

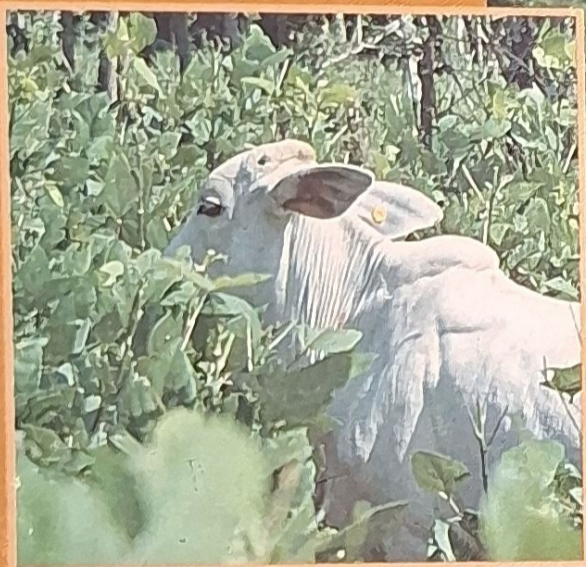
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# Phenology and nutritive value of the foliage of some forage tree species of Caatinga

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## Introduction

Researches on the botanical composition of the diet have shown the importance of native forage trees as source of fodder for the ruminants in caatinga. A total of 23 tree species, corresponding to 70% of the arboreous species on the sites, was found to participate in the botanical composition of the diets of goats and sheep (Araújo Filho et al., 1998). Due to high predominance of leguminous species among the caatinga forage trees, the protein content of the diet has been found adequate, even in the dry season, in most of the researches (Pfister, 1983 and Araújo Filho et al., 1996). The protein content in those diet studies varied from 25% in the wet season to 9,0% in the dry period. However, very few researches have been conducted on the nutrient content of the foliage of the caatinga trees and even less on their phenology (Pereira et al., 1989). This research dealt with the study of the nutrient content and digestibility of the foliage of some caatinga forage trees, with respect to their annual phenologic cycle.

## Material and methods

The data were collected at the Goat National Research Center, of EMBRAPA, Sobral, Ceará Brazil, in a representative area of the Sertão ecosystem, in the period from 1993-1995. The climate of the area is BShw' type and the soils are predominantly non-calcic brown, on a rolling topography.

*Auxemma oncocalyx*, *Bauhinia*, *Cheilanthes*, *Caesalpinia bracteosa*, *Caesalpinia ferrea*, *Mimosa caesalpinifolia*, *Mimosa hostilis* and *Zyziphus Joazeiro*, the most common forage trees, on the site of study, were selected. From these, *Caesalpinia ferrea*, *Mimosa hostilis* and *Zyziphus Joazeiro* were evergreen. Ten plants per species were permanently marked and visited every week, when the phenophases were observed and samples were harvested from each tree species for laboratory analysis. The following phenophases were considered: vegetative, flowering, fruiting and dormancy. The samples were analyzed for their dry matter (D.M. at 105 °C), crude protein, lignin and total tanins contents and dry matter *in vitro* digestibility.

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## Results and discussion

The dry matter content plays an important role on the fodder intake. The results presented by Table 1 indicate that from the vegetative to the fruiting stage the foliage of the trees species were adequate for consumption by the animals. The crude protein contents of all the tree species were above the minimum needed for the diet of the ruminants (c. 7,0%), along the phenologic cycle, except for the dormancy phase, when only *Bauhinia cheilantha* and *Caesalpinia bracteosa* would meet the minimum requirements (Table 1). The lignin percentage was always high for *Auxemma onocalyx* and low for *Bauhinia cheilantha* and *Caesalpinia bracteosa*, along the phenologic cycle (Table 2). As an average, it varied from 12.1% at the vegetative stage to 20.0% at the dormancy. Total tanins were high for the two species of *Caesalpinia*, while *Zyziphus Joazeiro* kept the lowest value (Table 2). The total tanin content apparently does not interferes with the palatability of the tree fodder. In fact, *Caesalpinia ferrea*, presenting a high total tanin percentage, has a very palatable forage. On the other hand, the odor, associated with *Caesalpinia bracteosa*, seems to be the major consumption restrainer. *Zyziphus Joazeiro*, *Bauhinia cheilantha* and *Caesalpinia bracteosa* showed the best digestibility values, at the vegetative phase. However the last two species kept the high percentage up to the fruiting stage (Table 3). The lignin content seemed to affect de fodder digestibility of the caatinga trees. In fact, high lignin content was always associated with low digestibility (Tables 2 and 3).

## Conclusions

The nutritive value of the tree foliage varied according to the phenologic phase, being higher at the vegetative stage, when the forage production is also at its high. The total tanin content may not be an intake restrainer for caatinga forage trees, while high lignin percentage reduces digestibility. *Caesalpinia bracteosa* and *Bauhinia cheilantha* are the best selections for hay production among the studied forage trees of caatinga.

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Table 1. Mean dry matter and crude protein content of caatinga forage trees, according to their yearly phenologic phases of vegetative (VEG), flowering (FLO), fruiting (FRU) and dormancy (DOR), in the 1993-1995 period. Sobral, Ceará, Brazil.

Phoenophase /Species	Dry Matter (%)				Crude Protein (%)			
	VEG	FLO	FRU	DOR	VEG	FLO	FRU	DOR
<i>Auxemma oncocalyx</i>	21.8	31.9	36.4	83.7	20.3	16.5	16.5	8.3
<i>Bauhinia Cheilantha</i>	25.1	33.4	37.4	90.9	20.7	18.1	13.3	9.7
<i>Caesalpinia bracteosa</i>	45.4	45.8	46.6	87.1	16.9	15.6	14.4	11,2
<i>Caesalpinia ferrea</i>	53.7	57.3	53.7	-	15.1	14.3	13.3	-
<i>Mimosa caesalpinifolia</i>	33.6	32.6	34.9	90.2	19.2	15.7	14.3	5.6
<i>Mimosa hostilis</i>	34.5	38.7	36.1	-	19.6	16.6	12.1	-
<i>Zyziphus Joazeiro</i>	24.3	30.6	44.8	-	20.6	16.1	12.2	-
Average	34.1	38.6	41.4	88.0	18.9	16.1	13.7	8.7

Table 2. Mean lignin and total tanin content of caatinga forage trees, according to their yearly phenologic phases of vegetative (VEG), flowering (FLO), fruiting (FRU) and dormancy (DOR), in the 1993-1995 period. Sobral, Ceará, Brazil.

Phoenophase /Species	Lignin (%)				Total tanin (%)			
	VEG	FLO	FRU	DOR	VEG	FLO	FRU	DOR
<i>Auxemma oncocalyx</i>	20.9	20.9	18.8	20.2	3.7	7.2	9.1	3.0
<i>Bauhinia Cheilantha</i>	9.1	12.5	12.6	15.3	5.7	6.4	12.2	3.9
<i>Caesalpinia bracteosa</i>	6.6	11.2	12.7	11.7	20.6	19.1	16.2	9.5
<i>Caesalpinia ferrea</i>	8.7	15.2	15.9	-	17.7	18.9	18.7	-
<i>Mimosa caesalpinifolia</i>	13.5	18.2	19.7	22.9	4.9	11.0	16.7	8.6
<i>Mimosa hostilis</i>	14.4	16.2	17.4	-	9.9	11.6	16.2	-
<i>Zyziphus Joazeiro</i>	11.9	13.3	14.2	-	0.1	0.1	1.3	-
Average	12.2	15.4	15.9	17.5	8.9	10.6	12.9	6.3

Table 3. Mean *in vitro* dry matter digestibility (%) of caatinga forage trees, according to their yearly phenologic cycle, in the 1993-1995 period. Sobral, Ceará, Brazil.

Phoenophases/Species	Vegetative	Flowering	Fruiting	Dormancy
<i>Auxemma oncocalyx</i>	25.9	24.4	21.9	12.7
<i>Bauhinia Cheilantha</i>	59.7	58.9	55.9	35.5
<i>Caesalpinia bracteosa</i>	58.4	52.5	50.4	30.9
<i>Caesalpinia ferrea</i>	43.1	37.5	30.4	-
<i>Mimosa caesalpinifolia</i>	39.2	33.0	28.7	22.9
<i>Mimosa hostilis</i>	29.5	32.8	26.0	-
<i>Zyziphus Joazeiro</i>	66.6	35.3	30.0	-
Average	46.1	39.2	36.0	25.5