

# Study of Chemical Compositions of Trembesi (*Samanea saman*): Potential as Ruminant Feed

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## ABSTRACT

The purpose of this study was to examine the chemical compositions of the Trembesi (*Samanea saman*) plant so that its potential as ruminant feed could be found. This research is a descriptive study, The materials used in this study are young leaves, old leaves, young petioles, old petioles, fruit, seeds, and rind. The material taken from the Sukoharjo area. The material samples were proximate analyzed. Analyzed for dry matter (DM), crude protein (CP), extract ether (EE) and Ash (AOAC, 1990), neutral detergent fiber (NDF), acid detergent fiber (ADF) and lignin (Van Soest *et al.*, 1991). The data obtained will be presented in a table. The data obtained shows that the parts of the Trembesi plant, namely leaves, petioles, fruit, seeds and rind contain sufficient nutrients to be used as animal feed, so this research can be concluded that trembesi (*Samanea saman*) can be potentially used as animal feed that supports it as an alternative feed for ruminants.

**Keywords:** trembesi, chemical compositions

## 1. INTRODUCTION

In Indonesia, the population of Trembesi trees (*Samanea saman*) is quite large and spread evenly distributed. Trembesi trees are widely chosen for planting because they have a wide canopy, making them ideal for greening plants. The trembesi tree is once a commodity that required to be planted by the Indonesian government. Trembesi has the ability to absorb strong groundwater, can absorb 28.5 tons / year of carbon dioxide and has roots that can symbiosis with rhizobium bacteria to fix nitrogen from the air. [1] stated that every 100 grams of trembesi leaves contain 47.8 grams of water, 10.2 g of protein, 2.1 grams of fat, 22.2 grams of insoluble carbohydrates, and 2.0 grams of ash. The results of research by [2] showed that trembesi leaves contained 10.83% protein.

Indonesia is a region that only has two seasons. The dry season is a critical time for ruminants because at that time there will be a scarcity of forage. From the results of existing research shows that trembesi has the potential as animal feed. Therefore, a study is needed that examines the chemical composition of all parts of the trembesi so that it can be known its use as animal feed.

## 2. METHODS

This research was conducted at the Laboratory of Chemistry and Microbiology, Universitas Veteran Bangun Nusantara. The materials used in this study are young leaves, old leaves, young petioles, old petioles, fruit, seeds, and rind. The material taken from the Sukoharjo area. The material samples were proximate analyzed. Analyzed for dry matter (DM), crude protein (CP), extract ether (EE) and Ash [3], neutral detergent fiber (NDF), acid detergent fiber (ADF) and lignin [4]. This research is a descriptive study, the data obtained will be presented in a table.

## 3. RESULT AND DISCUSSION

This objective to examine the chemical compositions of Trembesi so that it can be seen which parts of the tamarind plant can be used as animal feed. The research results are presented in Table 1.

Table 1 shows the data obtained in the research conducted regarding the chemical composition of *S. saman* leaves. The highest crude protein is found in young leaves and the lowest is in young petioles. The fibrous fraction of the leaves showed the highest levels of neutral detergent fiber (NDF) and acid detergent fiber (ADF) in old leaves and old petioles. [5] found that the

cell wall of the Trembesi tree increased the lignification rate. This factor must be considered in the nutritional assessment because of the high negative correlation between lignin and intake in ruminants [4].

The presence of lipid compounds in the leaves gives a higher energy value. [6] reported that the average concentration of ether extract (EE) in tree in tropical rainy areas was quite high, namely 4.4%. This shows that the chemical composition of *S. saman* leaves contains nutrients that can be utilized by livestock ([7], [8], and [9]). Forage physical indicators have an important function in the digestion of fibrous feed. Measurements related to leaf nutritional value are volumetric density (VD), water retention capacity (RCw), mean particle size and solubility of organic matter (OM) and mineral fraction. [1] studied these indicators on different leaves and showed that the VD values for *S. saman* were very similar to the mean obtained among all the trees studied and similar to a mean of 0.26 g / mL  $\pm$  0, 04 obtained by [10] for fibrous materials.

Forage RCw ranged from 3.80 mL / g for alfalfa straw and 8.87 mL / g for corn cobs. *S. saman* showed a slightly lower RCw value than these figures and the OM solubility was 9.5% according to the leaf residue studied [11]. *S. saman* produces high pods during the dry season with a high protein value, namely 21.3% for fruit and 25.2% for seeds so that it can be used as a supplement for animal feed when the quality of feed is low and has the potential as ruminant and monogastric animal feed. This relatively high CP content is also an important source of nutrients during dry periods for grazing ruminants.

[7] reported that in Nicaragua Trembesi leaves were not very attractive to livestock and were consumed only when the pasture was limited and the consumption was restricted. [12] reported that in Indonesia goats regularly consume trembesi leaves. [8] evaluated the preference of young cattle for the *S. saman* leaves. Young cattle were low consumed *S. saman* leaves are 58.72 g. and

variations in consumption can be related to nutritional quality and the presence of secondary compounds that will affect their palatability in livestock.

[13] stated that *S. saman* leaves showed lower rumen degradation from dry matter (DM) : 44.7% and OM is 47.4%. Effective nitrogen breakdown in the rumen was between 43.6 and 52.3%, for the pass rates of 0.03 and 0.05 h-1, values were lower than those reported for the other leaves. In vitro nitrogen digestibility is 34.8% was lower than *gliricidia* and *Leucaena* are 69.4 and 65.7%, respectively. The seedless fruit of *S. saman* showed the highest effective digestibility, with a value of 62 % and a very high soluble fraction of 55.60 %. The total digestibility of *S. saman* pods using two-step in vitro techniques (rumen and intestinal digestion) showed that it could reach 74% [14] When cattle are fed whole pods of *S. saman* as is the case with natural grazing, most of the whole grain passes through the digestive tract and is excreted in the feces [3] The seedless *S. saman* have high nutritional value with an in vitro digestibility of 71% ([14] and [15]).

The consumption of dry matter is a major obstacle to increasing livestock production in the tropics, especially during the dry season. One of the main advantages of supplementation with ground pods from *S. saman* is increased consumption of dry matter and digestible energy, without affecting forage consumption.

There are several studies that report animal performance when *S. saman* leaves or fruit are given as a dietary supplement for productive species. [16] found that up to 22% of concentrate for pigs could be replaced with ground pods from *S. saman* without compromising live weight gain. Similar results were obtained in the study of [17] that substitution of 20% supplement with *S. saman* fruit flour did not affect animal growth, but 30% had a negative effect on weight. In heifers, 10 and 20% of fruit intake in the diet did not affect their development [18].

**Table 1. Nutrient Composition of Trembesi (%)**

Sample	Dry Matter	Ash	CP	NDF	ADF	Lignin	EE	Ca	P
Young leaves	29.422	5.711	30.902	33.821	25.422	6.123	0.912	0.222	0.321
Mature leaves	34.193	6.741	22.613	47.500	36.913	10.310	1.121	0.412	0.222
Young petiole	43.371	6.923	12.602	35.212	25.732	14.441	1.422	0.411	0.211
Mature petiole	54.211	3.132	24.531	40.711	34.301	22.320	1.910	0.620	0.300
Fruits	85.733	4.701	21.332	36.302	23.211	24.812	4.420	1.020	0.130
Seeds	93.024	3.613	25.212	33.921	7.041	22.701	2.532	0.702	0.082
Rind	86.302	4.102	27.141	29.901	5.610	28.121	1.231	0.502	0.101
SD	26.925	1.503	5.719	5.734	5.160	8.178	1.225	0.257	0.094

[19] also reported that supplementation of *S. saman* (15 or 30%) with ground fruit or whole tamarind fruit in cow feed increased body weight from 4.1 to 5.1% and milk production increased between 0.5 and 1.1 L/beef/day, higher total solids (1.38%), butterfat (1.01%) and protein (0.59). Another study conducted on buffalo by [20] showed that giving 2 kg of *S. saman* pods as a supplement to basal feed of rice straw was sufficient for livestock to maintain their weight during the dry season. [21] stated that the relationship between animal performance and efficiency of nutrient use in cattle fed *S. saman* pods showed that different results could be attributed to the effect on the balance between glucogenic and acetogenic short-chain fatty acids and the increase between short-chain glucogenic and acetogenic fatty acids. / energy in absorbed nutrients. [22] state that rations for beef cattle plus 40% of leaf meal from the *S. saman* tree have increased feed consumption from 1.9 to 2.6%.

#### 4. CONCLUSION

Based on chemical compositions, Trembesi (*Samanea saman*) can be potentially used as animal feed that supports it as an alternative feed for ruminants.

#### AUTHORS' CONTRIBUTIONS

The author collaborates and is involved in all stages of the research.

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