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...
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. 2001). 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 langsdorffii* 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. |
|--------------------------------|---------|----|---------|-----|-----|
| Acanthaceae                    |         |    |         |     |     |
| *Aphelandra longiflora* (Lindl.) Profice | 16382   | Ss | GF      | 4-6 | 7-10 |
| *Justicia chrysotrichoma* Pohl ex Nees | 19598   | Ss | FB*     | 6-8 | -   |
| *Justicia irwinii* Washh.       | 16371   | Ss | GF      | 4-7 | 7-8 |
| *Justicia lanstyakii* Rizzini   | 19491   | Ss | FB*     | 6-9 | 9   |
| *Lepidagathis floribunda* (Pohl) Kameyama | 16375   | Ss | GF      | 3-7 | 7-9 |
| Alstroemeriaceae               |         |    |         |     |     |
| *Alstroemeria stenopetala* Schenk | 19403   | He | FB      | 2-4 | 4-6 |
| Amaranthaceae                  |         |    |         |     |     |
| *Gomphrena* sp.                | 19463   | He | FB      | 6   | -   |
| Apocynaceae                    |         |    |         |     |     |
| *Mandevilla emarginata* (Vell.) C. Ezcurra | 19386   | Ss | FB*     | 2-7 | 7-8 |
| Araceae                        |         |    |         |     |     |
| *Philodendron mayoi* E. G. Gonç. | 19521   | He | GF      | 9-10| 11  |
| *Philodendron wullschlaegelii* Schott | 19522   | He | GF      | 2-3 | 8   |
| Araliaceae                     |         |    |         |     |     |
| *Hydrocotyle quinqueloba* Ruiz and Pav. | 16389   | He | GF, FB  | 7-5 | 3-9 |
| Asteraceae                     |         |    |         |     |     |
| *Ageratum fastigiatum* (Gardner) R. M. King and H. Rob. | 19482   | He | FB*     | 6-8 | 7   |
| *Aspilia foliacea* (Spreng.) Baker | 19266   | He | FB*     | 12  | -   |
| *Astroeupatorium inulaefolium* (Kunth) R. M. King and H. Rob. | 17707   | Ss | FB      | 4-5 | -   |
| *Calea teucrifolia* (Gardner) Baker | 19358   | Ss | FB*     | 1-8 | -   |
| *Campuloclinium megacephalum* (Mart. ex Baker) R. M. King and H. Rob. | 19381   | He | FB*     | 2   | -   |
| *Chresta angustifolia* Gardner | 17877   | He | GF      | 10  | -   |
| *Chromolaena chaseae* (B. L. Rob.) R. M. King and H. Rob. | 19426   | Ss | FB*     | 4-6 | 6-8 |
| *Chromolaena stachyophylla* (Spreng.) R. M. King and H. Rob. | 19284   | Ss | FB*     | 11  | 12  |
| *Chrysolaena desertorum* (Mart. ex DC.) Dematt. | 19251   | Ss | FB*     | 10  | -   |
| *Elephantopus mollis* Kuntz | 19462   | He | FB*     | 5-6 | -   |
| *Graziella intermedia* (DC.) R. M. King and H. Rob. | 19360   | Ss | FB      | 1-2 | -   |

(Cont. …)
(Cont. Table 1)

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

(Cont. …)
(Cont. Table 1)

| FAMILY/SPECIES | UB  | LF  | Habitat | Fl. | Fr. |
|----------------|-----|-----|---------|-----|-----|
| *Chamaecrista nictitans* (L.) Moench | 19428 | Ss  | FB*     | 3   | -   |
| *Chamaecrista paniculata* (Benth.) H. S. Irwin and Barneby | 19519 | Ss  | GF      | 5-7 | 1   |
| *Crotalaria micans* Link | 19429 | Ss  | FB      | 3   | -   |
| *Crotalaria velutina* Benth. | 19382 | Ss  | FB*     | 2   | -   |
| *Eriosema brevipes* Grear | 19340 | Ss  | FB*     | 12-3| 12-3|
| *Periandra mediterranea* (Vell.) Taub. | 17729 | Sh  | GF      | 4-10| 5, 8-12|
| *Senna corifolia* (Benth.) H. S. Irwin and Barneby | 16386 | Sh  | FB*     | 4-5 | 5   |
| *Stylosanthes guianensis* (Aubl.) Sw. | 17710 | He  | FB*     | 1-5 | -   |
| **Gesneriaceae** | 19364 | He  | GF, FB  | 3-5 | -   |
| *Sinningia elatior* (Kunth.) Chautems | 16384 | He  | GF, FB  | 3-5 | -   |
| **Iridaceae** | 19365 | He  | FB*     | 12-1| 12-1|
| *Bermudiana incurvata* (Gardn.) Kuntze | 19436 | Ss  | FB*     | 1-4 | -   |
| **Lamiaceae** | 19369 | Ss  | FB*     | 1-4 | -   |
| *Amasonia campestris* (Aubl.) Moldenke | 19460 | Ss  | FB      | 4-10| 6-7 |
| *Hyptenia calycina* (Pohl ex Benth.) Harley | 17730 | Ss  | FB      | 5   | 5   |
| *Hypenia sp.* | 19465 | Ss  | FB      | 5   | 5   |
| *Hyptis cuneata* Pohl ex Benth. | 17736 | He  | FB*     | 10  | -   |
| *Hyptis rubiginosa* Mart. ex Benth. | 19474 | Ss  | FB*     | 5   | -   |
| *Marsypianthes montana* Benth. | 19388 | Ss  | FB*     | 2-7 | 7-8 |
| **Lentibulariaceae** | 19376 | He  | FB*     | 2   | -   |
| *Utricularia hispida* Lam. | 19385 | Ss  | FB*     | 10-3| 10-3|
| **Lythraceae** | 19443 | Ss  | FB*     | 4   | -   |
| *Cuphea spermacoce* A. St.-Hil. | 19285 | Ss  | FB*     | 10-3| 10-3|
| *Diplusodon incanus* Gardn. | 19443 | Ss  | FB*     | 4   | -   |
| **Malpighiaceae** | 19343 | Ss  | FB*     | 12  | -   |
| *Tetrapteryx macronata* Cav. | 17727 | Ss  | FB      | 9-10| -   |
| **Malvaceae** | 19343 | Ss  | FB*     | 12  | -   |
| *Bytneria jaculifolia* Pohl | 19343 | Ss  | GF      | 5   | 9   |
| *Pavonia malacophylla* (Link and Otto) Garcke | 17719 | Ss  | GF      | 5   | 9   |
| *Sida glomerata* Cav. | 19437 | Sh  | GF      | 4   | -   |
| **Melastomataceae** | 19246 | Sh  | FB      | 10-11| 11  |
| *Leandra lacunosa* Cogn | 19246 | Sh  | FB      | 10-11| 11  |
| *Leandra polystachya* (Naudin.) Cogn | 17878 | Sh** | FB      | 10-11| 10-11|
| *Leandra salicina* (DC.) Cogn | 19419 | Sh  | GF      | 3   | -   |
| *Miconia albicans* (Sw.) Triana | 17870 | Sh  | FB      | 10-11| -   |
| *Miconia chamossois* Naud. | 19245 | Ss  | FB      | 10-11| -   |
| *Microlicia euphorbioidea* Mart. | 19349 | Sh  | FB      | 1   | -   |
| *Tibouchina aegopogon* (Naudin) Cogn | 19334 | Ss  | GF      | 12  | -   |
| **Myrsinaceae** | 19411 | Ss  | GF      | 9   | 9-5 |
| *Cybianthus goyazensis* Mez | 19411 | Ss  | GF      | 9   | 9-5 |
| **Myrtaceae** | 19252 | Ss  | GF      | 10-12| 12  |
| *Campomanesia eugenioides* (Cambess.) D. Legrand | 19252 | Ss  | GF      | 10-12| 12  |
| *Campomanesia pubescens* (mart. ex DC.) O. Berg | 19253 | Ss  | FB      | 9-10| 10  |
| *Myrcia tocantinensis* Glaziou (nom. nud.) | 19341 | Ss  | FB      | 12  | 12  |
| **Orchidaceae** | 19422 | He  | FB      | 3-8  | 6-8 |
| *Epidendrum secundum* Jacq. | 19422 | He  | FB      | 3-8  | 6-8 |
| *Malaxis cf. excavata* (Lindl.) Kuntze | 19433 | He  | GF      | -   | 4   |
| *Oeceoclades maculata* (Lindl.) Lindl. | 19504 | He  | GF      | -   | 7-8 |
| *Prescottia stachyodes* (Sw.) Lindl. | 19502 | He  | GF      | 7-8  | 9   |

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

(Cont. …)
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 jupical* 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 xylsteoides, Psychotria capitata* and *Scleria latifolia* were found relatively easily at various points in the forest. The species *Alstroemeria stenopetala, Bromelia anticantha, Coccocypselum aureum* and *Miconia albicans* were also found easily, however, in small isolated areas. *Epidendrum secundum, Leandra salicina, Oxalis dianamintae, 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

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| FAMILY/SPECIES | UB | LF | Habitat | Fl. | Fr. |
|----------------|----|----|---------|-----|-----|
| **Verbenaceae** |    |    |         |     |     |
| *Lippia rotundifolia* Cham. | 17725 | Ss | FB*     | 9-1 | 1   |
| **Xyridaceae** |    |    |         |     |     |
| *Xyris hymenachne* Mart. | 19364 | He | FB*     | 1   | -   |
| *Xyris jupical* 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).
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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