



## Identification of descriptors for morphological characterization of vegetative tillers of native grass *Mesosetum chaseae* Luces

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### ABSTRACT

*Mesosetum chaseae* Luces is a tropical forage native to America, found in regions of the Pantanal with poor sandy soil. Germplasm accessions has been maintained in genebanks in the Nhumirim ranch of the Embrapa Pantanal. This study aimed to verify the existence or morphological descriptors of vegetative tillers that could differentiate the accessions of *M. chaseae*. Samples of this grass were collected from two populations (non-flooded open grassland and flooded open grassland). Ten seedlings were removed in each grassland and then, they were transplanted into pots. After the establishment, the following morphological characters were analyzed: tiller length; adult leaf length; adult leaf width; apical leaf length; apical leaf width; number of nodes per tiller; number of internodes per tiller; number of adult leaves; length of the second internode; number of trichomes of the apical leaf and adult leaf. Variance analysis and Tukey post-test was performed to test differences among accessions. Principal component analysis was used to discard descriptors that contributed least to the genetic divergence among accessions. Discriminant analysis was adopted to verify the percentage of correct classification using selected descriptors. There was a significant difference ( $P < 0.05$ ) for most of the descriptors evaluated, except for number of trichomes of the apical leaf and adult leaf. From 11 characters, five (tiller length, adult leaf length, adult leaf width, number of internodes per tiller and length of the second internode) were selected as being the most important for determining the morphological divergence among the populations.

**Key words:** Germplasm bank, phenotypical characterization, native forage resources

### INTRODUCTION

In the Pantanal, cattle ranching is based on native and cultivated pastures. Currently, there is a growing trend of the substitution of native pasture for exotic pasture, mainly of the genus *Urochloa*. Although this introduction is important for the sustainability of the livestock production, adequate criteria should be adopted (Santos *et al.*, 2011). Seeking alternatives species to genus *Urochloa*, potential native forage collections have been implanted in the Nhumirim farm, Nhecolândia sub-region, Pantanal. One of the potential native forage species for the sandy and poor areas is *Mesosetum chaseae*.

The expansion of the use of these native forage resources depends on the collection of germplasm and its characterization for the selection of cultivars with better forage characteristics. For this purpose, the Embrapa Pantanal has implemented a Germplasm Bank of native forage. Due to time consuming to the characterization, it is important to define minimum descriptors that actually show divergence between the accessions. These descriptors should compose the catalog of access descriptors with essential biological information for collection management and management (Ferreira *et al.*, 2005).

This study aimed to evaluate if there are morphological differences between the different accesses, as well as to define some



morphological descriptors of vegetative tillers that differentiate these populations (accessions).

## MATERIAL AND METHODS

The experiment was conducted in the greenhouse situated in the Embrapa Pantanal, Corumbá, MS. *M. chaseae* samples were collected from two populations (non-flooded open grassland and flooded open grassland) (Figure 1). Ten seedlings were removed in each grassland and then, they were transplanted into pots. After the establishment, five tillers were evaluated in each pot. The following morphological characters were analyzed: tiller length; adult leaf length; adult leaf width; apical leaf length; apical leaf width; number of nodes per tiller; number of internodes per tiller; number of adult leaves; length of the second internode; number of trichomes of the apical leaf and adult leaf.

The analysis of variance was used to verify if there was difference among the descriptors values of the accessions followed by Tukey post-test using PROC GLM of the SAS (1999). Principal component (CP) analysis using PROC PRINT of the SAS (1999) was applied to discard descriptors that contributed least to the genetic divergence among accessions. Discriminant analysis was adopted to verify the percentage of correct classification using selected descriptors using PROC DISCRIM of the SAS (1999). Based on the principle that the importance of the main components decreases from the first to the last, the variable with the lowest value of the eigenvector was considered of lesser importance to explain the genetic variability, therefore can be discarded. The criterion of discard of variables was based on Pearson correlation between the main component and each studied descriptor, maintaining the two main components.



A



B

Figure 1 -Non-flooded open grassland (A) and flooded open grassland (B) with dominance of *Mesosetum chaseae*, in Nhecolândia sub-region, Pantanal, MS.

## RESULTS AND DISCUSSION

There was a significant difference among the populations for most of the descriptors evaluated, showing a great morphological variability in the population of *M. chaseae*.

The two first major components accounted for 93% of the total variance. From 11 descriptors evaluated, the following were considered as the most discriminant: tiller length, adult leaf length, adult leaf width, number of internodes per tiller and length of the second internode. Table 1 shows the Pearson correlation coefficients of the first two main components with the main descriptors evaluated.



Table 1 - Pearson's correlation coefficients of the two major principal components (CP 1 and CP 2) of five selected descriptors

Descriptors	CP1	CP2
Tiller length	0.99**	0.05
Adult leaf length	0.07	0.84**
Adult leaf width	0.04	0.33
Number of internodes	0.54**	-0.68**
Internode second length	0.48**	0.25

\*\* ( $P < 0.05$ )

The CP 1 explained 82% of the variation and the descriptors significantly correlated ( $P < 0.05$ ) were tiller length (0.99), number of internodes (0.54) and length of the second internode (0.48). The CP1 expresses that these descriptors related to the development of the tiller discriminate the two accesses of *M. chaseae* evaluated.

On the other hand, CP2 explained 11% of the variation, showing that the descriptors with significant correlation were adult leaf length (0.88) and internode number (-0.68). Probably, the CP2 expresses that adult leaf length is inversely related to the length of the second internode, indicating that when the tiller is in development (increase in the number of internodes), the first leaf from the base (leaf evaluated) decreases the length.

Regarding the descriptors of the leaves, it was observed that the adult leaf was more discriminant than the apical leaf. Daher *et al.* (1997) observed different results with elephantgrass, in which the apical leaf showed to be more discriminant than the adult leaf, explained by the greater power of expression, related to the vegetative vigor.

In the discriminant analysis, it was used the selected descriptors in the principal component analysis. The linear discriminant functions were estimated for each population. From these functions, the classification percentages of each population were estimated. In population 1 (non-flooded open grassland), 37 of the 50 samples (74%) were classified correctly and at population 2 (flooded open-grassland), 27 of the 35 samples (77.1%) were classified correctly. These results can be considered promising, with an apparent error rate of 0.24.

## CONCLUSION

There was variation among the populations. From 11 descriptors evaluated, five were selected as being the most important for the morphological differentiation among the populations of *Mesosetum chaseae*. Based on these findings, it is aims to use similar methodology to analyze a greater number of descriptors covering all the accesses of the germplasm bank to define minimum descriptors to characterize each accession.

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