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In vitro fermentation kinects and potential degradability of *Tithonia diversifolia* cut in two developmental stages

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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 climate classified as tropical of altitude. The material was obtained from eight locations where the plants of *T. diversifolia* occur naturally. The material which presented higher yield (69,101.8 kg DM ha^{-1}) was statistically selected. Evaluations were conducted using plant material 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 polled 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 estimate the *in vitro* dry matter degradability (IVDMD) and fermentation parameters (potential of gas production, rate of fermentations and lag time). 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%. There was no chemical difference observed between plants collected at the stage of booting and pre-flowering for NDF (450.1 and 446.5 g kg^{-1} DM), ADF (386.3 - 383.5 g kg^{-1} DM) and hemicelluloses (63.1 to 63.8 g kg^{-1} DM). CP level was superior for the plants collected at booting stage (from 166.1 to 117.2 g kg^{-1} DM). *B. Brizantha*, used as the control, showed higher NDF (643.6 g kg^{-1} DM), ADF (357.9 g kg^{-1} DM) and hemicelluloses (286.3 g kg^{-1} DM) compared to *T. diversifolia*. The CP content of *B. Brizantha* was 126.6 g kg^{-1} DM, this value was considerably high for a tropical forage. Probably it was due to benefits promoted by the rotational management system which included application of high nitrogen doses. In contrast *T. diversifolia* even cultivated in unfavorable soil conditions (low pH and low levels of phosphorus, and calcium) produced forage with similar levels of CP (pre-flowering) or higher (booting) compared to the results observed for *B. brizantha*. Regarding to the fermentation parameters it was obtained higher value for the potential gas production in the treatments including 50 and 75% of *T. diversifolia*, independent of the cutting stage (booting and pre-flowering). However, the highest gas production rate and highest lag time were observed for the treatments with lowest levels of inclusion of *T. diversifolia* (0 to 25%). This fact may be related to the higher concentration of NDF in the *B. Brizantha* in relation to *T. diversifolia*. There was a higher IVDMD of the polled substrate originated from the treatments with inclusion of *T. diversifolia* up to 50% of inclusion. After 50% of inclusion of *T. diversifolia*, the IVDMD results decreased. This fact may be related to the higher concentration of hemicelluloses in the *B. brizantha* (286.3 g kg^{-1} DM) compared to *T. diversifolia* (63.5 g kg^{-1} DM). The inclusion level of 50% of *T. diversifolia* in this experiment, showed promised results for ruminant nutrition, highlighting their potential as forage which can grown in poor tropical soils.

Keywords: *Tithonia diversifolia*, gas production, nutritional value, rumen.

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