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In situ digestibility of *Gliricidia sepium* combined with *Brachiaria decumbens* in a silvopastoral system

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Introduction

Silvopastoral system (SPS) are characterized by a combination of trees, pasture and herbivores animals, in the same physical area, in order to obtain diversified products. A promising legume tree that has been studied and used in SPS in tropical areas is gliricidia [*Gliricidia sepium* (Jacq.) Steud]. Advantages of gliricidia use in SPS include N inputs *via* biological fixation, improvement of soil properties, nutrient cycling and also a source of feed to grazing animals (Cubillos-Hinojosa *et al*., 2011). Gliricidia has high crude protein concentration in its leaves, which complements the usual N-poor diet of ruminants grazing warm-season grasses. The introduction of gliricidia in SPS faces a problem due to the low initial acceptability by cattle, being necessary an adaptation period in order to cattle reach satisfactory intake levels (Carvalho Filho *et al*., 1997). In general, the quality of the forages can be predicted by accessing their nutritive value, represented by the chemical composition and digestibility of the forage constituents (Van Soest, 1994). The digestibility of dry matter in forages consumed in a SPS can be influenced by the forage species used, by grass/legume combinations, and by the proportion that each forage species takes in the diet of the ruminants. This study evaluated in situ digestibility of gliricidia in increasing levels of inclusion in the diet composed by sabi grass (*Brachiaria decumbens*, Stapf) in a silvopastoral system.

Materials and Methods

The experiment was carried out at the 'Instituto Agronômico de Pernambuco', in the city of Itambé - Pernambuco State, Brazil. The experimental unit was composed by paddocks of 1.0 ha (43.5 x 230.0 m). Treatments were: *Brachiaria decumbens* in monoculture and a SPS composed by mixed *B. decumbens* + *G. sepium*. Treatments were arranged in a randomized block design, with three replications. In the SPS treatment, gliricidia seedlings were implanted in 14 double rows, spaced by 15.0 x 1.0 x 0.5 m, totaling approximately a population of 2.500 plants ha^{-1}, with *B. decumbens* in the bands between the double rows. Forage samples were taken by simulated grazing, after observation of the grazing action by the cattle; for the gliricidia, green leaves and thin branches were the sampled fractions. Samples were dried in a forced ventilation oven at 65°C for 72 h and ground to a particle size of 10 mm. *In situ* digestibility was obtained after incubation of the 0.5 g of the different combinations of forage in the rumen of two buffaloes using Ankon F57 bags (porosity 25µm). Incubation treatments were composed by *B. decumbens* sole, and *B. decumbens* with increasing levels of *G. sepium* (25, 50, 75, and 100%). Incubated samples were removed from the rumen at different times (24, 48 and 96 h), and washed thereafter in a solution of water and methyl cellulose (Kudo *et al*., 1987). The zero time was identified for the samples just washed but which did not pass through the process of digestion in the rumen. Statistical analyzes were performed using PROC MIXED in SAS 9.1 statistical package, and means were compared by the probability of the difference (Pdiff) with T test adjusted by Tukey-Kramer ($P \leq 0.05$).

Results and Discussion

Increasing levels of gliricidia improved the *in situ* DM digestibility of the mixture (Table 1) in all incubation times. At the gliricidia inclusion levels of 75 and 100% , there was no statistical difference ($P > 0.05$), which can be speculated that until 75% of inclusion, increments in the *in situ* DM digestibility can be expected, although under 96 hours of incubation, there was no difference between 50 and 100% of gliricidia inclusion. Alayon *et al*. (1998) evaluating the effects of supplementation with gliricidia in diets of sheep fed with *Cynodon nlemfuensis* on the in situ DM digestibility, verified that levels of inclusion from 10 to 30% increased dry matter digestibility. Rising incubation time also favored the increases in dry matter digestibility, however, there were no differences ($P > 0.05$) between the incubation time of 48 and

96 h, for all levels of gliricidia inclusion. In the inclusions levels of 100%, there was no significant difference (P>0.05) in the *in situ* digestibility among the incubation times 24, 48 and 96 h. Disappearance of the incubated material at time zero occurred because of the washing process, at this time, the dry matter losses were attributed to the small particles leak through the pores of the bag.

Table 1: *In situ* DM digestibility of *Brachiaria decumbens* under increasing levels of *Gliricidia sepium* inclusion at different incubation times.

	***In situ* DM digestibility (%)**			
	Incubation time (h)			
Inclusion (%)	**0**	**24**	**48**	**96**
0	18.20 Dc	52.95 Db	68.22 Da	73.13 Ba
25	22.86 CDc	63.13 Cb	73.86 CDa	74.60 Ba
50	41.13 Ac	65.16 BCb	76.76 BCa	78.34 Aba
75	32.31 Bc	73.19 Ab	81.65 Aba	81.16 Aa
100	40.26 ABb	77.37 Aa	83.26 Aa	82.10 Aa

Means followed by the same uppercase letter in the column and lowercase in the line did not differ by Tukey test at (P>0.05).

Conclusion

The inclusion of *gliricidia* in the diets of ruminants in SPS with *Brachiaria decumbens* pastures can promote increments in the dry matter digestibility. Being recommended gliricidia inclusion in the diet of ruminants.

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