The Pharma Innovation Journal 2021; 10(4): 1097-1099

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(4): 1097-1099

www.thepharmajournal.com
Received: 03-02-2021
Accepted: 24-03-2021

K Sireesha
Assistant Professor, Department of Livestock Production Management, College of Veterinary Science, Garividi, Andhra Pradesh, India

CH Venkata Seshaiah
Professor and Head, LFC, NTRCVSc, Gannavaram, Andhra Pradesh, India

K Sudhakar
Professor and Head, Department of LPM, NTRCVSc, Gannavaram, Andhra Pradesh, India

DS Kumar
Professor and Head, Department of ANN, NTRCVSc, Gannavaram, Andhra Pradesh, India

R Vinoo
Professor and Head, Department of AGB, NTRCVSc, Gannavaram, Andhra Pradesh, India

Corresponding Author:
K Sireesha
Assistant Professor, Department of Livestock Production Management, College of Veterinary Science, Garividi, Andhra Pradesh, India

Estimation of proximate and chemical composition of locally available tropical tree leaves

K Sireesha, CH Venkata Seshaiah, K Sudhakar, DS Kumar and R Vinoo

DOI: https://doi.org/10.22271/tpi.2021.v10.i4p.6146

Abstract
Present study was carried out to analyse the proximate and chemical composition of five tropical tree leaves which are locally available in and around Krishna District. The trees selected for analysis were *Psidium guajava, Musa paradisiaca, Acacia nilotica, Moringa oleifera, Azadirachta indica*. Among the analysed samples *Moringa oleifera* leaves have highest CP content (20.15%) where as *Psidium guajava* have lowest CP content (6.92%) on dry matter basis. Phenol, tannin and condensed tannin content of all the leaves were analysed in the present study. Phenol content was ranged from 6.93 to 17.51% in the estimated samples. Among all the tree leaves *Psidium guajava* leaves have highest condensed tannin (10.7%) content, while *Musa paradisiaca* has lowest condensed tannin (4.2%) content. From the study it was concluded that these tree leaves were not only rich in crude protein also have high concentrations of secondary metabolites (phenols, tannins, CT) which help in improvement of growth when they are included in the animal diet.

Keywords: Phenol, tannin, condensed tannin, tree leaves

Introduction
As per the livestock census 2016 India has 199 million of cattle and 100 million of buffaloes. To meet the demands of these growing animal population tree leaves provide best alternative source of nutrition as the land availability for cultivation of fodders is declining and tree foliage has become a significant feed source and is considered as fodder bank that continuously supply fodder round the year and significantly contribute to filling feed gap during dry periods in feed resource limited regions of the world (Gutteridge and Shelton, 1998) [9].

In the present study five common trees in Krishna district area were selected and an attempt has been made to find out the proximate principles, and various phenolic fractions of their leaves for assessing their potential in feeding ruminant animals. The tree leaves selected for the study were *Psidium guajava*, *Musa paradisiaca*, *Acacia nilotica*, *Moringa oleifera*, *Azadirachta indica*.

Materials and methods
Present study was conducted in Krishna district of Andhra Pradesh, at Livestock farm complex, NTR College of Veterinary science, Gannavarm during 2019 to 2020.

Leaves collection and processing
Trees such as *Psidium guajava, Musa paradisiaca, Acacia nilotica, Moringa oleifera, Azadirachta indica* were selected for the study. 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 phenol fractions.

Estimation of proximate principals and phenol fractions
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

The proximate composition and chemical composition (Phenol, Tannin and condensed tannin content) of different tree leaves were analyzed and presented in table1 &2 respectively

Proximate composition

Crude protein content of tree leaves varied from 6.92% to 20.15% on dry matter basis. Highest CP content was observed in *Moringa oleifera* tree leaves. Among all the leaves analysed *Acasia nilotica* leaves have more crude fibre content(23.93%).

Table 1: Proximate composition of locally available tree leaves (DM basis)

S. No	Botanical name	DM	OM	CP	EE	CF	ASH	AIA	NFE
1	*Psidium guajava*	95.02	93.49	6.92	2.61	21.6	6.51	2.85	62.36
2	*Musa paradisiaca*	93.07	88.67	16.2	5.59	21.36	11.33	5.16	45.52
3	*Acacia nilotica*	92.66	87.64	16.97	11.6	23.93	12.36	5.38	35.14
4	*Moringa oleifera*	91.65	89.77	20.15	8.77	17.93	10.23	4.13	42.92
5	*Azadirachta indica*	96.83	88.53	17.82	2.32	21.35	11.47	2.98	47.04

Similar to the results of present study, Bhatta *et al*. (2005) [4] reported that *Azadirachta indica* leaves contained 14.5% CP, 39.5% NDF, 28.5% ADF, 3.36% EE and 5.12% Ash, According to the reports of Dubey *et al*. (2011) [7] the leaves of *Psidium guajava* contained 10.54% CP, 10.02% Ash, 3.83% EE, 38.19% NDF and 24.22% ADF. Chemical composition of tree leaves reported in the present study also broadly comparable with the earlier results reported (Senani *et al.*, 1997; Reddy *et al.*, 2008; Dey *et al.*, 2006) [16, 14, 6].

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) [13].

Chemical composition of locally available tree leaves

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

S. No	Botanical name	Phenols	Non tannin phenols	Tannins	HT	CT
1	*Psidium guajava*	13.26	1.12	12.14	1.44	10.7
2	*Musa paradisiacal*	12.34	2.82	9.52	5.32	4.2
3	*Acacia nilotica*	17.51	4.24	13.27	4.87	8.4
4	*Moringa oleifera*	6.93	0.76	6.17	1.67	4.5
5	*Azadirachta indica*	11.14	1.93	9.24	1.94	7.3

Compared to the present study, Dubey *et al*. (2011) [7] reported slightly higher values of CT for *Psidium guajava* leaves (11.99%). Rubanza *et al*. (2005) [15] analyzed the tree leaves from six species of Acacia and reported that the total phenols were in the range of 9.9-28.1% while, total tannins were found to be in the range of 8.4-25.6%. The observed values in the present study are also within this range.

Contrary to present findings phenol, tannin and condensed tannin content of different tree leaves reported by Giridhar *et al*. (2019) [8] and Chander Datt *et al*. (2008) [5] in multipurpose trees in subtropical humid climate of India are lower than the values reported in the present study. Jayanegara *et al*. (2011) [10] and Baruah *et al*. (2018) [3] reported lower values of phenol, tannin and condensed tannins for different tree leaves compared to the values reported in the present study.

CT was found in higher concentration in tropical plants as light intensity and high temperature stress enhance its synthesis (Makkar and Becker, 1998) [11]. The variation in the polyphenolic compounds levels observed in the present study might be due to differences in soil, agro climatic conditions, species of fodder tress grown, stage of leaf harvest etc, compared to the results reported in different areas of the world

Conclusion

From the present study it was concluded that these tree leaves have potential nutrient composition as they are rich in crude protein content and also rich in secondary metabolite like phenols, CT which play an important role in growth improvement in addition to their antioxidant capacity. Hence these tree leaves can be included in the diet of animals to decrease the cost of feeding and also as source of nutrition during scarcity periods.

Acknowledgement

Authors are thankful to Sri Venkateswara Veterinary University (SVVU), and livestock farm complex (LFC), NTR College of Veterinary Science, Gannavram for providing

funding and facilities for conducting research.

References

1. 20th Livestock Census Department of Animal Husbandry Dairying and Fisheries, Ministry of Agriculture, Government of India 2019.
2. AOAC. Official Methods of Analysis. 16th edition. Association of Official Analytical Chemists, Washington, D C 1995.
3. Baruah L, Malik P K, Kolte AP, Dhali A, Bhatta R. Methane mitigation potential of phyto sources from Northeast India and their effect on rumen fermentation characteristics and protozoa *in vitro*. Veterinary World 2018;11(6):809-818.
4. Bhatta R, Vaithiyanathan S, Singh NP, Shinde AK, Verma DL. Effect of feeding tree leaves as supplements on the nutrient digestion and rumen fermentation pattern in sheep grazing on semi-arid range of India-1. Small Ruminant Research 2005;60:273-280.
5. Chander Datt, Datta M, Singh NP. Assessment of fodder quality of leaves of multipurpose trees in subtropical humid climate of India. Journal of Forestry Research 2008;19(3):209-214.
6. Dey A, Narayan D, Sharma K, Pattanaik AK. Evaluation of condensed tannins from tropical tree leavesand its impact on *in vitro* nitrogen degradability of groundnut cake. Animal Nutrition and Feed Technology 2006;6:215-222.
7. Dubey M, Dutta N, Banerjee PS, Pattanaik AK, Sharma K, Singh M. Effect of Condensed Tannins Supplementation from Tanniferous Tree leaves on *In vitro* Nitrogen and Substrate Degradation. Animal Nutrition and Feed Technology 2011;11:115-122.
8. Giridhar K, Prabhu T, Singh K, Nagabhushana V, Thirumalesh T, Rajeshwari Y *et al*. Chemical Composition, Tannins and In Situ Degradation Characteristics of Selected Tree Leaves. International Journal of Livestock Research 2019;9(1):174-186.
9. Gutteridge RC, Shelton HM. The role of forage tree legumes in cropping and grazing systems. In: Forage Tree Legumes in Tropical Agriculture (Eds. R.C. Gutteridge and H.M. Shelton). Tropical Grassland Soc. Aust. Inc 1998.
10. Jayanegara A, Wina E, Soliva CR, Marquardt S, Kreuzer M, Leiber F. Dependence of forage quality and methanogenic potential of tropical plants on their phenolic fractions as determined by principal component analysis. Animal Feed Science and Technology 2011;163:231-243.
11. Makkar HPS, Becker K. Do tannins in leaves of trees and shrubs from Africa and Himalayan region differ in level and activity. Agroforesty System 1998;40:59-68.
12. Makkar HPS. Quantification of tannins in tree and shrub foliage. In: Makkar H P S (Editor) A Laboratory Manual. Kluwer Academic Publishers, 2003, 102.
13. Min BR, Barry TN, Attwood GT, McNabb WC. The effect of condensed tannins on the nutrition and health of ruminants fed fresh temperate forages: a review. Animal Feed Science Technology 2003;106:3-19.
14. Reddy DV, Elanchezhian N. Evaluation of tropical tree leaves as ruminant feedstuff based on cell contents, cell wall fractions and polyphenolic compounds. Livestock Research for Rural Development 2008;20(5):50-55.
15. Rubanza CDK, Shem MN, Otsynia R, Bakengesa SS, Ichinohe T, Fujihara T. Polyphenolics and tannins effect on *in vitro* digestibility of selected Acacis species. Animal Feed Science and Technology 2005;119:129-142.
16. Senani S, Rai RB, Saha SK, Padhi MK. Nutritive value of Gliricidia for goats. Indian Journal of Animal Nutrition 199714:286-287.