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The present thesis embodies the chemical and biochemical investigation of polyphenolics from *Anogeissus pendula* Edgew. (Fam. Combretaceae) and *Ficus glomerata* Roxb. (Fam. Moraceae). Polyphenolics, the proanthocyanidins are most common secondary metabolites in plant, with variable molecular weights, structure and complexity. Though their chemical nature and behavior is enigmatic but they are well known for their interaction with protein and metal ions on their ingestion, on account of multiple hydroxylation in molecules. Therefore not only the amount of phenolics is important but also their molecular structure concerns in relation to their biological activity. It is very much imperative to understand the type and nature of proanthocyanidins and their biological significance for designing strategy, for feeding with our natural resource of trees and shrubs to livestock for better production.

The work has been partitioned in five chapters as follows:-

Chapter I: Introduction the polyphenolic, encompassing their types variation in molecular structure analytical tools etc. It also includes relevance of proanthocyanidin in animal nutrition for national livestock wealth. In fact the livestock are under nourished or in malnutrition due to deficit fodder and feed supply. There is yawning gap between demand and supply. The tree leaves are nutritious and may be in corporate with low grade roughage. But the utilization of tree leaves in regular animal feed is always apprehensive, due to antiquality/antinutritional constituents. Among them proanthocyanidins are of main concerns. Therefore, knowledge of their structure, status
and biological function in native top feed *Anogeissus pendula* Edgew. and *Ficus glomerata* Roxb. assisted prior to their inclusion in feed to bridge the gap of demand and supply.

Chapter II: Nature of polyphenolics of *Anogeissus pendula* Edgew.

The chapter describes the isolation and characterization of four compounds coded as AP-4, AP-3, AP-2 and AP-1 with the help of various color reactions, chemical degradation and spectral data leading to identify them as:-

(i) (2R, 3R)-(+)-Gallocatechin-(4β→8)₄-(2R, 3R)-(+)-gallocatechin (AP-4).

Yield 106.2mg, molecular formula C₉₀H₇₄O₄₂, m.p. 280-82°, and M+H 1827 (protonated FABMS)
(ii) 3-O-galloyl-(2S, 3S)-(-)-epicatechin-(4α→8)[3-O-galloyl-(2S, 3S)-(-)-epicatechin
(4α→8)]2-(2S, 3S)-(-)-epicatechin (AP-3).

Yield 109.2mg, molecular formula C₈₁H₆₂O₃₆, m.p. 270-72° and M+H 1611 (protonated
FABMS)
(iii) (2S,3S) [6- {2S,3S} 3”，5”-dihydroxy, 6”-methoxy dihydrochromone} 3’,4’,5’,5-tetrahydroxy, 7-methoxy 3-O-8 dihydro biflavone] 3-O-8 [ 6-{(2S,3S) 3”，5”-dihydroxy, 6”-methoxy dihydro chromone} 3’,4’,5’3,5-penta hydroxyl 7-methoxy dihydroflavonol] (AP-2).

Yield 310mg, molecular formula C_{78}H_{62}O_{39}, m.p 290-2° and M+H 1623 (protonated FABMS)
(iv) \((2R,3R)-5,7,3',4',5'-\text{pentahydroxy dihydroflavanol-3-O-(2''-O-galloyl)-}\beta-\text{D-glucopyranoside (AP-1)}\).

Yield 447.1mg, molecular formula \(\text{C}_{28}\text{H}_{26}\text{O}_{17}\), m.p. 240-242° and \(\text{M}+\text{H} \ 635\) (protonated FABMS)

The pharmacological studies, with this compound revealed its neuroprotective nature.
Chapter III: Nature of polyphenolics of *Ficus glomerata* Roxb.

The chapter describes the isolation and characterization of six compounds coded as FRA-1, GA-5, GA-4, GA-3, GA-2 and GA-1 with the help of various color reactions, chemical degradation and spectral data leading to identify them as:

(i) \((2S:3S)-(-)\)-epicatechin-(4α→8)\((2R:3R)-(+)-catechin\) (FRA-1).

Yield 116.8mg, molecular formula \(C_{75}H_{62}O_{30}\), m.p. 260-2\(^\circ\) and \(M+H, 1443\) (protonated FABMS)
(ii) \((2R, 3R)\) bis 3-O-galloyl 7,3'-dimethoxy dihydroquercetin (GA-5).

Yield 200mg, molecular formula \(C_{48}H_{38}O_{22}\), m.p 240-2\(^\circ\) and M+H 967 (protonated FABMS).
(iii) (2S,3S) [7-O-7]-Bis 3-O-galloyl, 5-methoxy dihydroquercetin (GA-4).

Yield 389mg, molecular formula C_{46}H_{34}O_{21}, m.p. 280-2^\circ and M+H 923 (protonated FABMS)
(iv) (2R, 3R)-3-O-galloyl-(+)-catechin-(4β→8)\_3-(2R, 3R)-3-O-galloyl-(+)-catechin (GA-3). Yield 520mg, molecular formula C\textsubscript{88}H\textsubscript{66}O\textsubscript{40}, m.p. 266-8\(^\circ\) and M+H, 1763 (protonated FABMS).
(v) \((2R, 3R)\)-[IA6-IIA8, IIA6-IIIa8]-tri-(3-O-trans-caffeoyl)-dihydromyricetin (GA-2).

Yield 454mg, molecular formula \(C_{72}H_{39}O_{33}\), m.p. 256-8° and M+H1443 (protonated FABMS).
(vi) (2R, 3R)-[IB2'-IIA8, IIB2'-IIIA8]-tri 3'-O-methyltaxifolin (GA-1).

Yield 205mg, molecular formula C_{48}H_{38}O_{21}, m.p. 200-2\textdegree and M+H 951 (protonated FABMS).
Chapter IV: Effect of polyphenolics isolated from *Anogeissus pendula* and *Ficus glomerata* on some bovine rumen enzymes.

The chapter is composed of effect of the isolated and characterized polyphenolics constituents of *A. pendula* and *F. glomerata* on some ruminal enzymes like R-protease, R-cellulase (EC 3.2.1.4), Glutamic oxaloacetic transaminase(GOT) (EC 2.6.1.1), Glutamic pyruvic transaminase (GPT) (EC 2.6.1.2) and urease (EC 3.5.1.5) enzymes by in vitro experiments. The results displayed much variation in their behaviour with enzymes. The EC$_{50}$ to inhibit the 50% activity for R-GOT, R-GPT and R-cellulase changed with the nature of proanthocyanidins. The rumen proteolysis declined with the concentration. The isolated and characterized polyphenolics, virtually inhibited activity of all the enzymes tested. The activity varied with the molecular structures. Polyphenolics activity is a function of phenolic concentration in plant tissue and phenolic structure. Structure activity relationships are important in defining nutritional impact of proanthocyanidin or any other polyphenolics.

Chapter V: Status of phenolics and nutritional attributes in *Anogeissus pendula* and *Ficus glomerata*

This chapter contains the nutritional profile of *A. pendula* and *F. glomerata* in terms of crude protein (CP gKg$^{-1}$), Neutral detergent fibre (NDF gKg$^{-1}$), Acid detergent fibre (ADF gKg$^{-1}$), Acid detergent lignin (ADL gKg$^{-1}$), Hemicellulose (HC gKg$^{-1}$), Cellulose gKg$^{-1}$, *In Vitro* dry matter digestibility (IVDMD gKg$^{-1}$) and *In vitro* digestible crude protein (IVDCP gKg$^{-1}$) and antinutritional attributes assessed in terms of Total phenolics.
(TP gKg⁻¹), Condensed tannin (CT gKg⁻¹), Proanthocyanidin (PA gKg⁻¹), Protein precipitating capacity (PPC%), Protein precipitable phenolics (PPP%), Relative degree of polymerization (RDP%), Specific activity (SA%), Total proanthocyanidin ((TPA gKg⁻¹), Free proanthocyanidin (FPA gKg⁻¹), Protein bound proanthocyanidin (PBPA gKg⁻¹) and Fibre bound proanthocyanidin (FBPA gKg⁻¹). On thorough study of the results of different analysis it is evident that these tree leaves possessed adequate amount of crude protein and fibre required for maintenance and rumen ensalivations. The variation in phenolics and condensed tannin were pronounced in different months. The, chemical and biochemical assessment of proanthocyanidin of *A. pendula* and *F. glomerata* led to conclude that these tree leaves may be incorporated animal in lean period.