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Agronomic evaluation of 324 intraspecific hybrids of *Brachiaria decumbens* in Brazil

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Introduction

Brachiaria decumbens cv. Basilisk is certainly the most planted pasture grass in the tropics owing to its adaptation to poor and acid soils, typical of the tropics, plus good animal performance. This cultivar was responsible for a radical change of scenario in central Brazil in the early 1970s and is the only cultivar available commercially. Efforts to breed this species have been recent, as the successful somatic chromosome duplication of sexually reproducing diploid plants of *B. decumbens* was accomplished only in 2009 (Simioni and Valle 2009). Subsequently, intraspecific crosses with natural apomictic tetraploid accessions were carried out. Breeding is needed since cv. Basilisk is susceptible to grassland spittlebugs, which limit its widespread use. A recurrent selection scheme has been devised to improve the species and the first progeny are now under evaluation. This paper reports the preliminary results of the agronomic evaluation of 324 intraspecific hybrids of *B. decumbens*.

Methods

Four hundred and fifty-seven intraspecific hybrids, obtained from crossing 3 sexual plants artificially tetraploidized by colchicine with the apomictic tetraploid cv. Basilisk, comprise the Embrapa Beef Cattle base population of *B. decumbens*. Of these, 324 hybrids were selected (mass selection) and vegetatively propagated to produce 10 cuttings each. These were transplanted to a field trial at Embrapa Beef Cattle, Campo Grande, MS, in an 18 x 18 lattice design, with 2 replications and 5 plants per plot at a spacing of 1.0 x 0.5 m. The commercial cv. Basilisk was used as a control. This paper reports the results of 2 cuts during the dry season of 2012 (July 6, mid-season, and October 2, end of dry season).

Agronomic evaluations were made for total dry matter (TDM), leaf dry matter (LDM), leaf percentage (%L), leaf:stem ratio (LSR) and regrowth rating (REG). Regrowth rating was a combined score from 0 (poor) to 6 (excellent) of plant density (percentage of tillers shooting) and speed of regrowth. Data were analyzed using the restricted maximum likelihood/best linear unbiased prediction procedure (REML/BLUP), implemented in the software SELEGEN REML/BLUP (Resende 2002).

Results and Discussion

The accuracy observed in the analysis of the 2 cuts varied from 17% to 74% for %L and TDM, respectively (Table 1), considered by Resende and Duarte (2007) as of medium to very high precision for the traits evaluated. This means that the results are trustworthy with the exception of %L (17%). The latter could mean that there is little variation in leaf content among the hybrids during the dry season, when plant growth is limited.

There were significant ($P<0.01$) differences between hybrids for TDM and LDM by the likelihood ratio test (Table 1), indicating genetic variability among the hybrids, thus allowing for gains through selection. For %L, LSR and REG, no significant difference was observed ($P>0.05$). The interaction genotype x cut was significant for the majority of parameters except for LSR and REG, thus complicating the ranking of hybrids by TDM, %L and LDM in the same season.

The seasonality of production of fodder plants is a reflection of the reduction in the availability of light, temperature and rainfall, that usually occurs in the winter in the central region of Brazil. Thus like most tropical forage species, *B. decumbens* also fails to develop well

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during this period of unfavorable environmental conditions. Valle et al. (2000), when evaluating interspecific hybrids of *Brachiaria*, obtained average production of TDM and LDM in the rainy season 4 times those in the dry season.

For most parameters evaluated, cv. Basilisk presented the highest overall means, except for LSR, highlighting the exceptional performance of this cultivar. Even when a selection pressure of 2.5% was applied (best 8) there were no hybrids better than cv. Basilisk, except for LSR and REG. These are preliminary results and this evaluation will continue for at least 7 cuts. As some cuts will occur during the rainy season, differences between hybrids might become more evident.

Table 1. Genetic variance ($\hat{\sigma}_g^2$), genotype x cut interaction variance ($\hat{\sigma}_{gc}^2$), heritability estimates based on progeny means (h^2_m), accuracy (Acgen) and BLUP mean values of *Brachiaria decumbens* hybrids for agronomic traits, evaluated in 2 cuts at Embrapa Beef Cattle, Campo Grande.

	TDM[1]	%L	LDM	LSR	REG
$\hat{\sigma}_g^2$	95197.01**	0.85	22136.57**	0.22	0.02
$\hat{\sigma}_{gc}^2$	17832.64**	16.55**	11967.91**	0.06	0.12
h^2_m	0.55	0.03	0.47	0.23	0.14
Acgen	74.2	17.3	68.6	48.0	37.4
Overall mean	1485.95	50.90	754.39	2.34	2.20
Basilisk mean	2117.69	50.87	1018.78	2.12	2.24
$Mean_{10\%}$	1924.85	51.19	938.84	2.83	2.30
$Mean_{5\%}$	1990.52	51.24	968.94	3.06	2.34
$Mean_{2.5\%}$	2050.75	51.31	1003.11	3.33	2.38

[1]TDM: Total dry matter; %L: Leaf dry matter percentage; LDM: Leaf dry matter; LSR: Leaf:stem ratio; REG: Regrowth (0 = poor to 6 = excellent); Overall mean: BLUP mean value of the 324 hybrids; $Mean_{10\%}$: BLUP mean value of the best hybrids considering a selection intensity of 10%; $Mean_{5\%}$: BLUP mean value of the best hybrids considering a selection intensity of 5%; $Mean_{2.5\%}$: BLUP mean value of the best hybrids considering a selection intensity of 2.5%.

Conclusion

No hybrids of *B. decumbens* performed better than cv. Basilisk during this dry season study, but there was genetic variability among the hybrids. The presence of hybrid x cut interactions indicates that evaluation in the rainy season is necessary to predict the genotypic value of hybrids with greater reliability for selection. Nutritive value determination as well as spittlebug resistance will also be included in the future to rank these hybrids for selection.

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