Morphoagronomical performance of three forage varieties of *Megathyrsus maximus* in the rainy period

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Some morphoagronomical indicators of *Megathyrsus maximus* cv. Likoni, *Megathyrsus maximus* cv. Mombaza and *Megathyrsus maximus* cv. Tanzaria were characterized in the rainy period. The study was conducted at the Experimental Center of Pastures and Forages "Miguel Sistach Naya" of the Institute of Animal Science from 2010 and during two consecutive years. A random block design with five replications was used and the treatments consisted of the three varieties. The indicators determined were: DM content of the whole plant, height (cm), leaf contents, DM yield and length and width of leaves. The varieties had similar performance in the majority of the indicators studied, except for the Mombaza variety that had greater leaf percentage during the second year (75.76 %, $P < 0.01$) and Tanzania that presented greater number of tillers/plant (7.51, $P < 0.001$). Results showed that the varieties studied exhibited good agroproductive performance under the edaphoclimatic conditions in which the study was carried out. It is recommended the utilization of these three varieties as forage for animal feeding. Also studies on biomass quality and its evaluation with the use of irrigation and fertilization are suggested, as well as the economical analysis of these practices.

Key words: *guinea grass, agronomical indicators, cutting, rainy period*

Pastures and forages are the main feeding source for cattle in Cuba. Presently, with the reorganization of livestock production, it is necessary to count on species and varieties that will allow increasing animal production with efficiency and productivity as well as minimum resources. Thus, it is imperative to have a feeding basis at our disposal facilitating the animals expressing their best production potential.

Plants of Megathyrsus genus are characterized by their great biomass production potential. *Megathyrsus maximus* cv. Mombaza and *Megathyrsus maximus* cv. Tanzania outstand in countries such as Brazil, in which have been centered a great part of the efforts and resources invested for the research (Castagnara *et al*. 2011 and Barbosa *et al*. 2012). Cuba introduced these varieties for obtaining species of higher productive potential that increase the possibilities of feeding self-sufficiency in the cattle units. Therefore, their evaluation is of great importance under our conditions. The objective of this paper was to characterize some morphoagronomical indicators of *Megathyrsus maximus* cv. Likoni, *Megathyrsus maximus* cv. Mombaza and *Megathyrsus maximus* cv. Tanzania in the rainy period.

Materials and Methods

Localization, climate and soil. The study was carried out at the Experimental Center of Pastures and Forages "Miguel Sistachs Naya" of the Institute of Animal Science. The soil of the experimental area is red ferrallitic (Hernández *et al*. 1999).

In figure 1 are shown the rainfall values, as well as monthly mean, minimum and maximum temperatures during the two experimental years. These data came from the Meteorological Station of the Institute of Animal Science.

Treatments and design. A random block design with five replications was used. Treatments consisted of the three varieties: *Megathyrsus maximus* cv. Likoni, *Megathyrsus maximus* cv. Mombaza and *Megathyrsus maximus* cv. Tanzania.

Procedure. The experiment was established in the rainy season of 2009. A conventional soil preparation was made and plots were maintained clean until their establishment. Plots of 4.9 x 7 m were sown at a 70 cm sowing distance between rows. Cutting height was of 10 cm regarding soil surface. The study was developed in the rainy period during two consecutive years from 2010. Cuttings were practiced every 60 d. A fertilization of maintenance was made with 75 kg/ha of N in the rainy period in the two years of study.

Indicators measured. The following indicators were taken in each cutting: DM contents of the whole plant, height (cm), morphological composition, DM yield and length and width of leaves. In the second year of study the number of tillers/plant and number of plants per square meter were also measured. Data were transformed according to $\sqrt{X}$. Plant height was determined with a graduated rule, from soil level to the point where the flag leaf bends in five plants taken at random per replicate.

For determining yields and their components, complete plot harvesting was realized. Later, 200 g of the sample were weighed; leaves were separated from the stems and weighed separately for determining leaf and stem yields, as well as their proportion. DM percentage was determined by an air recirculation oven for 72 h at 60º C, according to the methodology of Herrera (2006).

Statistical analysis. A variance analysis was made

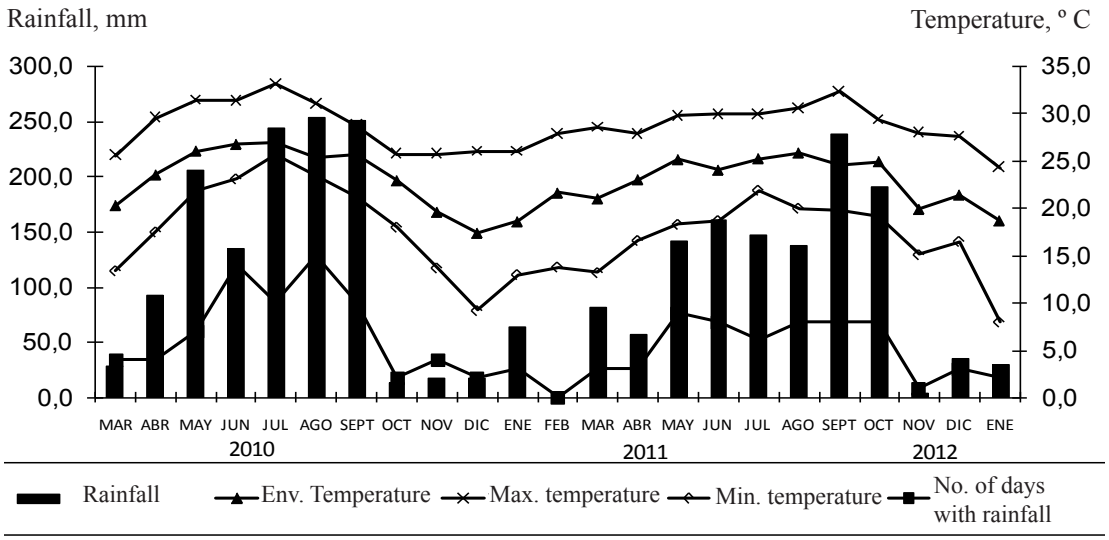

Figure 1. Performance of rainfall and temperatures during the years of study

according to SPSS, version 5.0 (Visauta 1998) and Duncan's (1955) multiple range test was applied for mean comparison in the necessary cases.

Results and Discussion

Results from table 1 show the performance of the agronomical indicators studied in the rainy period. Those corresponding to the dry period will be presented in another paper for facilitating the presentation and discussion of results. DM yield did not show differences between varieties in the rainy period throughout the two years of the study. Mombaza yields in the rainy period coincide with those found by García *et al*. (2008) in this variety at the same regrowth age, without the use of irrigation or fertilization. Sosa *et al*. (2008) found lower yields of these varieties than those of this study in the rainy period that could be due to the differences regarding the type of soil and the performance of the climatic factors. However, Herling *et al*. (200) reported summer productions of 7 to 24 t of DM ha^{-1} and of 0.8 to 7 t of DM ha^{-1} in winter for Tanzania and Mombaza, respectively. Cerdas and Vallejos (2011) and Castagnara *et al*. (2011) found linear response of the cultivars Tanzania and Mombaza to nitrogen fertilization. Therefore, the evaluation of the Megathyrsus varieties is suggested with the use of fertilizers allowing the expression of their productive potential.

DM percentage of the whole plant (WP) in the first year did not show differences between varieties either. However, in the second, the variety Mombaza had the highest value ($P < 0.001$). The percentage of leaves in the first year was higher in the varieties Tanzania and Mombaza ($P < 0.001$). The opposite occurred with the stems, but during the second year Mombaza showed greater percentage of leaves and lower of stems than Likoni and Tanzania. Animals mainly consume the leaf fraction, provided there is an adequate availability (Gomide *et al*. 2001). Results from this study suggest that Mombaza presents more favorable characteristics for its use in cattle feeding, although Tanzania and Likoni also had high leaf percentages. In addition, this indicator has its influence on biomass production, since it is precisely in the leaves where the plant synthesizes all the necessary compounds for its growth and development (Taiz and Zeiger 2010). In spite of these differences in

Table 1. Agronomical indicators of the Megathyrsus varieties in the rainy period

Treatment	DM WP, %	DM yield, t/ha	Leaf, %	Stem, %
		First year		
Likoni	23.08	8.16	64.45[a]	35.55[b]
Tanzania	21.78	7.42	76.01[b]	23.99[a]
Mombaza	22.36	7.58	75.47[b]	24.53[a]
SE ±	0.35	0.28	1.09***	1.09***
		Second year		
Likoni	25.88[b]	9.98	73.62[a]	26.20[a]
Tanzania	24.34[a]	9.26	73.58[a]	25.97[a]
Mombaza	27.02[c]	10.17	75.76[b]	24.44[b]
SE ±	0.22***	0.62	0.36**	0.24***

[abc]Values with different letters per column differ at $P < 0.05$ (Duncan 1955)
**$P < 0.01$ ***$P < 0.001$

this indicator, DM yields showed no differences between varieties. The influence of other intrinsic factors of the plant could account for this.

Height, length and width of the leaves did not show significant differences between varieties during the two experimental years (table 2). Values for height were lower than those obtained by Cruz *et al*. (2012) in Tanzania and Mombaza, without the application of irrigation or fertilizers and under other edaphoclimatic conditions.

Table 2. Morphological indicators of the Megathyrsus varieties in the rainy period

Treatment	Height, cm	Leaf length, cm	Leaf width, cm	Number of tillers/plant[1]	Number of plants/m^2 [1]
			First year		
Likoni	60.23	56.20	1.81	-	-
Tanzania	56.89	61.17	1.84	-	-
Mombaza	55.33	59.60	1.68	-	-
SE ±	4.78	3.67	0.07	-	-
			Second year		
Likoni	60.53	50.73	1.53	7.01(49.14)[a]	1.82 (3.31)
Tanzania	64.97	53.42	1.61	7.51(56.41)[b]	1.78 (3.17)
Mombaza	61.87	43.40	1.61	6.90(47.63)[a]	1.83 (3.35)
SE ±	1.41	2.03	0.06	0.04***	0.02

[1]Data transformed according to $\sqrt{X}$ ( ) True values

[ab]Values with different letters per column differ at $P < 0.05$ (Duncan 1955)

***$P < 0.001$

The number of tillers per plant was higher in the variety Tanzania than in Mombaza and Likoni. Similar results were obtained by Carvalho *et al*. (2006) who found greater number of tillers in the cultivar Tanzania than in Mombaza. This indicator had adequate values in the three cultivars what is favorable for plant perenniality, since tillering is the most important characteristic for establishing grass productivity (Da Silveira *et al*. 2010 and Piotto 2012) and constitutes a survival strategy in defoliation situations, either by cutting or by grazing (Sbrissia *et al*. 2008). Corsi and Nascimento J. (1994) referred that the increase in the number of tillers is the main component of the DM production in the vegetative stage, since in the reproductive stage, when the appearance of new tillers stops, the increase in plant weight occurs by the growth of the existing tillers. In this case, the variety Tanzania increases the number of tillers, probably as a strategy for increasing its perenniality in time.

The number of plants per square meter did not show differences between cultivars, though it can be assumed that in the rainy period the populations of these three varieties are similar. It can be concluded that the studied varieties showed good agroproductive performance under the edaphoclimatic conditions in which this study was carried out. They had a similar performance in the majority of the indicators studied, except for the Mombaza variety which had greater percentage of leaves and Tanzania exhibited greater tillering under the conditions of this study. It is recommended the utilization of these three varieties as forage for cattle feeding, as well as their evaluation when irrigation and fertilizers are used. Also, it is suggested realizing the economical evaluation of these practices, as well as a study on biomass quality.

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Received: February 20, 2014