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PHYTOSOCIOLOGY OF SOWN PASTURE WEEDS UNDER TWO LEVELS OF DEGRADATION IN BRAZILIAN SAVANNA AREAS, MATO GROSSO DO SUL STATE, BRAZIL[1]

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RESUMO

FITOSSOCIOLOGIA DE PLANTAS DANINHAS DE PASTAGENS CULTIVADAS SOB DOIS NÍVEIS DE DEGRADAÇÃO EM CERRADO, NO MATO GROSSO DO SUL

Pastagens cultivadas, de maneira geral, entram em processo de declínio, associado à infestação de plantas daninhas, cujo manejo exitoso começa com o levantamento das espécies infestantes e sua biologia. Este trabalho teve como objetivo o estudo fitossociológico, nas estações chuvosa e seca, em duas pastagens cultivadas de *Brachiaria* (*Urochloa*) spp., com gado (AI) e sem gado (AII), em áreas de Cerrado do Mato Grosso do Sul. Foi constatada a ocorrência de 104 espécies de plantas daninhas herbáceas e subarbustivas de Fanerógamas. As famílias de maior destaque, em número de espécies, foram Fabaceae (23 espécies), Poaceae (16) e Asteraceae (15). As hemicriptófitas predominam com 41% das espécies. As espécies com maiores valores de importância e cobertura relativa são *B. decumbens* e *Sida rhombifolia*, em AI, e *B. brizantha* e *Desmodium incanum*, em AII, além de *Paspalum notatum*, em ambas as pastagens. Os valores de diversidade de Shannon foram 4,19 e 4,43 nats, para AI e AII, respectivamente, indicando considerável riqueza de espécies. O índice de dissimilaridade florística entre AI e AII, obtido a partir da Distância Euclidiana, é 0,7468, o que indica poucas espécies em comum (44%). Na estação seca, o número de espécies em AI caiu 10% e, em AII, aumentou 4%.

PALAVRAS-CHAVE: Agroecossistema; *Brachiaria*; ecologia vegetal; flora; *Urochloa*.

ABSTRACT

Cultivated pastures, in general, go through a decline process, associated with the occurrence of weeds, whose successful management begins with the survey of species and their biology. This study aimed to carry out phytosociological surveys, during the rainy and dry seasons, in two pastures cultivated with *Brachiaria* (*Urochloa*) spp., with cattle (AI) and without cattle (AII), in *Cerrado* (Brazilian savanna) areas of the Mato Grosso do Sul State, Brazil. The occurrence of 104 weedy herbaceous and subshrubby Phanerogams species was recorded. The families with the highest number of species were Fabaceae (23 species), Poaceae (16), and Asteraceae (15). Hemicryptophytes predominate with 41% of the species. The species with the highest importance value and relative coverage are *B. decumbens* and *Sida rhombifolia*, in AI, and *B. brizantha* and *Desmodium incanum*, in AII, plus *Paspalum notatum*, in both pastures. The Shannon diversity index was 4.19 and 4.43 nats, for AI and AII, respectively, indicating considerable weed species richness. The floristic dissimilarity index between AI and AII, obtained from the Euclidian distance, is 0.7468, indicating just a few species in common (44%). In the dry season, the number of species in AI decreased 10% while in AII it increased 4%.

KEY-WORDS: Agroecosystem; *Brachiaria*; flora; plant ecology; *Urochloa*.

INTRODUCTION

Cerrado (Brazilian savanna) is the second biome in Brazil, 2 million km^2, approximately 22% of the country (Eiten 2001), covering nearly the whole Central-West region. Soils are generally dystrophic, but well structured, often on flat or gently rolled relief, what favors cattle ranching and mechanized crops (Pivello 2006). Cattle farming has expanded considerably in the region, after the 1970s, due to low prices of land, finance, and forage species well adapted to climate and soils (Perón & Evangelista 2004).

Sown pastures, in general, present high initial productivity, however, within a few years, go through a decline process (Dutra et al. 2004). Excessive stocking rate, wrong choice of forage species, and inadequate management have caused an increasing process of pastures degradation (Santos & Costa 2002, Perón & Evangelista 2004, Dias Filho 2007), which reaches 80% in the Central-West Brazilian region (Perón & Evangelista 2004). According to

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Macedo & Zimmer (1993), a degraded pasture undergoes a gradual process of vigor, productivity and recovery capacity loss, becoming unable to overcome harmful pests effects, diseases, and weeds, ending up with natural resources degradation. Correa et al. (2001) pointed out that pasture degradation in the *Cerrado* region is often related to exhaustion of soil fertility. Dias Filho (2007) stressed that weed proliferation in pastures is a consequence of the degradation process and not its cause, and that weeds compete for soil nutrients, making them less accessible to forage plants.

The management success of a weed community begins with the survey of weeds, in order to understand their biology and predominant species (Pott et al. 2006). So, floristics and phytosociology are extremely useful tools, helping on practices management and weed control of different crops, the first supplying a list of all weed species and the second supporting the understanding of species structure and dynamics, dominant populations, and the weed community, as a whole. Studies involving sown pastures weed communities were performed by Dantas & Rodrigues (1980), Dias Filho (1990), Mascarenhas et al. (1999), Mitja et al. (2000), Dutra et al. (2004), and Tuffi Santos et al. (2004), however, just a few were carried out in the Central-West region (Pott et al. 2006, Silva et al. 2006).

The objective of the present research was the phytosociological study of two pastures sown in *Cerrado* areas, with and without cattle, during the rainy and dry seasons, in Mato Grosso do Sul State, Brazil.

MATERIAL AND METHODS

Study areas

Nova Esperança ranch lays in the township of Sidrolândia, micro-region of Campo Grande, 37 km South of Campo Grande city, Mato Grosso do Sul State, Brazil, with an approximate area of 4,000 ha, including 1,500 ha of swamp, wet grassland, *Cerrado* grassland and scrub, and *Cerrado stricto sensu*, used as pastureland for beef cattle.

The Nova Esperança ranch presents a great ecological importance, as it includes seven headwaters and a registered private reserve, near Serra de Maracaju, part of the Pantanal-Atlantic Forest ecological corridor, being one of the few remnants of unbroken native vegetation, with more than 2,000 ha covered with *cerradão* and semideciduous forest, close to the capital city of Mato Grosso do Sul, Campo Grande.

The climate of the region, according to the Köppen system classification, is *Aw* humid tropical subtype (mean temperature of 24ºC and mean annual rainfall of 1,500 mm), with a rainy season in the Summer (October to April) and a dry one in the Winter. The relief is gently rolled, with predominance of Dystrophic red Latosol (*Rhodic Ferrasol*) (Embrapa 2008).

Two areas (paddocks) of sown pasture were selected, here named area I (AI) and area II (AII). Since the middle 1930s, these areas, originally from *Cerrado s.s.* and *cerradão*, have been cleared and burned for pasture development, usual practices in the region. In the 1970s, following a regional trend, African species of *Brachiaria* (*Urochloa*) were introduced.

AI has around 6 ha of *B. decumbens* (signal grass) pasture, within approximately 100 ha of paddock area, with 200 head of cattle and sometimes 20 horses. AI is limited by the coordinates 20º45′14,2″S and 54º50′34,9″W; 20º45′14,4″S and 54º50′32,4″W; 20º45′26,0″S and 54º50′35,2″W; 20º45′26,1″S and 54º50′37,1″W, and the smallest side of the polygon is connected to a strongly impacted and thinned *cerradão* remnant. Altitude varies from 513 m to 526 m.

AII represents a pasture of *B. brizantha* (palisade grass), 5 ha, within the coordinates 20º45′46,0″S and 54º50′21,9″W; 20º45′48,2″S and 54º50′15,2″W; 20º45′53,8″S and 54º50′11,9″W; 20º45′46,5″S and 54º50′10,9″W, and two polygon sides are adjacent to little disturbed *cerradão*. Altitude varies from 509 m to 520 m. Up to September 2006, only six working oxes were kept in this paddock, which stayed without cattle from October 2006 to January 2008, over the study period.

Floristic study

The study was performed from February 2007 to January 2008, during a rainy season (October to April) and a dry one (May to September). A minimum of 12 months is expected for this kind of study, due to variables such as fast vegetative growth and complete flowering, fruit set, and dispersion cycles. Monthly visits were made in order to survey pasture herbaceous, subshrubby and climbing weeds,

collect botanical material, and observe populations, through asystematic walks. Collected and identified material, with flowers and/or fruits, was botanized according to the usual techniques and kept in the CGMS Herbarium, at the Universidade Federal do Mato Grosso do Sul.

Herbs were considered the prostrate or erect non-woody plants, subshrubbs the erect and partially lignified plants, and climbers non-woody plants which use other herbs and subshrubs as support, according to Guedes-Bruni et al. (2002). Species varying from herbs to subshrubs were treated as a separate group. For identification, specialized bibliography and comparison in the herbarium were used and eventually specialists were consulted. Systematics for families follows APG II (2003) and for species author names Brummitt & Powell (1992).

Based on literature and field observations, each species was sorted for life form (chamephyte, geophyte, hemicryptophyte, therophyte), after the main groups proposed by the Raunkier system (1934), adapted by Müller-Dombois & Ellenberg (1974). Species which vary from therophytes to hemicryptophytes, hemicryptophytes to geophytes, and chamephytes to phanerophytes were considered as separate groups. Geographic origin was based on bibliography.

Phytosociological study

A set of 42 permanent plots of 0.25 m^2 was distributed in eight (AI) and nine (AII) parallel lines, North-South. Sampling sufficiency was tested through the species-area curve (Braun-Blanquet 1979) and determination of minimum area (Matteucci & Colma 1982). Two phytosociological samplings were performed, in July 2007 (dry period) and January 2008 (rainy period), recording all herbaceous to subshrubby Angiosperms present in the plots. For visual evaluation of species coverage, as well as bare ground, dry plant material (straw), and litter (decomposing plant material), these two lumped, the Daubenmire scale was used, following Müller-Dombois & Ellenberg (1974). Based on data of presence-absence and coverage scale, values of relative frequency (RF), relative cover (RC), and importance value (IV) were calculated. Shannon diversity species index (H') and similarity values based on Euclidian distance were obtained by using the PAST program (Hammer et al. 2001).

RESULTS AND DISCUSSION

The AI and AII floristic survey recorded a total of 25 families, 72 genera, and 104 herbaceous and subshrubby Phanerogams weed species (Table 1). From that total, 76 species are herbs, 14 are subshrubs, nine vary from herbs to subshrubs, and five are climbers, and approximately 49% of the species present some forage potential. Only 17% are exotics, however many species considered native only occur in secondary or disturbed natural vegetation, or are from open savanna and favored in the man-made formation, or secondary grassland, which the sown pasture is an example. Many species are considered pantropical weeds, such as the *Urena lobata*.

Concerning life forms, hemicryptophytes predominate in the area, with nearly 41% of the species. Hemicryptophytes present vegetative buds close to the soil surface, where they can escape from grazing. From the total of species, 37 are therophytes and seven geophytes, which, together, represent approximately 42%. The strategy adopted by these species is very common among herbs in the *Cerrado* area, whereas therophytes do their perpetuation by seeds, dormant in the adverse period, and geophytes present underground buds, protected from disturbances, such as drought and fire, besides herbivory and treading.

The families with the highest number of species were Fabaceae (22 species), Poaceae (17), and Asteraceae (15), which together correspond to nearly 52% of the species found. Similar results were reported by Mascarenhas et al. (1999), Lara et al. (2003), and Tuffi Santos et al. (2004), who also pointed out the referred families among those of highest weed species richness in sown pastures. Those families are generally the most numerous in the floristic spectrum of neotropical savannas.

In AI, 66 weed species were found, from 51 genera and 18 families. The richest families were Fabaceae (17 species), Asteraceae (10 species), and Poaceae (10 species). Nearly 1/3, 21 species, are exclusive from this area, with six of them being Fabaceae. Some legumes are potentially valuable as forage resource in tropical regions characterized by low soil fertility (Lascano et al. 2001), for example, *Arachis* and *Desmodium*, which, in sown pastures, may be favored by grazing.

In AII, 83 weed species were recorded, from 58 genera and 22 families. As well as in AI, families

Table 1. Weed species of two areas of *Brachiaria* spp. pastures in *Cerrado*, Nova Esperança ranch, Sidrolândia, Mato Grosso do Sul.

Family	Species	AI*	AII*	Life form	Habit	Forage potential	Herbarium CGMS number
ACANTHACEAE	*Ruellia gemminiflora* Kunth	-	X	cha	her	yes	20606
AMARANTHACEAE	*Amaranthus viridis* L. **	X	-	the	her	yes	20026
APOCYNACEAE	*Oxypetalum* sp.	-	X	the	her	no	20605
	Rhodocalyx rotundifolius Müll. Arg.	X	-	geo	sub	no	21852
ARISTOLOCHIACEAE	*Aristolochia esperanzae* Kuntze	-	X	the	her	no	20032
ASTERACEAE	*Acanthospermum australe* (Loefl.) Kuntze	X	X	the	her	no	20025
	Ageratum conyzoides L.	X	X	the	her	no	20337
	Bidens gardneri Baker	-	X	the/hem	her	yes	20035
	Chaptalia integerrima (Vell.) Burkart	X	X	the	her	no	20012
	Chaptalia nutans (L.) Pol.	X	X	the	her	no	20009
	Eclipta prostrata (L.) L. **	X	-	the/hem	her	no	20320
	Elephantopus angustifolius (Sw.) Gleason	X	X	hem	her	yes	20000
	Elephantopus mollis Kunth	X	X	hem	her	no	20332
	Emilia sonchifolia L. **	-	X	the	her	no	20022
	Eupatorium christieanum Baker **	-	X	hem	sub	no	20603
	Eupatorium paraguariense Hieron.**	X	-	hem	sub	no	20446
	Noticastrum marginatum (Kunth) Cuatrec. **	-	X	the/hem	her	no	20439
	Pterocaulon lanatum Kuntze	X	X	the/hem	her	no	20436
	Pterocaulon virgatum (L.) DC.	-	X	the/hem	her/sub	no	20054
	Tridax procumbens L. **	X	X	the	her	no	20015
BROMELIACEAE	*Bromelia balansae* Mez	-	X	hem	her	no	20338
COMMELINACEAE	*Commelina benghalensis* L. **	-	X	geo	her	yes	20316
CONVOLVULACEAE	*Ipomoea aristolochiaefolia* (Kunth) G. Don	-	X	the	cli	no	20604
	Ipomoea grandifolia (Dammer) O'Donell	-	X	the	cli	yes	20336
	Jacquemontia velutina Choisy	-	X	the	cli	yes	20053
CUCURBITACEAE	*Melancium campestre* Naudin	X	-	the	cli	yes	vegetative material
CYPERACEAE	*Cyperus cayennensis* Willd. ex Link	-	X	hem	her	yes	20020
	Cyperus consanguineus Kunth	-	X	hem	her	yes	20321
	Fimbristylis dichotoma (L.) Vahl	X	X	the/hem	her	yes	20034
	Kyllinga pumila Michx.	X	X	the	her	no	19974
	Rhynchospora nervosa (Vahl) Boeck.	X	-	hem	her	yes	20007
EUPHORBIACEAE	*Chamaesyce hirta* (L.) Millsp.	X	X	the	her	no	20027
	Chamaesyce hyssopifolia (L.) Small	X	X	the	her	no	20037
	Chamaesyce prostrata (Aiton) Small	X	X	the	her	no	19969
	Chamaesyce thymifolia (L.) Millsp. **	X	X	the	her	no	20708
	Euphorbia selloi (Klotzsch & Garcke) Boiss.	X	-	the	her	no	19985
FABACEAE	*Aeschynomene histrix* Poir.	X	X	cha	sub	yes	19975
	Arachis archeri Krapov. & W.C. Greg.	X	X	hem	her	yes	20325
	Arachis glabrata Benth.	X	-	geo	her	yes	20326
	Chamaecrista rotundifolia (Pers.) Greene	X	X	hem	her/sub	yes	20014
	Chamaecrista serpens (L.) Greene	X	-	hem	her	yes	20556
	Crotalaria incana L.	X	X	the	sub	yes	19986
	Crotalaria lanceolata E.Mey **	-	X	hem	her	yes	20039
	Crotalaria stipularia Desv.	X	X	hem	her/sub	yes	20019
	Desmanthus virgatus (L.) Willd.	X	X	hem	sub	yes	20600
	Desmodium affine Schltdl.	-	X	hem	her	yes	20329
	Desmodium axillare (Sw.) DC.	-	X	hem	her	yes	20352
	Desmodium incanum DC.	X	X	hem	her/sub	yes	20036
	Macroptilium lathyroides (L.) Urb.	X	-	the	her	yes	20328
	Mimosa debilis Humb. & Bonpl. ex Willd.	-	X	hem	her/sub	yes	20720
	Mimosa invisa Mart. ex Colla	X	X	hem	sub	no	20118
	Mimosa polycarpa Kunth	X	X	hem	sub	no	19967
	Mimosa quadrivalvis L.	X	-	hem	her	no	20001
	Rhynchosia edulis Griseb.	-	X	hem	her	yes	19979
	Senna obtusifolia (L.) H.S. Irwin & Banerby	X	-	the	sub	no	20010
	Stylosanthes bracteata Vogel	X	X	hem	her/sub	yes	20341
	Stylosanthes scabra Vogel	X	X	hem	sub	yes	20330
	Zornia latifolia Sm.	X	-	hem	her	yes	20440
IRIDACEAE	*Cipura paludosa* Aubl.	X	-	geo	her	no	20008
LAMIACEAE	*Eriope* sp.	X	-	the	her	yes	20437
	Hyptis suaveolens (L.) Poit.	X	X	the	sub	no	20031
MALVACEAE	*Corchorus hirtus* L.	X	X	the	her	yes	20324
	Malvastrum coromandelianum (L.) Gurcke	-	X	the/hem	her/sub	no	20117
	Sida carpinifolia L.f.	-	X	cha	sub	no	20016
	Sida glaziovii K. Schum.	-	X	cha	her/sub	no	19987
	Sida linifolia Cav.	X	X	the	her	no	20017
	Sida rhombifolia L.	X	X	the/hem	her	no	20340
	Sida urens L.	X	X	the	her	no	20030
	Urena lobata L. **	-	X	hem	her	yes	20607
	Waltheria indica L.	X	X	hem	her	no	19997
MORACEAE	*Dorstenia brasiliensis* Lam.	X	X	geo	her	no	20003
OXALIDACEAE	*Oxalis barrelieri* L.	-	X	geo	her	no	20334
	Oxalis sellowii Spreng.	X	X	geo	her	no	20442
PASSIFLORACEAE	*Passiflora tricuspis* Mast.	-	X	hem	cli	no	20438
PHYLLANTHACEAE	*Phyllanthus orbiculatus* Rich.	X	X	the	her	no	20033
POACEAE	*Andropogon gayanus* Kunth **	-	X	hem	her	yes	20591
	Axonopus fissifolius (Raddi) Kuhlm.	X	-	hem	her	yes	20819
	Brachiaria brizantha (Hochst. ex A. Rich.) Stapf **	X	-	hem	her	yes	20587
	Brachiaria decumbens Stapf **	-	X	hem	her	yes	21128
	Cenchrus echinatus L.	-	X	the	her	yes	20309
	Cynodon dactylon (L.) Pers. **	X	-	hem/geo	her	yes	20583
	Digitaria bicornis (Lam.) Roem. & Schult.	X	-	the	her	yes	20592
	Digitaria insularis (L.) Fedde	-	X	hem	her	no	20586
	Hyparrhenia rufa (Nees) Stapf. **	X	X	hem	her	yes	20589
	Melinis repens (Willd.) Zizka **	X	X	the	her	yes	20585
	Oplismenus hirtellus (L.) P. Beauv.	-	X	hem	her	yes	20023
	Paspalum notatum Flügge	X	X	hem	her	yes	20588
	Paspalum paniculatum L.	-	X	hem	her	yes	21131
	Paspalum plicatulum Michx.	X	X	hem	her	yes	20721
	Paspalum urvillei Steud.	-	X	hem	her	yes	20582
	Setaria parviflora (Poir.) Kerguélen	X	X	the/hem	her	yes	21660
	Sporobolus indicus (L.) R. Br.	X	X	hem	her	yes	20581
POLYGALACEAE	*Polygala asperulatum* Ruiz & Pav.	X	-	the	her	no	20599
	Polygala extraaxillaris Chodat	X	X	the	her	no	20333
	Polygala violacea Aubl.	-	X	the	her	no	20021
RUBIACEAE	*Borreria* sp.	X	X	hem	her	no	20306
	Diodia teres Walter	X	-	the	her	no	20327
	Richardia sp.	X	X	the	her	no	20413
SOLANACEAE	*Solanum americanum* Mill.	-	X	the	her	não	20040
	Solanum viarum Dunal	X	X	the/hem	her/sub	no	20308
VERBENACEAE	*Lantana camara* L.	-	X	cha/pha	sub	no	20018
	Phyla betulifolia (Kunth) Greene	-	X	hem	her	yes	20608
	Stachytarpheta cayennensis (Rich.) Vahl	X	X	the/hem	sub	no	20313
VIOLACEAE	*Hybanthus paraguariensis* (Chodat) Schulze-Menz	-	X	hem	her	yes	20602

* AI = Area I (with cattle); AII = Area II (without cattle). ** Exotic: cha = chamephyte; pha = phanerophyte; geo = geophyte; hem = hemicryptophyte; the = therophyte; her = herb; sub = subshrub; cli = climber.

with the highest number of species were Fabaceae (16 species), Poaceae (13 species), and Asteraceae (13 species). In this area, 38 species are exclusive, standing out Poaceae with seven, being six of them with forage potential, whose presence may be favored by cattle absence.

In both areas, as a mosaic in the cultivated grass sward, extended patches of *Paspalum notatum* were observed, a native species with good protein content, usually grazed, which protects soil from erosion. According to Pedreira & Pedreira (2006), the species is very competitive and tolerant to adverse conditions, such as drought, waterlogging, intense treading and low soil fertility.

The occurrence of *Mimosa* spp. and *Solanum viarum* was common in both areas. According to Lorenzi (2000), *Mimosa* species, in general, are rejected by cattle, due to their spiny and aggressive character. Seeds of *S. viarum* are spread in cattle dung (Pott & Pott 1994). For both plant groups, the negative selectivity of cattle favors large sizes and/or large populations. In addition, a large number of scattered individuals or small clumped populations of *Pterocaulon lanatum* was recorded. In general, the aerial part of *Pterocaulon* contains cumarine, which acts as a protection against herbivory and can cause phototoxicity (Stein 2005), therefore also probably rejected by cattle.

Being close to a spring and sheltered by two strips of *cerradão*, AII presents more shading and soil moisture, as compared to AI. Therefore, in moist AII habitats, species such as *Eclipta prostrata*, *Phyla betulifolia*, *Paspalum urvillei*, *Setaria parviflora*, and some sedges, for example, *Cyperus cayennensis*, *C. consanguineus*, *Kyllinga pumilla*, and *Fimbristylis dichotoma*, are more frequent, and in the shady ones, *Bromelia balansae*, *Chaptalia* spp., *Desmodium affine*, *D. axillare*, and *Oplismenus hirtellus*.

Shannon diversity values (H') were 4.19 and 4.43 nats, for AI and AII, respectively. Although animal load and management type (period of grazing, exclosure, etc.) are very distinct between both areas, their floristic diversity values are pretty close. These values are considered high, when compared to those obtained by Dutra et al. (2004), in *Brachiaria humidicola* (1.527 to 2.620) and *B. brizantha* (1.395 to 2.544) pastures, in the Amazonian Northeastern Pará.

The floristic dissimilarity index between AI and AII, obtained from the Euclidian distance, was 0.7468. This high index indicates that the studied areas are floristically distinct, in other words, present few species in common (44%), what can be explained by differences related to cattle, shading by adjacent *cerradão*, and exposure to wind and sun.

A synthesis of results from recent studies involving survey of sown pastures weed species, in different Brazilian regions, is presented in Table 2. Analysis of floristic dissimilarity among this work and the referred studies revealed values between 0.8825 and 0.9707. This high dissimilarity could be explained by the original vegetation, geographical distance, and regional climatic and edaphic factors, plus differences in type and intensity of anthropic actions, or management, such as forage species, fire, grazing history, and weed introduction and control (herbicide, slashing).

Over the dry season, a considerable population reduction of all weeds groups was visually observed, partly due to drought (AI and AII), but also to cattle consumption and treading (AI). This reduction, however, appeared more dramatic among species of Euphorbiaceae, Fabaceae, Malvaceae, and Rubiaceae. On the other hand, *Pterocaulon lanatum*, besides ungrazed, showed to be drought resistant, due to its xylopodium, practically maintaining the size and density of its populations (table 3).

Table 2. Synthesis of recent studies involving survey of weed species of *Brachiaria* spp. sown pastures and dissimilarity index (Euclidan distance), in relation to the present research.

Study	Township, State	Cultivated species	Total of species	Dissimilarity index
Mascarenhas et al. (1999)	Terra Alta, PA	*B. humidicola*	118	0.9558
Lara et al. (2003)	Abaeté, Bom Despacho, Iguatama, Luz, Martinho Campos, Pompéu, MG	*B. mutica*	31	0.8825
Dutra et al. (2004)	Castanhal, Terra Alta, Paragominas, PA	*B. humidicola* and *B. brizantha*	66	0.9707
Tuffi Santos et al. (2004)	Leopoldina, MG	*B. mutica*	27	0.9558

Table 3. Months of occurrence of weed species in two areas of *Brachiaria* spp. sown pastures in *Cerrado*, Nova Esperança ranch, Sidrolândia, Mato Grosso do Sul.

Months	FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC		JAN	
Area*	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II
Acanthospermum australe	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Aeschynomene histrix	X	X	X	X	X	X	X	X	X	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-
Ageratum conyzoides	-	-	-	-	-	-	X	X	X	X	X	X	X	-	X	-	X	-	X	-	X	-	X	-
Andropogon gayanus	-	-	-	-	-	-	-	X	-	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-
Arachis archeri	X	-	X	-	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	X	-	X	-
Arachis glabrata	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	-	-	-	-	X	-	X	-
Amaranthus viridis	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aristolochia esperanzae	-	X	-	X	-	X	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-
Axonopus fissifolius	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-
Bidens gardneri	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Borreria sp.	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X
Brachiaria brizantha	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-
Brachiaria decumbens	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X
Bromelia balansae	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X
Cenchrus echinatus	-	-	-	-	-	-	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-
Chamaecrista rotundifolia	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	X
Chamaecrista serpens	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Chamaesyce hirta	X	X	X	X	X	X	X	X	-	X	-	X	X	-	-	-	-	-	-	-	X	-	-	-
Chamaesyce hyssopifolia	-	-	-	-	X	X	X	X	X	X	X	X	-	X	-	-	-	-	-	-	X	-	X	X
Chamaesyce prostrata	X	X	X	X	X	X	X	X	-	X	-	-	-	-	-	-	-	-	-	-	X	-	X	X
Chamaesyce thymifolia	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	X	-	X	X
Chaptalia integerrima	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chaptalia nutans	X	X	X	X	-	X	-	-	-	-	-	X	-	X	X	X	X	X	X	X	X	X	X	X
Cipura paludosa	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commelina benghalensis	-	-	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-
Corchorus hirtus	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Crotalaria incana	-	X	-	X	X	X	X	X	X	-	X	-	X	-	-	-	-	-	-	-	-	X	-	X
Crotalaria lanceolata	-	X	-	X	-	X	-	X	-	X	-	-	-	X	-	X	-	-	-	X	-	X	-	X
Crotalaria stipularia	X	X	X	X	X	X	X	X	X	X	-	X	-	X	-	-	-	-	-	-	-	-	-	X
Cynodon dactylon	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyperus cayennensis	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X
Cyperus consanguineus	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X
Desmanthus virgatus	X	-	X	-	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Desmodium affine	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	-	-	-	-	X	-	X
Desmodium axillare	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-	X	-	X	-	X	-	-
Desmodium incanum	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
Digitaria bicornis	-	-	-	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Digitaria insularis	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diodia teres	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dorstenia brasiliensis	X	-	X	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	X	-	X	-	X	-
Eclipta prostrata	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Elephantopus angustifolius	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	-	X	-	X	-
Elephantopus mollis	-	X	-	X	X	X	X	X	X	X	-	X	-	X	-	X	-	-	-	-	X	-	X	-
Emilia sonchifolia	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-
Eriope sp.	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-
Eupatorium christieanum	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X
Eupatorium paraguariense	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-
Euphorbia selloi	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-
Fimbristylis dichotoma	-	X	-	X	-	X	X	X	X	X	X	X	-	X	-	X	-	-	-	-	-	-	-	X
Hybanthus paraguariensis	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hyparrhenia rufa	-	-	-	-	-	-	X	X	X	X	X	X	X	X	-	X	-	X	-	X	-	X	-	-
Hyptis suaveolens	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-
Ipomoea aristolochiaefolia	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ipomoea grandifolia	-	-	-	-	-	-	-	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-
Jacquemontia velutina	-	-	-	-	-	-	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-
Kyllinga pumila	X	X	-	X	-	X	-	X	-	X	-	X	-	X	X	-	X	-	-	-	X	-	X	X
Lantana camara	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Macroptilium lathyroides	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Melancium campestre	-	-	-	-	-	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Malvastrum coromandelianum	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X
Melinis repens	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	X	-	X	-	X	-
Mimosa debilis	-	X	-	X	-	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-
Mimosa polycarpa	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mimosa quadrivalvis	X	-	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mimosa invisa	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-
Noticastrum marginatum	-	-	-	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oplismenus hirtellus	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X
Oxalis barrelieri	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	-
Oxalis sellowii	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-
Oxypetalum sp.	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paspalum notatum	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Paspalum paniculatum	-	-	-	-	-	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-
Paspalum plicatulum	-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	X
Paspalum urvillei	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Passiflora tricuspis	-	-	-	-	-	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	X	-	X
Phyla betulifolia	-	-	-	-	-	-	-	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-
Phyllanthus orbiculatus	X	X	X	X	X	X	X	X	X	X	-	X	-	X	-	-	-	-	-	-	-	X	X	X
Polygala asperulatum	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polygala extraaxilaris	-	X	-	X	-	X	-	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polygala violacea	-	X	-	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	X
Pterocaulon lanatum	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pterocaulon virgatum	-	-	-	-	-	X	-	X	-	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-
Rhodocalyx rotundifolius	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-
Rhynchosia edulis	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X
Rhynchospora nervosa	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Richardia sp.	X	-	X	-	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ruellia geminiflora	-	-	-	-	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Senna obtusifolia	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-
Setaria parviflora	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sida carpinifolia	-	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X
Sida glaziovii	-	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sida linifolia	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sida rhombifolia	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sida urens	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Solanum americanum	-	-	-	-	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Solanum viarum	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sporobolus indicus	-	X	-	X	-	X	X	-	X	-	-	-	-	-	-	-	-	-	X	-	X	-	X	X
Stachytarpheta cayennensis	X	X	X	X	X	X	X	X	-	X	-	X	-	X	-	X	-	X	-	X	X	X	X	X
Stylosanthes bracteata	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-
Stylosanthes scabra	-	-	-	-	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X	-	X	-	X
Tridax procumbens	X	-	X	-	X	-	X	-	X	X	X	X	X	X	X	-	X	-	X	-	X	-	X	-
Urena lobata	-	-	-	-	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waltheria indica	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Zornia latifolia	-	-	-	-	-	-	X	-	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-

* Area I = with cattle; Area II = without cattle.

Floristic richness of the AI and AII weed communities responded in a distinct way to the dry season (Figures 1 and 2): in AI, the number of species dropped from 60 to 54 (10%), while, in AII, it increased from 72 to 75 (4%).

The importance value (IV) and relative cover (RC) for phytosociological data (Table 4) show as main species *Paspalum notatum*, *Brachiaria decumbens*, and *Sida rhombifolia*, in AI, and *B. brizantha*, *P. notatum*, and *Desmodium incanum*, in AII. Similar results were obtained by Tuffi Santos et al. (2004) and Lara et al. (2003), who found *S. rhombifolia* and *P. notatum* among the species of highest IV.

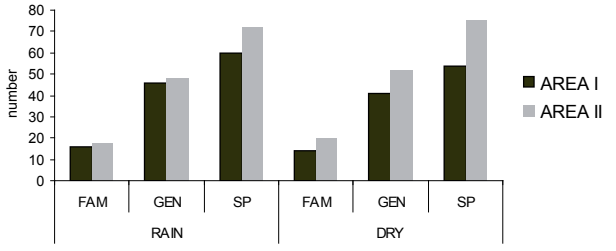

Figure 1. Number of families, genera and species found in rainy and dry seasons, in two areas of *Brachiaria* spp. sown pastures in *Cerrado*, Nova Esperança ranch, Sidrolândia, Mato Grosso do Sul (Area I = with cattle; Area II = without cattle; fam = family; gen = genus; sp = species; dry = dry period; rain = rainy period).

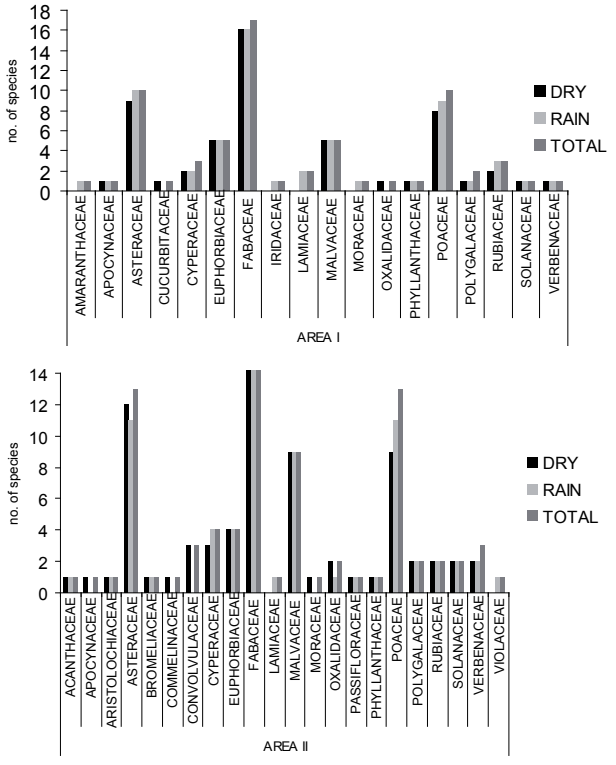

Figure 2. Total number of species per family and season, in two areas of *Brachiaria* spp. sown pastures in *Cerrado*, Nova Esperança ranch, Sidrolândia, Mato Grosso do Sul (Area I = with cattle; Area II = without cattle; DRY = dry period; RAIN = rainy period).

In AI, the pasture weeds add up an IV of 38.8% (dry period) and 46.3% (rainy period). These values are higher than those obtained for weed species in AII, with IV of 16.1% (dry period) and 15.2% (rainy period). The high IV of the weed community in AI may be related to the presence of cattle, due to treading, grazing selectivity, and dispersion of some weed species.

In AI, *B. decumbens* reached RC of 13.4% (dry period) and 21.1% (rainy period), less than for *P. notatum*, exhibited in both seasons. This may be attributed to the high adaptability of this species to adverse environmental conditions, as previously mentioned. In AII, RC of *B. brizantha* stayed high, 38.0% (dry period) and 37.7% (rainy period).

Though in the rainy season, in AII, there was an increase of "straw and litter", overrunning the coverage of *B. brizantha*, a probable effect of cattle removal, *P. notatum* also stood out in this area, what confirms its adaptability to different management types. The "straw and litter" and "bare ground" attributes are high in terms of IV and RC, in both areas and seasons. In AII, "bare ground" reached its maximum RC (23.5%), in the dry period, while 70.3% of soil was protected by *B. brizantha* and "straw and litter".

In AI, a considerable amount of bare ground was observed, besides gullies in advanced stage, forming deep ravines and causing relevant loss of vegetation areas and soil. In some patches of nearly bare ground, the presence of *Sida rhombifolia*, *Tridax procumbens*, and *Acanthospermum australe* was observed, indicators of degraded pasture. The last two species, although showing low height, generally being prostrate, form densifications, which give some cover and protection to the soil. Nevertheless, during the dry period, their population was reduced, and, as a consequence, the bare ground area increased considerably.

According to criteria established by Vieira & Kichel (1995), to indicate pasture degradation, AI is considered degraded, due to high weeds infestation, besides unvegetated areas, with soil compaction

Table 4. Phytosociological parameters of attributes and weed species in two areas of *Brachiaria* spp. sown pastures in *Cerrado*, Nova Esperança ranch, Sidrolândia, Mato Grosso do Sul.

Area I – Dry period (July/ 2007)					
Attributes and Species	IV (%)	AC (%)	AF (%)	RC (%)	RF (%)
Straw and litter	29.05	953.75	1.00	35.02	23.08
Paspalum notatum	24.78	856.25	0.79	31.44	18.13
Bare ground	17.16	411.00	0.83	15.09	19.23
Brachiaria decumbens	14.94	365.00	0.71	13.40	16.48
Sida rhombifolia	2.79	17.50	0.21	0.64	4.95
Desmodium incanum	2.08	8.75	0.17	0.32	3.85
Brachiaria brizantha	1.94	46.25	0.10	1.70	2.19
Chamaesyce hyssopifolia	1.90	13.75	0.14	0.50	3.30
Hyparrhenia rufa	1.53	23.75	0.10	0.87	2.20
Acanthospermum australe	0.89	3.75	0.07	0.14	1.65
Sida urens	0.71	8.75	0.05	0.32	1.10
Arachis archeri	0.41	7.50	0.02	0.28	0.55
Chamaesyce thymifolia	0.30	1.25	0.02	0.05	0.55
Sida linifolia	0.30	1.25	0.02	0.05	0.55
Stylosanthes scabra	0.30	1.25	0.02	0.05	0.55
Tridax procumbens	0.30	1.25	0.02	0.05	0.55
Waltheria indica	0.30	1.25	0.02	0.05	0.55
Zornia latifolia	0.30	1.25	0.02	0.05	0.55
Total	100.0	2,723.5	4.3	100.0	100.0

Area II – Dry period (July/ 2007)					
Attributes and Species	IV (%)	AC (%)	AF (%)	RC (%)	RF (%)
Brachiaria brizantha	31.13	1,445.00	0.98	38.00	24.26
Straw and litter	28.57	1,227.50	1.00	32.28	24.85
Bare ground	24.18	893.50	1.00	23.50	24.85
Paspalum notatum	4.08	130.00	0.19	3.42	4.73
Desmodium incanum	3.30	26.00	0.24	0.68	5.92
Sida rhombifolia	1.91	10.00	0.14	0.26	3.55
Chamaesyce hyssopifolia	1.51	2.50	0.12	0.07	2.96
Waltheria indica	1.51	2.50	0.12	0.07	2.96
Hyparhenia rufa	0.94	26.25	0.05	0.69	1.18
Sida urens	0.70	8.00	0.05	0.21	1.18
Arachis archeri	0.39	7.50	0.02	0.20	0.59
Chamaesyce thymifolia	0.39	7.50	0.02	0.20	0.59
Corchorus hirtus	0.39	7.50	0.02	0.20	0.59
Setaria parviflora	0.39	7.50	0.02	0.20	0.59
Mimosa polycarpa	0.30	0.50	0.02	0.01	0.59
Phyllanthus orbiculatus	0.30	0.50	0.02	0.01	0.59
Total	100.00	3,802.25	4.02	100.00	100.00

Area I – Rainy period (January/2008)					
Attributes and Species	IV (%)	AC (%)	AF (%)	RC (%)	RF (%)
Paspalum notatum	24,94	918.50	0.81	32.99	16.90
Brachiaria decumbens	18.52	588.75	0.76	21.14	15.91
Straw and litter	17.67	444.25	0.93	15.95	19.39
Bare ground	17.47	502.25	0.81	18.04	16.90
Sida rhombifolia	4.49	42.50	0.36	1.53	7.46
Brachiaria brizantha	3.77	99.25	0.19	3.56	3.98
Acanthospermum australe	2.95	39.50	0.21	1.42	4.47
Chamaesyce thymifolia	2.69	39.00	0.19	1.40	3.98
Desmodium incanum	1.46	9.50	0.12	0.34	2.57
Paspalum plicatulum	1.35	33.75	0.07	1.21	1.49
Sida urens	1.23	26.75	0.07	0.96	1.49
Melinis repens	1.02	15.50	0.07	0.56	1.49
Chamaesyce hyssopifolia	0.64	8.00	0.05	0.29	0.99
Sporobolus indicus	0.38	7.50	0.02	0.27	0.50
Tridax procumbens	0.38	7.50	0.02	0.27	0.50
Mimosa polycarpa	0.26	0.50	0.02	0.02	0.50
Richardia sp.	0.26	0.50	0.02	0.02	0.50
Senna obtusifolia	0.26	0.50	0.02	0.02	0.50
Setaria parviflora	0.26	0.50	0.02	0.02	0.50
Total	100.00	2,784.50	4.80	100.00	100.00

Area II - Rainy period (January/2008)					
Attributes and Species	IV (%)	CA (%)	FA (%)	RC (%)	RF (%)
Straw and litter	34.20	1,451.25	1.00	40.57	27.82
Brachiaria brizantha	32.10	1,348.75	0.95	37.71	26.49
Bare ground	18.47	492.25	0.83	13.76	23.18
Paspalum notatum	6.58	210.00	0.26	5.87	7.29
Desmodium incanum	3.87	40.00	0.24	1.12	6.62
Pterocaulon lanatum	1.45	9.00	0.10	0.25	2.65
Waltheria indica	1.11	8.50	0.07	0.24	1.99
Sida rhombifolia	0.68	1.00	0.05	0.03	1.32
Mimosa polycarpa	0.44	7.50	0.02	0.21	0.66
Rhynchosia edulis	0.44	7.50	0.02	0.21	0.66
Chamaesyce hyssopifolia	0.34	0.50	0.02	0.01	0.66
Corchorus hirtus	0.34	0.50	0.02	0.01	0.66
Total	100.00	3,576.75	3.60	100.00	100.00

Area I = with cattle; Area II = without cattle; IV = Importance value; AC = Absolute coverage; AF = Absolute frequency; RC = Relative cover; and RF = Relative frequency.

and erosion. The present bad condition is probably due to the management type practiced over decades, under permanent treading. By the same criteria, AII can also be considered degraded, however in a much lower level, if compared to AI. Considerable weed infestation and bare ground patches were also observed in AII, although the soil is little compacted and there is no rill erosion, a possible direct reflex of low stocking over the years, what explains the high RC of "straw and litter" (Table 4).

Plants considered ruderal pioneers, particularly *Cenchrus echinatus*, *Melinis repens*, *Digitaria insularis*, *Hyparrhenia rufa*, and *Sporobolus indicus* indicate high degree of environmental degradation. These weedy grasses probably remained in AII, due to previous grazing history. Absence or reduced number of individuals of the referred species in AI could be related to competition from *B. decumbens*, whose basal cover is higher than *B. brizantha*, once they produce abundant diaspores of a wide range, one being zoochorous (*C. echinatus*) and some anemochorous (*M. repens* and *D. insularis*).

Besides providing comparative information on botanical composition of different grasslands, the gathered floristic and phytosociological data can be useful for further studies, for example, agronomic (management of degraded pastures) and biochemical studies involving pasture weed

species, plus ecological research. Some aspects to investigate could be the separate effects of sown grass species and the presence/absence of grazing, which became confounded. In addition, a longer research time is necessary for a better understanding of the dynamics of pasture weed flora in the micro-region. The pastures, although degraded, are generally intermingled with areas of Legal Reserve and Permanent Preservation, and interactions between the agroecosystem and the original matrix have not been adequately studied yet.

There is an obvious need for more investment in time, technology and resources for recovery of degraded pastures, utilization of native forage species (for example *Arachis* and *Desmodium*), or regeneration of the original *Cerrado* vegetation.

CONCLUSIONS

1. The weeds diversity is high, with low proportion of exotic species, in two distinct degraded pastures, in the Campo Grande micro-region. The richest families are Fabaceae, Asteraceae, and Poaceae. Hemicryptophytes predominate, followed by therophytes. The main species are *Brachiaria decumbens* and *Sida rhombifolia*, in the area with cattle, and *B. brizantha* and *Desmodium incanum*, in the area without cattle, plus *Paspalum notatum*, in both pastures.
2. The diversity is considered high, and areas with and without cattle show similar floristic diversity. The floristic dissimilarity index is high between the studied areas and it is even higher in relation to sown pastures in other Brazilian regions.
3. The 15-month period rest (without cattle) does not favor the spread of the weed community, on the other hand, it contributes little to the regeneration of the natural *Cerrado* vegetation.
4. The weeds population decreases in the dry season.

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