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The use of *Tithonia diversifolia* (Hemsl.) Gray as forage to contribute to reduction on the enteric methane emission

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The aim of this study was to evaluate the potential of *Tithonia diversifolia* to mitigate greenhouse gases originated from enteric fermentation in the rumen. The experiment was conducted in the city of São João del-Rei (Latitude: 21 ° 05 '11 "S, Longitude: 044 ° 13' 33" W and altitude of 950 m), Minas Gerais state, Brazil. This region belongs to the transition zone of the Cerrado - Atlantic Forest, and it is classified as tropical of altitude. The material was obtained from eight locations where the plants *T. diversifolia* occur naturally. The material which presented higher yield (69,101.8 kg DM ha^{-1}) was statistically selected. Evaluations were conducted using plants of *T. diversifolia* collected at two developmental stages (booting and pre-flowering) polled with five levels of inclusion of *Brachiaria brizantha* (0, 25, 50, 75 and 100%). The material was submitted to chemical analysis (crude protein - CP, neutral detergent fiber - NDF, acid detergent fiber - ADF and hemicellulose) and was subsequently fermented using the *in vitro* gas production technique to quantify methane and volatile fatty acids (VFA) at six and 12h of incubation. The experimental design was a completely randomized and comparison of means was done using the SNK test (Student Newman Keuls) with a significance level of 5%. *T. diversifolia* collected during the booting stage showed higher CP content (166.1 g kg^{-1} DM) compared to the period of pre-flowering (117.2 g kg^{-1} DM). *B. Brizantha,* used as control treatment, showed high CP content (126.6 g kg^{-1} DM). This is due to the fact that material was obtained from a rotational grazing system with application of high doses of nitrogen. In contrast to *T. diversifolia* cultivated in unfavorable soil conditions (acidic pH and low levels of P and Ca), as was the case of plants collected for this experiment, showed equal levels of CP (pre-flowering) or higher (booting) to that observed for *B. Brizantha*. There was no influence of the stage of development of *T. diversifolia* on NDF (446.5 - 450.1 g kg^{-1} DM) and hemicellulose (63.1 - 63.8 g kg^{-1} DM). However, these values were lower compared to *B. Brizantha* which showed higher NDF content of 6436 g kg^{-1} DM and hemicellulose 286.3 g kg^{-1} DM. There were no significant differences between the levels of the FDA of *T. diversifolia* (386.3 to 383.5 g kg^{-1} DM) collected at different stages of development or between *T. diversifolia* and *B. Brizantha* (357.9 g kg^{-1} DM). The VFA production, for both incubation time (six and 12 hours), the acetate concentrations were not different. However, it was verified higher concentrations of propionate in the treatments of 50% of *T. diversifolia*. The acetate : propionate ratio was not different; however there was a trend of reduction in the treatments including 50% of *T. diversifolia*. The same patron was observed for the methane production. The congruence between acetate : propionate ratio and methane production level indicates that the inclusion of 50% of *T. Diversifolia* was able to provide adequate VFA profile and a consequently reduction in the enteric methane. *T. diversifolia* due to your high nutritive value preserved during long period is a strategically important for forage management. However, according to the growing age, it was verified a reduction on the CP level. The inclusion of *T. diversifolia* with *B. Brizantha* (50%), demonstrated the potential of this forage for reduction on the enteric methane production for ruminants.

Keywords: *Tithonia diversifolia*, methane, rumen, VFA.

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