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Agronomical Evaluation of Four Varieties of Pastures

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ABSTRACT

A five-year study was carried out in the municipality of Jimaguayú, province of Camagüey, Cuba, to evaluate the agro productive performance of four grassy pastures (*Cynodon dactylon* cv. Tifton 85, *Brachiaria decumbens* cv. Basilisk, *Brachiaria brizantha* cv. Marandú, and *Brachiaria hibrido* cv. Mulato) without soil irrigation or fertilization. An experimental randomized block design with three replicas was used in 20 m^2 areas of brown soil without typical carbonates. Agamic propagation seeds were sown at a distance of 0.70 m between furrows while gamic propagation seeds were sown at a distance of 0.50 m. Dry matter yielding was determined for every cutting period (every 60 days during the rainy season and every 90 days during the dry season). Plant height was measured from the stem base to the highest foliage. A volume of 200 g of pastures was sampled twice a year to determine their bromatological composition according to AOAC (1997). *Brachiaria brizantha* cv. Marandú showed the best agro productive performance, with yieldings reaching 6.20 t/ha and 14.90 t/ha of dry matter during the dry and rainy seasons, respectively; and 12.26 % of dry protein.

Key Words: *grassy pastures, agroproductive performance, yield*

INTRODUCTION

Forage production is the basis for ruminant nutrition in most tropical areas (80-90 % of nutrients from pastures) (Pezo *et al.*, 1992). It occurs because pastures and forages are the most economical solution to feed these species, and because these sources do not threaten man´s sources directly, as pastures and forages are cultivated in low quality lands, not suitable for other crops.

Recently, most tropical Latin-American countries have undergone 50 % depletion of all pasture lands (Blanco, 1991; Botero, 1997, ICA, 2000). Consequently, a remarkable decrease in production and economic indicators has been observed.

Considering the heterogeneity of livestock raising worldwide, there is a need to create a broad range of species and varieties of pastures, in order to achieve high input conversion and long-life improved pasture land to compensate for investments in sowing and further maintenance. Scientific institutions for rural extension and technological transference are working in several regions of the world on breeding, introduction and evaluation of forage germplasm under several conditions where livestock is maintained, promising results in prairie improvements (Hutton, 1978; Harrison, 1986).

The aim of this paper is to evaluate the agro productive behavior of four graminaceae pretense in the municipality of Jimaguayú.

MATERIALS AND METHODS

The work lasted five years (2003-2007) at the Experimental Station of Pastures and Forages of Camaguey, located in the most important cattle raising region in the country (EEPFIH, 1987), at 21° 17' 30" northern latitude and 77° 47' 30" western longitude, altitude was 118 meters above the sea level. Species like *Cynodon dactylon* cv. Tifton 85, *Brachiaria decumbens* cv. Basilisk, *Brachiaria brizantha* cv. Marandú, y *Brachiaria híbrido* cv. Mulato, on brown soil without the common carbonate, were studied (Table 1).

An experimental design of randomized blocks was used with three replicas in 4 x 5 m lots. The soil was prepared with ploughs, a cross and two blades. Sowing was made in September 2002, at 0.70 and 0.50 m between furrows for agamic and gamic propagation plants, respectively. No irrigation or fertilization was applied. Cuts were done every 60 days in the rainy season, and 90 days in the dry season.

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Each cut was used to determine dry matter yielding. The lot was completely harvested, except the 50 cm of the edge, which were discarded. Height was measured in centimeter, from the stem base to the highest point of foliage. Samples of 200 g were taken twice a year for bromatological composition according to AOAC (1997).

The statistical analysis was performed with SPSS, version 15 for Windows (2006). The differences among the means were calculated using Duncan test (1955) for $P < 0.05$.

RESULTS AND DISCUSSION

Table 2 shows the results in the dry season, when the highest yielding values of dry matter (DM) are achieved by *Bracharia* species with no differences among them. *Brachiaria brizantha* cv. Marandú remarkably outstages ($P \leq 0.05$) *Cynodon dactylon* cv. Tifton 85, which has no differences with cultivars Basilisk and Mulato. Similar results were achieved by Olivera and Machado (2004) when these species were compared on Camisole soil in the province of Matanzas. Other similar reports were made by Ramírez and Cepero (2006) on alithic soil in Villa Clara; and Argel *et al.*, (2006) and Rincon and Ligarreto (2008), on Oxisols from Costarrica and Colombia, respectively.

In terms of height (Table 2) *Brachiaria brizantha*, *Brachiaria decumbens* and *Cynodon dactylon* show no differences among themselves*;* however*, Brachiaria hibrido* is significantly outstaged ($P \leq 0.05$) by them, which corroborate reports by Hernández *et al.* (2006), when comparing these species in the humid tropic of Costa Rica. The results are different from Guiot (2005b), with better performance of *Brachemia hibrido* over *Bracharia brizantha*, *Brachiaria decumbens* and *Cynodon dactylon* evaluated in arid Mexican soils. This may be due to the use of more inputs like irrigation and fertilizers.

The correlation between height and yielding (Table 2) is significant for all the species, and higher in *Brachiaria brizantha* cv. Marandú, *Brachiaria decumbens* cv. Basilisk and *Cynodon dactylon* cv. Tifton 85, followed by *Brachiaria hibrido* cv. Mulato, where the correlation was lower in spite of its height. These results match those achieved by Loch and Miles (2002), and Miles *et al.* (2006) in humid Colombian tropical areas.

Table 3 shows the behavior of all these indicators in the rainy season. *Bracharias* are still the species with the highest behavior of MS. Though no differences are observed between them, they significantly outstaged *Cynodon dactylon* ($P \leq 0.05$). These results match reports by Argel *et al.* (2006) when the species were evaluated in spring on brown soils in Costa Rica and Mexico. CIAT (2007) research in arid Colombian area, and Olivera *et al.* (2006) on ferrous and brown soils in Matanzas and Villa Clara, Cuba, had similar results.

Table 3 shows different height behavior in the dry season, as *Bracharia Brizantha* cv Marandú and *Bracharia decumbens* cv Basilisk had no differences among them. However, cultivar Marandú significantly outstages ($P \leq 0.05$) Mulato and *Cynodon dactylon* cv. Tifton 85. Moreover, *Bracharia decumbens* cv. Basilisk had no differences with any of the *Bracharia* species, but significantly outstaged ($P \leq 0.05$) *Cynodon dactylon* cv. Tifton 85, a species that is also outstaged ($P \leq 0.05$) by *Brachiaria hibrido* cv. Mulato. Similar results were achieved by CIAT researchers (2004, 2005, 2006) in pasture lands in Brazil, Costa Rica and Colombia. On the contrary, Guiot *et al.* (2005a) found superiority of *Brachiaria hibrido* to the other species in the rainy season, which may be assumed as more irrigation and fertilizers, for it is a genetically modified species.

The correlation between height and yielding (Table 3) was very similar in this period to the rainy season results, matching Loch *et al.* (2002) and Miles *et al.* (2006) in humid Colombian tropical areas, and by IDIAP researchers in different areas of Panama during the spring.

Significant differences were found among the species for all the elements, in terms of bromatological composition (Table 4). *Brachiaria brizantha* cv. Marandú was prominent due to the great amount of gross protein (PB), differing ($P \leq 0.05$) from all the rest, followed by *Brachiaria decumbens cv*. Basilisk, *Brachiaria hibrido cv*. Mulato and *Cynodon dactylon cv*. Tifton 85, which had no differences among them.

Low phosphorous content may point to the need of providing some sort of supplement to animals who feed from those pastures (Youssef, 1988). The results are similar to Caceres *et al.* (2002), Herrera (2003) and Sanchez *et al.* (2007).

CONCLUSIONS

All species showed a positive behavior, especially *Brachiaria brizantha cv*. Marandú for MS yieldings and PB percents.

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Table 1. Chemical characteristics of the soil

Elements	($cmol_c/kg^{-1}$)
Na	0.19
K	0.28
Ca	8.18
Mg	2.15
P	8.01
MO	3.7
pH	6.12

Table 2. Behavior of indicators evaluated for the species in the dry season

Species	Indicators		
	MS yielding (t/ha)	Height (m)	MS Height-yielding correlation.
Cynodon dactylon cv. Tifton 85	3.20^{b}	1.53^{a}	0.705^{**}
Brachiaria decumbens cv. Basilisk	4.70^{ab}	1.63^{a}	0.811^{**}
Brachiaria brizantha cv. Marandú	6.20^{a}	1.65^{a}	0.940^{**}
Brachiaria hibrido cv. Mulato	5.00^{ab}	0.79^{b}	0.674^{*}
ES±	1.34	0.12	-

Values with different letters in the same column differ from $P \leq 0.05$ (Duncan, 1955)

Table 3. Behavior of indicators evaluated for the species in the rainy season

Species	Indicators		
	MS yielding (t/ha)	Height (m)	MS Height-yielding correlation
Cynodon dactylon cv. Tifton 85	10.10^{b}	0.91^{c}	0.697^{**}
Brachiaria decumbens cv. Basilisk	16.50^{a}	1.82^{ab}	0.801^{**}
Brachiaria brizantha cv. Marandú	14.90^{a}	1.91^{a}	0.932^{**}
Brachiaria hibrido cv. Mulato	15.90^{a}	1.63^{b}	0.612^{*}
ES±	2.50	0.12	-

Values with different letters in the same column differ from $P \leq 0.05$ (Duncan, 1955)

Table 4. Bromatological composition of the species during agro productive evaluation

Species	PB (%)	P (%)	K (%)	Ca (%)	Mg (%)
Cynodon dactylon cv. Tifton 85	10.54^{b}	0.18^{a}	1.16^{c}	0.88^{a}	0.14^{c}
Brachiaria decumbens cv. Basilisk	10.26^{b}	0.18^{a}	1.51^{b}	0.70^{c}	0.20^{b}
Brachiaria brizantha cv. Marandú	12.26^{a}	0.15^{b}	1.49^{b}	0.80^{b}	0.12^{c}
Brachiaria hibrido cv. Mulato	9.78^{b}	0.20^{a}	1.74^{a}	0.56^{d}	0.23^{a}
ES±	0.92	0.88	0.97	0.97	0.84

Values with different letters in the same column differ from $P \leq 0.05$ (Duncan, 1955)