



## Climate change impacts on *Panicum maximum* yield in Brazil

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The Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC) indicated an increase up to 4.8 °C in global temperature by 2100. In Brazil, analysis of scenarios derived from the PRECIS regional climate system model also suggests that there will be significant changes on rainfall, besides an increase on maximum and minimum temperature extremes. The projected forage production, under a range of climate scenarios, is important for the evaluation of the impacts of global climate changes over animal production systems in Brazil. The aim of this research was to evaluate the effect of regional climate trends, based on downscaled outputs of two general circulation climate models (PRECIS and ETA), on *Panicum maximum* cv. Tanzania ('Tanzania' guineagrass) production in Brazil. Forage production was estimated by an agrometeorological model, based on degree-days (DD), calculated with 14.3°C of base temperature, and corrected by the water deficit factor (ARM):  $DMAR = 10.76 * DD * ARM$ . The ARM factor was determined by the ratio between the actual soil water storage and the soil water holding capacity, obtained from the 5-day sequential climatological water balance considering three soils water capacities: 40, 60 and 100 mm. The model was developed and tested with data from four locations (São Carlos, SP; Piracicaba, SP; Juiz de Fora, MG e Sobral, CE). Climatic scenarios were created considering the IPCC gases emissions scenarios for low and high emissions of greenhouse gases. Data (temperature and precipitation) obtained from 285 weather stations in Brazil in the period of 1963 to 2009 was considered as current climate (base line) and future scenarios were determined from 2013 to 2040 (2025 scenario) and 2043 to 2070 (2055 scenario). Predicted baseline scenarios indicated that there are regional and seasonal variations on *Panicum maximum* production in Brazil. Productions were lower on the semiarid area (northeast of Brazil) and higher on the rainforest area (north of Brazil). Seasonal productions were related to variation on temperature and water availability along the year. Total annual production on future climate scenarios was predicted to increase up to 20% on most of the Brazilian area. The highest increase on forage production is expected to be in South, Southeast and Midwest areas of Brazil. In these regions, future climate scenarios will not change the seasonal production, with larger increases in productivity during the summer. Strategies for mitigation of impacts should aim ways for the use of summer forage surplus, and to reduce effects of lower water availability. In the Northeast area, *Panicum maximum* production is expected to decrease, mainly when considering scenarios based on the PRECIS model for 2055.

**Keywords:** ETA model, PRECIS model, climate change, livestock, degree days, water balance

**Acknowledgments:** CNPq