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REFERÊNCIA

AMARAL, Aryanne Gonçalves et al. Vascular flora in dry-shrub and wet grassland Cerrado seven years after a fire, Federal District, Brasil. **Check List**, v. 9, n. 3, p. 487-503, 2013. Disponível em: <<http://www.checklist.org.br/getpdf?SL121-12>>. Acesso em: 6 jan. 2013.

Vascular flora in dry-shrub and wet grassland Cerrado seven years after a fire, Federal District, Brazil

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ABSTRACT: Studies of temporal dynamics for grassland sites report that fire suppression plays a crucial role in floristic changes. The objective of this study was to verify whether after seven years without fire, communities showed variations in terms of composition, life forms, pollination and dispersal syndromes. The first survey (T0) was conducted from September 1999 to October 2000, while the second (T1) took place from August 2006 to August 2007. The floristic results in T1 were compared with the survey in T0 through the Sorensen similarity index and Chi-square tests. Over time, there were differences in the composition, life forms and pollination and dispersion syndromes. The evidence of changes suggests that the frequency of the fire regime can be considered the main agent for change in the flora of these communities.

INTRODUCTION

The dynamic process in a community is characterized by patterns, mechanisms and, in many systems, successive disturbances are important sources of changes in the landscape (Glenn-Lewin and van der Maarel 1992). The progression of changes in the composition and structure of a community over time, due to disturbances in the environment, is conceptualized as a succession process or directional change (Buchanan 1982).

Studies of temporal dynamics for grassland sites report that the suppression of disturbances such as fire plays a crucial role in the floristic and structural changes of these communities (San José and Fariñas 1991; Moreira 2000; Behling *et al.* 2007; Kahmen and Poschlod 2008; Ravi and D’Odorico 2009). Changes over time are related to differences in species abundance and composition, differences in the spectrum of life forms and functional characteristics. The suppression of fire in savannas intervenes in natural ecological processes, and in more open areas like grasslands, a gradual increase in the density of woody and fire-sensitive species can be seen (San José and Fariñas 1983; 1991; Silva *et al.* 2001; Durigan and Ratter 2006; Gardner 2006; Pinheiro and Durigan 2009).

Savannas are considered dynamic ecotones, distributed between grassland formations and more densely vegetated areas (Coutinho 1978, Roitman *et al.* 2008). In these landscapes grasses and trees coexist, influenced by interactions with the climate, soil and disturbances such as fire, and fluctuations in any of these factors may result in an increase in certain life forms (Roitman *et al.* 2008). The intensification or suppression of disturbances modifies the composition of species in an area. The landscape is altered by the exclusion of sensitive species in the first case, and by the exclusion of resistant species in the second (Libano and Felfili 2006).

In South America, the largest savanna region is located in Brazil, and is called Cerrado, and as in other savannas, the fire regime is an important factor in the evolution of the landscape and, consequently, of the vegetation (Gottsberger and Silberbauer-Gottsberger 2006a). In savannic physiognomies the presence of trees is greater in areas protected from fire, especially in dry-shrub savannas, where protection allows the regeneration of the woody component (Moreira 2000). In general, the absence of fire benefits the woody component and increases the structural complexity of vegetation, while the passage of fire benefits the non-woody component and increases the presence of herbs and subshrubs in the landscape (Mistry 1998).

In the Cerrado, most of the ongoing studies on dynamics have focused only on the tree layer (Libano and Felfili 2006; Aquino *et al.* 2007; Roitman *et al.* 2008, Carvalho and Felfili 2011). Studies that directly focus on understanding the temporal dynamics of the herbaceous and shrub layer over the years are still scarce, especially with regard to the grassland physiognomies of the biome (Eugênio *et al.* 2011).

The Cerrado phytogeographical domain has a very heterogeneous physiognomy, that ranges from open grasslands to dense forests, but which has as the most common formation the savannic physiognomy, known as cerrado *sensu stricto* (Oliveira-Filho and Ratter 2002; Ab’Sáber 2003; Ribeiro and Walter 2008). The grassland formations include wet grassland (campo limpo), dry-shrub grassland (campo sujo) and “campo rupestre” (rupicolous field grassland) (Ribeiro and Walter 2008), and until 2007 these occupied 7% of the entire Cerrado. In the Federal District alone, they covered a total of 6,164 ha (Sano *et al.* 2007).

The dry-shrub grassland (Campo sujo) is one of the

physiognomies of the Cerrado domain and is comprised exclusively by shrubs and herbaceous species, where variations in topography, soil, and humidity allow the establishment of subshrub-herbaceous species and also of some woody species found in adjacent cerrado areas (Ribeiro and Walter 2008). Wet grasslands (Campo limpo úmido) can be found in various topographic positions, with different variations in humidity, depth and soil fertility conditions (Munhoz *et al.* 2008). This physiognomy rarely occurs in flat areas with deep soils, but is common in Central Brazil, on the slopes of plateaus and alongside “veredas” (palm swampy vegetation) (Ribeiro and Walter 2008). The wet grasslands occur on the edge of gallery forests, seasonally flooded soils in valley bottoms, especially on hydromorphic soils and peaty organic soils (Felfili *et al.* 2005), with gradations of humidity and segments where the water table is shallow (Munhoz *et al.* 2008).

This paper reports on an ongoing monitoring project of the flora in an area of wet grassland and dry-shrub grassland, on the Água Limpa Farm, located in the south of the Federal District, Brazil. The study sites had experienced an accidental fire about a month before the first survey (1999-2001) (Munhoz and Felfili 2007a), and over a period of seven years there were no disturbances related to the fire regime. The main objectives were to verify whether after seven years without fire, the communities showed variation in their floristic composition, life forms, pollination and dispersal syndromes.

MATERIALS AND METHODS

Study site

This study was conducted in adjacent wet grassland and dry-shrub grassland sites (Figure 1), both of approximately 16 ha, located on the Água Limpa Farm (ALF), (15°56' to 15°59' S and 47°55' to 47°58' WGr.), in the south of the Federal District, and owned by the University of Brasilia (UnB), comprising a core area of the Cerrado Biosphere Reserve.

The climate is Aw according to Köppen classification and is characterized by two well defined seasons: one that is hot and rainy (October to April) and the other cold and dry (May-September). In the study site the average annual maximum temperature is 28.5°C with an average annual minimum of 12°C. The average annual rainfall from November 1999 to April 2007 was 1,175 mm, measured at

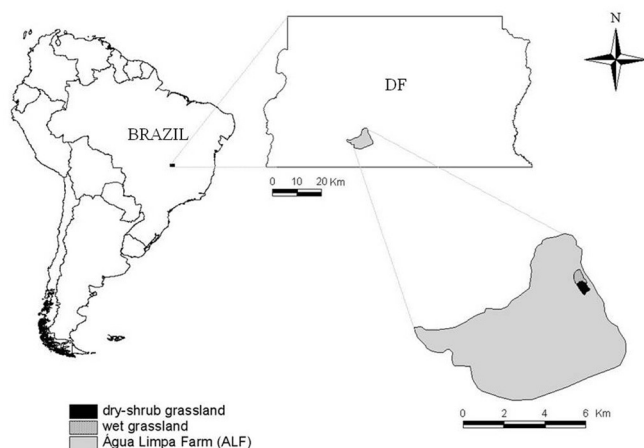


FIGURE 1. Location of Água Limpa Farm (ALF) in the south of Federal District, Brazil. The study areas are located in northeast at AFL.

the meteorological station of the IBGE Ecological Reserve (RECOR), at a distance of approximately 5 km from the study site.

The dry-shrub grassland in ALF occurs on an Oxisol of low fertility, with good drainage, deep groundwater and acid soil (pH 4.02), and high levels of Al⁺³ (0.35 cmolc.dm⁻³), low levels of Ca²⁺ (0.35 cmolc.dm⁻³), Mg²⁺ (0.12 cmolc.dm⁻³) and P⁺ (1.14 cmolc.dm⁻³) (Munhoz and Felfili 2006). The wet grassland adjacent to the dry-shrub grassland has a hydromorphic soil with a shallow water table, featuring areas of temporary flooding in the rainy season and permanent ones in the depressions. The wet grassland also features acid soil (pH 3.76), high levels of Al³⁺ (0.87 cmolc.dm⁻³), low Ca²⁺ (0.22 cmolc.dm⁻³), Mg²⁺ (0.11 cmolc.dm⁻³) and P⁺ (3.31 cmolc.dm⁻³) (Munhoz *et al.* 2008).

Data collection

The study sites and the surrounding areas (gallery forest and cerrado *sensu stricto*) experienced an accidental fire in the first week of August 1999, about a month before the first survey (T0), carried out in the area on a fortnightly basis, from September 1999 to October 2000 (Munhoz and Felfili 2004; 2007a), but have never since suffered any disturbances related to the fire regime.

The second floristic survey (T1) was carried out twice a month from August 2006 to August 2007. In both studies, botanical materials in reproductive stage of all specimens with herbaceous, subshrub, shrub and nonwoody liana habits were collected along marked trails running parallel and perpendicular to the edge of the gallery forest stream Taquara, so as to cover the greatest possible extent of the site (Munhoz and Felfili 2004; 2007a).

The species collected were classified according to the main groups of plant life forms, following the terminology proposed by Raunkiaer (1934) and adapted by Ellenberg and Mueller-Dombois (1967). The taxonomic identification was performed by reference to the literature, comparison with specimens from the herbarium of the University of Brasilia (UB) and the Ecological Reserve of the Brazilian Institute of Geography and Statistics (IBGE) and subsequent confirmation by specialists in each taxonomic group. The specimens collected were herbalized according to the usual procedures, and stored in the herbaria mentioned above. Exotic species behaving as invasive in the study site were also collected for floristic records.

Species were classified into families based on the Angiosperm Phylogeny Group III system (APG III 2009), and through the Angiosperm Phylogeny Website (Stevens 2001). Author names for all species and synonyms were checked against The Plant List project page (2010) (<http://www.theplantlist.org/>).

Data Analysis

Floristic findings in T1 for the ALF wet and dry-shrub grasslands were compared with the T0 survey (Munhoz and Felfili 2004; 2007a), by means of the Sørensen Similarity Index. The floristic lists produced for both surveys was compiled into a single one, taking into account only Angiosperms. Life forms and the dispersal and pollination syndromes comprised the species matrix, classified for their presence and absence in T1 and T0. In order to classify the species as native and subspontaneous

(exotic) we used the information available in the Brazilian Flora Species List (<http://floradobrasil.jbrj.gov.br/2012/index>) and the recommendations suggested by Moro *et al.* (2012). The rare species were classified according to the list of rare plants in Brazil (Giulietti *et al.* 2009).

To verify that the categories of life forms, pollination and dispersal syndromes were significantly different over time and space, Chi-square (χ^2) tests were applied (Zar 1999).

To assess the similarity between surveys and between communities we used the Sørensen Similarity Index, based on the presence and absence of species (Mueller-Dombois and Ellenberg 1974). This index was calculated by means of the MVSP software, version 3.13 (Kovach Computing Services 2005).

RESULTS AND DISCUSSION

After seven years without fire, changes in their floristic composition of the studied communities were verified (Figure 2A). There was an increase in the richness of species, families and genera (Figure 2A). Compared to the first survey, the number of species increased by 7.5% and 6% for the wet (campo limpo úmido) and dry-shrub (campo sujo) grassland, respectively. In both periods, the dry-shrub and wet grasslands had 35 species in common, while in the second survey only 24 such species were found. In the wet grassland, 101 species that were recorded after

the 1999 fire were not found in 2006, and 124 settled in the area after seven years, while in the dry-shrub grassland, 101 disappeared and 134 emerged (Table 1). In total (T0 + T1) were listed 317 species for wet grassland and 394 species for the dry-shrub grassland. There was a record of 557 species adding the two areas.

The floristic similarity between the surveys in the dry-shrub grassland was 53.5%, while in the wet grassland it was 38.5%. Albeit adjacent, the floristic similarity between the sites is low, 30% in T0 and 33.6% in T1. The low similarity between communities in space and on different observation occasions suggests floristic distinctions between the wet and dry-shrub grasslands, with most species being typical of each area, with low sharing over the seven-year interval between the surveys.

The five families with the greatest number of species in the ALF wet and dry-shrub grassland sites were Asteraceae (91), Poaceae (75), Fabaceae (47), Melastomataceae (25) and Cyperaceae (23). The families Poaceae and Cyperaceae showed a reduction in the wealth of species -- the former in both sites and the latter only in the wet grassland. In the grassy-woody savanna of the Pantanal an increase in the number and frequency of the Cyperaceae's species and Eudicots was observed after fire (Cardoso *et al.* 2000), suggesting that its suppression could influence the decline in the richness of these species, as observed in the ALF wet grassland after seven years without the

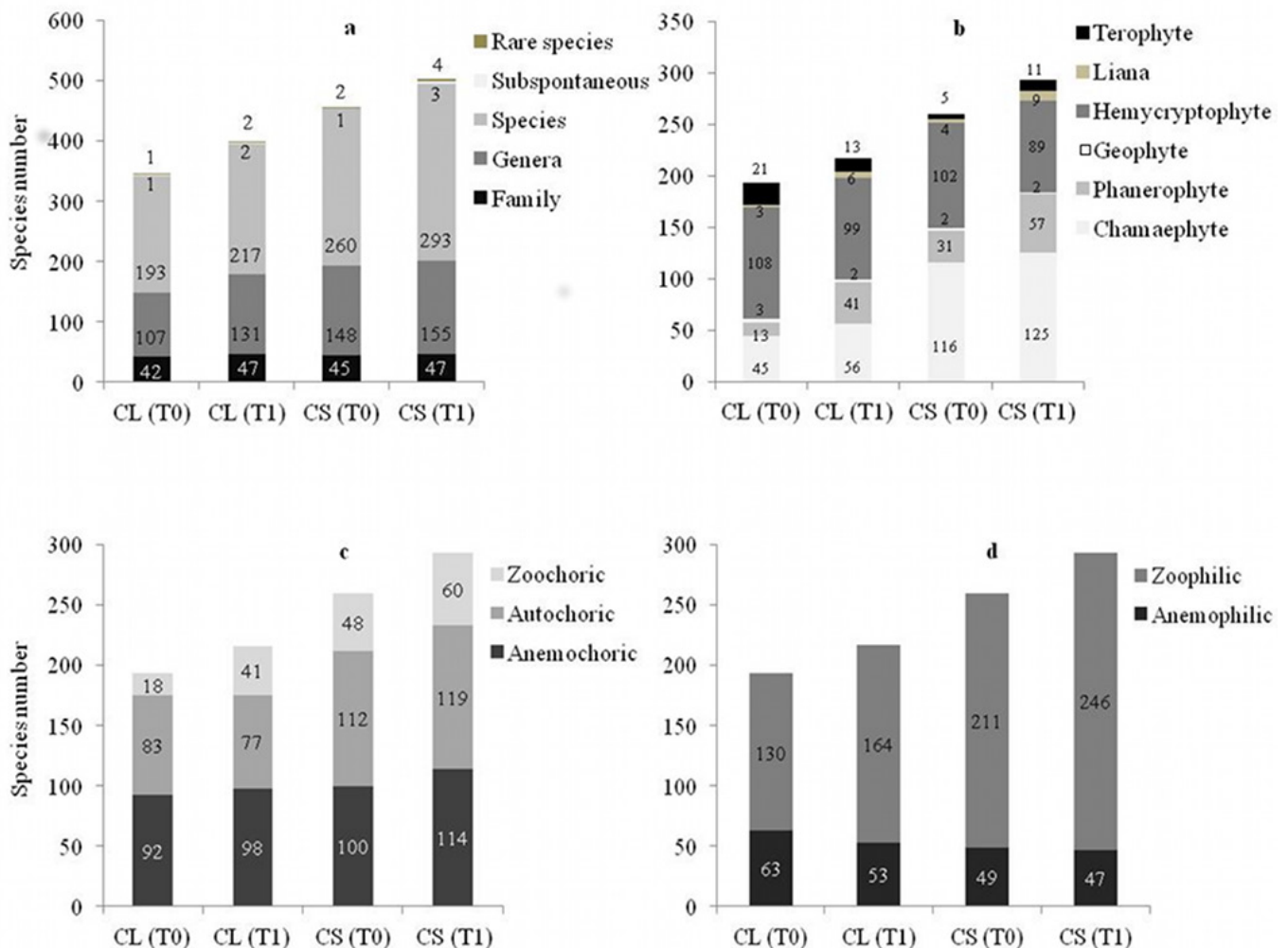


FIGURE 2. Floristic composition, life forms, pollination and dispersal syndromes of the species in the dry-shrub and wet grassland in T0 and T1 at Água Limpa Farm, (ALF), Brasília, DF, Brazil. (A) Number of species per family and genera and subspontaneous and rare species; (B) Number of species per life form; (C) Number of species per dispersal syndrome; (D) Number of species per pollination syndrome.

presence of fire. Over time, only Poaceae and Asteraceae were common to the two sites among the five families with the highest number of species. The Asteraceae and Poaceae typically feature greater variety, especially in the savanna and grassland physiognomies of the Cerrado, where they are virtually restricted to the herbaceous-subshrub component (Mantovani and Martins 1993; Batalha and Martins 2002; Munhoz and Felfili 2007a). The high colonization by individuals of these families is due to the fact that most species support direct sunlight and require high light intensity, conditions found in open areas, making these ideal places for their settlement (Tannus and Assis 2004). These two are also among the nine families deemed hyperdiverse in Brazil, since they feature at least a thousand species considered to be native (Rapini *et al.* 2009).

Significant differences were found in life forms between the wet and dry-shrub grasslands, both in T0 ($\chi^2 = 41.24, p = 8.39 \cdot 10^{-8}$) and in T1 ($\chi^2 = 12.61, p = 0.02$). Over time, the dominant life forms in the communities were the hemicryptophytes and chamaephytes, the former predominating in the wet grassland and the latter in the dry-shrub grassland (Figure 2B). As time elapsed since the last fire, the number of phanerophyte species increased in both communities, and that of therophytes and hemicryptophytes dropped in wet grassland (Figure 2B). Over time, only the wet grassland showed significant differences in the number of species by life form ($\chi^2 = 19.51, p = 0.0015$) due to the significant increase in phanerophytes and chamaephytes and reduction in hemicryptophytes and therophytes (Figure 2B). In the open savannas of Africa, the increase in shrubs determined a decline in the number of herbaceous species, after the suppression of fire (Belsky 1994; Duncan and Duncan 2000). The presence of shrubs and small trees in the landscape can change the phenology, composition, spatial distribution, biomass allocation and productivity of the herbaceous component (Scholes and Archer 1997). Shrub establishment, coverage and density cause changes in the soil and shading of herbs, resulting in the declining productivity of the latter (Scholes and Archer 1997).

As for the Cerrado, a gradual increase in tree coverage density has been recorded after years of vegetation protection against fire. In areas of savanna woodland (cerradão), cerrado *sensu stricto*, “campo cerrado” and shrub savanna (campo sujo), the absence of fires caused a significant increase in the number of woody species, with open areas showing the highest values, that is, the absence of disturbances allowed the settlement and regeneration of the woody component (Moreira 2000). After 44 years of protection from fire, the main change observed with satellite images in vegetation cover at the Assis Ecological Station, an area of Cerrado in southeastern Brazil, was the continuous thickening of vegetation, with open grassland areas being gradually occupied by closed cerrado physiognomies (Pinheiro and Durigan 2009). Protected since 1959, with the suppression of fire since 2004 in that area the wet grassland had its area reduced to one fourth of the initial extent, losing ground to the cerrado *sensu stricto* and riparian forests (Pinheiro and Durigan 2009). Apparently, in the ALF wet grassland these patterns described by Moreira (2000) and Pinheiro and Durigan

(2009) can also be verified, whereby the exclusion of fire for seven years has encouraged the growth and settlement of phanerophytes and chamaephytes (woody component) and resulted in changes in the landscape due to the density of these shrubs.

The dispersal syndromes, anemochory and autocory remained dominant in the communities studied (Figure 2C). There were significant changes in the dispersal syndromes in the wet grassland over time ($\chi^2 = 7.93, p = 0.01$), with a reduction in autochorous species and an increase in zoochoric ones (Figure 2C). The dispersion syndromes of the wet and dry-shrub grasslands were significantly different in T0 ($\chi^2 = 8.56, p = 0.01$) but not in T1 ($\chi^2 = 2.03, p = 0.36$), suggesting that over time and space a functional strategy of dispersal syndrome convergence occurred between the adjacent areas.

Zoophily was the dominant pollination syndrome in the communities in both surveys (Figure 1d), with increases of 8.6% in the wet grassland and approximately 3% in the dry-shrub grassland. There was a general reduction in the number of anemophilous species: in the wet grassland this decrease was of 8.1% and in the dry-shrub grassland, 2.8% (Figure 2D). Over time, only the wet grassland ($\chi^2 = 3.40, p = 0.05$) showed significant differences in pollination syndromes, due to the increase in the number of zoochoric species between surveys and the decrease in anemophilous species (Figure 2D).

The predominance of anemochoric dispersion over time is associated to the physiognomic types of the sites, which are open grasslands, and the dominance of herbaceous species, a pattern observed in other studies on the Cerrado (Batalha *et al.* 1997; Batalha and Mantovani 2000; Tannus *et al.* 2006), and in this dry-shrub grassland seven years ago (Munhoz and Felfili 2007b), but increased zoochory may be another factor to confirm the influence of the absence of fire in the changes found in the landscape over time, especially in the ALF wet grassland, where after years of fire protection a greater density of chamaephytes and phanerophytes was verified. The prevalence of the zoochoric dispersal syndrome in different environments is associated with the dominance of woody species (phanerophytes and chamaephytes), as occurs in the cerrado *sensu stricto* and forest habitats (Batalha and Mantovani 2000; Kinoshita *et al.* 2006; Tannus and Assis 2006; Ishara and Maimoni-Rodella 2011).

The conditions of more open vegetation and the dominance of one layer composed of herbs, besides benefiting the presence of wind-dispersed species also favor a high frequency of anemophilous species (Gottsberger and Silberbauer-Gottsberger 2006b; Barbosa and Sazima 2008; Ishara and Maimoni-Rodella 2011), which in the ALF wet and dry-shrub grasslands showed a reduction over time in the studied communities. This anemophily reduction is associated with the exclusion of fire for seven years, since the reproductive behavior of some grasses, a group to which belong most of the species pollinated by wind, is dependent on fire, so few species flourish in the absence of this type of disorder (Sarmiento 1992; Canales *et al.* 1994; Munhoz and Amaral 2010). The proportions and occurrences of different pollination systems are affected by differences in floristic composition (Ramírez 1989).

Seven species found in the ALF site are on the list of Rare Plants of Brazil (Giulietti *et al.* 2009): *Wedelia souzae* H. Rob. (Asteraceae); *Lobelia brasiliensis* A.O.S. Vieira and G.J. Shep. (Campanulaceae); *Hyptis loeseneriana* Pilg. (Lamiaceae); *Hyptis tenuifolia* Epling (Lamiaceae); *Polygala juncea* A.St.-Hil. (Polygalaceae); *Spermacoce irwiniana* (E.L. Cabral) Delprete (Rubiaceae) and *Xyris diaphanobracteata* Kral and Wand. (Xyridaceae) while *W. souzae*, *L. brasiliensis*, *H.loeseneriana* e *X.diaphanobracteata* only settled in the sites after fire suppression, *P. juncea* was listed after the fire only. This species flowers and fruits from November to May, and flowering is intense especially after fires (Marques 1988). *H.tenuifolia* e *S. irwiniana* were recorded in both surveys. *H. tenuifolia* occurred for a short period in the ALF dry-shrub grassland, and was recorded seven months after the fire, in the month of April during the dry season of 2000 (Munhoz and Felfili 2006). These plants were considered rare, since they have a restricted range of occurrence (<10,000 km²) and therefore meet criteria B1 and D2 of the IUCN (International Union for the Conservation of Nature), that is, in terms of the first criterion they can be classified as threatened depending on the number of locations or fragmentation and if they experience decline and/or extreme fluctuations regarding the boundaries of occurrence, area of occupancy, environmental conditions, number of locations or subpopulations, and/or number of mature individuals; and for the second criterion, these species can be considered endangered in the near future

(Rapini *et al.* 2009).

Three species were classified as subsponaneous to the flora of the Brazil (Brazilian Flora Species List 2012) (Table 1). *Clibadium armanii* (Balb.) Sch. Bip. ex O.E. Schulz (Asteraceae) e *Melinis minutiflora* P. Beauv (Poaceae) were recorded only after some distance from fire and only *Melinis repens* (Willd.) Zizka (Poaceae) appeared in all surveys (Table 1). After seven years of fire the grass *Melinis minutiflora* P. Beauv. settled in the ALF dry-shrub grassland was listed among the species with the highest percentage of coverage (A.G. Amaral, unpublished data). *M. minutiflora* is sensitive to fire and is adapted to low soil fertility (Martins *et al.* 2004), a condition found in the ALF dry-shrub grassland for its settlement and proliferation alongside the absence of fire for seven years. As a consequence of high competitive power, ample plant growth and a vast production of viable seeds, the species *M. minutiflora* has become a threat to the conservation of the biome's flora (Filgueiras 1991; Martins *et al.* 2004).

For the herb-shrub layer of the dry-shrub grassland, and particularly in the ALF wet grassland, the evidence found in changes related to composition, life forms and pollination and dispersal syndromes, point to a process of succession in these communities, generated by the exclusion of fire for seven years. For these environments, the frequency of the fire regime can be considered the main agent of change in the composition, life forms and phenology of species.

TABLE 1. Families, genera and species according the life form (LF) proposed by Raunkiaer (1934) and adapted by Ellenberg and Mueller-Dombois (1967), dispersal syndrome (DS) and pollination syndrome (PS) in a campo sujo (CS), dry-shrub grassland, and a campo limpo úmido (CL), wet grassland, in 1999-2000 (T0) and 2006-2007 (T1), in the Água Limpa Farm, Federal District, Brazil. Legend: cham=chamaephyte; geo=geophyte; hem=hemicryptophyte; ph=phanerophyte; lia=liana; ter=terophyte; autoc= autochoric; zooc= zoochoric; anemoc= anemochoric; zoo= zoophilic; ane= anemophilic; *subsponaneous species; +rare species; CM= C. Munhoz; AA= A. Amaral.

SPECIES	VOUCHER	CLT0	CLT1	CST0	CST1	Habit	LF	DS	PS
Acanthaceae									
<i>Justicia oncodes</i> (Lindau) Wassh. and C. Ezcurra	CM1058	-	-	1	-	herb	hem	autoc	zoo
<i>Justicia phyllocalyx</i> (Lindau) Wassh. and C. Ezcurra	AA617	-	-	1	1	herb	hem	autoc	zoo
<i>Justicia pycnophylla</i> Lindau	AA696	1	-	1	1	subshrub	cham	autoc	zoo
<i>Ruellia brevicaulis</i> (Nees) Lindau	CM2076	-	-	1	-	subshrub	cham	autoc	zoo
<i>Ruellia incomta</i> (Nees) Lindau	AA58	1	-	1	1	subshrub	cham	autoc	zoo
<i>Ruellia</i> sp.	AA1230	-	-	-	1	subshrub	cham	autoc	zoo
Alstroemeriaceae									
<i>Alstroemeria burchellii</i> Baker	AA232	-	1	-	-	herb	geo	autoc	zoo
<i>Alstroemeria gardneri</i> Baker	AA822	-	-	-	1	herb	geo	autoc	zoo
<i>Alstroemeria longistyla</i> Schenk	CM956	1	-	-	-	herb	geo	autoc	zoo
<i>Alstroemeria</i> sp.	CM1460	-	-	1	-	herb	hem	autoc	zoo
Amaranthaceae									
<i>Gomphrena aphylla</i> Pohl ex Moq.	CM741	1	-	-	-	subshrub	cham	autoc	zoo
<i>Pfaffia jubata</i> Mart.	CM890	1	-	1	-	subshrub	cham	autoc	zoo
Anacardiaceae									
<i>Anacardium humile</i> A. St.-Hil.	AA92	-	1	-	1	shrub	ph	zooc	zoo
Apiaceae									
<i>Eryngium juncifolium</i> (Urb.) Mathias and Constance	AA48	-	1	1	1	herb	hem	autoc	zoo
<i>Eryngium marginatum</i> Pohl ex Urb.	CM812	1	-	1	-	herb	hem	autoc	zoo
<i>Eryngium</i> sp.	CM2096	1	-	-	-	herb	hem	autoc	zoo
Apocynaceae									
<i>Asclepias candida</i> Vell.	CM2078	1	-	1	-	herb	hem	anemoc	zoo
<i>Ditassa cordata</i> (Turcz.) Fontella	AA1433	1	1	-	-	subshrub	cham	anemoc	zoo
<i>Ditassa</i> sp.	CM2298	-	-	1	-	subshrub	cham	autoc	zoo
<i>Mandevilla longiflora</i> (Desf.) Pichon	CM2053	-	-	1	-	subshrub	cham	anemoc	zoo
<i>Mandevilla novocapitalis</i> Markgr.	AA393	-	-	-	1	subshrub	cham	autoc	zoo
<i>Mandevilla rugosa</i> (Benth.) Woodson	AA347	1	-	-	1	vine	lia	anemoc	zoo

TABLE 1. CONTINUED.

SPECIES	VOUCHER	CLTO	CLT1	CSTO	CST1	Habit	LF	DS	PS
<i>Mandevilla velame</i> (A. St.-Hil.) Pichon	AA1636	-	-	1	1	subshrub	cham	anemoc	zoo
<i>Oxypetalum aequaliflorum</i> E. Fourn.	AA535	1	-	-	1	herb	hem	anemoc	zoo
<i>Oxypetalum appendiculatum</i> Mart.	AA145	-	1	-	-	vine	lia	anemoc	zoo
<i>Oxypetalum erectum</i> Mart.	AA407	-	-	1	1	subshrub	cham	anemoc	zoo
Asteraceae									
<i>Achyrocline alata</i> (Kunth) DC.	CM1187	1	-	-	-	subshrub	cham	anemoc	zoo
<i>Achyrocline satureioides</i> (Lam.) DC.	AA40	-	1	-	1	herb	hem	anemoc	zoo
<i>Ageratum conyzoides</i> (L.) L.	AA547	-	1	-	-	subshrub	cham	anemoc	zoo
<i>Apopyros warmingii</i> (Baker) G.L. Nesom	CM1936	-	-	1	-	subshrub	cham	anemoc	zoo
<i>Aspilia foliacea</i> (Spreng.) Baker	AA258	1	1	1	1	herb	hem	anemoc	zoo
<i>Aspilia jolyana</i> G.M. Barroso	AA45	-	-	1	1	shrub	cham	anemoc	zoo
<i>Aspilia montevidensis</i> (Spreng.) Kuntze	AA495	-	-	-	1	herb	hem	anemoc	zoo
<i>Aspilia ovalifolia</i> (DC.) Baker	AA709	-	-	-	1	subshrub	cham	anemoc	zoo
<i>Aspilia platyphylla</i> (Baker) S.F. Blake	CM2173	-	-	1	-	subshrub	cham	anemoc	zoo
<i>Aspilia reflexa</i> (Sch.Bip. ex Baker) Baker	CM839	-	-	1	-	herb	hem	anemoc	zoo
<i>Aspilia</i> sp.	CM2237	-	-	1	-	subshrub	cham	autoc	zoo
<i>Ayapana amygdalina</i> (Lam.) R.M. King and H. Rob.	AA49	-	1	-	1	subshrub	cham	anemoc	zoo
<i>Baccharis erigeroides</i> DC.	CM2013	1	-	-	-	subshrub	cham	anemoc	zoo
<i>Baccharis rufescens</i> var. <i>ventanica</i> Cabrera	AA62	-	-	1	1	subshrub	cham	anemoc	zoo
<i>Baccharis subdentata</i> DC.	CM959	1	-	-	-	subshrub	cham	anemoc	zoo
<i>Baccharis</i> sp.1	AA1933	-	-	1	1	subshrub	cham	anemoc	zoo
<i>Baccharis</i> sp.2	AA834	-	1	-	1	subshrub	cham	anemoc	zoo
<i>Bidens graveolens</i> Mart.	AA750	-	-	1	1	subshrub	cham	anemoc	zoo
<i>Calea cuneifolia</i> DC.	AA504	-	-	1	1	subshrub	cham	anemoc	zoo
<i>Calea fruticosa</i> (Gardner) Urbatsch, Zlotzky and Pruski	CM1341	-	-	1	-	shrub	ph	anemoc	zoo
<i>Calea gardneriana</i> Baker	CM1941	1	-	1	-	herb	Hem	anemoc	zoo
<i>Calea hymenolepis</i> Baker	AA1105	-	-	-	1	subshrub	cham	anemoc	zoo
<i>Calea lantanoides</i> Gardner	AA1786	-	-	-	1	subshrub	cham	anemoc	zoo
<i>Calea mediterranea</i> (Vell.) Pruski	CM792	1	-	1	-	subshrub	cham	anemoc	zoo
<i>Calea quadrifolia</i> Pruski and Urbatsch	AA873	-	-	-	1	subshrub	cham	anemoc	zoo
<i>Campuloclinium hirsutum</i> Gardner	AA1197	-	1	-	-	herb	hem	anemoc	zoo
<i>Chaptalia integerrima</i> (Vell.) Burkart	AA425	-	-	1	1	herb	hem	anemoc	zoo
<i>Chresta sphaerocephala</i> DC.	AA20	-	1	1	1	shrub	ph	anemoc	zoo
<i>Chromolaena chaseae</i> (B.L. Rob.) R. M. King and H. Rob.	AA26	-	-	1	1	subshrub	cham	anemoc	zoo
<i>Chromolaena horminoides</i> DC.	AA1770	-	-	-	1	herb	hem	anemoc	zoo
<i>Chromolaena laevigata</i> (Lam.) R. M. King and H. Rob.	AA1256	-	1	-	1	shrub	ph	anemoc	zoo
<i>Chromolaena maximiliani</i> (Schrad. ex DC.) R.M. King and H. Rob.	AA1849	-	1	-	-	subshrub	cham	anemoc	zoo
<i>Chromolaena vindex</i> (DC.) R.M. King and H. Rob.	AA1257	1	-	-	1	herb	hem	anemoc	zoo
<i>Chrysanthemum morifolium</i> Ramat.	CM1674	-	-	1	-	subshrub	cham	anemoc	zoo
<i>Clibadium armanii</i> (Balb.) Sch. Bip. ex O.E. Schulz *	AA1095	-	1	-	1	shrub	ph	anemoc	zoo
<i>Dimerostemma asperatum</i> S.F. Blake	CM843	-	-	1	-	subshrub	cham	anemoc	zoo
<i>Dimerostemma brasilianum</i> Cass.	AA639	-	-	-	1	shrub	ph	anemoc	zoo
<i>Echinocoryne holosericea</i> (Mart.) H. Rob.	AA102	-	-	-	1	shrub	ph	anemoc	zoo
<i>Echinocoryne stricta</i> (Gardner) H. Rob.	AA426	-	-	-	1	subshrub	cham	anemoc	zoo
<i>Elephantopus elongatus</i> Gardner	AA893	1	1	-	1	shrub	ph	anemoc	zoo
<i>Emilia fosbergii</i> Nicolson	AA1761	-	1	1	1	herb	ter	anemoc	zoo
<i>Erechtites hieracifolius</i> (L.) Raf. ex DC.	AA1557	-	1	-	1	herb	ter	anemoc	zoo
<i>Eremanthus mollis</i> Sch. Bip.	AA948	-	-	-	1	shrub	ph	anemoc	zoo
<i>Eupatorium macrocephalum</i> Less.	AA391	-	-	-	1	herb	hem	anemoc	zoo
<i>Eupatorium megacephalum</i> Mart. ex Baker	AA748	-	-	1	1	subshrub	cham	anemoc	zoo
<i>Eupatorium stachyophyllum</i> Spreng.	CM2133	-	-	1	-	subshrub	cham	anemoc	zoo
<i>Eupatorium tremulum</i> Hook. and Arn.	AA1068	-	1	-	-	shrub	ph	anemoc	zoo
<i>Eupatorium</i> sp.	CM783	-	-	1	-	subshrub	cham	anemoc	zoo
<i>Ichthyothere latifolia</i> Baker	AA521	1	1	1	1	subshrub	cham	anemoc	zoo
<i>Lepidaploa aurea</i> (Mart. ex DC.) H. Rob.	AA33	-	1	1	1	subshrub	cham	anemoc	zoo
<i>Lessingianthus argyrophyllus</i> (Less.) H. Rob.	AA34	-	-	1	1	subshrub	cham	anemoc	zoo
<i>Lessingianthus bardanoides</i> (Less.) H. Rob.	AA702	-	-	1	1	subshrub	cham	anemoc	zoo
<i>Lessingianthus compactiflorus</i> (Mart. ex Baker) H. Rob.	AA17	-	-	-	1	subshrub	cham	anemoc	zoo
<i>Lessingianthus desertorum</i> (Mart. ex DC.) H. Rob.	CM1859	1	-	-	-	subshrub	cham	anemoc	zoo
<i>Lessingianthus durus</i> (Mart. ex DC.) H. Rob.	AA260	-	-	1	1	subshrub	cham	anemoc	zoo

TABLE 1. CONTINUED.

SPECIES	VOUCHER	CLTO	CLT1	CSTO	CST1	Habit	LF	DS	PS
<i>Lessingianthus erythrophilus</i> (DC.) H. Rob.	AA421	-	1	-	1	subshrub	cham	anemoc	zoo
<i>Lessingianthus grearii</i> (H. Rob.) H. Rob.	CM889	1	-	-	-	subshrub	cham	anemoc	zoo
<i>Lessingianthus ligulifolius</i> (Mart. ex DC.) H. Rob.	AA720	-	-	-	1	subshrub	cham	anemoc	zoo
<i>Lessingianthus linearifolius</i> (Less.) H. Rob.	CM1697	1	-	-	-	subshrub	cham	anemoc	zoo
<i>Lessingianthus psilophyllus</i> (DC.) H. Rob.	AA1194	-	1	-	-	subshrub	cham	anemoc	zoo
<i>Lessingianthus simplex</i> (Less.) H. Rob.	AA327	1	-	1	1	subshrub	cham	anemoc	zoo
<i>Mikania sessilifolia</i> DC.	CM1661	-	-	1	-	subshrub	cham	anemoc	zoo
<i>Podocoma</i> sp.	AA494	-	-	-	1	subshrub	cham	anemoc	zoo
<i>Porophyllum angustissimum</i> Gardner	CM1357	-	-	1	-	subshrub	cham	anemoc	zoo
<i>Porophyllum lanceolatum</i> DC.	CM1043	-	-	1	-	shrub	ph	anemoc	zoo
<i>Praxelis kleinioides</i> (Kunth) Sch. Bip.	AA1197	-	1	-	-	herb	hem	anemoc	zoo
<i>Praxelis</i> sp.	AA205	-	1	-	-	subshrub	cham	anemoc	zoo
<i>Riencourtia oblongifolia</i> Gardner	AA519	1	1	1	1	subshrub	cham	anemoc	zoo
<i>Senecio adamantinus</i> Bong.	AA366	-	1	-	-	herb	hem	anemoc	zoo
<i>Senecio</i> sp.	AA451	-	1	-	-	subshrub	cham	anemoc	zoo
<i>Soaresia velutina</i> Sch. Bip.	AA1390	-	-	-	1	herb	hem	anemoc	zoo
<i>Stevia heptachaeta</i> DC.	AA1366	1	1	1	1	herb	hem	anemoc	zoo
<i>Stevia</i> sp.	AA815	-	-	1	1	subshrub	cham	anemoc	zoo
<i>Symphiopappus reticulatus</i> Baker	AA590	-	1	-	-	shrub	ph	anemoc	zoo
<i>Trichogonia salviifolia</i> Gardner	AA472	-	-	-	1	herb	hem	anemoc	zoo
<i>Trichogonia</i> sp.	CM986	1	-	-	-	herb	hem	anemoc	zoo
<i>Trixis glutinosa</i> D. Don	AA18	-	-	1	1	shrub	ph	anemoc	zoo
<i>Trixis nobilis</i> (Vell.) Katinas	AA1363	-	1	-	1	subshrub	cham	anemoc	zoo
<i>Vernonanthura ferruginea</i> (Less.) H. Rob.	AA27	-	-	-	1	shrub	ph	anemoc	zoo
<i>Vernonanthura membranacea</i> (Gardner) H. Rob.	AA1775	-	-	-	1	subshrub	cham	anemoc	zoo
<i>Vernonanthura phosphorica</i> (Vell.) H. Rob.	CM1366	-	-	1	-	shrub	ph	anemoc	zoo
<i>Vernonia megapotamica</i> Spreng.	AA634	-	-	1	1	subshrub	cham	anemoc	zoo
<i>Vernonia rubriramea</i> Mart. ex DC.	AA184	-	-	-	1	subshrub	cham	anemoc	zoo
<i>Viguiera bracteata</i> Gardner	AA259	-	1	1	1	subshrub	cham	anemoc	zoo
<i>Viguiera discolor</i> Baker	AA592	-	1	-	-	subshrub	cham	anemoc	zoo
<i>Viguiera kunthiana</i> Gardner	AA1604	-	1	-	-	herb	hem	anemoc	zoo
<i>Viguiera robusta</i> Gardner	AA400	-	-	1	1	subshrub	cham	anemoc	zoo
<i>Viguiera</i> sp.	CM917	-	-	1	-	subshrub	cham	anemoc	zoo
<i>Wedelia bishopii</i> H. Rob.	CM839	1	-	1	-	herb	hem	anemoc	zoo
<i>Wedelia souzae</i> H. Rob.*	AA1263	-	-	-	1	shrub	ph	anemoc	zoo
<i>Willoughbya officinalis</i> (Mart.) Kuntze	AA868	1	1	-	1	subshrub	cham	anemoc	zoo
Begoniaceae									
<i>Begonia cucullata</i> Willd.	AA1199	-	1	-	-	herb	ter	autoc	zoo
Bignoniaceae									
<i>Adenocalymma pedunculatum</i> (Vell.) L.G.Lohmann	AA1015	-	-	-	1	subshrub	cham	anemoc	zoo
<i>Anemopaegma arvense</i> (Vell.) Stellfeld ex de Souza	CM782	-	-	1	-	subshrub	cham	anemoc	zoo
<i>Anemopaegma glaucum</i> Mart. ex DC.	AA1274	-	-	1	1	subshrub	cham	anemoc	zoo
<i>Jacaranda caroba</i> (Vell.) A. DC.	AA1878	-	1	-	-	shrub	ph	anemoc	zoo
<i>Jacaranda ulei</i> Bureau and K. Schum.	s/no	-	-	1	-	shrub	ph	anemoc	zoo
<i>Zeyheria montana</i> Mart.	AA1016	-	-	-	1	shrub	ph	anemoc	zoo
Boraginaceae									
<i>Cordia calocephala</i> Cham.	AA480	1	-	1	1	shrub	ph	autoc	zoo
<i>Heliotropium salicioides</i> Cham.	AA51	-	-	1	1	subshrub	cham	autoc	zoo
Burmanniaceae									
<i>Burmannia flava</i> Mart.	CM1003	1	-	-	-	herb	ter	autoc	zoo
Campanulaceae									
<i>Lobelia brasiliensis</i> A.O.S. Vieira and G.J.Shepherd*	AA356	-	1	-	-	shrub	ph	anemoc	zoo
<i>Lobelia camporum</i> Pohl	CM1896	1	1	1	-	herb	hem	anemoc	zoo
Chrysobalanaceae									
<i>Parinari obtusifolia</i> Hook. f.	AA21	1	-	1	1	subshrub	cham	zoo	zoo
Clusiaceae									
<i>Kielmeyera abdita</i> Saggi	AA24	-	1	1	1	subshrub	cham	anemoc	zoo
<i>Kielmeyera variabilis</i> Mart. and Zucc.	CM864	-	-	1	-	shrub	ph	anemoc	zoo
Convolvulaceae									
<i>Evolvulus lagopodioides</i> Meisn.	AA82	-	-	1	1	herb	hem	anemoc	zoo

TABLE 1. CONTINUED.

SPECIES	VOUCHER	CLTO	CLT1	CST0	CST1	Habit	LF	DS	PS
<i>Ipomoea aurifolia</i> Dammer	AA392	-	-	-	1	subshrub	cham	autoc	zoo
<i>Ipomoea campestris</i> Meisn.	AA499	-	1	1	1	herb	hem	autoc	zoo
<i>Ipomoea geophylifolia</i> K. Afzelius	AA593	-	1	-	-	vine	lia	autoc	zoo
<i>Ipomoea procumbens</i> Mart. and Choisy	AA972	-	-	-	1	vine	lia	autoc	zoo
<i>Ipomoea procurrens</i> Meisn.	AA507	1	-	1	1	vine	lia	autoc	zoo
<i>Ipomoea</i> sp.	CM2163	-	-	1	-	vine	lia	autoc	zoo
<i>Merremia contorquens</i> (Choisy) Hallier f.	AA66	-	-	-	1	vine	lia	autoc	zoo
<i>Merremia digitata</i> var. <i>ericoides</i> (Meisn.) D.F. Austin and Staples	AA1400	-	-	-	1	vine	lia	autoc	zoo
Cucurbitaceae									
<i>Cayaponia weddellii</i> (Naudin) Cogn.	AA1076	-	1	-	-	vine	lia	zooc	zoo
Cyperaceae									
<i>Ascolepis brasiliensis</i> (Kunth) Benth. ex C.B. Clarke	CM2039	1	-	-	-	herb	ter	anemoc	ane
<i>Bulbostylis capillaris</i> (L.) Kunth ex C.B. Clarke	CM1191	1	-	-	-	herb	ter	anemoc	ane
<i>Bulbostylis jacobinae</i> (Steud.) Lindm.	AA659	-	-	-	1	herb	hem	anemoc	ane
<i>Bulbostylis junciformis</i> (Kunth) C.B. Clarke	AA536	1	1	1	1	herb	hem	anemoc	ane
<i>Bulbostylis juncooides</i> (Vahl) Kük. ex Herter	CM2174	-	-	1	-	herb	hem	anemoc	ane
<i>Bulbostylis paradoxa</i> (Spreng.) Lindm.	s/no	-	-	1	-	herb	hem	anemoc	ane
<i>Bulbostylis paraensis</i> C.B. Clarke	CM828	1	-	-	-	herb	hem	anemoc	ane
<i>Bulbostylis sellowiana</i> (Kunth) Palla	AA143	1	1	-	-	herb	hem	anemoc	ane
<i>Bulbostylis</i> sp. CL	AA1753	-	1	-	-	herb	hem	anemoc	ane
<i>Bulbostylis</i> sp. CS	CM729	-	-	1	-	herb	hem	anemoc	ane
<i>Lagenocarpus rigidus</i> (Kunth) Nees	AA379	1	1	-	-	herb	hem	anemoc	ane
<i>Lagenocarpus rigidus</i> subsp. <i>tenuifolius</i> (Boeckeler) T. Koyama and Maguire	AA568a	-	1	-	-	herb	hem	anemoc	ane
<i>Rhynchospora</i> cf. <i>albiceps</i> Kunth	CM888	1	-	-	-	herb	hem	anemoc	ane
<i>Rhynchospora brasiliensis</i> Boeckeler	CM948	1	-	-	-	herb	hem	anemoc	ane
<i>Rhynchospora consaguinea</i> (Kunth) Boeckeler	AA275	1	1	1	1	herb	hem	anemoc	ane
<i>Rhynchospora emaciata</i> (Nees.) Boeckeler	AA566	1	1	-	-	herb	hem	anemoc	ane
<i>Rhynchospora gigantea</i> Link	CM1293	1	-	-	-	herb	hem	anemoc	ane
<i>Rhynchospora globosa</i> (Kunth) Roem. and Schult.	AA117	1	1	-	1	herb	hem	autoc	ane
<i>Rhynchospora marisculus</i> Lindl. and Nees.	AA609	1	1	-	-	herb	hem	anemoc	ane
<i>Rhynchospora patuligluma</i> C.B. Clarke ex Lindm.	CM2302	-	-	1	-	herb	hem	anemoc	ane
<i>Rhynchospora robusta</i> (Kunth) Boeckeler	AA235	1	1	-	-	herb	hem	anemoc	ane
<i>Rhynchospora rugosa</i> (Vahl) Gale	AA47	1	1	-	1	herb	hem	anemoc	ane
<i>Rhynchospora spruceana</i> C.B. Clarke	AA680	1	1	-	-	herb	hem	autoc	ane
<i>Rhynchospora tenuis</i> Link	AA901	1	1	-	-	herb	hem	autoc	ane
<i>Rhynchospora velutina</i> (Kunth) Boeckeler	AA1336	1	1	-	1	herb	hem	autoc	ane
<i>Rhynchospora</i> sp.1	CM826	1	-	-	-	herb	hem	autoc	ane
<i>Rhynchospora</i> sp.2	CM1594	1	-	-	-	herb	hem	autoc	ane
<i>Rhynchospora</i> sp.3	CM2212	1	-	-	-	herb	hem	autoc	ane
<i>Rhynchospora</i> sp.4	AA1613	-	1	-	-	herb	hem	autoc	ane
<i>Scleria hirtella</i> Sw.	CM1064	1	1	1	-	herb	hem	autoc	ane
<i>Scleria leptostachya</i> Kunth	AA816	1	1	-	1	herb	ter	autoc	ane
<i>Scleria scabra</i> Willd.	AA1151	-	-	-	1	herb	ter	autoc	ane
<i>Scleria</i> sp.	CM898	1	-	-	-	herb	hem	autoc	ane
Dilleniaceae									
<i>Davilla elliptica</i> A. St.-Hil.	AA1265	-	-	1	1	shrub	ph	zooc	zoo
Droseraceae									
<i>Drosera montana</i> A. St.-Hil.	AA820	1	1	-	1	herb	hem	autoc	zoo
Ericaceae									
<i>Agarista chlorantha</i> (Cham.) G. Don	AA124	-	1	-	-	subshrub	cham	autoc	zoo
Ericaceae									
<i>Gaylussacia goyazensis</i> Sleumer	AA80	-	1	-	1	shrub	ph	zooc	zoo
<i>Gaylussacia</i> sp.	AA1701	-	1	-	-	shrub	ph	zooc	zoo
Eriocaulaceae									
<i>Eriocaulon modestum</i> Kunth	CM1584	1	-	-	-	herb	hem	anemoc	ane
<i>Paepalanthus eriocauloides</i> Ruhland	CM1480	1	-	-	-	herb	ter	anemoc	zoo
<i>Paepalanthus flaccidus</i> (Bong.) Kunth	AA1052	1	1	-	-	herb	hem	anemoc	zoo
<i>Paepalanthus giganteus</i> Sano	AA198	-	-	1	1	herb	hem	anemoc	zoo
<i>Paepalanthus lundii</i> Körn.	CM1858	1	-	-	-	herb	hem	anemoc	zoo

TABLE 1. CONTINUED.

SPECIES	VOUCHER	CLTO	CLT1	CSTO	CST1	Habit	LF	DS	PS
<i>Paepalanthus cf. speciosus</i> Gardner	CM1599	1	-	-	-	herb	hem	anemoc	zoo
<i>Syngonanthus densiflorus</i> (Korn.) Ruhland	AA283	1	1	-	-	herb	hem	autoc	zoo
<i>Syngonanthus gracilis</i> (Bong.) Ruhland	AA282	1	1	-	-	herb	ter	autoc	zoo
<i>Syngonanthus nitens</i> (Bong.) Ruhland	AA1606	1	1	-	-	herb	hem	autoc	zoo
<i>Syngonanthus xeranthemoides</i> (Bong.) Ruhland	CM2220	1	-	1	-	herb	hem	autoc	zoo
<i>Syngonanthus</i> sp.1	CM1817	1	-	-	-	herb	hem	autoc	zoo
<i>Syngonanthus</i> sp.2	CM1580	1	-	-	-	herb	hem	autoc	zoo
Erythroxylaceae									
<i>Erythroxylum campestre</i> A. St.-Hil	AA50	-	-	1	1	subshrub	cham	zooc	zoo
<i>Erythroxylum deciduum</i> A. St.-Hil.	AA156	1	-	1	1	shrub	ph	zooc	zoo
<i>Erythroxylum suberosum</i> A. St.-Hil.	AA1000	-	-	-	1	shrub	ph	zooc	zoo
<i>Erythroxylum tortuosum</i> Mart.	CM1872	-	-	1	-	shrub	ph	zooc	zoo
Euphorbiaceae									
<i>Acalypha clausenii</i> (Turcz.) Müll.Arg.	CM2052	1	-	1	-	herb	hem	autoc	zoo
<i>Croton antisiphiliticus</i> Mart.	AA157	1	-	1	1	subshrub	cham	autoc	zoo
<i>Croton campestris</i> A. St.-Hil.	AA416	-	-	1	1	subshrub	cham	autoc	zoo
<i>Croton goyazensis</i> Müll. Arg.	AA14	-	-	1	1	subshrub	cham	autoc	zoo
<i>Dalechampia caperonioides</i> Baill.	AA6	1	1	1	1	herb	hem	autoc	zoo
<i>Euphorbia potentilloides</i> Boiss.	CM733	1	1	1	-	herb	hem	autoc	zoo
<i>Euphorbia</i> sp.	CM731	-	-	1	-	subshrub	cham	autoc	zoo
<i>Maprounea guianensis</i> Aubl.	AA323	-	-	-	1	shrub	ph	autoc	zoo
<i>Sapium glandulosum</i> (L.) Morong	AA343	-	-	-	1	subshrub	cham	autoc	zoo
Fabaceae									
<i>Acosmium dasycarpum</i> (Vogel) Yakovlev	AA179	-	-	-	1	shrub	ph	autoc	zoo
<i>Aeschynomene falcata</i> (Poir) DC.	CM1068	-	-	1	-	herb	hem	anemoc	zoo
<i>Aeschynomene paniculata</i> Vogel	AA192	-	-	-	1	subshrub	cham	anemoc	zoo
<i>Bauhinia dumosa</i> Benth.	AA633	-	-	-	1	shrub	ph	autoc	zoo
<i>Bauhinia rufa</i> (Bong.) Steud	AA195	-	-	-	1	shrub	ph	autoc	zoo
<i>Bauhinia</i> sp.	CM1463	-	-	1	-	subshrub	cham	autoc	zoo
<i>Calliandra dysantha</i> Benth.	CM1336	-	1	1	-	subshrub	cham	autoc	zoo
<i>Chamaecrista cathartica</i> (Mart.) H.S. Irwin and Barneby	AA190	-	1	1	1	subshrub	cham	autoc	zoo
<i>Chamaecrista conferta</i> (Benth.) H.S.Irwin and Barneby	CM1176	1	-	-	-	subshrub	cham	autoc	zoo
<i>Chamaecrista crommyotricha</i> (Harms) H.S. Irwin and Barneby	AA30	-	-	-	1	subshrub	cham	autoc	zoo
<i>Chamaecrista desvauxii</i> (Collad.) Killip	CM866	-	-	1	-	subshrub	cham	autoc	zoo
<i>Chamaecrista desvauxii</i> var. <i>langsдорffii</i> (Vogel) H.S. Irwin and Barneby	AA708	-	-	1	1	subshrub	cham	autoc	zoo
<i>Chamaecrista pohliana</i> (Benth) H.S. Irwin and Barneby	AA388	1	1	1	1	subshrub	cham	autoc	zoo
<i>Chamaecrista</i> sp.	CM1063	-	-	1	-	subshrub	cham	autoc	zoo
<i>Crotalaria cf. goiasensis</i> Windler and S.G. Skinner	CM2475	1	-	1	-	subshrub	cham	autoc	zoo
<i>Clitoria guianensis</i> (Aubl.) Benth.	CM2055	-	-	1	-	herb	hem	autoc	zoo
<i>Crotalaria flavicoma</i> Benth.	AA832	-	-	1	1	subshrub	cham	autoc	zoo
<i>Crotalaria unifoliolata</i> Benth.	AA1486	-	-	1	1	subshrub	cham	autoc	zoo
<i>Crotalaria</i> sp.	CM855	-	-	1	-	subshrub	cham	autoc	zoo
<i>Desmodium barbatum</i> (L.) Benth.	AA1306	-	1	-	-	subshrub	cham	autoc	zoo
<i>Desmodium platycarpum</i> Benth.	CM1896	-	-	1	-	subshrub	cham	autoc	zoo
<i>Eriosema defoliatum</i> Benth.	AA8	1	1	1	1	subshrub	cham	autoc	zoo
<i>Eriosema glabrum</i> Benth.	AA847	-	-	-	1	subshrub	hem	autoc	zoo
<i>Galactia crassifolia</i> (Benth.) Taub.	AA37	-	-	-	1	subshrub	cham	autoc	zoo
<i>Galactia grewiiifolia</i> (Benth.) Taub.	AA332	1	-	1	1	subshrub	cham	autoc	zoo
<i>Galactia peduncularis</i> Benth. (Taub)	AA742	-	-	1	1	herb	hem	autoc	zoo
<i>Galactia stereophylla</i> Harms	AA61	-	1	1	1	herb	hem	autoc	zoo
<i>Galactia</i> sp.	AA1891	-	-	-	1	subshrub	cham	autoc	zoo
<i>Lupinus velutinus</i> Benth.	AA759	-	-	1	1	shrub	ph	autoc	zoo
<i>Mimosa albolanata</i> Taub.	AA1799	-	1	1	1	shrub	ph	autoc	zoo
<i>Mimosa albolanata</i> var. <i>brasiliiana</i> Barneby	AA36	-	-	-	1	shrub	ph	autoc	zoo
<i>Mimosa gracilis</i> Benth.	s/no	-	-	1	-	subshrub	cham	autoc	zoo
<i>Mimosa lanuginosa</i> Burkart	AA94	-	-	1	1	subshrub	cham	autoc	zoo
<i>Mimosa nuda</i> Benth. var. <i>glaberrima</i> (Chodat and Hassl.) Barneby	AA524	-	-	1	1	herb	hem	autoc	zoo
<i>Mimosa radula</i> Benth. var. <i>imbricata</i> (Benth.) Barneby	AA739	-	-	1	1	subshrub	cham	autoc	zoo

TABLE 1. CONTINUED.

SPECIES	VOUCHER	CLTO	CLT1	CSTO	CST1	Habit	LF	DS	PS
<i>Mimosa setosa</i> Benth.	AA1348	1	-	1	1	subshrub	cham	autoc	zoo
<i>Mimosa setosa</i> Benth. subsp. <i>setosa</i>	AA244	-	-	-	1	subshrub	cham	autoc	zoo
<i>Mimosa somnians</i> Willd.	AA612	-	-	-	1	shrub	ph	autoc	zoo
<i>Mimosa somnians</i> Willd. subsp. <i>viscida</i> (Willd.) Barneby var. <i>leptocaulis</i> (Benth.) Barneby	AA1098	-	-	-	1	subshrub	cham	autoc	zoo
<i>Mimosa xanthocentra</i> Mart. subsp. <i>tremula</i> (Benth.) Barneby var. <i>tremula</i>	AA844	-	-	1	1	subshrub	cham	autoc	zoo
<i>Senna rugosa</i> (G. Don) H.S. Irwin and Barneby	AA1234	-	-	1	1	shrub	ph	autoc	zoo
<i>Stylosanthes guianensis</i> (Aubl.) Sw.	AA2	-	-	1	1	subshrub	cham	autoc	zoo
<i>Vigna</i> cf. <i>linearis</i> (Kunth) Marechal and al.	CM1000	1	-	-	-	vine	lia	autoc	zoo
<i>Zornia gemella</i> (Willd.) Vogel	AA1023	-	-	-	1	subshrub	cham	autoc	zoo
<i>Zornia vestita</i> Mohlenbr.	AA622	-	-	1	1	subshrub	cham	autoc	zoo
<i>Zornia virgata</i> Moric.	AA975	-	-	1	1	subshrub	cham	autoc	zoo
<i>Zornia</i> sp.	AA1232	-	-	-	1	subshrub	cham	autoc	zoo
Gentianaceae									
<i>Chelonanthus purpurascens</i> (Aubl.) Struwe, S. Nilsson and V.A. Albert	AA1058	-	1	-	-	subshrub	cham	autoc	zoo
<i>Curtia tenuifolia</i> (Aubl.) Knobl.	AA1180	1	1	-	-	herb	ter	anemoc	zoo
<i>Deianira chiquitana</i> Herzog	AA31	1	1	1	1	subshrub	cham	autoc	zoo
<i>Deianira nervosa</i> Cham. and Schldtl.	CM1335	-	-	1	-	herb	hem	autoc	zoo
<i>Iribachia speciosa</i> (Cham. and Schldtl.) Maas	AA165	-	1	1	1	subshrub	cham	anemoc	zoo
<i>Schultesia gracilis</i> Mart.	AA1164	1	1	-	-	herb	hem	autoc	zoo
<i>Schultesia guianensis</i> (Aubl.) Malme	AA1124	-	1	-	1	herb	hem	autoc	zoo
Gesneriaceae									
<i>Sinningia allagophylla</i> (Mart.) Wiehler	AA857	-	1	-	1	herb	hem	anemoc	zoo
<i>Sinningia elatior</i> (Kunth) Chautems	AA557	1	1	-	-	subshrub	cham	anemoc	zoo
Iridaceae									
<i>Sisyrinchium restioides</i> Spreng.	AA1259	1	1	1	1	herb	hem	autoc	zoo
<i>Sisyrinchium vaginatum</i> Spreng.	AA1009	1	1	-	1	herb	hem	autoc	zoo
<i>Trimezia juncifolia</i> (Klatt.) Benth. and Hook. f.	CM1121	1	-	-	-	herb	geo	autoc	zoo
Lamiaceae									
<i>Amasonia hirta</i> Benth.	CM1222	-	-	1	-	subshrub	cham	autoc	zoo
<i>Eriope complicata</i> Mart. ex Benth.	CM746	-	-	1	-	shrub	ph	autoc	zoo
<i>Eriope crassipes</i> Benth.	CM1952	-	-	1	-	herb	hem	autoc	zoo
<i>Hypenia brachystachys</i> (Pohl ex Benth.) Harley	AA16	-	1	1	1	subshrub	cham	autoc	zoo
<i>Hyptis carpinifolia</i> Benth.	AA1468	1	1	-	1	shrub	ph	autoc	zoo
<i>Hyptis crenata</i> Pohl ex Benth.	AA625	-	-	-	1	herb	hem	autoc	zoo
<i>Hyptis crinita</i> Benth.	AA1460	-	-	1	1	subshrub	cham	autoc	zoo
<i>Hyptis cuneata</i> Pohl ex Benth.	AA1350	-	1	1	1	subshrub	cham	autoc	zoo
<i>Hyptis lavandulacea</i> Pohl ex Benth.	AA1431	-	1	-	-	subshrub	cham	autoc	zoo
<i>Hyptis linarioides</i> Pohl ex Benth.	AA286	1	1	-	-	subshrub	cham	autoc	zoo
<i>Hyptis loeseneriana</i> Pilg.*	AA32	-	-	-	1	subshrub	cham	autoc	zoo
<i>Hyptis nudicaulis</i> Benth.	AA896	-	-	1	1	herb	hem	autoc	zoo
<i>Hyptis orbiculata</i> Pohl ex Benth.	AA214	-	1	-	-	subshrub	cham	autoc	zoo
<i>Hyptis peduncularis</i> Benth.	CM1234	-	-	1	-	herb	hem	autoc	zoo
<i>Hyptis subrotunda</i> Pohl ex Benth.	AA320	1	1	-	-	subshrub	cham	autoc	zoo
<i>Hyptis subviolacea</i> Briq.	CM1940	-	-	1	-	herb	hem	autoc	zoo
<i>Hyptis tenuifolia</i> Epling*	AA823	-	-	1	1	subshrub	cham	autoc	zoo
<i>Hyptis villosa</i> Pohl ex Benth.	AA99	-	1	1	1	herb	hem	autoc	zoo
<i>Marsypianthes montana</i> Benth.	CM2064	-	-	1	-	shrub	ph	autoc	zoo
<i>Rhabdocaulon denudatum</i> (Benth.) Epling	AA28	1	1	1	1	herb	hem	autoc	zoo
<i>Salvia brevipes</i> Benth.	CM2086	-	-	1	-	herb	hem	autoc	zoo
Lauraceae									
<i>Cassytha filiformis</i> L.	AA114	-	1	-	1	vine	lia	zooc	zoo
Lentibulariaceae									
<i>Utricularia amethystina</i> Salzm. ex A. St.-Hil. and F. Girard	AA678	1	1	-	-	herb	ter	autoc	zoo
<i>Utricularia hispida</i> Lam.	AA142	-	1	-	-	herb	hem	autoc	zoo
<i>Utricularia neottioides</i> A. St.-Hil. and Girard	AA539	-	1	-	-	herb	hem	autoc	zoo
Lythraceae									
<i>Cuphea ferruginea</i> Pohl ex Koehne	AA737	-	-	-	1	subshrub	cham	autoc	zoo

TABLE 1. CONTINUED.

SPECIES	VOUCHER	CLTO	CLT1	CSTO	CST1	Habit	LF	DS	PS
<i>Cuphea linarioides</i> Cham. and Schltldl.	AA386	1	1	1	1	subshrub	cham	autoc	zoo
<i>Cuphea spermacoce</i> A. St.-Hil.	AA86	1	-	1	1	subshrub	cham	autoc	zoo
<i>Diplusodon oblongus</i> Pohl	AA396	-	-	-	1	subshrub	cham	autoc	zoo
<i>Diplusodon sessiliflorus</i> Koehne	AA977	-	-	1	1	subshrub	cham	autoc	zoo
<i>Diplusodon villosus</i> Pohl	AA698	-	-	1	1	subshrub	cham	autoc	zoo
<i>Diplusodon virgatus</i> Pohl	CM1302	1	-	-	-	shrub	ph	autoc	zoo
Malpighiaceae									
<i>Banisteriopsis campestris</i> (A. Juss.) Little	AA70	-	1	1	1	shrub	ph	anemoc	zoo
<i>Banisteriopsis irwinii</i> B. Gates	AA1874	-	1	-	-	shrub	ph	anemoc	zoo
<i>Banisteriopsis laevifolia</i> (A. Juss.) B. Gates	AA513	-	-	-	1	shrub	ph	anemoc	zoo
<i>Banisteriopsis megaphylla</i> (A. Juss.) B. Gates	CM2437	1	-	-	-	shrub	ph	anemoc	zoo
<i>Banisteriopsis variabilis</i> B. Gates	AA1266	-	-	-	1	shrub	ph	anemoc	zoo
<i>Byrsonima basiloba</i> A. Juss.	AA721	-	-	1	1	subshrub	cham	zoo	zoo
<i>Byrsonima guilleminiana</i> A. Juss.	AA96	-	1	-	1	shrub	ph	zoo	zoo
<i>Byrsonima pachyphylla</i> A. Juss.	AA837	-	1	1	1	shrub	ph	zoo	zoo
<i>Byrsonima rigida</i> A. Juss.	AA402	-	-	1	1	subshrub	cham	zoo	zoo
<i>Byrsonima subterranea</i> Brade and Markgr.	AA189	-	-	1	1	shrub	ph	zoo	zoo
<i>Heteropterys byrsonimifolia</i> A. Juss.	AA209	-	1	-	-	shrub	ph	anemoc	zoo
<i>Heteropterys campestris</i> A. Juss.	AA56	-	-	1	1	shrub	ph	anemoc	zoo
<i>Peixotoa goiana</i> C.E. Anderson	AA19	-	-	1	1	subshrub	cham	anemoc	zoo
<i>Peixotoa</i> sp.	CM1039	-	-	1	-	subshrub	cham	anemoc	zoo
<i>Pterandra pyroidea</i> A. Juss.	AA90	-	-	-	1	subshrub	cham	anemoc	zoo
<i>Tetrapterys ambigua</i> (A. Juss.) Nied.	AA163	1	-	1	1	shrub	ph	anemoc	zoo
Malvaceae									
<i>Byttneria scalpellata</i> Pohl	AA825	-	-	1	1	subshrub	cham	autoc	zoo
<i>Byttneria</i> sp.	AA976	-	-	-	1	subshrub	cham	autoc	zoo
<i>Melochia spicata</i> (L.) Fryxell	AA711	-	-	-	1	subshrub	cham	autoc	zoo
<i>Pavonia rosa-campetris</i> A. St.-Hil.	s/no	-	-	1	-	subshrub	cham	zoo	zoo
<i>Peltaea lasiantha</i> Krapov. and Cristobal	AA629	-	-	1	1	subshrub	cham	zoo	zoo
<i>Peltaea trinervis</i> (C. Presl) Krapov. and Cristóbal	AA582	-	1	-	-	subshrub	cham	zoo	zoo
<i>Peltaea</i> sp.	CM2469	-	-	1	-	subshrub	cham	zoo	zoo
<i>Sida linifolia</i> Juss. ex Cav.	AA65	1	-	-	1	subshrub	cham	autoc	zoo
<i>Waltheria communis</i> A. St.-Hil.	CM1944	-	-	1	-	herb	hem	autoc	zoo
Melastomataceae									
<i>Cambessedesia espora</i> DC.	AA5	-	-	1	1	herb	hem	autoc	zoo
<i>Cambessedesia hilariana</i> (Kunth) DC.	AA395	-	-	-	1	subshrub	cham	autoc	zoo
<i>Clidemia capitellata</i> (Bonpl.) D. Don	s/no	1	-	-	-	shrub	ph	zoo	zoo
<i>Comolia lanceaeflora</i> Triana	AA905	1	1	-	-	subshrub	cham	autoc	zoo
<i>Desmoscelis villosa</i> (Aubl.) Naudin	AA1304	1	1	-	-	shrub	ph	autoc	zoo
<i>Lavoisiera bergii</i> Cogn.	AA136	-	1	-	-	shrub	ph	autoc	zoo
<i>Leandra deflexa</i> Cogn.	AA200	-	1	-	-	shrub	ph	zoo	zoo
<i>Leandra erostrata</i> (DC.) Cogn.	AA125	-	1	-	-	shrub	ph	zoo	zoo
<i>Leandra polystachya</i> (Naudin) Cogn.	AA864	1	1	-	1	subshrub	cham	zoo	zoo
<i>Macairea radula</i> (Bonpl.) DC.	AA134	-	1	-	-	shrub	ph	autoc	zoo
<i>Meisneria cordata</i> (Pohl ex DC.) Triana	AA1556	-	1	1	1	herb	hem	autoc	zoo
<i>Miconia albicans</i> (Sw.) Steud.	AA3	-	1	-	1	shrub	ph	zoo	zoo
<i>Miconia chamissois</i> Naudin	AA129	-	1	-	-	shrub	ph	zoo	zoo
<i>Microlicia euphorbioides</i> Mart.	AA1127	-	1	-	1	subshrub	cham	autoc	zoo
<i>Microlicia helvola</i> (Spreng.) Triana	AA127	-	1	-	-	subshrub	cham	autoc	zoo
<i>Microlicia polystemma</i> Naudin	AA203	1	1	-	-	subshrub	cham	autoc	zoo
<i>Ossaea congestiflora</i> Cong.	AA627	-	-	-	1	shrub	ph	zoo	zoo
<i>Pterolepis repanda</i> (DC.) Triana	AA966	-	-	-	1	subshrub	cham	autoc	zoo
<i>Rhynchanthera grandiflora</i> (Aubl.) DC.	AA138	1	1	-	-	shrub	ph	autoc	zoo
<i>Tibouchina aegopogon</i> (Naudin) Cogn.	AA529	1	-	1	1	subshrub	cham	autoc	zoo
<i>Tibouchina gracilis</i> (Bonpl.) Cogn.	AA632	1	1	1	1	subshrub	cham	autoc	zoo
<i>Tibouchina stenocarpa</i> (DC.) Cogn.	AA906	-	1	-	-	shrub	ph	autoc	zoo
<i>Tibouchina</i> sp.	AA1056	-	1	-	-	subshrub	cham	autoc	zoo
<i>Trembleya parviflora</i> (D. Don) Cogn.	AA132	-	1	-	-	shrub	ph	autoc	zoo
<i>Trembleya phlogiformis</i> DC.	AA394	-	1	1	1	shrub	ph	autoc	zoo
Menispermaceae									

TABLE 1. CONTINUED.

SPECIES	VOUCHER	CLTO	CLT1	CSTO	CST1	Habit	LF	DS	PS
<i>Cissampelos ovalifolia</i> DC.	AA398	1	1	1	1	subshrub	cham	zoc	zoo
Moraceae									
<i>Brosimum gaudichaudii</i> Trécul	AA1602	-	1	-	-	shrub	ph	zoc	ane
Myrtaceae									
<i>Campomanesia adamantium</i> (Cambess.) O. Berg	AA64	-	-	1	1	shrub	ph	zoc	zoo
<i>Campomanesia pubescens</i> (Mart. ex DC.) O. Berg	CM1938	-	-	1	-	shrub	ph	zoc	zoo
<i>Campomanesia xanthocarpa</i> (Mart.) O. Berg.	AA246	-	-	1	1	shrub	ph	zoc	zoo
<i>Eugenia calycina</i> Cambess.	AA67	1	1	1	1	shrub	ph	zoc	zoo
<i>Eugenia complicata</i> O. Berg.	AA9	-	-	-	1	shrub	ph	zoc	zoo
<i>Eugenia cristaensis</i> O. Berg.	CM787	-	-	1	-	subshrub	cham	zoc	zoo
<i>Eugenia klotzschiana</i> O. Berg.	AA57	-	-	-	1	subshrub	cham	zoc	zoo
<i>Eugenia myrcianthes</i> Nied.	CM745	-	-	1	-	subshrub	cham	zoc	zoo
<i>Eugenia puniceifolia</i> (Kunth) DC.	AA250	-	1	-	1	shrub	ph	zoc	zoo
<i>Myrcia decorticans</i> DC.	AA7	-	-	-	1	shrub	ph	zoc	zoo
<i>Myrcia decrescens</i> O. Berg.	AA169	1	1	1	1	herb	hem	zoc	zoo
<i>Myrcia hiemalis</i> Cambess.	CM1880	-	-	1	-	subshrub	cham	zoc	zoo
<i>Myrcia lasiantha</i> DC.	s/no	-	-	-	1	shrub	ph	zoc	zoo
<i>Myrcia linearifolia</i> Cambess.	s/no	-	-	1	-	subshrub	cham	zoc	zoo
<i>Myrcia stricta</i> O. Berg. (Kiaersk.)	AA72	-	-	-	1	subshrub	cham	zoc	zoo
<i>Myrcia tomentosa</i> (Aubl.) DC.	AA335	-	-	-	1	shrub	ph	zoc	zoo
<i>Myrcia torta</i> DC.	AA11	1	1	1	1	shrub	ph	zoc	zoo
<i>Myrciaria cuspidata</i> O. Berg	CM817	-	-	1	-	shrub	ph	zoc	zoo
<i>Psidium firmum</i> O. Berg.	AA12	-	1	-	1	shrub	ph	zoc	zoo
<i>Psidium grandifolium</i> Mart. ex DC.	AA518	-	-	-	1	shrub	ph	zoc	zoo
<i>Psidium laruotteanum</i> Cambess.	AA406	-	-	-	1	shrub	ph	zoc	zoo
Ochnaceae									
<i>Ouratea floribunda</i> Engl.	AA83	-	1	1	1	subshrub	cham	zoc	zoo
<i>Sauvagesia linearifolia</i> A. St.-Hil	AA1554	1	1	-	1	herb	hem	autoc	zoo
<i>Sauvagesia racemosa</i> A. St.-Hil	AA122	1	1	-	-	subshrub	cham	autoc	zoo
Onagraceae									
<i>Ludwigia nervosa</i> (Poir.) H. Hara	AA130	1	1	-	-	shrub	ph	anemoc	zoo
<i>Ludwigia tomentosa</i> (Cambess.) H. Hara	AA1854	-	1	-	-	shrub	ph	anemoc	zoo
Orchidaceae									
<i>Cleistes</i> sp.	CM2213	1	-	-	-	herb	hem	autoc	zoo
<i>Epistephium sclerophyllum</i> Lindl.	AA1357	-	1	1	1	herb	geo	autoc	zoo
<i>Habenaria ayangannensis</i> Renz	AA1110	-	-	-	1	herb	hem	anemoc	zoo
<i>Habenaria heringeri</i> Pabst	AA647	-	-	-	1	herb	hem	anemoc	zoo
<i>Habenaria nuda</i> Lindl.	s/no	1	-	1	-	herb	geo	anemoc	zoo
<i>Habenaria</i> cf. <i>urbaniana</i> Cogn.	CM1495	1	-	-	-	herb	hem	anemoc	zoo
Orobanchaceae									
<i>Buchnera juncea</i> Cham. and Schldl.	AA1440	-	1	-	-	herb	hem	anemoc	zoo
<i>Buchnera lavandulacea</i> Cham. and Schldl.	CM906	1	-	-	-	herb	hem	anemoc	zoo
<i>Buchnera rosea</i> Kunth	CM1041	-	-	1	-	herb	hem	anemoc	zoo
<i>Escobedia grandiflora</i> (L. f.) Kuntze	AA1062	-	1	-	-	subshrub	cham	autoc	zoo
<i>Esterhazyia splendida</i> J.C. Mikan	AA1373	-	-	1	1	shrub	ph	autoc	zoo
<i>Melasma</i> sp.	CM1575	1	-	-	-	herb	hem	autoc	zoo
Oxalidaceae									
<i>Oxalis confertifolia</i> (Kuntze) R. Knuth	AA4	1	1	1	1	subshrub	cham	autoc	zoo
<i>Oxalis cordata</i> A. St.-Hil.	AA647	-	-	-	1	subshrub	cham	autoc	zoo
<i>Oxalis suborbiculata</i> Lourteig	AA74	-	-	1	1	subshrub	cham	autoc	zoo
Passifloraceae									
<i>Passiflora amethystina</i> J.C. Mikan	AA1066	-	1	-	-	vine	lia	zoc	zoo
<i>Passiflora clathrata</i> Mast.	AA285	-	1	-	-	subshrub	cham	zoc	zoo
<i>Piriqueta sidifolia</i> (A. St.-Hil. and A. Juss. and Cambess.) Urb.	AA1002	1	-	1	1	subshrub	cham	zoc	zoo
<i>Turnera longiflora</i> Cambess.	AA242	-	-	-	1	subshrub	cham	autoc	zoo
<i>Turnera oblongifolia</i> Cambess.	AA390	1	1	1	1	herb	hem	autoc	zoo
Piperaceae									
<i>Piper fuliginum</i> Kunth	AA1061	-	1	-	-	shrub	ph	zoc	zoo
Poaceae									
<i>Agenium leptocladum</i> (Hack.) Clayton	AA119	-	1	-	1	herb	hem	anemoc	ane

TABLE 1. CONTINUED.

SPECIES	VOUCHER	CLTO	CLT1	CSTO	CST1	Habit	LF	DS	PS
<i>Andropogon bicornis</i> L.	AA887	1	1	1	1	herb	hem	zoc	ane
<i>Andropogon lateralis</i> Nees.	AA530	1	1	-	1	herb	hem	anemoc	ane
<i>Andropogon lateralis</i> subsp. <i>cryptopus</i> (Hack.) A. Zanin	CM754	1	-	-	-	herb	hem	anemoc	ane
<i>Andropogon leucostachyus</i> Kunth	AA501	1	1	1	1	herb	hem	anemoc	ane
<i>Andropogon selloanus</i> (Hack.) Hack.	CM796	1	-	-	-	herb	hem	anemoc	ane
<i>Andropogon virgatus</i> Desv.	AA197	1	1	1	1	herb	hem	anemoc	ane
<i>Aristida recurvata</i> Kunth	AA15	-	-	1	1	herb	hem	anemoc	ane
<i>Aristida riparia</i> Trin.	AA1026	-	1	1	1	herb	hem	anemoc	ane
<i>Aristida setifolia</i> Kunth	AA35	-	-	1	1	herb	hem	anemoc	ane
<i>Aristida</i> sp.	CM1693	-	-	1	-	herb	hem	anemoc	ane
<i>Arthropogon filifolius</i> Filg.	AA313	1	1	-	-	herb	hem	anemoc	ane
<i>Arthropogon villosus</i> Nees	CM2077	1	-	1	-	herb	hem	anemoc	ane
<i>Arthropogon</i> sp.	AA1826	-	1	-	-	herb	hem	anemoc	ane
<i>Arundinella hispida</i> (Willd.) Kuntze	AA35	1	1	1	1	herb	hem	anemoc	ane
<i>Axonopus aureus</i> P. Beauv.	AA1877	-	1	1	1	herb	hem	anemoc	ane
<i>Axonopus brasiliensis</i> (Spreng.) Kuhlman.	AA882	1	1	1	1	herb	hem	anemoc	ane
<i>Axonopus comans</i> (Doll) Kuhlman.	AA284	1	1	-	-	herb	hem	anemoc	ane
<i>Axonopus marginatus</i> (Trin.) Chase ex Hitchc.	AA657	-	1	1	1	herb	hem	anemoc	ane
<i>Axonopus siccus</i> (Nees) Kuhlman.	AA728	-	-	1	1	herb	hem	autoc	ane
<i>Axonopus</i> sp.	CM2142	1	-	-	-	herb	hem	anemoc	ane
<i>Ctenium</i> cf. <i>brachystachyum</i> (Nees) Kunth	CM742	1	-	-	-	herb	hem	anemoc	ane
<i>Ctenium cirrhosum</i> (Nees) Kunth	AA1407	1	1	1	1	herb	hem	anemoc	ane
<i>Digitaria</i> sp.	CM1365	-	-	1	-	herb	hem	anemoc	ane
<i>Echinolaena inflexa</i> (Poir.) Chase	AA41	1	1	1	1	herb	hem	zoc	zoo
<i>Elionurus muticus</i> (Spreng.) Kuntze	CM750	1	1	1	-	herb	hem	anemoc	ane
<i>Eragrostis maypurensis</i> (Kunth) Steud.	AA1280	-	-	1	1	herb	hem	zoc	ane
<i>Eriochrysis cayennensis</i> P. Beauv.	AA603	-	1	-	-	herb	hem	anemoc	ane
<i>Hyparrhenia bracteata</i> (Humb. and Bonpl. ex Willd.) Stapf.	AA1497	1	1	-	1	herb	hem	anemoc	ane
<i>Ichnanthuschamporum</i> Swallen	AA731	-	1	1	1	herb	hem	zoc	ane
<i>Ichnanthus procurrans</i> (Nees ex Trin.) Swallen	AA374	-	1	-	-	herb	hem	zoc	ane
<i>Lasiacis standleyi</i> Hitchc.	CM1969	1	-	-	-	herb	hem	anemoc	ane
<i>Leptocoryphium lanatum</i> (Kunth) Nees	AA429	-	-	1	1	herb	hem	anemoc	ane
<i>Melinis minutiflora</i> P. Beauv.*	AA110	-	-	-	1	herb	hem	anemoc	ane
<i>Melinis repens</i> (Willd.) Zizka.*	AA725	1	1	1	1	herb	hem	anemoc	ane
<i>Mesosetum ferrugineum</i> (Trin.) Chase	CM757	1	-	-	-	herb	hem	anemoc	ane
<i>Mesosetum loliiforme</i> (Steud.) Hitchc.	AA875	-	-	-	1	herb	hem	anemoc	ane
<i>Otachyrium seminudum</i> Send. and Soderstr.	CM2283	1	1	1	-	herb	hem	autoc	ane
<i>Panicum caaguazuense</i> Henrard	AA1617b	-	1	-	-	herb	hem	zoc	ane
<i>Panicum cyanescens</i> Nees ex Trin.	AA648	1	-	1	1	herb	hem	zoc	ane
<i>Panicum olyroides</i> Kunth	s/no	-	-	1	1	herb	hem	zoc	ane
<i>Panicum olyroides</i> Kunth. var. <i>olyroides</i>	AA537	-	1	-	1	herb	hem	zoc	ane
<i>Panicum parvifolium</i> Lam.	AA913	1	1	-	-	herb	hem	zoc	ane
<i>Panicum peladoense</i> Henrard	AA726	-	-	1	1	herb	hem	zoc	ane
<i>Paspalum ammodes</i> Trin.	CM2131	-	-	1	-	herb	hem	anemoc	ane
<i>Paspalum dedecae</i> Quarín	AA297	1	1	-	-	herb	hem	anemoc	ane
<i>Paspalum ellipticum</i> Döll	CM751	1	-	1	-	herb	hem	anemoc	ane
<i>Paspalum erianthum</i> Nees ex Trin.	CM1960	1	-	-	-	herb	hem	anemoc	ane
<i>Paspalum gardnerianum</i> Nees	AA44	1	1	1	1	herb	hem	zoc	ane
<i>Paspalum geminiflorum</i> Steud.	CM1017	1	-	1	-	herb	hem	anemoc	ane
<i>Paspalum glaucescens</i> Hack.	AA46	1	-	-	1	herb	hem	anemoc	ane
<i>Paspalum hyalinum</i> Nees ex Trin.	CM1326	1	-	-	-	herb	hem	anemoc	ane
<i>Paspalum imbricatum</i> Filg.	AA806	1	1	-	-	herb	hem	anemoc	ane
<i>Paspalum lineare</i> Trin.	s/no	1	-	-	-	herb	hem	anemoc	ane
<i>Paspalum maculosum</i> Trin.	AA1035	1	1	1	1	herb	hem	anemoc	ane
<i>Paspalum pectinatum</i> Nees ex Trin.	CM762	1	-	1	-	herb	hem	autoc	ane
<i>Paspalum pilosum</i> Lam.	AA1035	-	-	1	1	herb	hem	anemoc	ane
<i>Paspalum polyphyllum</i> Nees ex Trin.	CM1022	1	1	1	-	herb	hem	anemoc	ane
<i>Paspalum reduncum</i> Nees ex Steud.	AA1159	-	-	1	1	herb	ter	anemoc	ane
<i>Paspalum stellatum</i> Flügge	AA113	1	1	1	1	herb	hem	anemoc	ane
<i>Paspalum trichotomum</i> Hack.	AA1662	-	-	-	1	herb	hem	anemoc	ane

TABLE 1. CONTINUED.

SPECIES	VOUCHER	CLTO	CLT1	CSTO	CST1	Habit	LF	DS	PS
<i>Pennisetum nervosum</i> (Nees) Trin.	CM1218	-	-	1	-	herb	hem	anemoc	ane
<i>Pennisetum polystachion</i> (L.) Schult.	AA730	-	-	1	1	herb	hem	anemoc	ane
<i>Saccharum asperum</i> (Nees) Steud.	AA152	-	1	-	-	herb	hem	anemoc	ane
<i>Sacciolepis myuros</i> (Lam.) Chase	AA571	-	1	-	-	herb	hem	autoc	ane
<i>Schizachyrium condensatum</i> (Kunth) Nees	AA1155	1	1	1	1	herb	hem	anemoc	ane
<i>Schizachyrium sanguineum</i> (Retz.) Alston	AA1410	-	1	-	1	herb	hem	anemoc	ane
<i>Schizachyrium tenerum</i> Nees	CM1386	-	-	1	-	herb	hem	anemoc	ane
<i>Schizachyrium</i> sp.	CM1214	1	-	-	-	herb	hem	anemoc	ane
<i>Setaria parviflora</i> (Poir.) M. Kerguelen	AA880	-	1	1	1	herb	ter	zooc	ane
<i>Sorghastrum nutans</i> (L.) Nash	AA1278	-	-	-	1	herb	hem	anemoc	ane
<i>Sporobolus reflexus</i> Boechat and Longhi-Wagner	CM763	1	-	1	-	herb	hem	anemoc	ane
<i>Trachypogon macroglossus</i> Trin.	AA1661	-	-	-	1	herb	hem	zooc	ane
<i>Trachypogon spicatus</i> (L.f.) Kuntze	CM1387	-	-	1	-	herb	hem	zooc	ane
<i>Tristachya leiostachya</i> Nees	AA431	-	1	1	1	herb	hem	zooc	ane
Polygalaceae									
<i>Monnina oblongifolia</i> Arechav.	AA278	1	-	1	1	subshrub	cham	anemoc	zoo
<i>Polygala abreu</i> Marques and J.F.B. Pastore	AA216	-	1	-	-	herb	hem	zooc	zoo
<i>Polygala carphoides</i> Chodat	CM953	1	-	-	-	herb	ter	zooc	zoo
<i>Polygala celosioides</i> Mart. ex A.W. Benn.	AA1889	-	-	-	1	herb	ter	zooc	zoo
<i>Polygala cuspidata</i> DC.	CM1012	-	-	1	-	herb	hem	zooc	zoo
<i>Polygala</i> cf. <i>fendleri</i> Chodat	CM2442	1	-	-	-	herb	ter	autoc	zoo
<i>Polygala galioides</i> Poir.	AA830	1	1	-	1	herb	ter	autoc	zoo
<i>Polygala harleyi</i> M.C.M. Marques	CM1177a	1	-	-	-	herb	hem	autoc	zoo
<i>Polygala hygrophila</i> Kunth	AA963	1	-	-	-	herb	ter	autoc	zoo
<i>Polygala juncea</i> A. St.-Hil.*	CM2061	-	-	1	-	herb	hem	autoc	zoo
<i>Polygala longicaulis</i> Kunth	AA819	1	1	1	1	herb	ter	autoc	zoo
<i>Polygala martiana</i> A.W. Benn.	AA399	1	-	1	1	herb	hem	anemoc	zoo
<i>Polygala misella</i> Bernardi	AA1040	1	1	-	-	herb	ter	autoc	zoo
<i>Polygala pseudosericea</i> Chodat	CM795	1	-	-	-	herb	hem	autoc	zoo
<i>Polygala subtilis</i> Kunth	CM972	1	-	-	-	herb	ter	autoc	zoo
<i>Polygala tenella</i> Willd.	CM1199	1	-	-	-	herb	ter	autoc	zoo
<i>Polygala tenuis</i> DC.	AA81	1	1	1	1	herb	hem	autoc	zoo
<i>Polygala timoutou</i> Aubl.	CM1314	1	-	-	-	herb	ter	autoc	zoo
<i>Pteromonnina stenophylla</i> (A. St.-Hil.) B. Eriksen	AA221	1	1	-	-	subshrub	cham	zooc	zoo
Rhamnaceae									
<i>Crumenaria choretroides</i> Martius ex Reisseck	CM737	-	-	1	-	herb	hem	anemoc	zoo
<i>Crumenaria erecta</i> Reisseck	CM1808	-	-	1	-	herb	hem	autoc	zoo
Rubiaceae									
<i>Chomelia ribesoides</i> Benth. ex A. Gray	AA256a	-	-	-	1	shrub	ph	zooc	zoo
<i>Declieuxia cordigera</i> var. <i>cordigera</i>	CM2164	-	-	1	-	herb	hem	autoc	zoo
<i>Declieuxia fruticosa</i> (Willd. ex Roem. and Schult.) Kuntze	AA998	-	-	-	1	subshrub	cham	autoc	zoo
<i>Galianthe grandifolia</i> E.L. Cabral	AA862	-	1	1	1	subshrub	cham	autoc	zoo
<i>Galianthe ramosa</i> E.L. Cabral	AA474	-	-	1	1	subshrub	cham	autoc	zoo
<i>Galianthe verbenoides</i> Cham. and Schtdl.	AA46	-	-	-	1	subshrub	cham	autoc	zoo
<i>Mitracarpus frigidus</i> (Willd. ex Roem. and Schult.) K. Schum.	CM1358	-	-	1	-	herb	hem	autoc	zoo
<i>Palicourea coriacea</i> (Cham.) K. Schum.	AA22	-	-	1	1	subshrub	cham	zooc	zoo
<i>Palicourea officinalis</i> Mart.	AA43	-	1	1	1	subshrub	cham	zooc	zoo
<i>Palicourea rigida</i> Kunth	AA516a	-	-	-	1	shrub	ph	zooc	zoo
<i>Richardia scabra</i> L.	CM1014	-	-	1	-	herb	hem	zooc	zoo
<i>Sabicea brasiliensis</i> Wernham	AA69	-	1	1	1	subshrub	cham	zooc	zoo
<i>Spermacoce irwiniana</i> (E.L. Cabral) Delprete*	AA1769	1	-	-	1	herb	hem	autoc	zoo
<i>Spermacoce latifolia</i> Aubl.	AA397	1	1	-	1	subshrub	cham	autoc	zoo
<i>Spermacoce martirovettiana</i> (E.L.Cabral) Govaerts	CM1680	1	-	1	-	herb	hem	autoc	zoo
<i>Spermacoce ocymoides</i> Burm. f.	AA599	-	1	-	-	herb	hem	autoc	zoo
<i>Spermacoce poaya</i> A. St.-Hil.	AA417	1	-	1	1	subshrub	ter	autoc	zoo
<i>Spermacoce tenella</i> (Kunth) Cham. and Schtdl.	AA1253	1	-	1	1	herb	hem	autoc	zoo
<i>Spermacoce</i> sp.	CM2069a	-	-	1	-	subshrub	cham	autoc	zoo
<i>Staelia capitata</i> K. Schum.	CM1347	-	-	1	-	subshrub	cham	autoc	zoo
<i>Tocoyena formosa</i> (Cham. and Schtdl.) K. Schum.	AA334	-	-	1	1	shrub	ph	zooc	zoo
Salicaceae									

TABLE 1. CONTINUED.

SPECIES	VOUCHER	CLTO	CLT1	CST0	CST1	Habit	LF	DS	PS
<i>Casearia sylvestris</i> Sw.	AA42	-	-	1	1	shrub	ph	autoc	zoo
Santalaceae									
<i>Thesium brasiliense</i> A. DC.	CM974	1	-	-	-	herb	ter	zooc	zoo
Sapindaceae									
<i>Serjania erecta</i> Radlk.	AA492	-	1	-	1	vine	cham	autoc	zoo
<i>Serjania lethalis</i> A. St.-Hil.	AA109	-	1	-	1	vine	lia	anemoc	Zoo
Simaroubaceae									
<i>Simaba suffruticosa</i> Engl.	AA55	-	-	1	1	subshrub	cham	zooc	zoo
Siparunaceae									
<i>Siparuna brasiliensis</i> (Spreng.) A. DC.	AA25	-	1	-	-	shrub	ph	zooc	zoo
Smilacaceae									
<i>Smilax goyazana</i> A. DC.	AA25	-	-	1	1	vine	lia	zooc	zoo
Solanaceae									
<i>Brunfelsia obovata</i> Benth.	AA131	-	1	-	-	shrub	ph	autoc	zoo
<i>Schwenckia americana</i> Rooyen ex L.	AA1	-	-	-	1	herb	hem	autoc	zoo
<i>Solanum americanum</i> Mill.	CM2300	-	-	1	-	herb	hem	zooc	zoo
<i>Solanum foederale</i> M. Nee	AA382	-	-	-	1	herb	hem	zooc	zoo
<i>Solanum lycocarpum</i> A. St.-Hil.	AA383	-	-	-	1	shrub	ph	zooc	zoo
<i>Solanum subumbellatum</i> Vell.	AA183	1	1	1	1	subshrub	cham	zooc	zoo
Symplocaceae									
<i>Symplocos crenata</i> (Vell.) Mattos	AA1593	-	1	-	-	shrub	ph	zooc	zoo
Verbenaceae									
<i>Lippia corymbosa</i> Cham.	CM1658	1	-	1	-	subshrub	cham	autoc	zoo
<i>Lippia lacunosa</i> Mart. and Schauer	AA1514	-	1	-	-	subshrub	cham	autoc	zoo
<i>Lippia lupulina</i> Cham.	AA738	-	-	1	1	subshrub	cham	autoc	zoo
<i>Lippia martiana</i> Schauer	CM870	-	-	1	-	subshrub	cham	autoc	zoo
<i>Lippia rotundifolia</i> Cham.	AA1772	-	1	-	1	shrub	ph	autoc	zoo
<i>Lippia sericea</i> Cham.	AA1341	-	-	-	1	subshrub	cham	autoc	zoo
<i>Lippia</i> sp.	CM1695	-	-	1	-	subshrub	cham	autoc	zoo
<i>Stachytarpheta gesnerioides</i> Cham.	CM845	-	-	1	-	subshrub	cham	autoc	zoo
<i>Stachytarpheta longispicata</i> (Pohl) S. Atkins	AA852	-	-	1	1	subshrub	cham	autoc	zoo
<i>Stachytarpheta</i> sp.	AA889	-	-	1	1	subshrub	cham	autoc	zoo
Violaceae									
<i>Hybanthus lanatus</i> (A. St.-Hil.) Baill.	CM781	-	-	1	-	herb	hem	autoc	zoo
Vitaceae									
<i>Cissus erosa</i> Rich.	AA490	-	-	1	1	vine	lia	zooc	zoo
Xyridaceae									
<i>Abolboda poarchon</i> Seub.	AA1453	1	1	-	-	herb	hem	anemoc	zoo
<i>Xyris dawsonii</i> L.B. Sm. and Downs	AA888	-	-	-	1	herb	hem	anemoc	zoo
<i>Xyris diaphanobracteata</i> Kral and Wand.*	AA1447	-	1	-	-	herb	hem	anemoc	zoo
<i>Xyris fallax</i> Malme	AA810	-	1	-	-	herb	hem	anemoc	zoo
<i>Xyris filifolia</i> L.A. Nilsson	AA1688	-	1	-	-	herb	hem	anemoc	zoo
<i>Xyris guaranitica</i> Malme	AA146	1	1	-	-	herb	ter	anemoc	zoo
<i>Xyris hymenachne</i> Mart.	AA929	1	1	-	-	herb	hem	anemoc	zoo
<i>Xyris jupicai</i> Rich.	AA104	1	1	-	1	herb	ter	anemoc	zoo
<i>Xyris lacerata</i> Pohl ex Seub.	AA144	-	1	-	-	herb	hem	anemoc	zoo
<i>Xyris laxifolia</i> Mart.	AA1093	-	1	-	-	herb	hem	anemoc	zoo
<i>Xyris paculipoda</i> Kral and Smith	AA1158	-	1	-	-	herb	hem	anemoc	zoo
<i>Xyris roraimae</i> Malme	AA1625	-	1	-	-	herb	hem	anemoc	zoo
<i>Xyris savanensis</i> Miq.	AA1208b	-	1	-	-	herb	hem	anemoc	zoo
<i>Xyris schizachne</i> Mart.	CM2278	1	1	1	-	herb	hem	anemoc	zoo
<i>Xyris seubertii</i> A. Nilsson	AA1816	-	-	-	1	herb	hem	anemoc	zoo
<i>Xyris tortula</i> Mart.	AA921	1	1	-	-	herb	hem	anemoc	zoo
<i>Xyris</i> sp.1	CM827	1	-	-	-	herb	hem	anemoc	zoo
<i>Xyris</i> sp.2	CM2044	1	-	-	-	herb	hem	anemoc	zoo
<i>Xyris</i> sp.3	AA1085	-	1	-	-	herb	hem	anemoc	zoo

ACKNOWLEDGMENTS: The authors wish to thank Ana Carolina Gomes Côrrea for her field work support and assistance; CAPES, for the master degree grant awarded to the first author; the staff of the UnB and IBGE

herbaria; and the experts in the botanical families for their support in identifying the material collected.

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RECEIVED: August 2012

ACCEPTED: February 2013

PUBLISHED ONLINE: May 2013

EDITORIAL RESPONSIBILITY: James Byng