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## Persistence and yield of *Brachiaria* cultivars on an Ultisol in Puerto Rico

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### ABSTRACT

Grass cultivars Mulato (a hybrid; *Brachiaria brizantha* x *B. ruziziensis*), Marandú (*B. brizantha*) and Toledo (*B. brizantha*) are the most important tropical grass releases in Latin America for grazing. However, information on yield and persistence of these cultivars in Puerto Rico is limited. This study assessed yield, nutritive value and mob grazing effects of Mulato, Marandú and Toledo. The study was conducted at the Corozal substation of the Agricultural Experiment Station of the University of Puerto Rico. Soil type was of the Corozal series (fine clay, mixed, isohypetermic Aquic Haplohumults). Established stands of Mulato, Marandú and Toledo were stocked every 35 d with yearling steers (mob grazed for 1 to 2 d to a 15-cm height). Prior to grazing, a 1 m<sup>2</sup> quadrant was clipped, weighed and dried to determine yield, and sub samples (500 g; four samples in the year) were ground to determine their chemical composition [crude protein (CP), neutral detergent fiber (NDF), and acid detergent fiber (ADF)]. All pastures were mob grazed for 15 grazing cycles to determine changes in yield over time. Mean yield of Mulato (1,207 kg/ha), Marandú (1,094 kg/ha) and Toledo (1,271 kg/ha) were different ( $P < 0.05$ ), but there were no differences in CP (6.8%). There was a cultivar effect ( $P < 0.05$ ) on NDF and ADF, with a lower NDF (64.6%) and ADF 33.6% for Mulato. There was a grazing cycle date effect on yield ( $P < 0.05$ ) consistent with rainfall patterns in the Corozal area. After 1.5 years of grazing it is evident that all three cultivars persisted, but that grazing management is needed (longer periods of regrowth) during the dry periods.

**Key words:** Grass cultivars, Yield, Persistence, Forage quality

### INTRODUCTION

In Latin America and the Caribbean there has been a major effort to develop new pasture technologies, to increase livestock for the extensive systems prevailing in the tropical lowlands. This multi-national and inter-institutional effort was initiated through the International Network for the Evaluation of Tropical Pastures (RIEPT, by its name in Spanish), which operated from 1976 to 1996 under CIAT leadership.

As an example, in Central America and Mexico, of all pasture cultivars released by CIAT the *Brachiaria* genus currently dominate the market (Holmann et al., 2005). Mello et al. (2005) found that over the last 25 years more than 70 m/ha in Brazil has been replaced by pastures from the *Brachiaria* and *Panicum* genera. These cultivated pastures represent on average 35% more forage production than the Amazonian native pastures. In Puerto Rico, *Brachiaria decumbens* cultivar Basilisk has been promoted as a potential forage for acid soils and humid areas, but with limited success. The new CIAT cultivar releases of the *Brachiaria* genus, Mulato (hybrid *B. brizantha* x *B. ruziziensis*), Toledo (*B. brizantha*), and Marandú (*B. brizantha*) represent possible alternatives to *Brachiaria decumbens* cultivar Basilisk. However, little information is

available on the yield performance, persistence and nutritive value of such new cultivar releases in Puerto Rico (Valencia et al., 2005).

The objective of the present study is to evaluate the three above mentioned new CIAT releases in relation to their potential use as grazing forages in Puerto Rico.

## MATERIALS AND METHODS

The experiment was conducted at the Corozal Agricultural Experiment Station during the period between 16 November 2004, and 31 January 2006. Soil type was of the Corozal series (fine clay, mixed, isohyperthermic, Aquic Haplohumults). Yearly rainfall precipitation for year 2004-2005 was 2,900 mm, unevenly distributed during the seasons.

A completely aleatorized block design with four replications and the Bonferroni mean Grouping Test was used for the statistical analysis of all data. Soil area was prepared by two plow passes followed by two disc harrowings. Total area for the experiment was 0.12 ha with four plots of 15.24 m x 3.2 m. Each plot was planted by broadcasting 4.0 kg/ha of seed from the three *Brachiaria* cultivars. Grass cultivars under evaluation were Mulato (hybrid *B. brizantha* x *B. ruziziensis*), Marandú (*B. brizantha*), and Toledo (*B. brizantha*).

After establishment, the plots were mob grazed with six growing beef steers (136-363 kg/animal) every 35 days in the short day season and every 28 days in the long day season. Each grazing period lasted for one to two days and plots were grazed to a height of 15 cm from the soil.

Prior to grazing, a 1-m<sup>2</sup> quadrant was clipped, weighed and dried to determine yield, and sub samples (500 g/four samples per year) were ground for chemical composition of CP, NDF and ADF. All pasture plots were grazed for 15 grazing cycles to determine changes in yield over time. Soil cover was estimated with a 1-m<sup>2</sup> quadrant divided in 25 equal squares as suggested by Toledo (1982).

The estimations on NDF and ADF were determined according to the procedures established by Van Soest et al., (1991); and CP according to the procedures of the AOAC (1990).

## RESULTS AND DISCUSSION

In relation to soil cover, although no significant ( $P<0.05$ ) differences were observed among the three cultivars, cultivar Mulato presented the highest coverage (85.6%) percentage eight months after the establishment. However, in terms of persistence the results showed that the three cultivars were similar.

The average dry matter yield (DMY) for all cultivars showed a grazing cycle date effect ( $P<0.05$ ) attributed to variations in the rainfall distribution in the Corozal area. Significantly less DMY was observed during the summer and autumn drought grazing periods.

Table 1 shows the average DMY of the three cultivars under evaluation after 15 grazing cycles. No significant ( $P<0.05$ ) differences in yield were observed between cultivars Mulato and Toledo but significant differences ( $P<0.05$ ) in DMY were obtained

between cultivars Toledo and Marandú. From this point of view cultivars Mulato and Toledo were more highly recommended forages for grazing.

Table 1: Average dry matter yield of three *Brachiaria* cultivars on mob grazing during the period between 16 November 2004 and 31 January 2006.

Cultivars	Yield <sup>*1</sup> kg/ha/grazing
Mulato	1,207 AB
Marandú	1,094 B
Toledo	1,271 A

<sup>\*1</sup>Means in the same column followed by different letters differ ( $P < 0.05$ ).

Table 2 shows the average Acid Detergent Fiber (ADF), Neutral Detergent Fiber (NDF) and Crude Protein (CP) content of the three evaluated cultivars. A significant ( $P < 0.05$ ) reduction in ADF was observed for cultivar Mulato in relation to that of cultivar Toledo, whereas NDF content of cultivar Mulato was significantly ( $P < 0.05$ ) lower than those of both Toledo and Marandú. These results are similar to those of Valencia et al. (2005), who found higher NDF values for cultivars Basilisk and Marandú in relation to those of cultivar Mulato. Valencia et al. (2005) also found that cultivar Mulato presented a significantly ( $P < 0.05$ ) faster ruminal degradation rate in relation to that of cultivars Basilisk and Marandú. The evidence of both studies suggests that a lower NDF content is expected in Mulato than in Basilisk, Marandú or Toledo.

Table 2: Average ADF, NDF and CP content of the three cultivars on four different grazing cycles of year 2004 to 2005.<sup>\*1</sup>

Cultivar	ADF %	NDF %	CP %
Mulato	33.60 <sup>*1</sup> B	64.63 B	6.86 A
Marandú	34.70 AB	67.15 A	6.81 A
Toledo	35.33 A	66.83 A	6.76 A

<sup>\*1</sup>Average from low grazing cycles per year.

<sup>\*2</sup>Means followed by different letters differ at the  $P < 0.05$  probability level.

## CONCLUSIONS

After 15 grazing cycles the DMY of cultivars Mulato and Toledo was very similar. A significantly ( $P < 0.05$ ) lower DMY was observed in cultivar Marandú than in cultivar Toledo. In terms of the NDF content cultivar Mulato was significantly ( $P < 0.05$ ) lower than that of the rest of the cultivars under evaluation.

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