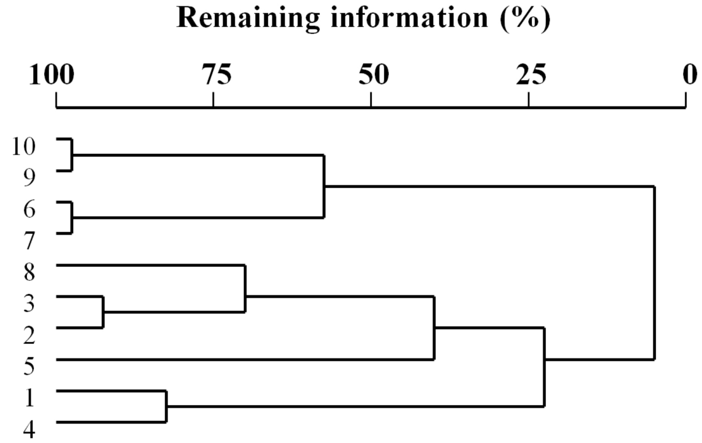

Figure 1. UPGMA dendrogram using Jaccard similarity coefficient between ten Brazilian swamp forest floristic surveys. The numbers correspond to study sites described in Table 3.

The DCA diagram showed similar results to those found in UPGMA (Figure 2). Although short gradients have occurred for the first two axes (2.93 and 2.50), the eigenvalues were 0.632 for the axis 1 and 0.276 for the axis 2. Thus, around 63% of the variation of the data was synthesized by the first axis of the diagram, which separated the DF and TM swamp forests of the other forests in SP state and south of MG (Coqueiral). The variation of approximately 28% recorded for the axis 2 can be explained mainly by the isolation of the study carried in Coqueiral. By this diagram emerges an indication that the ten compared swamp forests showed structural separation based on the distinction of Domains, with reflex in the geographical distances between the surveys. So between the latitudes 15º-18º was formed a cohesive group of the swamp forests of the DF and TM, which fall within the Cerrado Domain. While between latitudes 22º-23º grouped the forests of the SP state, and latitude 21º comprised the study of Coqueiral, which are closer to the Atlantic Domain (Table 1).

These floristic and structural tree distinctions between swamp forests occur due the abundance of some unique species in certain localities. Some of these species like *Ferdinandusa speciosa*, *Hedyosmum brasiliense*, *Pseudolmedia laevigata*, *Richeria grandis* and *Xylopia emarginata* occurred exceptionally in DF and TM surveys. *Protium heptaphyllum* was also present in these regions and in Coqueiral. While *Styrax pohlii*, *Ficus obtusiuscula*, *Copaifera langsdorffii* and *Syagrus romanzoffiana* were frequent only in the SP state swamp forests, with the latter two also occurring in Coqueiral. Unlike, some species were widely distributed throughout the swamp forests. Among the 96 species used for comparative analysis, *Calophyllum brasiliense*, *Dendropanax cuneatus*, *Magnolia ovata* and *Tapirira guianensis* occurred in all studies, while *Cecropia pachystachya*, *Guarea* *macrophylla* and *Protium spruceanum* occurred in most than 70% of the surveys.

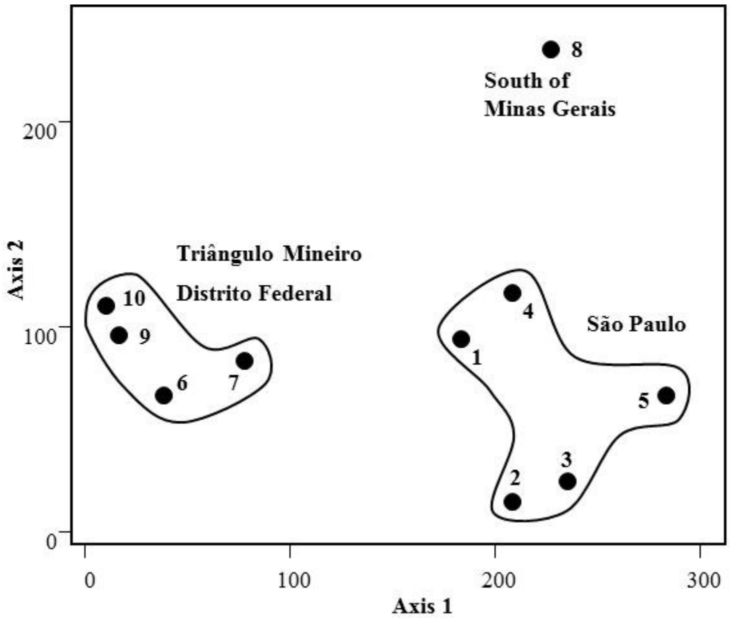

Figure 2. DCA ordination of the two first axes comparing data from 96 tree species abundance in surveys of ten Brazilian swamp forests. The numbers correspond to study sites described in Table 3.

DISCUSSION

High floristic and structural dissimilarities were found between the swamp forest and the seasonal semideciduous forests and the two 'cerradões', which comprise a single urban forest remnant in the PMS (GUILHERME et al., 1998; GUILHERME; NAKAJIMA, 2007). Considering that these physiognomies are adjacent to the swamp forest, it would not be surprising to find a larger number of species co-occurring between them. These data reinforce that the peculiarities of the alluvial environment, offered by the intermittent water stress, provide the occurrence of distinctive species, and no support the founds in other studies (TORRES et al., 1994; IVANAUSKAS et al., 1997; MARQUES et al., 2003; ROCHA et al., 2005). This authors considered the adjacent forest connections propitious for the species supply, contributing for the increasing the floristic abundance and the diversity in the swamp forests. Therefore, the swamp forest floristic composition and structure traits, extols the importance of their conservation, both in the maintenance of plant diversity as the water resources in PMS.

When compared with other swamp forests assessed in this study, 25.6% of the 39 species recorded here occurred only in the PMS. Among them, *Chomelia pohliana*, *Coussarea hydrangeifolia*, *Ouratea castaneifolia* and *Terminalia glabrescens* are scattered in gallery forests and other forest physiognomies at the Cerrado Domain, and many others commonly found in the Triângulo Mineiro (OLIVEIRA FILHO, 2006). *Daphnopsis racemosa*, *Diospyros inconstans*, *Ilex brasiliensis* and *Tococa formicaria* also occur in these forests and, under the conservation status, are seen as rarely found in the Minas Gerais state (OLIVEIRA FILHO, 2006). All showed only one individual in the survey, except *I. brasiliensis*, with 14 individuals registered.

The tree structure of the swamp forest studied had peculiar features to those found in other similar forests, where few species, typically found in flooded soil, were important in terms of dominance, density and frequency. *Richeria grandis*, *Protium heptaphyllum*, *Xylopia emarginata*, *Tapirira guianensis*, *Caloplyllum brasiliense*, *Guarea kunthiana* and *G. macrophylla* contributed with over 70% of the total IV. That predictable concentration of many individuals in a few species characterized the structure of the PMS swamp forest and resulted in a relatively low evenness value. Associated to this, the small number of species recorded (39) reflected in the low diversity (H '= 2.69), corroborating with the values found in other swamp forests in SP and MG states, besides the Distrito Federal, which did not reach H' = 3.00. The low diversity found in these forests associated with poorly drained soils is consequence of the restrictive environmental conditions imposed on most species occurring there.

The presence and the importance of some botanical families may constitute important elements of differentiation between phytogeographic units. In this study, Fabaceae was represented by only two individuals of *Inga vera*. This has proved to be useful for physiognomy delimitation between the swamp forest and the other surrounding forestry formations of the PMS. The high occurrence of Fabaceae, with 29 species in total, contributed with the highest values of density and dominance in the physiognomies of the seasonal semideciduous forests and 'cerradões' studied by Guilherme e Nakajima (2007). Studies made in other regions of TM and DF (NOGUEIRA; SCHIAVINI, 2003; GUARINO; WALTER, 2005), also corroborate patterns of few Fabaceae species and individuals in swamp forests. However, a different pattern has been found in swamp forests of the SP state (TONIATO et al., 1998; MARQUES et al., 2003) and south of the MG state (ROCHA et al., 2005), where the Fabaceae appeared among the families with highest floristic richness.

This aspect registered for families was also found in qualitative and quantitative species analysis among the ten swamp forests compared. The forests of TM and DF have showed high structural and floristic similarities. The higher similarity occurs between the forest of PMS and the forest studied by Nogueira e Schiavini (2003), both in TM. The six most important species in PMS also include among the seven most important species in the survey of Nogueira e Schiavini (2003) in Uberlândia. The group of swamp forests studied in SP state showed similarities both in qualitative and quantitative analysis. Although without affinities in tree structure, the study of Coqueiral, in the south of MG state, presented floristic similarities with all studies in SP state. The segregation found between the surveys is related to the differentiated distribution of some abundant species exclusive in some sites.

Xylopia emarginata and *Richeria grandis* are among the most common species of Brazilian riverine forests (OLIVEIRA FILHO; RATTER, 1995) showing great emphasis on these alluvial formations. However, between latitudes 15º-18º, which includes the DF and TM, seem to limit the distribution of these species by the swamp forests. In its turn, *Protium heptaphyllum* also seems to occur with great abundance at higher latitudes and even in other forest physiognomies with less influence of the water courses, also occurring in the seasonal semideciduous forest of the PMS (GUILHERME e NAKAJIMA, 2007). In fact, other studies have reported *P. heptaphyllum* with wide distribution, occurring both in flooded and non-flooded forests (OLIVEIRA FILHO; RATTER, 1995; RIBEIRO; WALTER, 2008).

In the group of high density species in the swamp forests of SP state, *Styrax pohlii*, *Ficus obtusiuscula*, *Copaifera langsdorffii* and *Syagrus romanzoffiana* seems to dominate in higher latitudes, between 22º and 23º. Although they can be found throughout the area of the Cerrado Domain, as *C. langsdorffii* which was registered as a species of broad distribution for the Brazilian cerrados (RATTER et al., 2003), the others are more characteristics of the Atlantic Domain (OLIVEIRA FILHO et al., 2003). A wide range of occurrence of the Atlantic Domain throughout the SP state may help to explain these distribution patterns.

Nevertheless, some species were widely distributed throughout the swamp forests, such as. *Calophyllum brasiliense*, *Dendropanax cuneatus*, *Magnolia ovata*, *Tapirira guianensis*, *Cecropia pachystachya*, *Guarea macrophylla* and *Protium spruceanum*. All these species are considered of wide occurrence in the riverine forests, both permanently flooded as those periodically flooded (RODRIGUES; NAVE, 2000). However, Silva et al. (2007) verified that *C. brasiliense*, *D. cuneatus* and *M. ovata* occurs preferentially in swamp forests, although Oliveira Filho e Ratter (1995) reported that C. *brasiliense* is well distributed in South America, coupled with the water courses in soils with high humidity, and also in non-flooded gallery forest. Similarly, *T. guianensis* presents a wide distribution not only in forests associated with the beds of rivers, but also are found in 'cerradões' and well drainage forest physiognomies, including the Amazon Domain (OLIVEIRA FILHO; RATTER, 1995).

Although some species always appear with high emphasis along the Brazilian swamp forests, others are uncommon and specific to each survey. So, even though studies indicate a certain homogeneity and physiognomic likeness, the results indicate some degree of floristic diversity in the Brazilian riparian forests in environments on poorly drained soils (e.g. MARQUES et al., 2003; GUARINO; WALTER, 2005; TEIXEIRA; ASSIS, 2005). Although floristic and structural variations offered by environmental factors can act, this heterogeneity along the surveys seems also to have relation with the major Brazilian phytogeographic Domains. The floristic differences found between the studies indicate that these formations show a good example of floristic structural heterogeneity of the vegetation, reinforcing the need of more studies, delimiting future policies for conservation and suitable management of the Brazilian swamp forests.

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RESUMO: O estudo objetivou avaliar a estrutura arbórea de uma floresta paludosa na região sudoeste do Brasil, comparando-a com outros estudos. Todos os indivíduos com perímetro à altura do peito ≥10 cm foram amostrados em 0,22 hectares. Foram registradas 39 espécies inseridas em 26 famílias botânicas. *Richeria grandis*, *Xylopia emarginata*, *Protium heptaphyllum*, *Tapirira guianensis* e *Calophyllum brasiliensis* mostraram os maiores valores de importância, e são bem representadas nas florestas paludosas brasileiras. Essas florestas são restritas de terrenos permanentemente alagado e mostraram composição florística e estrutura peculiares, diferindo de outras fisionomias lenhosas do Domínio Cerrado. Comparações florísticas e estruturais com outras florestas paludosas mostrou uma clara distinção entre Distrito Federal e as florestas do Triângulo Mineiro, com aquelas localizadas no Estado de São Paulo e sul de Minas Gerais. Isso sugere alguma heterogeneidade florística e estrutural relacionado com a distância geográfica entre os levantamentos, e relação com padrões fitogeográficos para cada uma das florestas comparadas.

PALAVRAS-CHAVE: Florestas de brejo. Comparações florísticas e estruturais. Fitogeografia. Fitossociologia. Florestas de galeria inundáveis.

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