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ORIGINAL RESEARCH

Phyto chemical and proximate composition of locally available *tanniferous herbages*

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ABSTRACT

Present research was carried out to study the phyto chemical and proximate composition of five locally available tropical tree leaves. They were analyzed for proximate principles, total phenolics, total tannins and condensed tannins in dried leaf meal. These trees were*leucenealeucocephala, ficusbengalensis, Tamarindus indica, Moringa oleifera*and *Sesbania grandiflora*among these five leaves phenolics content was highest in *ficusbengalensis*(17.51%) and crude protein content was highest in*leucenealeucocephala*(25.54%). Because of presence of high protein content and moderate tannin content make these tree leaves can be included as supplementary fodder for livestock.

Key words: Phenol, Tannin, Condensed Tannin, Tree Leaves

INTRODUCTION

Feeding of tree leaves to the livestock during scarcity is a common practice in India. These tree leaves not only provide a cheap source of nitrogen, energy and micro-nutrients but have also many other advantages like their wide spread on-farm availability and easy accessibility to

farmers, their laxative influence on the alimentary system, low degradability of nitrogen in the rumen, and above all, the scope of adding variety to the diet (Dey*et al*., 2008 and Pathak*et al.,* 2013). Most species of plants seem to be competent of synthesizing plant secondary metabolites. Plants with potent bioactive compounds are often characterized as both poisonous and medicinal, and a beneficial or an adverse effect may depend on the quantity eaten by the animal. Some tropical tree leaves with bioactive compounds (tannins, saponins, essential oils, or other aromatic compounds) are usually considered as advantageous (Scalbert, 1991; Chung *et al*., 1998). Hence present study was undertaken to asses the secondary metabolites in the various tropical tree leaves.

MATERIALS AND METHODS

The matured tree leaves were lopped and dried under the shade for 15 days in livestock complex of NTR College of Veterinary Science, Gannavaram. The dried tree leaves were stored in a dry place. A representative sample from each variety was taken for analysis of proximate principles and CT levels.

Estimation of Proximate Principles

Proximate analysis of tree leaves was carried out as per AOAC 1995. The extraction of phenols and condensed tannins (CT) were done as per Makkar (2000). 10 ml Aqueous acetone (70%) was mixed with 200 mg of finely ground leaf meal and the resultant was centrifuged at 3000g for 20 mts to get the supernatant. Phenol content was estimated using folin-ciocaletue method. Total phenolics consist of simple phenolic compounds or non-tannin phenolics and pure tannins or total tannin phenolics.

For estimation of tannins in the supernatant PVPP reagent was added which binds the tannins on the sample. Polyvinyl polypyrrolidone (PVPP; Sigma – Aldrich) has the property to bind tannins but not the simple phenolics. Two ml distilled (triple glass) water and 2 ml total phenolics extract were added to the test tube containing 200 mg PVPP and vortexed twice and filtered through Whatman No 1 filter paper. The filtrate was used to estimate nontannin phenolics, which was subtracted from total phenolics to obtain total tannins. The concentration of total phenolics and total tannins were expressed as tannic acid equivalent.

Estimation of CT

Three ml n-butanol – HCl (95:5 v/v) and 0.1 ml ferric ammonium sulphate (1%) were added to the test tube containing 0.5 ml phenolics extract. The test tube was closed with a glass marble and heated in a boiling water bath for 60 min. The absorbance of the red anthocyanidin products (i.e., condensed tannin) was measured at 550 nm and condensed tannin was expressed as leucocyanidin equivalent.

RESULTS AND DISCUSSION

Proximate composition of tree leaves

Crude protein content of different tree leaves were ranged from 11.09 to 25.54% on dry matter basis. Whereas crude fiber content of different tree leaves was ranged from 16.22 to 28.65% on dry matter basis. Among the five tree leaves analyzed *Leucaena leucocephala* has highest CP (25.54%) content and *Ficus benghalensis* leaves have lowest CP (11.9%).

Table 1: Proximate composition of locally available tanniferous herbage (DM basis)

S.No	Botanical name	DM	OM	CP	EE	CF	ASH	AIA	NFE
1	*Leucaena leucocephala*	90.93	89.7	25.54	9.93	16.22	10.3	2.25	38.01
2	*Ficus benghalensis*	93.95	91.61	11.9	4.89	28.65	8.39	3.16	46.17
3	*Tamarindus indica*	93.68	89.9	14.39	7.47	24.47	10.1	3.94	43.57
4	*Moringa oleifera*	91.65	89.77	20.15	8.77	17.93	10.23	4.13	42.92
5	*Sesbania grandiflora*	90.7	90.7	22.4	4.1	18.12	9.3	1.96	46.08

Present findings were in accordance with the finding of Dey and De, (2014) who reported the chemical composition of *Ficus benghalensis* which contained 10.9% CP, 3.9% EE, 14.8% Total ash, 42.5% NDF and 36.9% ADF. According to Dubey*et al*. (2011) the leaves of *Ficus benghalensis* contained 11.07% CP, 8.98% Ash, 3.45% EE, 59.83% NDF and 40.44% ADF also inaccordance with present findings. Contrary to the present findings, Reddy and Elanchezhian, (2008) reported 34.9% CP, 4.68% EE, 46.3% NFE, 7.47% CF and 6.63% total ash for the leaves of *Sesbania grandiflora.*

The differences in the chemical composition of various tree leaves could be attributed to the variation in agro-climatic conditions, season, stage of maturity, genetic makeup, soil fertility, harvesting methodology, post harvest storage and processing conditions like drying and /or grinding before analysis (Makkar, 2000, 2003; Min *et al*., 2003).

Phyto chemical composition of tree leaves

Among the leaves analyzed*Ficus benghalensis* leaves have highest phenol content (17.5%), followed by *Sesbania grandiflora* leaves with 10.28% phenol content. Reddy and Elanchezhian, (2008) and Panda *et al.* (1988) has reported 5.71% and 1.9% of CT, respectively for the leaves of *Sesbania grandiflora* which were lower compared to the values for the same reported in the present study (6.3%). Ally and Kunjukutty (2003) also reported lower values of total tannin (5.5%) and condensed tannins (2.9%) for subabul foliage than the values reported in the present study.

Jayanegara*et al*. (2011) and Baruah*et al*. (2018) also reported lower values of phenol, tannin and condensed tannins for different tree leaves compared to the values reported in the present study.

The levels of CT in plants vary greatly between species, within species, stage of development, locations and even years (Mehansho*et al.,* 1987). CT was found in higher concentration in tropical plants as light intensity and high temperature stress enhance its synthesis (Makkar and Becker, 1998).

Table 2: The total phenolics (TPH), tannins and condensed tannin (CT) content of locally available tanniferous herbage(on %DM basis)

S.No	Botanical name	Phenols	Non tannin phenols	Tannins	HT	CT
1	*Leucaena leucocephala*	9.72	0.53	9.19	3.99	5.2
2	*Ficus benghalensis*	17.5	2.61	14.89	3.59	11.3
3	*Tamarindus indica*	9.6	0.85	8.75	2.95	5.8
4	*Moringa oleifera*	6.93	0.76	6.17	1.67	4.5
5	*Sesbania grandiflora*	10.28	1.37	8.91	2.61	6.3

CONCLUSION

From the present study it was concluded that these locally available tree leaves can be included in the diet of Ruminants as they are rich in crude protein content and play an important role in feeding especially during scarcity periods. Inclusion of these nutrient rich tree leaves appear as cheap source of protein for animal production.

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