

## CHEMICAL COMPOSITION AND *IN VITRO* EVALUATION OF RAIN TREE (*ALBIZIA SAMAN*) PODS AS A LIVESTOCK FEED

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**Abstract:** The present study was conducted to evaluate the nutrient composition and *in vitro* digestibility of Rain Tree (*Albizia saman*) pods for incorporation in livestock rations. Results indicated that pods contained 95.98% DM; 3.21% TA; 19.32% CP; 3.4% EE; 28.4% CF; 54.33% NFE; 39.72% NDF; 30.72% ADF; 9.72% Hemi-cellulose; 17.48% Cellulose and 8.89% ADL. The calcium and phosphorus (%) was 0.24 and 0.13, respectively. Chemical composition revealed that the pods are high in dry matter, protein and energy rich carbohydrates which suggest the potential as a component of feed for livestock. The pods were evaluated *in vitro* to study the effect on digestibility of nutrients. Data revealed that the *in vitro* digestibility (%) of DM, CP, NDF and ADF was 57.62, 31.0, 11.83 and 8.16, respectively, giving an indication of potential digestibility. It is concluded that rain tree pods can be used as non-conventional feed ingredient for feeding livestock.

**Keywords:** Rain tree pods, Nutrient composition, *In vitro* digestibility.

### Introduction

Shortage of quality animal feeds, particularly in developing countries was attributed to seasonal variation and availability of quality pasture. This has necessitated the exploration of novel alternative sources of feeding materials for possible incorporation into animal diets (Fasuya, 2005). Rain tree (*Albizia saman*), family, Fabaceae, is a tropical tree native to deciduous and sub-deciduous forests of India, Srilanka, Burma and Bangladesh and usually reaches a height of 15-25 m. It is propagated by seeds and cuttings and thrive best in hot moist localities and dry barren lands. The bark of the tree is dark grey, rough and fissured in long plates or corky ridges. The tiny flowers are massed in pinkish heads and the leaves are alternately arranged along twigs. Mature pods are black-brown, oblong, lumpy 4-8 inch long, 0.6-0.8 inch wide, 0.25 inch thick, straight or slightly curved but eventually cracking irregularly, and filled with sticky, brownish pulp that is sweet and edible. A mature tree can yield about 500-600 kg green forage foliage and 250-300 kg pods per annum. The leaves and pods of the trees are esteemed as fodder for livestock. Ripen pods are available from

February to May, when other fodders are scarce (Venkataraman, 1943 and Kehar and Negi, 1949). The ripen pods fall on the ground and go waste. In order to utilize the pods and to exploit their nutritive and feeding value the present study was undertaken to estimate the chemical composition and *in vitro* nutrient digestibility of rain tree pods with the aim of using them in livestock rations.

### **Materials and Methods**

Matured and dried rain tree pods were sampled from growing trees in the villages nearby Gannavaram. The pods were further sun dried for five days, finely ground through 2 mm sieve using Wiley mill and the powdered samples were stored in air tight plastic containers prior to analysis. The proximate composition (AOAC, 2007) and forage fiber constituents (Van Soest *et al*, 1991) of pods were analyzed. Calcium and Phosphorus content were determined as per Talapatra *et al*. (1940). Three fistulated graded Murrah buffalo bulls fed a conventional diet comprising of 4.0 kg paddy straw; 5.0 kg Hybrid Napier and 1.5 kg concentrate mixture were used as donors of rumen inoculum. All the animals were maintained in good hygienic conditions kept in individual stalls with the provision of potable water all through the day.

Dried and ground (0.5 mm particle size) samples of rain tree pods in triplicate were used as substrate for *in vitro* studies to evaluate the digestibility of DM, CP, NDF and ADF (Tilley and Terry, 1963). In the first stage, around 0.5 g of finely ground sample is incubated for 48 h with the buffered rumen liquor in a tube under anaerobic conditions. In the second stage, the microbial activities are stopped by acidifying with hydrochloric acid to pH 2.0 and then digested by incubating with pepsin for another 24 h. In the last stage, the insoluble residue is filtered off (Whatman No. 54), dried at 100°C overnight and weighed. The data were statistically analyzed as per Snedecor and Cochran (1989) using Compare Means (SPSS 17.0 version).

### **Results and Discussion**

Chemical composition revealed that rain tree pods contained 95.98, 3.21 and 19.32, percent DM, TA, and CP, respectively (Table 1). The nutritional components of a particular feed are driving factor of its nutritional potential. In this study, rain tree pods have high DM content, lower ash content (<2.5 %) and higher crude protein content which is an important feed component considered for selection in feed formulation. Further the samples are rich in carbohydrate (NFE) and can be used as a fodder for animals as a source of energy. Lower values (%) for DM, CP and CF and higher values (%) for TA and EE were reported in

Samanea pods (Barcelo and Barcelo, 2012), while the NFE (53.09 %) corroborated with the value in the present study (54.33 %). This higher value of NFE reflects that rain tree pods are rich in carbohydrates and are relished by livestock due to its sweet taste.

The crude fibre content is low which indicates that most carbohydrates are easily digestible. Similar chemical composition is reported by (Hosmani *et al.*, 2005) in rain tree pods. The values indicated that it is equivalent to any cereal grain by-products like deoiled rice bran (Hosamani *et al.*, 2000). The ash content of rain tree pods is 3.21 % in the present study. Akintayo (2004), states that any plant material intended to be used in feed formulation should have ash content less than 2.5 %. This gives an indication that the samples with more ash content could not be used as selfdom feeding material, but rather mixed with other ingredients for better results. This suggests that rain tree pods in the present study can be used by mixing with other feed ingredients. In the present study, the pods have Ca to P ratio (Ca/P) of 2:1 which indicates the better bioavailability of macro-minerals.

The chemical composition itself may not be pure indicative of its usage as feed to animals, but has to be supplemented with digestibility or feeding trials. *In vitro* studies revealed that digestibility (%) of DM, CP, NDF and ADF of pods were 57.62, 31.0, 11.83 and 8.16, respectively in the present experiment (Table 2). The intake of dry matter and digestibility of crude protein, ether extract was optimum in goats (Thomas *et al.*, 1976), sheep (Kathaperumal *et al.*, 1988) and cattle fed rain tree pods (Thole *et al.*, 1992). This may be due to ease of availability of sugars from pods. The nutritive value in rain tree pods was almost equivalent to cereal grain by-products such as de oiled rice bran. It was inferred that rain tree pods contain higher protein and sugars, lower fibre, silica, lignin and tannin. It has got better digestible crude protein and total digestible nutrients equivalent to cereal grain by- products. These findings can be used to correlate with the values of *in vitro* digestibility in the present study particularly in terms of dry matter and crude protein. The rain tree pods can very well be incorporated in the diet of ruminants to replace concentrate to reduce the cost of feeding significantly.

### **Conclusion**

The present study indicated that rain tree pods are a rich source of dry matter, protein, nitrogen free extract, minerals and *In vitro* studies indicated better utilization of nutrients. Hence, it can be concluded that pods can be used as a component for feed formulation; however other parameters such as palatability and toxicity should be studied before drawing a final conclusion.

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**Table 1. Chemical composition (% DM basis) of rain tree pods**

Parameter	Rain tree pods
Dry matter	95.57 ± 0.09
Total Ash	3.21 ± 0.12
Crude Protein	19.32 ± 0.24
Ether Extract	3.40 ± 0.31
Crude Fibre	28.40 ± 0.61
Nitrogen Free Extract	54.33 ± 0.45
Neutral Detergrnt Fibre	39.72 ± 0.13
Acid Detergent Fibre	30.72 ± 0.29
Hemi-cellulose	9.72 ± 0.37
Cellulose	17.48 ± 0.46
Acid Detergent Lignin (ADL)	8.89 ± 0.22
Calcium	0.24 ± 0.09
Phosphorus	0.13 ± 0.07

Values are expressed, as mean ± standard deviation of three replicates

**Table 2. *In vitro* nutrient digestibility (%) of rain tree pods**

<i>In vitro</i> digestibility (%)	Rain tree pods
IVDMD	57.62 ± 0.46
IVCPD	31.10 ± 0.97
IVNDFD	11.83 ± 0.64
IVADFD	8.16 ± 0.32

Values are expressed, as mean ± standard deviation of three replicates