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## **Floristic Survey of the Herbaceous-Shrub Layer of a Gallery Forest in Alto Paraíso de Goiás - Go, Brazil**

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### **ABSTRACT**

*Flowering species of the herbaceous and shrubby layer were sampled in a gallery forest at Portal da Chapada, Alto Paraíso de Goiás-GO in the Chapada dos Veadeiros during 12 months growing within 4.5 meters on either side of a raised pathway 2.4 Km long. The collections were included to University of Brasilia Herbarium (UB). A total of 138 species (103 genera and 40 families) were recorded; the most species-rich families were Asteraceae (22), Poaceae (14), Rubiaceae (12), Fabaceae (11) and Melastomataceae (7). The richest family in number of genera was Asteraceae (19), followed by Poaceae (8), Fabaceae (8) and Rubiaceae (7). The results showed a meaningful increase in the Chapada dos Veadeiros flora, especially considering the herbaceous-shrubby layer of the gallery forests (223.6%). Despite the richness of the flora, the number of endemics species in the Goiás State was only 1.5%.*

**Key words:** Floristic survey, Cerrado, Chapada dos Veadeiros

### **INTRODUCTION**

The Cerrado biome of Central Brazil, extends across nine states (Bahia, Goiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Piauí and Tocantins, as well in the, Federal District), including some disjunct areas in the states of Amapá, Amazonas, Pará, Paraná, Rondônia, Roraima and São Paulo (Cavalcanti 2002). This territory occupies an area of approximately two million square kilometers (Ribeiro and Walter 2001), an area far more extensive than, for example the Pantanal, and qualifies the Cerrado as the second largest Brazilian biome, being smaller only to the Amazon rainforest. Among the phytophysionomies present in this biome, the gallery forests, ecosystems associated with the water (Ribeiro and Walter 1998) have been object of various studies in recent decades, which is of

fundamental importance to sustainable exploration and restoration of these environments.

Although the gallery and riverine forests occupy only 5% of the Cerrado biome, they contain nearly 33% of all known flowering plant species in the biome (Felfili et al. 2001), and although they are similar, these two forest types show some differences. These forest formations can be differentiated in three aspects (Ribeiro and Walter 2001): the width of the river which is adjacent to them, being narrower in the gallery forests, so that the tree crowns touch across the river (forming a gallery) while in the riparian forests, which can occur on the lake shores and the larger rivers (usually not exceeding 100 meters wide), the crowns do not touch, the deciduousness, which is much more evident in riparian forests and the floristic composition (with deciduous species predominant in the riparian forest and evergreen

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species in the gallery forests). Gallery forests can also be divided into flooded and non-flooded (Ribeiro and Walter 1998).

In the gallery forests of the Federal District, the number of herbs and shrub species can be well represented compared to the floristic composition of the tree stratum. In a section of gallery forest which has a high degree of human disturbance along the Guará stream in the Guará Ecological Park-DF, 49 tree species and 56 shrub and herbaceous were found (Nogueira et al. 2002). In the Cafuringa Environmental Protection Area in the Northern Federal District, there exists at least 108 herb and shrub species and 125 trees in the gallery forests (Silva et al. 1996). Gallery forests of the Biosphere Nuclear Area Reserve in the Federal District have more than 700 terrestrial flowering plant species, with 374 herbaceous and shrubby species and 340 trees (Mendonça et al. 2000). Felfili et al. (2001) reported that the floral diversity in the gallery forests was, in general, very similar to an equivalent area in other tropical forests and richer than those of the adjacent savanna formations. Gallery forests also tend to have many endemic species (Silva Junior et al. 1998).

According to Felfili et al. (2001), the gallery forests of Cerrado biome have, in general, similar numbers of species in the herbaceous and shrub and tree layers. However, the studies involving the vegetation of these forests were almost exclusively in the tree stratum (Eira and Martins Netto 1998; Fonseca and Ribeiro 1998; Haridasan 1998; Souza 1999, Correia et al. 2001; Schiavini et al. 2001; Silva et al. 2001; Silva Júnior et al. 2001; Ribeiro and Walter 2001).

In the region of Alto Paraíso, various studies have contributed to improving the floral knowledge of the Chapada dos Veadeiros region, but they did not prioritize the herbaceous-shrub layer when undertaken in the gallery forests. Munhoz and Proença (1998) reported 1310 flowering plant species in various vegetation types in the region of Chapada dos Veadeiros; 55 of which were herbaceous and shrub species and 69 tree species in the gallery forests. Souza (1999) conducted a floristic survey on a farm in the municipality of Cavalcante-GO, adjacent to the Chapada dos Veadeiros National Park, sampling various vegetation types, and found five herbaceous, two shrub and 27 tree species for the gallery forests. Silva et al. (2001), identified in gallery forests in the region, 23 flowering plant species utilized by

the local people, including six herbaceous and shrub species and 17 trees. In a floristic tree survey carried out in the Portal da Chapada, Alto Paraíso, Soares-Silva (2005) found 136 tree species in the same area of gallery forest of Couros river sampled in this present study, using the same collection criteria.

This work studied the herb-shrub species, along a section of gallery forest on the margins of the Couros river, and has been, therefore a complementary study to that by Soares-Silva (2005) to provide more data on the same area, also allowing the comparison of data.

There is a clear discrepancy between the number of studies undertaken on tree species and the herb-shrub layer, and consequently the herbs, shrubs and sub-shrubs are less well-known in the gallery forests. Knowledge on the floristic composition of the shrub layer may also be important in the projects of regenerating degraded areas, where not only trees but also shrub species can be used, information that corroborates that of Rezende (1998).

Herbaceous species may contribute to a rapid soil cover, improving the soil moisture conditions, increasing organic matter by accelerated decomposition, reducing erosion and also creating better conditions for development of tree species. In addition, the Chapada dos Veadeiros region has a well-developed ecotourism centre and for this activity, knowledge about the local flora would be of great importance, especially the herb-shrub layer of gallery forests, which are little known.

## MATERIAL AND METHODS

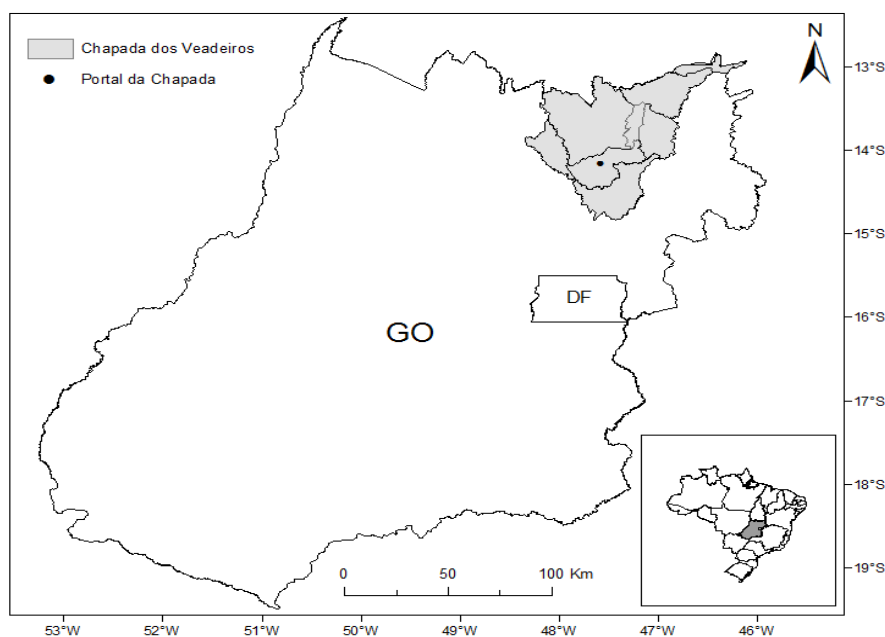
### Area of study

The study area is a forest formation with some flooded areas on the right bank of the Couros river, comprising 2.16 hectares, adjacent to an area of moist grassland. This area is located on the private property Portal da Chapada (14° 09' S, 47° 35' W, alt. 1164 m) in the municipality of Alto Paraíso de Goiás-GO in the Chapada dos Veadeiros region, about 240 km from Brasília-DF (Fig. 1). The forest is intercut by small streams and is in an excellent condition of conservation, with well-developed specimens of copaiba (*Copaifera langsdorfii* Desf.), cajarana [*Cabralea canjerana* (Vell.) Mart.], peroba-branca (*Aspidosperma spruceanum* Benth. ex Muell. Arg.) and palmito (*Euterpe edulis* Mart.).

### Floristic survey

Part of the gallery forest was bisected by a trail, on which a wooden walkway (1m wide and 2.4 Km long) was mounted, following the right bank of the Couros river. This catwalk, about 70 cm above the soil, was used as the reference point for the collections. Most of it passed through the forest interior, and sometimes along the border (ecotone

forest-wet grassland). Each day samples were collected, of all flowering plants in the herbaceous and shrub layer up to 4.5 m on each side of the walkway, throughout its extension. When the catwalk was along the forest border, the collections were made only of the forest side. This field procedure was repeated fortnightly for twelve months, totaling 25 sampling days.



**Figure 1** - Location of the State of Goiás, Chapada dos Veadeiros and Portal da Chapada in Brazil.

Species of terrestrial herbs, shrubs and semi-shrubs, flowering and /or fruiting, up to 2.5 m tall, had up to four samples collected, according to the availability of material. The most relevant characteristics of each species collected, such as height, colour and reproductive status were recorded in the field. Photographic records of specimens were taken with an Olympus digital camera with a resolution of 4 megapixels, to help the identification and create a photographic record. The specimens collected were processed according to standard methodology and were incorporated into the UB Herbarium (University of Brasilia).

The identifications were made by comparison with the herbarium material, consulting the relevant literature (Wanderley 1989; Filgueiras 1995, Judd et al. 1999; Barbosa and Amaral Jr. 2001, Cavalcanti et al. 2001; Barroso et al. 2002; Assis 2002; Carvalho-Silva and Cavalcanti 2002,

Lombardi 2002, Mendonca and Amaral Jr. 2002; Chautems 2003, Souza and Lorenzi 2005) and consultations with the specialists (Araceae, Asteraceae, Fabaceae, Lythraceae, Myrtaceae, Orchidaceae, Poaceae and Rubiaceae). The classification of the species was based on APG III (2009). The online databases consulted were Flora do Brasil, IPNI and MOBOT. In this study, the following definitions related to habit following Eiten (1992) were used:

#### Herb

The plant with herbaceous aerial shoots (devoid of a woody cylinder), which may be persistent (evergreen), pseudo-persistent, recurrent, biannual and annual.

#### Shrub

The plant with many fine aerial shoots (up to 3 cm in diameter), woody to the apex; subdivided into persistent, pseudo-persistent and recurrent.

**Semi-shrub**

The plant with aerial stem and woody base and herbaceous in the distal part, subdivided into persistent, pseudo-persistent, base persistent, recurrent, biannual and annual.

**RESULTS AND DISCUSSION**

A total of 138 species were recorded belonging to

103 genera and 40 families (Table 1), a value similar to that found by Soares-Silva (2005) for the tree layer - 136 species in the same area. These results supported the study of Felfili et al (2001). The families with the highest number of species were Asteraceae (22 species), Poaceae (14), Rubiaceae (12), Fabaceae (11) and Melastomataceae (7), indicating that 47.8% of species were concentrated in 12.5% of the families.

**Table 1** - Herbaceous and shrub flowering plants of the gallery forest on the right side of the Couros river, at the Portal da Chapada, in Alto Paraíso de Goiás-GO. UB – University of Brasília Herbarium. LF - life form: Ss – Semi-shrub, Sh – Shrub, He – Herb. Habitat: GF – Gallery Forest Interior, FB- Gallery Forest Border; Fl - Flower; Fr - Fruit. Numbers 1-12 = months of the year.

Family/Species	UB	LF	Habitat	Fl.	Fr.
<b>Acanthaceae</b>					
<i>Aphelandra longiflora</i> (Lindl.) Profice	16382	Ss	GF	4-6	7-10
<i>Justicia chrysotrichoma</i> Pohl ex Nees	19598	Ss	FB*	6-8	-
<i>Justicia irwinii</i> Wash.	16371	Ss	GF	4-7	7-8
<i>Justicia lanstykii</i> Rizzini	19491	Ss	FB*	6-9	9
<i>Lepidagathis floribunda</i> (Pohl) Kameyama	16375	Ss	GF	3-7	7-9
<b>Alstroemeriaceae</b>					
<i>Alstroemeria stenopetala</i> Schenk	19403	He	FB	2-4	4-6
<b>Amaranthaceae</b>					
<i>Gomphrena</i> sp.	19463	He	FB	6	-
<b>Apocynaceae</b>					
<i>Mandevilla emarginata</i> (Vell.) C. Ezcurra	19386	Ss	FB*	2-7	7-8
<b>Araceae</b>					
<i>Philodendron mayoi</i> E. G. Gonç.	19521	He	GF	9-10	11
<i>Philodendron wulfschlaegelii</i> Schott	19522	He	GF	2-3	8
<b>Araliaceae</b>					
<i>Hydrocotyle quinqueloba</i> Ruiz and Pav.	16389	He	GF, FB	7-5	3-9
<b>Asteraceae</b>					
<i>Ageratum fastigiatum</i> (Gardner) R. M. King and H. Rob.	19482	He	FB*	6-8	7
<i>Aspilia foliacea</i> (Spreng.) Baker	19266	He	FB*	12	-
<i>Autroepatorium inulaefolium</i> (Kunth) R. M. King and H. Rob.	17707	Ss	FB	4-5	-
<i>Calea teucrifolia</i> (Gardner) Baker	19358	Ss	FB*	1-8	-
<i>Campuloclinium megacephalum</i> (Mart. ex Baker) R. M. King and H. Rob.	19381	He	FB*	2	-
<i>Chresta angustifolia</i> Gardner	17877	He	GF	10	-
<i>Chromolaena chaseae</i> (B. L. Rob.) R. M. King and H. Rob.	19426	Ss	FB*	4-6	6-8
<i>Chromolaena stachyophylla</i> (Spreng.) R. M. King and H. Rob.	19284	Ss	FB*	11	12
<i>Chrysolaela desertorum</i> (Mart. ex DC.) Dematt.	19251	Ss	FB*	10	-
<i>Elephantopus mollis</i> Kunth	19462	He	FB*	5-6	-
<i>Grazielia intermedia</i> (DC.) R. M. King and H. Rob.	19360	Ss	FB	1-2	-

(Cont. ...)

(Cont. Table 1)

<b>Family/Species</b>	<b>UB</b>	<b>LF</b>	<b>Habitat</b>	<b>Fl.</b>	<b>Fr.</b>
<i>Lepidaploa aurea</i> (Mart. ex DC.) H. Rob.	16372	Ss	FB	4-6	5-8
<i>Lessingianthus argyrophyllus</i> (Less.) H. Rob.	19370	Ss	FB*	1	-
<i>Lessingianthus ligulifolius</i> (Mart. ex DC.) H. Rob.	19283	Ss	FB*	2	-
<i>Raulinoreitzia tremula</i> (Hook and Arn.) R. M. King and H. Rob.	19483	Ss	FB*	6	-
<i>Senecio adamantinus</i> Bong.	19301	He	FB*	12	-
<i>Stevia heptachaeta</i> DC.	19461	He	FB*	5	-
<i>Symphyopappus reticulatus</i> Baker	19351	Ss	FB*	1	-
<i>Vernonanthura ferruginea</i> (Less.) H. Rob.	19511	Ss	GF	5-9	7-8
<i>Viguiera grandiflora</i> (Gardner) Gardner	19250	Ss	FB*	10	-
<b>Bromeliaceae</b>					
<i>Aechmea bromeliifolia</i> (Rudge) Baker	19277	He	GF	5-10	11-12
<i>Bromelia antiacantha</i> Bertol.	19520	He	GF	12	12
<b>Burmanniaceae</b>					
<i>Apteria aphylla</i> (Nutt.) Barnhart ex Small	19503	He	GF	7	-
<i>Dictyostega orobanchoides</i> (Hook.) Miers	19435	He	GF	4-5	-
<b>Campanulaceae</b>					
<i>Centropogon cornutus</i> (L.) Druce	17723	Ss	GF	6-2	-
<i>Siphocampylus corymbiferus</i> Pohl	19492	Ss	GF	6-7	-
<b>Chloranthaceae</b>					
<i>Hedyosmum brasiliense</i> Miq.	16378	Ss	GF	-	4-5
<b>Clusiaceae</b>					
<i>Kielmeyera pumila</i> Pohl	19336	Ss	FB*	12	-
<b>Commelinaceae</b>					
<i>Commelina erecta</i> L.	19319	He	FB	1-4	4
<i>Commelina obliqua</i> Vahl	16381	He	GF	4-6 10-11	4-5
<b>Cyperaceae</b>					
<i>Cyperus aggregatus</i> (Willd.) Endl.	17734	He	GF	4-11	-
<i>Rhynchospora armerioides</i> J. Presl and C. Presl	19278	He	FB*	11	-
<i>Rhynchospora brasiliensis</i> Boeckeler	19399	He	FB	9-5	8-5
<i>Rhynchospora exaltata</i> Kunth	17735	He	GF, FB	1-12	1-12
<i>Scleria latifolia</i> Sw.	16383	He**	GF	1-12	1-12
<b>Eriocaulaceae</b>					
<i>Paepalanthus amoenus</i> (Bong.) Körn.	19398	He	FB*	2-6	6-7
<i>Paepalanthus chlorocephalus</i> Silveira	19480	He	FB*	6	-
<i>Syngonanthus caulescens</i> (Poir.) Ruhland	17733	He	GF	10	-
<b>Erythroxylaceae</b>					
<i>Erythroxylum deciduum</i> A. St.-Hil.	19337	Sh	FB	8-1	9-2
<i>Erythroxylum suberosum</i> A. St.-Hil.	17873	Sh	FB*	8-12	9-1
<b>Euphorbiaceae</b>					
<i>Croton antisiphiliticus</i> Mart.	19248	Ss	FB*	10-11	11-12
<i>Sapium glandulosum</i> (L.) Morong	19268	Sh	FB	10-11	12
<i>Microstachys bidentata</i> (Mart. and Zucc.) Esser	19354	He	FB*	1	5
<i>Sebastiania myrtilloides</i> (Mart.) Pax	19357	He	FB*	1	1
<b>Fabaceae</b>					
<i>Aeschynomene paniculata</i> Willd. ex Vogel	16373	He	FB*	4-5	4-5
<i>Bionia coriacea</i> (Nees and Mart.) Benth.	17731	Ss	FB	3-9	5-6
<i>Chamaecrista desvauxii</i> (Collad.) Killip	19400	Ss	FB*	5-6, 10-2	6, 11

(Cont. ...)

(Cont. Table 1)

<b>FAMILY/SPECIES</b>	<b>UB</b>	<b>LF</b>	<b>Habitat</b>	<b>Fl.</b>	<b>Fr.</b>
<i>Chamaecrista nictitans</i> (L.) Moench	19428	Ss	FB*	3	3
<i>Chamaecrista paniculata</i> (Benth.) H. S. Irwin and Barneby	19519	Ss	GF	5-7	1
<i>Crotalaria micans</i> Link	19429	Ss	FB	3	-
<i>Crotalaria velutina</i> Benth.	19382	Ss	FB*	2	-
<i>Eriosema brevipes</i> Grear	19340	Ss	FB*	12-3	12-3
<i>Periandra mediterranea</i> (Vell.) Taub.	17729	Sh	GF	4-10	5, 8-12
<i>Senna corifolia</i> (Benth.) H. S. Irwin and Barneby	16386	Sh	FB*	4-5	5
<i>Stylosanthes guianensis</i> (Aubl.) Sw.	17710	He	FB*	1-5	-
<b>Gesneriaceae</b>					
<i>Sinningia elatior</i> (Kunth.) Chautems	16384	He	GF, FB	3-5	-
<b>Iridaceae</b>					
<i>Bermudiana incurvata</i> (Gardn.) Kuntze	19365	He	FB*	12-1	12-1
<b>Lamiaceae</b>					
<i>Amasonia campestris</i> (Aubl.) Moldenke	19369	Ss	FB*	1-4	-
<i>Hypenia calycina</i> (Pohl ex Benth.) Harley	17730	Ss	FB	4-10	6-7
<i>Hypenia</i> sp.	19465	Ss	FB	5	5
<i>Hyptis cuneata</i> Pohl ex Benth.	17736	He	FB*	10	-
<i>Hyptis rubiginosa</i> Mart. ex Benth.	19474	Ss	FB*	5	-
<i>Marsypianthes montana</i> Benth.	19388	Ss	FB*	2-7	7-8
<b>Lentibulariaceae</b>					
<i>Utricularia hispida</i> Lam.	19376	He	FB*	2	-
<b>Lythraceae</b>					
<i>Cuphea spermacoce</i> A. St.-Hil.	19285	Ss	FB*	10-3	10-3
<i>Diplusodon incanus</i> Gardn.	19443	Ss	FB*	4	-
<b>Malpighiaceae</b>					
<i>Tetrapteryx mucronata</i> Cav.	17727	Ss	FB	9-10	-
<b>Malvaceae</b>					
<i>Byttneria jaculifolia</i> Pohl	19343	Ss	FB*	12	-
<i>Pavonia malacophylla</i> (Link and Otto) Garcke	17719	Ss	GF	5	9
<i>Sida glomerata</i> Cav.	19437	Ss	GF	4	-
<b>Melastomataceae</b>					
<i>Leandra lacunosa</i> Cogn	19246	Sh	FB	10-11	11
<i>Leandra polystachya</i> (Naudin.) Cogn	17878	Sh**	FB	10-11	10-11
<i>Leandra salicina</i> (DC.) Cogn	19419	Sh	GF	-	3
<i>Miconia albicans</i> (Sw.) Triana	17870	Sh	FB	10-11	-
<i>Miconia chamissois</i> Naud.	19245	Ss	FB	-	10-11
<i>Microlicia euphorbioides</i> Mart.	19349	Sh	FB	1	-
<i>Tibouchina aegopogon</i> (Naudin) Cogn	19334	Ss	FB*	12	-
<b>Myrsinaceae</b>					
<i>Cybianthus goyazensis</i> Mez	19411	Ss	GF	9	9-5
<b>Myrtaceae</b>					
<i>Campomanesia eugenioides</i> (Cambess.) D. Legrand	19252	Ss	GF	10-12	12
<i>Campomanesia pubescens</i> (mart. ex DC.) O. Berg	19253	Ss	FB	9-10	10
<i>Myrcia tocaninensis</i> Glaziou (nom. nud.)	19341	Ss	FB	12	12
<b>Orchidaceae</b>					
<i>Epidendrum secundum</i> Jacq.	19422	He	FB	3-8	6-8
<i>Malaxis</i> cf. <i>excavata</i> (Lindl.) Kuntze	19433	He	GF	-	4
<i>Oeceoclades maculata</i> (Lindl.) Lindl.	19504	He	GF	-	7-8
<i>Prescottia stachyodes</i> (Sw.) Lindl.	19502	He	GF	7-8	9

(Cont. ...)

(Cont. Table 1)

<b>FAMILY/SPECIES</b>	<b>UB</b>	<b>LF</b>	<b>Habitat</b>	<b>Fl.</b>	<b>Fr.</b>
<b>Oxalidaceae</b>					
<i>Oxalis diamantinae</i> R. Knuth	19265	He	FB	11	-
<b>Piperaceae</b>					
<i>Piper aduncum</i> L.	19481	Sh	GF	6-9	9
<i>Piper cernuum</i> Vell.	19348	Sh	GF	1, 7-9	-
<i>Piper crassinervium</i> Kunth	19505	Sh	GF	7-8	7-8
<i>Piper xylosteoides</i> (Kunth) Steud.	16377	Sh	GF	4-11	8-12
<b>Poaceae</b>					
<i>Echinolaena inflexa</i> (Poir.) Chase	19430	He	FB*	3-5	5-6
<i>Ichnanthus bambusiflorus</i> (Trin.) Döll	19309	He	FB	12-1	-
<i>Ichnanthus</i> aff. <i>longiglumis</i> Mez	19280	He	FB*	12-3	-
<i>Ichnanthus mollis</i> Ekman	19362	He	FB, GF	1-7	-
<i>Ichnanthus</i> sp.	17720	He	GF	5	-
<i>Loudetiopsis chrysothrix</i> (Nees) Conert	19431	He	FB*	3-6	-
<i>Ocellochloa rudis</i> (Nees) Zuloaga and Morrone	19361	He	FB, GF	1-5	-
<i>Oplismenus hirtellus</i> (L.) P. Beauv.	16380	He	GF	4-5	-
<i>Panicum parvifolium</i> Lam.	17732	He	GF	10	-
<i>Panicum pilosum</i> Sw.	19449	He	GF	4	-
<i>Panicum</i> sp.	19397	He	FB, GF	1-3, 8	-
<i>Paspalum coryphaeum</i> Trin.	19372	He	FB	1	-
<i>Paspalum</i> sp.	19487	He	FB	6	-
<i>Trachypogon spicatus</i> (L. f.) Kuntze	19439	He	FB*	4	-
<b>Polygalaceae</b>					
<i>Polygala poaya</i> Mart.	17871	Ss	GF, FB	6-10	-
<b>Rubiaceae</b>					
<i>Cordia concolor</i> (Cham.) Kuntze	17726	Sh	GF	4, 8-11	6-12
<i>Cordia sessilis</i> (Vell.) Kuntze	17879	Sh	GF	10-11	-
<i>Borreria latifolia</i> (Aubl.) K. Schum.	19332	He	GF, FB	12-6	3-6
<i>Coccocypselum aureum</i> (Spreng.) Cham. and Schltldl.	19264	He	GF, FB	12-5	4-11
<i>Coccocypselum lanceolatum</i> (Ruiz and Pav.) Pers.	16374	He	GF	12-5	3-6
<i>Ferdinandusa speciosa</i> Pohl	16385	Sh	FB	4-5, 9	4-5
<i>Galium noxium</i> (A. St.-Hil.) Dempster	19387	He	FB	1-2	-
<i>Palicourea crocea</i> (Sw.) Roem. and Schult.	17711	Ss	GF	7-5	1-7
<i>Psychotria capitata</i> Ruiz and Pav.	19255	Sh	GF	10-7	12-8
<i>Psychotria hoffmannseggiana</i> (Willd. ex Schult.) Müll. Arg.	16376	Ss	GF	9-5	12-6
<i>Psychotria subtriflora</i> Müll. Arg.	19241	Ss	GF	5-3	10-5
<i>Psychotria vellosiana</i> Benth.	19305	Ss	GF	11-12	12
<b>Siparunaceae</b>					
<i>Siparuna brasiliensis</i> (Spreng.) A. DC.	19344	Sh	GF, FB	12	12-1
<b>Solanaceae</b>					
<i>Brunfelsia brasiliensis</i> (Spreng.) L. B. Sm. and Downs	19368	Sh	GF	1-2	-
<b>Turneraceae</b>					
<i>Piriqueta sidifolia</i> (Cambess.) Urb.	19356	Ss	FB*	1, 5	5
<i>Turnera oblongifolia</i> Cambess.	19464	Ss	FB	5	-
<b>Velloziaceae</b>					
<i>Vellozia squamata</i> Pohl	16388	Sh	FB*	4-5	5-9

(Cont. ...)



(Cont. Table 1)

FAMILY/SPECIES	UB	LF	Habitat	Fl.	Fr.
<b>Verbenaceae</b>					
<i>Lippia rotundifolia</i> Cham.	17725	Ss	FB*	9-1	1
<b>Xyridaceae</b>					
<i>Xyris hymenachne</i> Mart.	19364	He	FB*	1	-
<i>Xyris jupicai</i> Rich	19375	He	GF	2	-

\* species collected along border of the Gallery Forest, however also typical in other phytophysionomies such as: campo limpo úmido, vereda or cerrado *sensu stricto*.

\*\* Species not cited by Munhoz and Proença (1998) and Mendonça *et al* (2008).

Similar results were found by Mendonça *et al.* (2000), in a preliminary survey of the flora in the core areas of the Cerrado Reserve, Federal District, including the IBGE Ecological Reserve and National Park of Brasília, showing that for these habitats, 36.4% of species in gallery forests were found in these same five families. It should be noted that Mendonça *et al.* (2000) included epiphytes within the herbaceous habit, which were not included in this work, leading to some distortion in the compared data. This could be very significant, since over half the species of the orchid family (one of the largest) in gallery forests, were epiphytes (Felfili *et al.* 2001). Therefore, without these differences in the methodology, the percentages of the five families would be even closer when comparing the two studies. Asteraceae, Poaceae, Rubiaceae, Melastomataceae and Fabaceae, have also been cited among the most species-rich families both for the Cerrado biome (Mendonça *et al.* 2000; Mendonça *et al.* 2008; Munhoz and Proença 1998), and also for the riverine and gallery forests (Felfili *et al.* 2001), which indicated their wide representation and distribution in the context of the biome.

The families with highest number of genera were Asteraceae (19 genera), Fabaceae (8), Poaceae (8) and Rubiaceae (7), totaling 40.8% of all genera sampled. Among the genera, the most representative were *Ichnanthus* (Poaceae), *Piper* (Piperaceae) and *Psychotria* (Rubiaceae), with four species each. The species distribution in the studied area was: 46 species (33.3%) restricted to inside the forest; 82 (59.4%) only in the forest border; and 10 species were registered on both the sites. Among the border species, 53 species (38.4%) were typical of open areas, such as campo limpo úmido, vereda and Cerrado *sensu stricto* (Munhoz and Proença 1998; Mendonça *et al.* 2008). Twenty nine (21%) species were typical of gallery forest border.

Despite a very rich flora, only two species, *Chresta angustifolia* and *Cybianthus goyazensis* were endemics to the Goiás State. It is notable that 52 of the species found were not cited for the Gallery forest or its border by Silva *et al.* (1996), Munhoz and Proença (1998), Mendonça *et al.* (2000), Felfili *et al.* (2001), Proença *et al.* (2001) and Mendonça *et al.* (2008) studies. These authors recorded no representatives of the Xyridaceae family in the gallery forests, while in this study, samples of *Xyris jupicai* were collected on the banks of a small stream, in a tributary of the Couros river and *Xyris hymenachne* along the gallery forest border. Felfili *et al.* (2001), Mendonça *et al.* (2000) and Silva *et al.* (1996) reported that, in general, the herbaceous shrub layer has a higher percentage of woody or semi-woody plants than herbs in riparian and gallery forests. In the present study, similar results were found, with 43.5% of the plants sampled in this layer being herbaceous.

Over the 25 sampling days, some species were frequently found, while others were recorded only once. *Coccocypselum lanceolatum*, *Justicia irwinii*, *Palicourea crocea*, *Piper xylosteoides*, *Psychotria capitata* and *Scleria latifolia* were found relatively easily at various points in the forest. The species *Alstroemeria stenopetala*, *Bromelia antiacantha*, *Coccocypselum aureum* and *Miconia albicans* were also found easily, however, in small isolated areas. *Epidendrum secundum*, *Leandra salicina*, *Oxalis diamantinae*, *Pavonia malacophylla*, *Psychotria vellosiana* and *Sinningia elatior* were rare in the Couros river gallery forest.

The data obtained in this study were compared with those in Silva *et al.* (2001) and Munhoz and Proença (1998), who studied the areas near to the Portal da Chapada in the Chapada dos Veadeiros and showed a significant increase in the number of species in the region. It was observed that 65

species (47%) had not yet been reported for the flora of the region based on these authors. According to the same studies, 123 species were not included as part of the gallery forests neither in the interior or along the border.

Out of the total number of species cited by Munhoz and Proença (1998) for the Chapada dos Veadeiros region, 57 were found in the herbaceous-shrub layer of Gallery Forest and its border, and 14 of them found in this study. Therefore, the increases in the flora were 5% for the region as a whole, 99.2% for the gallery forests and 223.6% for the herbaceous-shrub layer of the gallery forests in the Chapada dos Veadeiros region. The data provided here showed the lack of studies in the region, particularly for life forms. The richness observed in this study could be related to the systematization of the study, allowing the sampling of the species throughout the year in different phenological phases.

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