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ESTABLISHMENT OF TANZANIA GRASS PASTURE USING MILLET AS A COMPANION CROP

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Abstract

Forage yield and quality of millet [*Pennisetum glaucum* (L.) R. Br.] and tanzania grass (*Panicum maximum* Jacq. cv. Tanzania I) were evaluated when grown in mixture. The treatments evaluated were four seed mixture combinations, based on a standard sowing density of 8 kg.ha^{-1}, of tanzania grass/millet (08/00; 05/03; 04/04 and 03/05 kg.ha^{-1}) and three cutting frequencies (1 cutting – 100th day after sowing; 2 cuttings – 50th and 100th days after sowing and 3 cuttings – 40th, 70th and 100th days after sowing), in a randomized complete block design, with four replications, in a split-plot scheme. Sowing densities were allocated in the main plots (5.0 x 12.0 m, each) and cutting frequencies in the subplots (5.0 x 4.0 m, each). The yields of DM of millet combined with tanzania grass were higher than that for pure tanzania grass stand. The CP increased whereas NDF and ADF decreased for both millet and tanzania grass with increasing cutting frequency. There was a small decrease in CP content when millet was in association with tanzania grass. According to these results, it was concluded that it is feasible the establishment of tanzania grass pasture using millet as a companion crop.

Keywords: Companion crop, millet, pasture formation, tanzania grass

Introduction

For pasture establishment in association with companion crops in the Brazil it is used mainly the perennial forage grasses of de genus *Brachiaria*, *Panicum*, *Andropogon*, *Hyparrhenia* and *Setaria*, with the accompanying cultures such as corn (*Zea mays* L.), sorghum [*Sorghum bicolor* (L.) Moench.], rice (*Oryza sativa* L.) and millet [*Pennisetum glaucum* (L.) R. Br.]. The expected and generally reached advantage of that association is the reduction of costs of the formation of pasture of the perennial species, practically represented by the cost of the seeds, because all the practices accomplished for the conduction of the annual culture certainly benefit the plant associated forage, and the pasture should be formed after harvesting the annual culture (Carvalho, 1993). This method, in the recent years, was denominated renewing pasture system, called “Barreirão” (Kluthcouski et al., 1991). The corn, sorghum, rice and, rarely, millet cultures, in that case, are used for grain production.

This work aimed to study the production and the chemical composition of forages of the millet and tanzania grass, in mixture, seeking the formation of pasture of later ones.

Material and Methods

The present study was done during the period from October of 1997 to February of 1998 in an area of the Animal Science Department of the Universidade Federal de Lavras (UFLA). The soil of the experimental area is classified as clayey Dusky-Red Latosol with pH = 6.0; P and K = 17.0 and 106.0 $mg.dm^{-3}$, respectively; Ca, Mg and Al = 3.8, 0.6 and 0.0 $cmol_c.dm^{-3}$, respectively; V = 59.0 % and organic matter = 3.5 $dag.kg^{-1}$. The studied treatments were four combinations of mixture of seeds (here referred as sowing densities), in a standard seeding density of 8 $kg.ha^{-1}$, of tanzania grass/millet (08/00; 05/03; 04/04 and 03/05 $kg.ha^{-1}$) and three cut frequencies (3 cuts - 40th, 70th and 100th days after seeding; 2 cuts - 50th and 100th days after seeding and 1 cut - 100th day after seeding. The used experimental design was a complete block with twelve treatments and

four replications, with the treatments arranged in a split plot schem. The seeding densities constituted the main plots (5.0 x 12.0 m, each) and the cutting frequencies, the subplots (5.0 x 4.0 m, each). The fertilization in the planting furrows consisted of the application of 25, 50 and 65 $kg.ha^{-1}$ of N, P_2O_5 and K_2O, as ammonium sulfate, single superphosphate and potassium chloride, respectively. The sowing occured in 10/28/97, being sowed the millet and tanzania grass together at the same time, in agreement with the proposed treatments. Forty one days after seeding was done a nitrogen topdressing in the base of 35 $kg.ha^{-1}$ of N, as ammonium sulfate, for all treatments. The cuts were accomplished manually, harvesting all species at once at the height of 0.10 to 0.12 m of the soil. After the cuttings, the forage was weighed and sampled for determination of DM production and laboratorial analyses that included contents of CP, NDF and ADF. The statistical analyses of the data were processed using the SAS program (SAS Institute Inc., 1985).

Results and Discussion

The DM production of millet was maximum in harvest done at 100th day after sowing (8.5 $t.ha^{-1}$), due to the largest accumulation of DM, in function of the advanced age of the plants. The cutting frequencies 2 and 3 performed production of DM of 5.7 and 3.2 $t.ha^{-1}$, respectively. The sowing densities didn't influence the CP content of the millet. However, significant differences were verified among the cutting frequencies. The smallest CP concentration was obtained in the millet harvested in the 100th day after sowing, in cutting frequency 1, due to the advanced stage of growth of the plants (Table 1). On the other hand, the maximum CP contents were obtained in more young forages of the cutting frequencies 2 and 3, being different ($P<0.05$). The concentrations of NDF and ADF of the millet were maximum in the forage harvested in the 100th day after sowing (Table 1), in opposition to the cutting frequency 3.

The DM production of tanzania grass was maximum at sowing density 1 (8.0 kg.ha^{-1}, tanzania grass alone) for the three cutting frequencies (8.0, 5.5 and 4.5 t.ha^{-1}, respectively, for the cutting frequencies 1, 2 and 3). The strong competition exercised by the millet on tanzania grass was more evidenced in cutting frequency 1. However, the tiller population was 122 tillers.m^{-2} in this frequency compared to 179 and 206 tillers.m^{-2}, respectively, for the cutting frequencies 2 and 3. The three tillers populations were capable for good tanzania grass establishment, so that there were compensatory effects in these populations and an equilibrium in second growing season of tanzania grass. Significant differences were not observed among concentrations of CP, NDF and ADF of tanzania grass according to tested sowing densities. The maximum contents of CP of tanzania grass were obtained on forage of the cutting frequencies 2 and 3. As well as it happened with millet, the more elevated contents of NDF and ADF of tanzania grass were found in that forage harvested at 100th day after sowing.

It was observed that the mixture produced more DM than each grass species alone in all the tested cutting frequencies (9.9, 7.8 and 5.4 t.ha^{-1} against 8.0, 5.5 and 4.5 t.ha^{-1}, respectively, for cutting frequencies 1, 2 and 3). When comparing CP contents of tanzania grass alone with tanzania grass plus millet, it is observed that this presented a small reduction. However, even with the harvest at the 100th day after sowing, the produced forage is of good quality because it is above the critical limit to animal nutrition of 7.0 % of CP (NRC, 1996).

The three mixtures of seeds of tanzania grass plus millet did not differ to each other in DM production and chemical composition of the forage. The cutting frequency 2 provided a good DM production of nutritional good quality. The establishment of tanzania grass with millet, as a companion crop, is feasible because DM yield of the mixture was larger than that of each grass species alone and with equivalent nutritional quality.

References

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Table 1 - Contents (%) of crude protein (CP), neutral detergent fiber (NDF) and acid detergent fiber (ADF) (DM basis) of millet according to cutting frequency

Cutting frequency	CP	NDF	ADF
One cut (100 d)	7.7c	80.6a	53.7a
Two cuts (50, 100 d)	15.2b	71.6b	45.4b
Three cuts (40, 70, 100 d)	19.6a	66.3c	42.2c
CVb	13.01	3.34	6.50

Means followed by same letters differ ($P < 0.05$) by Tukey test

Table 2 - Contents (%) of crude protein (CP), neutral detergent fiber (NDF) and acid detergent fiber (ADF) (DM basis) of tanzania grass according to cutting frequency

Cutting frequency	CP	NDF	ADF
One cut (100 d)	10.9b	78.8a	49.4a
Two cuts (50, 100 d)	17.2a	72.6b	45.1b
Three cuts (40, 70, 100 d)	22.0a	67.1c	42.4c
CVb	35.19	3.04	5.76

Means followed by different letters differ ($P < 0.05$) by Tukey test