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## Inventory of grasses in Cerrado areas impacted by farming, Mato Grosso do Sul, Brazil<sup>1</sup>

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**ABSTRACT:** (Inventory of grasses in Cerrado areas impacted by farming, Mato Grosso do Sul, Brazil). A floristic survey of grasses (Poaceae) in grassland, savanna and forest formations of Mato Grosso do Sul is presented. Field collections were performed from August 2007 through July 2008. We found 28 genera and 45 species of Poaceae, of which 27 are native and 18 exotic. The subfamily Panicoideae had the highest number of species (33). *Setaria parviflora* (Poir.) Kerguelen was found in all areas sampled. Sown pastures were the most species-rich (24). A checklist of the species recorded, with data on origin, life cycle, forage potential and habitat recorded from field observations is presented. An identification key is given, to support taxonomic and ecological studies.

**Key words:** Floristics, exotic weeds, native plants, Poaceae.

**RESUMO:** (Inventário das gramíneas em áreas de Cerrado sob influência de atividade agropecuária, Mato Grosso do Sul, Brasil). Com o propósito de reunir informações florísticas das gramíneas (Poaceae) de formações campestres, savânicas e florestais do Mato Grosso do Sul foram realizados levantamentos florísticos de agosto de 2007 a julho de 2008. Obteve-se o total de 45 espécies de Poaceae distribuídas em 28 gêneros, das quais 27 espécies são nativas e 18 exóticas. Panicoideae foi a subfamília mais representativa (33 spp.). *Setaria parviflora* (Poir.) Kerguelen foi comumente encontrada em todas as áreas amostradas e a maior riqueza específica foi encontrada em pastagens cultivadas (24). O trabalho apresenta a lista de espécies confirmadas para a área de estudo, bem como dados sobre origem, ciclo de vida, potencial forrageiro, e hábitat, a partir de observações na área de estudo. Chaves de identificação são fornecidas a fim de subsidiar estudos taxonômicos e ecológicos.

**Palavras-chave:** Florística, invasoras exóticas, plantas nativas, Poaceae.

### INTRODUCTION

The biogeographic contact with different domains (Amazonia to the north, Caatinga to the northeast, Atlantic Forest to the east and southeast, and the Chaco and Pantanal to the southwest) is one of the factors leading to the high biodiversity in the Cerrado biome of central Brazil (Silva & Santos 2005). Occupying ca. 200 million ha, the Cerrado has suffered mismanagement in land use and exploitation of natural resources, generally related to impacting economic uses such as farming and cattle ranching (Mazzetto 2009).

Although poor in nutrients, Cerrado soils have good physical structure and flat or slightly rolling relief, favorable for cattle husbandry and mechanized agriculture (Pivello 2011). These and other factors attracted farmers who replaced the native vegetation with crops and cultivated pastures (Klink & Machado 2005), considerably modifying the original landscape. Pivello (2011) pointed out that the use of exotic grasses directly affects the native herbaceous populations through competition, and can cause local extinctions and consequently loss of biodiversity. Central-western Brazil contains ca. 57 million ha of natural pastures (IBGE 2008), which may be invaded by weedy grasses.

Grasses (Poaceae) have a wide geographic distribution, and the large number of species makes them economically and ecologically important. The family contains ca. 11 000 species, distributed in all regions of the world (Watson & Dallwitz 1992, GPWG 2001, GPWG 2012). Approximately 210 genera and 1,425 species occur in Brazil (Filgueiras *et al.* 2013), mainly in open and forest vegetation. Floristic inventories are an important tool to expand the knowledge of the flora of a given region, and provide useful information for taxonomic, phenological, phytosociological and ecological studies, as well as for planning for sustainable management and developing proposals of priority areas for conservation.

Although a floristic survey of Poaceae in Mato Grosso do Sul would be helpful to many agrostologists, studies involving this family are few, for example those by Allem & Valls (1987), Pott & Pott (2000), Pott *et al.* (2006) and Guglieri-Caporal *et al.* (2011). In recent decades, several studies on Poaceae were conducted in other Brazilian states, *e.g.*, Viana & Filgueiras (2008), Mota *et al.* (2009), Schmidt & Longhi-Wagner (2009), Zanin & Longhi-Wagner (2011) and Welker & Longhi-Wagner (2012), among others.

Because of the high importance of grasses and the

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need to expand the floristic knowledge of the group, a floristic survey of Poaceae in a Cerrado area influenced by farming activities was carried out. Here, we provide information on the origin, life cycle, habitat and forage potential of the species found in this survey.

## MATERIAL AND METHODS

This study was carried out at the Fazenda Nova Esperança ranch (20°45'34.5''S, 54°50'28.7''W). Of the total ranch area of 4,000 ha, approximately 250 ha are devoted to soybeans and ca. 2,000 ha are covered by Cerrado woodland (locally termed “cerradão”, with

canopy cover about 50% and trees up to 9 m tall) and forest. The remaining open formations include areas of swamp, wet grassland, open and shrubby Cerrado grassland (“campo limpo”, “campo úmido” and “campo sujo”, respectively), and Cerrado *s.s.*, mostly utilized as pasture for beef cattle. In addition, previously existing Cerrado *s.s.* and woodland areas were cleared and burned in recent decades for sown pastures, within the remaining natural vegetation on the ranch.

The climate of the region is type “Aw” humid tropical (Köppen 1948), with a mean temperature of 24° C, and a rainy season in summer (October to April) and a dry season in winter (Mato Grosso do Sul 1990). The re-

**Table 1.** List of species at Fazenda Nova Esperança ranch, Mato Grosso do Sul, Brazil; voucher and habitat (\* cultivated species, CO = Cerrado *s.s.*, SP = sown pasture, CR = crops, CW = Cerrado woodland, FO = forest, GF = gallery forest, OG = open grassland, RU = ruderal, SG = shrubby grassland, WE = weed, WG = wet grassland).

| SPECIES                          | VOUCHER<br>(CGMS) | HABITAT |    |    |    |    |    |    |    |    |    |
|----------------------------------|-------------------|---------|----|----|----|----|----|----|----|----|----|
|                                  |                   | RU      | OG | SG | WG | CW | CO | FO | GF | SP | CR |
| <i>Andropogon gayanus</i>        | 20591             | X       |    | X  |    |    |    |    |    | X  |    |
| <i>Avena strigosa</i> *          | 20825             | X       |    |    |    |    |    |    |    |    | X  |
| <i>Axonopus compressus</i>       | 20880             |         |    |    | X  |    |    |    | X  |    |    |
| <i>Axonopus fissifolius</i>      | 20819             |         |    |    |    |    |    |    |    | X  |    |
| <i>Chusquea sellowii</i>         | sterile           | X       |    |    |    |    |    |    |    |    |    |
| <i>Cenchrus echinatus</i>        | 24215             |         |    |    |    |    |    |    |    | X  | X  |
| <i>Cenchrus purpureus</i> *      | 21150             | X       |    |    |    |    |    |    |    |    | X  |
| <i>Chloris elata</i>             | 20049             |         |    |    |    |    |    |    |    |    | X  |
| <i>Cynodon dactylon</i>          | 20583             | X       | X  |    |    |    |    |    |    | X  |    |
| <i>Cynodon nlemfuensis</i>       | 21151             | X       |    |    |    |    |    |    |    | X  |    |
| <i>Digitaria aequiglumis</i>     | 20815             |         |    |    |    |    |    |    |    | X  |    |
| <i>Digitaria bicornis</i>        | 20592             |         |    |    | X  |    | X  |    |    | X  |    |
| <i>Digitaria fuscescens</i>      | 26992             |         |    |    |    |    |    |    |    | X  |    |
| <i>Digitaria insularis</i>       | 24216             | X       |    |    |    |    |    |    |    | X  | X  |
| <i>Echinochloa colona</i>        | 25888             |         |    |    | X  |    |    |    |    |    |    |
| <i>Eleusine indica</i>           | 20814             | X       |    |    |    |    |    |    |    | X  |    |
| <i>Eragrostis articulata</i>     | 20874             | X       |    |    | X  |    | X  |    |    |    |    |
| <i>Eragrostis amabilis</i>       | 20878             | X       |    |    |    |    |    |    |    |    |    |
| <i>Hyparrhenia rufa</i>          | 20589             | X       | X  | X  |    |    |    |    |    | X  | X  |
| <i>Imperata brasiliensis</i>     | 24218             |         |    |    | X  |    |    |    |    |    |    |
| <i>Leptochloa virgata</i>        | 24219             | X       |    |    |    |    |    | X  | X  |    |    |
| <i>Luziola bahiensis</i>         | 24220             |         |    |    |    |    |    |    | X  |    |    |
| <i>Melinis repens</i>            | 20585             | X       |    |    |    |    |    |    |    | X  | X  |
| <i>Megathyrsus maximus</i>       | 21149             |         |    |    |    |    |    |    | X  |    |    |
| <i>Mnesithea aurita</i>          | 20873             |         |    |    | X  |    |    |    |    |    |    |
| <i>Mnesithea granularis</i>      | 24217             |         | X  |    |    |    |    |    |    | X  |    |
| <i>Olyra latifolia</i>           | 20353             |         |    |    |    | X  |    | X  | X  |    |    |
| <i>Oplismenus hirtellus</i>      | 20826             |         |    |    |    | X  |    | X  | X  |    |    |
| <i>Panicum exiguum</i>           | 20828             |         |    |    |    | X  |    |    |    |    |    |
| <i>Paspalum conjugatum</i>       | 20817             | X       |    |    | X  |    |    |    | X  |    |    |
| <i>Paspalum notatum</i>          | 20818             | X       | X  | X  |    |    | X  |    |    | X  |    |
| <i>Paspalum paniculatum</i>      | 21131             |         |    |    |    |    |    |    |    | X  |    |
| <i>Paspalum plicatulum</i>       | 20721             |         |    |    |    |    |    |    |    | X  |    |
| <i>Paspalum urvillei</i>         | 20582             |         |    |    |    |    |    |    |    | X  |    |
| <i>Saccharum officinarum</i> *   | sterile           | X       |    |    |    |    |    |    |    |    | X  |
| <i>Saccharum villosum</i>        | 24221             |         |    |    | X  |    |    |    |    |    |    |
| <i>Schizachyrium condensatum</i> | 20875             | X       |    | X  |    |    |    |    |    |    |    |
| <i>Setaria hassleri</i>          | 24222             |         | X  |    |    |    |    |    |    | X  | X  |
| <i>Setaria parviflora</i>        | 21660             | X       | X  | X  | X  | X  | X  | X  | X  | X  | X  |
| <i>Sporobolus indicus</i>        | 24223             | X       |    |    |    |    |    |    | X  | X  |    |
| <i>Urochloa brizantha</i> *      | 20587             | X       | X  | X  | X  | X  | X  |    |    | X  | X  |
| <i>Urochloa decumbens</i> *      | 20584             | X       | X  | X  | X  | X  | X  |    | X  | X  | X  |
| <i>Urochloa humidicola</i>       | 29098             |         |    |    |    |    |    |    |    | X  |    |
| <i>Urochloa ruziziensis</i>      | 29115             |         |    |    |    |    |    |    |    | X  |    |
| <i>Zea mays</i> *                | 20724             | X       |    |    |    |    |    |    |    |    | X  |

gional relief is slightly undulating with dark-red latosol predominating (Brasil 1982, Mato Grosso do Sul 1990).

The floristic study was performed from August 2007 through July 2008 (48 collections), through collection of fertile specimens found in grassland, savanna and forest vegetation types in the study area. Specimens were identified through appropriate bibliographic references and deposited in the herbarium CGMS of the Universidade Federal de Mato Grosso do Sul. We also included in the list, those species found in a vegetative state (sterile), but did not deposit specimens in the herbarium.

From the list of species confirmed for Nova Esperança ranch, we composed an identification key to genera and species. Information on origin, life cycle (perennial, annual or pluriannual), forage potential (high, moderate, low, very low or null), and ecological and economic importance was taken from Allen & Valls (1987), Longhi-Wagner *et al.* (2001) and Boldrini *et al.* (2005), and the habitat was observed in the field. We included only common names (when existing) known in the state of Mato Grosso do Sul, obtained from the literature and from local residents.

The terms Cerrado *s.s.*, Cerrado woodland, forest, gallery forest, open grassland, shrubby grassland and

wet grassland follow Ribeiro & Walter (2008) and in Table 1 refer to the areas of natural vegetation that may or may not contain fields of crops or sown pastures, and are occasionally invaded by cattle. Other terms utilized in Table 1 are: sown pasture – cultivated pastures for cattle, and weeds; crops – for human and animal consumption, and weeds; ruderal – areas under constant human interference, such as roadsides within the ranch and the surroundings of the homestead. An asterisk indicates the species cultivated on the ranch.

## RESULTS AND DISCUSSION

We recorded 45 species distributed in 28 genera and 5 subfamilies of Poaceae (Table 2) in the vegetation types at Nova Esperança ranch. Of this total, 27 are native and 18 are exotic, representing approximately 60% and 40% of the species, respectively. Best represented was the subfamily Panicoideae, with 33 species distributed in 18 genera. The other species were divided among Chloridoideae (8), Bambusoideae (2), Ehrhartoideae and Pooideae (1 specie each). The richest genera were *Paspalum* L. (5) and *Digitaria* Haller and *Urochloa* P. Beauv. (4 each). An identification key for the species recorded in the study area is presented below.

### Identification key for the grass species occurring at Nova Esperança ranch, Mato Grosso do Sul, Brazil

1. Spikelets unisexual in separate inflorescences, male spikelets apical and female spikelets axillary.
  2. Stoloniferous plants; native ..... *Luziola bahiensis*
  - 2'. Non-stoloniferous plants; cultivated plant ..... *Zea mays*
- 1'. Spikelet unisexual or bisexual in the same inflorescence.
  3. Panicle lax, contracted to spiciform; with bilateral branches
    4. Leaves pseudopetiolate; usually forest plants.
      5. Woody culms; foliage leaves linear-lanceolate, 0.6-1 cm wide ..... *Chusquea sellowii*
      - 5'. Herbaceous culms; leaves oval-lanceolate, 3.5-6.5 cm wide ..... *Olyra latifolia*
    - 4'. Leaf laminae without pseudopetiole; generally grassland plants.
      6. Diaspore borne above the glumes.
        7. Spikelets with a single anthecium ..... *Sporobolus indicus*
        - 7'. Spikelets with two or more anthecia.
          8. Glumes longer than anthecia; lemma awned ..... *Avena strigosa*
          - 8'. Glumes shorter than anthecia; lemma awnless.
            9. Palea keels conspicuously ciliate, cilia 0.8-1 mm ..... *Eragrostis amabilis*
            - 9'. Palea keels with inconspicuous cilia, cilia 0.1-0.2 mm ..... *Eragrostis articulata*
        - 6'. Diaspore borne below the glumes.
          10. Spikelets not in pairs, pedicellate (falling separately at ripening); upper anthecium coriaceous to cartilaginous, never hyaline; glumes membranous, subcoriaceous or cartaceous.
            11. Spikelets surrounded at base by involucre bristles; panicle spiciform.
              12. Bristles fused in spiny involucre ..... *Cenchrus echinatus*
              - 12'. Bristles not fused in spiny involucre.
                13. Involucre bristles in rachis deciduous after spikelets mature ..... *Cenchrus purpureus*
                - 13'. Involucre bristles in rachis persistent after spikelets mature.
                  14. Panicle adherent; 2-3 bristles per spikelet ..... *Setaria hassleri*
                  - 14'. Panicle non-adherent; 4-11 bristles per spikelet ..... *Setaria parviflora*
              - 11'. Spikelets without involucre bristles on base; panicle lax to contracted.
                15. Spikelets densely hairy ..... *Melinis repens*
                - 15'. Spikelets glabrous or sparsely hairy.
                  16. Second anthecium smooth, black at ripening ..... *Panicum exiguum*
                  - 16'. Second anthecium transversely wrinkled, pale brown at ripening ... *Megathyrsus maximus*

- 10'. Spikelets in pairs on each rachis node, one spikelet sessile or subsessile and the other pedicellate (both or only the sessile spikelet falling together with the rachis internode at ripening) or both pedicellate (falling individually at ripening); upper anthecium hyaline; glumes, at least the lower ones, stiffly coriaceous or cartaceous.
17. Spikelets sessile and pedicellate, awnless.
18. Internodes of rachis filiform; glumes and callus of spikelets with long white trichomes ..... *Imperata brasiliensis*
- 18'. Internodes of rachis crateriform; glumes and callus of spikelets glabrous.
19. Spikelets sessile, oblong with lower glume smooth ..... *Mnesithea aurita*
- 19'. Spikelets sessile, orbicular with lower glume transversely wrinkled ..... *Mnesithea granularis*
- 17'. Spikelets sessile and/or pedicellate awned.
20. One flower branch per spatheola ..... *Schizachyrium condensatum*
- 20'. Two or more flower branches per spathe.
21. Panicle with central axis elongated and persistent after ripening of spikelets.
22. Spikelets awnless; plants with glabrous nodes; lanceolate leaf blades; cultivated plant ....  
..... *Saccharum officinarum*
- 22'. Spikelets awned; plants with hairy nodes; leaf laminae linear; native plant .....  
..... *Saccharum villosum*
- 21'. Panicle with central axis reduced and non-persistent after ripening of spikelets
23. Pedicellate spikelets rudimentary; sessile spikelets awnless ..... *Andropogon gayanus*
- 23'. Pedicellate spikelets developed; sessile spikelets awned ..... *Hyparrhenia rufa*
- 3'. Panicle with unilateral branches.
24. Diaspore borne above glumes.
25. Inflorescence with alternate branches ..... *Leptochloa virgata*
- 25'. Inflorescence with digitate or verticillate branches.
26. Spikelets multi-flowered ..... *Eleusine indica*
- 26'. Spikelets 1-flowered, with 2-3 sterile apical anthea or internode of the rachila as vestige of the second anthecium.
27. Plants caespitose ..... *Chloris elata*
- 27'. Plants stoloniferous or stoloniferous-rhizomatose.
28. Prefoliation conduplicate; ligule with line of long trichomes that stand out laterally .....  
..... *Cynodon dactylon*
- 28'. Prefoliation convolute; ligule with line of long trichomes that do not stand out laterally ..  
..... *Cynodon nlemfuensis*
- 24'. Diaspore borne below glumes.
29. Lower glume absent or reduced (up to 0.7 mm long.).
30. Back of upper glume and lemma adaxial to rachis.
31. Lemma with well-developed hyaline margins fully covering the palea.
32. Plants caespitose, erect ..... *Digitaria insularis*
- 32'. Plants decumbent or stoloniferous.
33. Rachis not conspicuously winged, membranous expansions narrower than central part of rachis ..... *Digitaria aequiglumis*
- 33'. Rachis conspicuously winged, membranous expansions wider than or equal to central part of rachis.
34. Spikelets in pairs, pedicellate spikelet hairy, subsessile spikelet glabrous or sparsely hairy ..... *Digitaria bicornis*
- 34'. Spikelets usually in groups of three, glabrous ..... *Digitaria fuscescens*
- 31'. Lemma without developed coiled margins, partially covering the palea.
35. Plants with horizontal aboveground rhizomes ..... *Paspalum notatum*
- 35'. Plants without aboveground rhizomes.
36. Spikelets obtuse ..... *Paspalum paniculatum*
- 36'. Spikelets subacute to acute or acuminate.
37. Inflorescence with 2 branches ..... *Paspalum conjugatum*
- 37'. Inflorescence with 3-20 branches.
38. Lower lemma transversally plicate; ligule 0.6-2.5 mm ..... *Paspalum plicatulum*
- 38'. Lower lemma not plicate; ligule 3.5-7.5 mm ..... *Paspalum urvillei*
- 30'. Back of upper glume and of lemma abaxial to rachis.
39. Prefoliation convolute; spikelets 2.2-2.8 mm ..... *Axonopus compressus*
- 39'. Prefoliation conduplicate; spikelets 1.6-1.8 mm ..... *Axonopus fissifolius*

- 29'. Lower glume always present and developed.
40. Upper glume and lower lemma with stiff trichomes on the nerves ..... *Echinochloa colona*
- 40'. Upper glume and lower lemma without stiff trichomes on the nerves.
41. Lower glume awned; awns 5-11 cm ..... *Oplismenus hirtellus*
- 41'. Lower glume awnless.
42. Lower glume 3/4 length of spikelet ..... *Urochloa humidicola*
- 42'. Lower glume 1/2 length of spikelet or smaller.
43. Plants 50-80 cm tall; leaf sheaths glabrous or with ciliate margins ..... *Urochloa decumbens*
- 43'. Plants 1-2 m tall; leaf sheaths hairy.
44. Rachis 0.3-0.4 mm wide ..... *Urochloa ruziziensis*
- 44'. Rachis 0.5-0.8 mm wide ..... *Urochloa brizantha*

**Table 2.** List of species at Fazenda Nova Esperança ranch, Mato Grosso do Sul, Brazil; data on origin, life cycle, forage potential and common names.

| SUBFAMILY/SPECIES                                                | ORIGIN                  | LIFE CYCLE          | FORAGE POTENTIAL | COMMON NAMES                      |
|------------------------------------------------------------------|-------------------------|---------------------|------------------|-----------------------------------|
| SUBFAMILY BAMBUOIDEAE                                            |                         |                     |                  |                                   |
| <i>Chusquea sellowii</i> Ruprecht                                | native                  | pluriannual         | high             | cará                              |
| <i>Olyra latifolia</i> L.                                        | native                  | perennial           | high             | taquari                           |
| SUBFAMILY CHLORIDOIDEAE                                          |                         |                     |                  |                                   |
| <i>Chloris elata</i> Desv.                                       | native                  | annual              | very low         | -                                 |
| <i>Cynodon dactylon</i> (L.) Pers.                               | Asia, Africa, Europe    | perennial           | medium           | grama-seda                        |
| <i>Cynodon nlemfuensis</i> Vanderryst                            | Africa                  | perennial           | medium           | -                                 |
| <i>Eleusine indica</i> (L.) Gaertn.                              | Asia, Africa            | annual              | null             | capim-pé-de-galinha               |
| <i>Eragrostis articulata</i> (Schrank) Nees                      | native                  | annual              | low              | -                                 |
| <i>Eragrostis amabilis</i> (L.) Wight & Arn.                     | native                  | annual              | -                | -                                 |
| <i>Leptochloa virgata</i> (L.) P. Beauv.                         | native                  | perennial           | medium           | -                                 |
| <i>Melinis repens</i> (Willd.) Zizka                             | Africa                  | annual              | low              | capim-favorito                    |
| SUBFAMILY EHRHARTOIDEAE                                          |                         |                     |                  |                                   |
| <i>Luziola bahiensis</i> (Steud.) Hitchc.                        | native                  | perennial           | low              | -                                 |
| SUBFAMILY PANICOIDEAE                                            |                         |                     |                  |                                   |
| <i>Andropogon gayanus</i> Kunth                                  | Africa                  | perennial           | medium           | -                                 |
| <i>Axonopus compressus</i> (Sw.) P. Beauv.                       | native                  | perennial           | low              | grama-tapete                      |
| <i>Axonopus fissifolius</i> (Raddi) Kuhlm.                       | native                  | perennial           | medium           | grama-tapete                      |
| <i>Cenchrus echinatus</i> L.                                     | native                  | annual              | low              | carrapicho                        |
| <i>Cenchrus purpureus</i> (Schumach.) Morrone                    | Africa                  | perennial           | high             | capim-elefante                    |
| <i>Digitaria aequiglumis</i> (Hack. & Arechav.) Parodi           | native                  | annual              | low              | -                                 |
| <i>Digitaria bicornis</i> (Lam.) Roem. & Schult.                 | native                  | annual              | low              | capim-de-capoeira                 |
| <i>Digitaria fuscescens</i> (J. Presl) Herard                    | Asia                    | perennial           | high             | taquarizano justa-conta           |
| <i>Digitaria insularis</i> (L.) Fedde                            | native                  | perennial           | null             | capim-armagoso                    |
| <i>Echinochloa colona</i> (L.) Link                              | Asia, Europe            | annual              | low              | -                                 |
| <i>Hyparrhenia rufa</i> (Nees) Stapf                             | Africa                  | perennial           | -                | capim-jaraguá                     |
| <i>Imperata brasiliensis</i> Trin.                               | native                  | perennial           | low              | capim-sapé                        |
| <i>Megathyrsus maximus</i> (Jacq.) B. K. Simon & S. W. L. Jacobs | Africa                  | perennial           | high             | capim-colônia                     |
| <i>Mnesithea aurita</i> (Steud.) de Koning & Sosef               | native                  | perennial           | -                | -                                 |
| <i>Mnesithea granularis</i> (L.) de Koning & Sosef               | Asia, Africa            | annual              | low              | -                                 |
| <i>Oplismenus hirtellus</i> (L.) P. Beauv.                       | native                  | perennial           | low              | -                                 |
| <i>Panicum exiguum</i> Mez                                       | native                  | annual              | low              | capim-lanudo                      |
| <i>Paspalum conjugatum</i> P.J. Bergius                          | native                  | perennial           | high             | capim-bananal                     |
| <i>Paspalum notatum</i> Flügge                                   | native                  | perennial           | high             | grama-batatais, capim-mato-grosso |
| <i>Paspalum paniculatum</i> L.                                   | native                  | perennial           | high             | -                                 |
| <i>Paspalum plicatulum</i> Michx.                                | native                  | perennial           | high             | macega, macega-branca             |
| <i>Paspalum urvillei</i> Steud.                                  | native                  | perennial           | high             | -                                 |
| <i>Saccharum officinarum</i> L.                                  | Asia                    | perennial           | high             | cana-de-açúcar                    |
| <i>Saccharum villosum</i> Steud.                                 | native                  | perennial           | -                | -                                 |
| <i>Schizachyrium condensatum</i> (Kunth) Nees                    | native                  | perennial           | very low         | rabo-de-burro                     |
| <i>Setaria hassleri</i> Hack.                                    | native                  | perennial           | medium           | -                                 |
| <i>Setaria parviflora</i> (Poir.) Kerguelen                      | native                  | annual or perennial | medium           | sugarana                          |
| <i>Sporobolus indicus</i> (L.) R. Br.                            | native                  | perennial           | medium           | -                                 |
| <i>Urochloa brizantha</i> (Hochst. ex A. Rich.) Webster          | Africa                  | perennial           | high             | braquiário, brizantão             |
| <i>Urochloa decumbens</i> (Stapf.) R.D. Webster                  | Africa                  | perennial           | high             | braquiária                        |
| <i>Urochloa humidicola</i> (Rendle) Morrone & Zuloaga            | Africa                  | perennial           | high             | humidicola                        |
| <i>Urochloa ruziziensis</i> (R. Germ. & C.M. Evrard) Crins       | Africa                  | perennial           | high             | braquiária, braquiária-peluda     |
| <i>Zea mays</i> L.                                               | Mexico, Central America | annual              | high             | milho                             |
| SUBFAMILY POOIDEAE                                               |                         |                     |                  |                                   |
| <i>Avena strigosa</i> Schureb                                    | Europe                  | annual              | high             | aveia-preta                       |

According to Viana & Filgueiras (2008), *Axonopus compressus*, *A. fissifolius*, *Mnesithea aurita*, *Digitaria insularis*, *Eragrostis articulata*, *Panicum exiguum*, *Paspalum notatum*, *P. paniculatum*, *Saccharum villosum* and *Setaria parviflora* are confirmed for the Cerrado domain. Although we found no new record for the state of Mato Grosso do Sul, this is the first record of *Setaria hassleri* in over 35 years.

In the study area, areas of Cerrado *s.s.* were replaced by cultivated pastures of *Urochloa brizantha* and *U. decumbens*, which became dominant. Nowadays, both species are invasive in other vegetation types, including forests. Within sown pastures of *Urochloa* we observed populations of *Paspalum notatum*, a native species also with a good protein content and equally sought by cattle. Most local species of *Paspalum* have good forage value (Allem & Valls 1987) and are well grazed by cows and horses. Nearly half of the species have good forage potential (41.5%) and 19.5% moderate potential, while the remainder (39%) have low, very low or no value (Table 2).

*Setaria parviflora*, which adapts to different conditions of soil and climate, was common in all areas sampled (Table 1). The areas with highest species richness were sown pastures (22 species) and ruderal areas (20 species). Species considered ruderal such as *Sporobolus indicus*, *Melinis repens* and *Digitaria insularis* are abundant in the study area, which suggests an advanced degree of human alteration. The last species is abundant in disturbed areas, mainly because cattle do not graze it (Allem & Valls 1987). The abundance of these species in many study areas suggests that these areas are highly altered.

*Saccharum officinarum* (sugarcane), *Zea mays* (corn), *Cenchrus purpureus* (elephant grass) and *Avena strigosa* (black oats) are grasses used as fodder and grown on a small scale on the ranch. Sugarcane is widely used as forage because of its tolerance to long dry periods and its high potential for production of dry matter and carbohydrates (Ferreira *et al.* 2002). Corn and oats are grown for grain (Nakagawa *et al.* 1994). All three species were observed escaped from cultivation in disturbed ground or near buildings. *Zea mays* was also found as a weed in the oat crop.

Typically umbrophilous grasses such as *Olyra latifolia*, *Oplismenus hirtellus* and *Leptochloa virgata* were found on the edges and inside Cerrado woodland and forest. The last species is also abundant in highly disturbed habitats such as roadsides and farm tracks.

In areas with considerable moisture, such as the wet grasslands situated on lower ground, *Echinochloa colona* is quite common. This grass forms dense rounded bunches, which allows it to establish in degraded areas, and confers an advantage in terms of soil cover over other grasses. Also in wet grasslands we found *Luziola bahiensis* and *Imperata brasiliensis*, the latter rapidly invading disturbed areas on the ranch, due to its strong rhizomes (Allem & Valls 1987) that allow it to propagate in and occupy these areas.

Our results showed that among the forage species found in the study area, the species of *Urochloa* (exotic) and *Paspalum* (native) were most prominent.

Besides clearing, the major cause of environmental change at Fazenda Nova Esperança was the introduction of *Urochloa brizantha* and *U. decumbens*, which became potential weeds, since they were found in all the vegetation types studied. The high number and abundance of ruderal grasses indicate that the areas evaluated are highly altered, and these species pose a serious threat to native vegetation.

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