

# Breeding *Panicum maximum* in Brazil

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*Panicum maximum* is a widely used forage species occupying around 20 million hectares in Brazil. It is mainly used as a pasture in intensive grazing systems for cattle rearing and finishing. The main cultivars Tanzânia, Mombaça and Massai were released by Embrapa Beef Cattle after 1990. Due to the extent of the country and demand for new forage cultivars, a breeding program is underway under the coordination of Embrapa Beef Cattle. Breeding involves crosses between sexual and apomictic plants of the same ploidy levels. A breeding population was composed with 108 hybrids from the cross between sexual S10 and cv. Tanzania, 167 hybrids from the cross between sexual S10 and Mombaça and 45 from the cross between sexual S12 and cv. Tanzania in a total of 320 hybrids.

Hybrids were planted to the field as single plants with two replications in February 2009. Evaluation began on January 2010. Plants were harvest to 20 cm from the soil every 40 days in the rainy season and once in the dry season until February 2011 in a total of seven evaluations. Harvested forage was weighed in the field, separated into leaf, stem and dead material, dried and weighed again. Regrowth was visually estimated seven days after each harvest. The incidence of leaf spot *Bipolaris maydis* was visually evaluated prior to each harvest. In May-June 2011 and 2012, seed production was evaluated by collecting mature shattering seeds into a bag every two days, and then cutting the inflorescences when the seeds of the top one third of the inflorescences had already shattered. After detaching the remainder of the seeds from the panicles, pure seeds were separated in a seed blower. The variables leaf dry matter yield, leaf percentage, regrowth seven days after harvest, incidence of leaf spots caused by *Bipolaris maydis* and pure seed production were analysed using SAS and Computerized Genetic Selection via Linear Mixed Models, Selegen - REML/BLUP. The reproductive mode of each hybrid (apomixis or sexuality) was also determined by observing thirty embryo sacs per hybrid under contrast-interference phase microscopy.

The twenty best sexual and twenty best apomictic plants were selected. Mean values for the variables for all hybrids and for the apomictic and sexual selected plants are presented, as well as their range of variation. Mean apomictic and sexual plants presented 21% and 27% greater leaf dry matter yield, 10 and 12% better regrowth after harvests, and 25 and 50% less incidence of *B. maydis* than the mean for all hybrids. Mean leaf percentage, however, was maintained and were similar for all means (88.8%). Pure seed production of selected plants were 12% to 30% smaller than the mean for all hybrids, because of the negative relationship between seed and forage production.

The 20 best sexual plants selected were cloned and four to five clones of each plant were transplanted to the field on December 2011 at 1 m spacings so that each sexual plant was next to each one of the other 19 sexual plants. Sexual plants were wind-pollinated. Seeds were harvested from each sexual plant and germinated. Thirty hybrids of each one of the 20 sexual plants were planted to the field in a half-sib progeny test on December 2012 in a randomized block design with six replications and five hybrids/progenitor/block. Hybrids were evaluated for forage production as described above. Two forage evaluations have already been completed. The objectives are to improve the sexual population so as to improve hybrid performance in future crosses.

The 20 best apomictic plants selected were multiplied for seed and planted as regional trials in six states in Brazil. The objectives are to evaluate genotype x environment interaction and to select candidates for future cultivar release, which after evaluation under grazing of the selected ones may be released commercially. These two approaches, improvement of the sexual population and direct selection of improved hybrids is expected to have a large impact on the cattle production chain in Brazil in the near future.

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