

**SURVEY OF BRYOPHYTES AT FAZENDA DA PRATA, UNAÍ - MINAS
GERAIS, BRAZIL**

**LEVANTAMENTO DE BRIÓFITAS NA FAZENDA DA PRATA, UNAÍ –
MINAS GERAIS, BRASIL**

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ABSTRACT

Currently, 25% of Brazil's cereal production occurs in areas of cerrado and the county of Unaí, located in the north-west of Minas Gerais, is included within this biome. In this region are located the large producing properties of beans, soy, corn, among other crops. The native vegetation is found in fragments of PPA (Permanent Preservation Areas). There are no studies or surveys about the local brio flora, and these plants have fundamental ecological roles. In this way, the aim of this work was made the first moss survey of Fazenda Prata, Unaí, Minas Gerais.

Keywords: Cerrado. Dry season. Moss.

RESUMO

Atualmente, 25% da produção brasileira de cereais ocorre em áreas de cerrado, estando o município de Unaí, localizado no noroeste de Minas Gerais, incluído nesse bioma. Nesta região estão localizadas as grandes propriedades produtoras de feijão, soja, milho, entre outras culturas. A vegetação nativa é encontrada em fragmentos de APP (Áreas de Preservação Permanente). Não existem estudos ou pesquisas sobre a brio flora local, e estas plantas têm papéis ecológicos

fundamentais. Desta forma, o objetivo deste trabalho foi o primeiro levantamento de musgo da Fazenda Prata, Unaí, Minas Gerais.

Palavras-chave: Cerrado. Estação seca. Musgos.

Cerrado is a biome of predominantly savanna vegetation, occupying an area of approximately 2,000,000 square kilometres in central Brazil. Extending from the border with the Amazon region to the southern states of São Paulo and Paraná (RATTER et al., 1997). Cerrado is a very old biome and there are suggestions that it already existed in the prototypical form in the Cretaceous, before the separation of the South American and African continents (RATTER et al., 1996). The cerrado presents varied floristic formations, the main formations are: forest formations, savannas and countryside. These formations are subdivided into phytophysionomies (RIBEIRO & WALTER, 2008), totaling 11 main ones.

Prior to 1950, cerrado was hardly used for agriculture because of hot climates and nutrient-deficient soils. However, currently more than a quarter of Brazil's cereals are grown in cerrado areas (VASCONCELOS, 2008). In addition, the cerrado remained one of the most significant regions for Brazilian cattle production. Especially since the 1970s, as a result of the governmental incentives of the regional development programs.

In this context, the region of Unaí, in the north-west of Minas Gerais state, belongs to the domain of the megatérmic tropical humid climate of the savannas, with the presence of two well defined seasons, one with a high level of precipitation (summer) and another one dry (winter) (SILVA, 2006).

The municipality has large areas of flat landscape, known in the region as "chapadas", is in these regions, mostly, that are located the large producing properties of beans, soy, corn, among other crops. These are crops that use high-tech machinery and are suitable for flat areas. Between

2002 and 2009, 97% of the areas that suffered deforestation in the cerrado were in areas of favourable topography for mechanization (ROCHA et al., 2011).

Floristic studies were done only for phanerogams and to this day without including data for the bryoflora, being disregarded their fundamental ecological roles to the environment such as nutrient cycling, protection against erosion caused by rainwater, among others (CÂMARA, 2008a).

There are specific surveys for bryophytes in regions near the municipality of Unaí-MG, such as the Federal District (CÂMARA, 2008a; CÂMARA, 2008b; SOARES et al., 2011; MUNDIM & CÂMARA, 2015), as well as surveys in the National Park of Chapada dos Veadeiros, Goiás (PINHEIRO & CÂMARA, 2012; PINHEIRO et al., 2012). In Minas Gerais state there are works in Serra do Cipó (YANO & PERALTA, 2011; SOUZA & CÂMARA, 2014) and Serra de Grão-Mogol (YANO & PERALTA, 2009).

Bryophytes are the second largest group of terrestrial plants in number of species, second only to the angiosperms, and colonize most environments, including: deserts, mountain tops, frozen environments and at high altitudes where vascular plants are sparse or not exist (NEWTON et al., 2000). Because it is a municipality with great aptitude for farming, and has a predominantly flat land area, agricultural activity has expanded considerably on native vegetation, leaving only fragments of native vegetation in areas of APP (Permanent Preservation Areas) and legal reserves.

The samples were collected in a local farm named Fazenda Prata (16°23' 33.8'S, 047° 08' 53.8" W), Unaí- Minas Gerais, and followed Yano (1984). The collects were made during the dry season in August 2016.

The samples were identified using a stereoscopic and optical microscope. The classification system adopted will be based on literature (GOFFINET et al., 2009; SANTOS & STECH, 2016). The samples are housed at UB herbarium.

One hundred and forty eight samples were collected of moss and identified 28 species distributed in 20 generas belonging to in 14 families (Figure 1). The list of species is showed in Table 1.

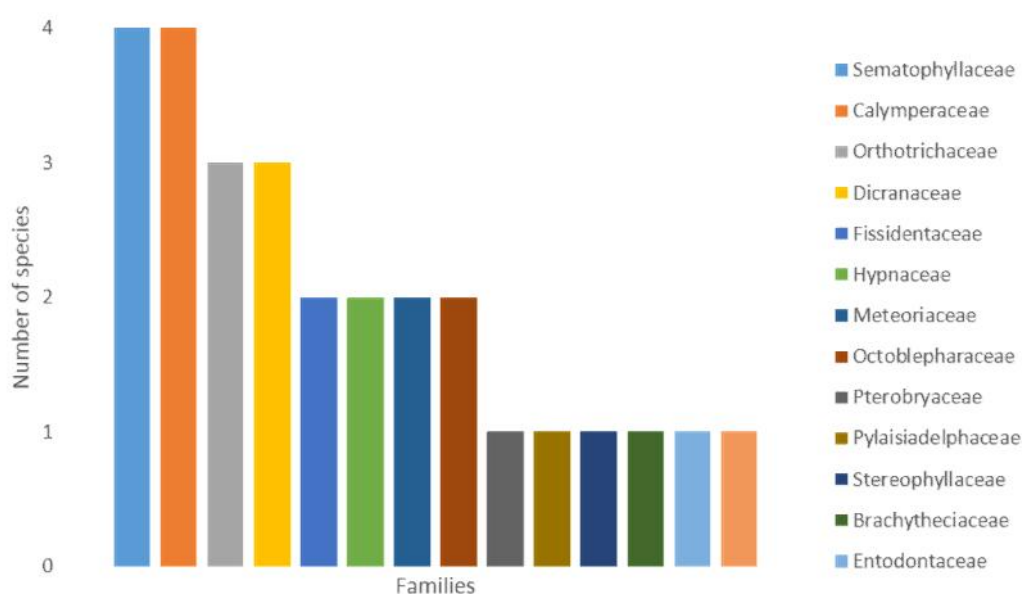


Figure 1. Number of species per family.

Table 1. List of species from Fazenda Da Prata, Unaí - Minas Gerais. The samples were incorporated into the UB herbarium.

Families	Species	Voucher
Brachytheciaceae	<i>Brachythecium ruderale</i> W.R. Buck	D.V. Valente et al. 173; M.J. Cunha et al. 24.
Calymperaceae	<i>Calymperes palisotii</i> Schwägr.	D.V. Valente et al. 12.
	<i>Calymperes tenerum</i> Müll. Hal.	M.J. Cunha et al. 16.
	<i>Syrrhopodon ligulatus</i> Mont.	M.J. Cunha et al. 4.
	<i>Syrrhopodon prolifer</i> Schwägr.	D.V. Valente et al. 124, 128.
Dicranaceae	<i>Leucobryum albicans</i>	M.J. Cunha et al. 5, 13, 19.

	<i>(Schwägr.) Lindb.</i>	
	<i>Leucobryum martianum</i> (Hornsch.) Hampe ex Müll. Hal.	D.K. Henriques et al. 423.
	<i>Ochrobryum gardneri</i> (Müll. Hal.) Mitt.	M.J. Cunha et al. 1.
Entodontaceae	<i>Erythrodontium longisetum</i> (Hook.) Paris	M.J. Cunha et al. 29.
Fabroniaceae	<i>Fabronia ciliaris</i> (Brid.) Brid.	D.V. Valente et al. 174. Associated material.
Fissidentaceae	<i>Fissidens pellucidus</i> Hornsch.	D.K. Henriques et al. 399.
	<i>Fissidens serratus</i> Müll. Hal.	P.E.A.S. Câmara et al. 2864.
Hypnaceae	<i>Chryso-hypnum diminutivum</i> (Hampe) W.R. Buck	A.L. Silva et al. 249; D.K. Henriques et al 396, 398 , 402, 404; D.V. Valente et al. 138; M.J. Cunha et al. 7, 40, 43.
	<i>Ctenidium malacodes</i> Mitt.	D.K. Henriques et al. 412.
Meteoriaceae	<i>Orthostichella versicolor</i> (Müll. Hal.) B.H. Allen & W.R. Buck	M.J. Cunha et al. 37.
	<i>Zelometeorium recurvifolium</i> (Hornsch.) Manuel	M.J. Cunha et al. 39.
Octoblepharaceae	<i>Octoblepharum albidum</i> Hedw.	A.L. Silva et al. 245; D.K. Henriques et al. 411, 413, 424; D.V. Valente et al. 159 ; M.J. Cunha et al. 30, 31, 45.
	<i>Octoblepharum cocuiense</i> Mitt.	D.K. Henriques et al. 397.
Orthotrichaceae	<i>Macromitrium altituberculosum</i> E.B. Bartram	D.V. Valente et al. 125, 128.
	<i>Schlotheimia chamissonis</i> Hornsch.	D.V. Valente 164.
	<i>Schlotheimia jamesonii</i> (Arn.) Brid.	M.J. Cunha et al. 6.
Pterobryaceae	<i>Jaegerina scariosa</i> (Lorentz) Arzeni	A.L. Silva et al. 254; D.K. Henriques et al. 401, 403; D.V. Valente et al. 136, 158, 165, 169; M.J. Cunha et al. 14, 28.
Pylaisiadelphaceae	<i>Isopterygium tenerum</i> (Sw.) Mitt.	A.L. Silva et al. 237, 241, 243; D.K. Henriques et al. 415; D.V. Valente et al. 122, 140, 145,

		146, 155, 165, 168, 176, 179, 185; M.J. Cunha et al. 3, 23; P.E.A.S.Câmara 2839, 2850.
Sematophyllaceae	<i>Donnellia commutata</i> (Müll. Hal.) W.R. Buck	A.L. Silva et al. 239; D.K. Henriques et al. 400; M.J. Cunha et al. 17, 20, 25, 35.
	<i>Sematophyllum subpinnatum</i> (Brid.) E. Britton	A.L. Silva et al. 247; D.K. Henriques et al. 395, 416, 418, 420; D.V. Valente et al. 125, 133, 151, 157, 174; M.J. Cunha et al. 2, 32, 38, 47.
	<i>Sematophyllum adnatum</i> (Michx.) E. Britton	A.L. Silva et al. 238; D.K. Henriques et al. 406, 409; D.V. Valente et al. 127, 142, 148, 166, 172; A.L. Silva et al. 238; M.J. Cunha et al. 8, 9, 21, 42.
	<i>Sematophyllum subsimplex</i> (Hedw.) Mitt.	A.L. Silva et al. 244, 251, 252; D.K. Henriques et al. 407, 408, 410, 414, 421; D.V. Valente et al. 117, 118, 119, 123, 126, 129, 130, 131, 134, 139, 143, 147, 150, 152, 153, 154, 156, 160, 167, 170, 180, 182, 183, 186; M.J. Cunha et al. 10, 11, 12, 15, 22, 26, 27, 34, 41, 44, 46, 48; P.E.A.S. Câmara 2838.
Stereophyllaceae	<i>Entodontopsis nitens</i> (Mitt.) W.R. Buck & Ireland	D.K. Henriques et al. 422, 425; D.V. Valente et al. 161.

The most abundant families in number of species were Calymperaceae and Sematophyllaceae, with 4 species each. Dicranaceae and Orthotrichaceae present 3 species each.

Fissidentaceae, Hypnaceae, Meteoriaceae and Octoblepharaceae present 2 species each. Brachytheciaceae, Entodontaceae, Fabroniaceae, Pterobryaceae, Pylaisiadelphaceae and Stereophyllaceae present only one species each.

According to Yano & Peralta (2011), the bryoflora of Serra do Cipó is composed of 142 species distributed in 67 genera and 34 families. Of the 142 species, 18 also occur in the Fazenda Prata. In contrast, 8 species of the Fazenda Prata were not reported for Serra o Cipó.

Yano & Peralta (2009) reported 10 families of mosses, 15 genera and 25 species for the Grão-Mogol. Of the species, 7 species are also present in the Fazenda Prata. Twenty species of the Fazenda Prata were not found in Grão-Mogol.

One new occurrences for Minas Gerais were found: *Schlotheimia chamissonis* Hornsch. (Orthotrichaceae). *Calymperes tenerum* Müll. Hal. is a new occurrence for Cerrado, this species was found only for Amazonia and Atlantic rainforest. *Brachythecium ruderale* W.R. Buck has wide distribution and occur in Atlantic Forest of Minas Gerais, but had never been found in Cerrado. (BRAZIL FLORA, 2017).

It is still necessary to make more collections in the rainy season and in other locations to obtain more information about the bryophytes occurring in Unaí.

REFERENCES

- BRAZIL FLORA. Brazilian Flora 2020 project - Projeto Flora do Brasil 2020. v393.107. **Instituto de Pesquisas Jardim Botânico do Rio de Janeiro**. Disponível em: <<http://floradobrasil.jbrj.gov.br/>>. Acesso em: 29 mar. 2017.
- CÂMARA, P.E.A.S. Musgos Acrocárpicos das matas de galeria da Reserva Ecológica do IBGE, RECOR, Distrito Federal, Brasil. **Acta Botanica Brasilica**, v. 22, p. 1027-1035. 2008a.

_____. Musgos Pleurocárpicos das matas de galeria da Reserva Ecológica do IBGE, RECOR, Distrito Federal, Brasil. **Acta Botanica Brasilica**, v.22, n.2, p. 573-581. 2008b.

GOFFINET, B., BUCK, W.R., SHAW, A.J. Morphology, anatomy, and classification of the Bryophyta. In: GOFFINET, B., SHAW, A.J. (eds.). **Bryophyte Biology**. 2nd edn. Cambridge, Cambridge University Press, 2009. p. 55-138.

MUNDIM, J.V., CÂMARA, P.E.A.S. Musgos do Parque Ecológico dos Pequiizeiros, Planaltina-DF. **Heringeriana**, v.9, n. 2, p. 130-139. 2015.

NEWTON, A. E., COX, C.J, WHELEER, J.A., GOFFINET, B., HEDDERSON, T. A. J., MISHLER, B.D. Evolution of the Major Moss Lineages: Phylogenetic Analyses Based on Multiple Gene Sequences and Morphology. **The Bryologist**, v.103, n.2, p.187-211. 2000.

PINHEIRO, E.M.L., ALKIMIM-FARIA, A. L., CÂMARA, P. E. A. S. Riqueza de espécies e diversidade de marchantiophyta (hepáticas) de capões de mata, no Parque Nacional da Chapada dos Veadeiros, Goiás, Brasil. **Biologia Neotropical**, v. 9, n.1, p 19-27. 2012.

_____, CÂMARA, P.E.A.S. Musgos pleurocárpicos de capões de mata no Parque Nacional da Chapada dos Veadeiros, Goiás, Brasil. **Heringueriana**, v. 6, p 54-65. 2012.

RATTER, J.A., BRIDGEWATER, S., ATKINSON, R., RIBEIRO, J.F. Analysis of the floristic composition of the Brazilian cerrado vegetation II: comparison of the woody vegetation of 98 areas. **Edinburgh Journal of Botany**, v.53, n.2, p.153-180. 1996.

_____, RIBEIRO, J.F., BRIDGEWATER, S. The Brazilian Cerrado Vegetation and Threats to its Biodiversity. **Annals of Botany Company**, v. 80, p. 223-230. 1997.

RIBEIRO, J.F., WALTER, B.M.T. As principais fitofisionomias do Bioma cerrado. **Cerrado Ecologia e Flora**, v.1, p. 153-212. 2008.

ROCHA, G.F, FERREIRA, L.G, FERREIRA, N.C., FERREIRA, M.E. Detecção de desmatamentos no bioma cerrado entre 2002 e 2009: padrões, tendências e impactos. **Revista Brasileira de Cartografia**, v.63 n.03, p. 341-349. 2011.

SANTOS, M.B., STECH, M. Tackling relationships and species circumscriptions of *Octoblepharum*, an enigmatic genus of haplolepidous mosses (Dicranidae, Bryophyta). **Systematics and Biodiversity**, p.1-9. 2016.

SILVA, L.M. **Gestão dos recursos hídricos em Unaí- MG: Os usos múltiplos da água e suas implicações sócio - ambientais**. Dissertação (Mestrado) - Universidade de Brasília (UnB) Brasília. 2006.

SOARES, A.E.R., CÂMARA, P.E.A.S., PERALTA, D.F. Mosses of gallery forests from Brasília National Park, Federal District, Brazil. **Boletim do Instituto de Botânica**, v. 21, p. 185-192. 2011.

SOUZA, R.V., CÂMARA, P. E. A. S. Survey of the bryophytes of a gallery forest in the National Park of Serra do Cipó, Minas Gerais, Brazil. **Acta Botânica Brasilica** v. 29, n.1, p. 24-29. 2014.

VASCONCELOS, V.V. **Impactos e custos econômico-ambientais da agricultura moderna: estudo de caso da frente agrícola do noroeste de Minas Gerais**. Dissertação (Especialização), Departamento de ciências do Solo, Universidade federal de lavras (UFLA), Minas Gerais. 2008.

YANO, O. Briófitas. Pp. 27-30. In: FIDALGO, O., BONONI, V. (coord.). **Técnicas de coleta, Preservação e Herborização de Material botânico**. Série Documentos, Instituto de Botânica de São Paulo. 1984.

_____, PERALTA, D.F. Flora de Grão-Mogol, Minas Gerais: Briófitas (Bryophyta e Marchantiophyta). **Boletim de Botânica da Universidade de São Paulo**, v. 27, n.1, p. 1-26. 2009.

_____. _____. Flora da Serra Do Cipó, Minas Gerais: briófitas (anthocerotophyta, bryophyta e marchantiophyta). **Boletim de Botânica da Universidade de São Paulo**, v.29, n 2, p 135 – 299. 2011.