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Physiological and Productive Responses of *Brachiaria brizantha* cv. BRS Piatã in Brazilian Integrated Systems

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Abstract

The Cerrado is responsible for large of Brazil agricultural production, but has presented problems with environmental degradation. The integrated crop-livestock-forestry systems (ICLF) have shown promise for land use. The diversification of productive activities, promote environmental benefits, helping to mitigate emissions of greenhouse gases, generated in agricultural production. However, the shading of trees modifies the microclimatic, influence interfering in morphological and physiological process essential for biomass accumulations in forage species. These adaptations may alter the accumulation of forage in the pasture. Aiming to understand these modifications and obtain better forage production in shaded environments, we evaluated the effect of shading and microclimate, generated by different tree densities, on the physiological and productive responses of *Brachiaria brizantha* cv. BRS Piatã in ICLF systems, in the seasons of the year, in the Brazilian Cerrado. The two ICLF systems with *Eucalyptus urograndis*, with spacing in the single lines of 14 m (ICLF14) and 22 m (ICLF 22) trees, compared the integrated crop-livestock system (ICL, in full sun). The experiment was conducted at Embrapa Beef Cattle (20º27 'S, 54º37' W). The experimental area was planted in the 2008/2009 harvest, with a randomised blocks, in split block, with three replicates. Monthly were evaluated; the level of shading; temperature and humidity of the air; the accumulation of forage (AF) and leaf photosynthesis rate (PLR) of the piatã grass, under continuous grazing, from July 2015 to June 2016. The ICLF showed intense shading (72 %), significantly affecting PLR and AF (22 μmol CO_2 m^{-2} s^{-1} in the ICLF and 26 μmol CO_2 m^{-2} s^{-1} in ICL). The AF of the piatã grass reduced 62 and 49 % ICLF14 and ICLF22, respectively. However, in the spring, season with higher drought effect, and high temperatures, ICLF systems obtained AF similar to the ICL, due to the effect of shading on the reduction of temperature (4.5°C) and increase of the relative humidity of the air (10 %). The ICLF systems promote microclimatic conditions that may favour AF in the dry season, but the low light intensity significantly affects the PLR, so it is necessary to perform thinning operations to favour the entry of light into the understory.

Keywords: Accumulation of forage, Brazilian Cerrado, photosynthesis rate, shading, tropical grass

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