



Preliminary Phytochemical screening of bark of some important Trees of College campus with special reference to Tannin, Glycoside and their Medicinal Properties

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Abstract

The present study aims to utilization of natural phytochemicals present in tree barks. Different parts of plants like bark, wood, leaves, roots, fruits contain tannin and have variable quantity. Very less species have sufficient quantity of commercial importance. Tannin has commercial importance in various industries. During the study, isolation of tannin and test of Glycoside of trees of college campus were done. Bark of some trees have sufficient amount of tannin and glycoside. In our investigation tannin isolated from Mango, Neem, Gulmohar, Kadamba and Kachnar Barks. The range of Percentage of tannin found in the bark of some trees from 14.04% to 19.40% was recorded.

Keywords: Tannic acid, glycoside bark, angiosperm plants, college campus.

Introduction

Throughout human history, people have depends on natural products. People have always interested to find the products (especially from plants) which help to improve health and protect human being from diseases. The past 200 years have witnessed not only acceleration in the rate of extinction of plants and animals species, but also the erosion of traditional knowledge related to the medicinal importance and their uses¹. Therapeutic properties of herbal drugs are present in plant which varies according to their age and maturity². Among different chemical constituents polyphenols (flavonoids, phenolics, condensed and hydrolysable tannins) are major bioactive compounds responsible for the prevention of chronic diseases and health care³ water soluble tannin precipitate proteins from the solution⁴ Tannic acid is a type of polyphenol and commercial form of tannin. The presence of large number of phenol groups shows weak acidic characters. Soluble poly phenolic compounds which are widespread in plants and found in bark, galls, leaves, fruits and wood. Tannins are the fourth most abundant plant constituents after cellulose, hemicelluloses and lignin⁵. Vegetable tannin is a natural organic compound. The German word **tanna'** is used for an oak tree which have large amount of tannin. The term tannin is used for compound contains number of hydroxyl and other suitable groups⁶.

Tannins are glucosidal organic compounds, which gives acidic reaction and are astringent. Tannins have ability to bind with certain types of proteins, so it is economically important. They are useful in medicine due to astringent nature. Because of this characteristic, tannin-containing materials are in great demand. In plant kingdom tannin is found in gymnosperms and angiosperms. Tannin distributed in different families of dicot

and monocots. It is proved that some families of dicot have tannin free species⁷.

It is observed that tannic acid is brown coloured compound. Wood which is light in colour has less percentage of tannin. A tree has dark colour wood like brown, red or yellow give a high yield of tannin.

Topography: College is basically a Fort of Holker Emperor. The area of Fort is 52610 Sq. Meter. Holker Emperor constructed it in 1860; it was constructed by stone and lime. The college established in 1963 in the Fort. The college campus and surrounding area rich in flora. The annual rainfall was recorded 894.30 m.m. while, maximum temperature was recorded 42^o C in the month of May and minimum temperature recorded 10^oC in the month of December. The total trees recorded in college campus are 32 angiosperm trees. The bark of some important plant trees were collected and isolated during 2012-2013 (July-June).

Materials and Method

In college campus large number of trees having rich in tannin found in bark, leaves, fruits etc. Various tannin-rich agros-residues like Neem (*Azadirachta indica* bark) Kachnar (*Bauhinia variegata* Linn. Bark, fruits), Amla (*Phyllanthus ambluca*, bark, leaves and fruit), Amaltash (*Cassia fistula*, leaves), ber (*Zyzipu mauritiana*, leaves), Gulmoher (*Delonix regia* Bark, fruits) Eucalyptus (*Eucalyptus glogus*, bark and leaves), jamun (*Syzygium cumini*, bark and leaves), guava (*Psidium guazava*, bark and leaves), keekar (*Acacia nilotica*, leaves, bark), mango (*Magnifer aindica*, leaves), mulberry (*Moru smacroua*, leaves), tamarind (*Tamarindus indica*, seed) and pomegranate

(*Punica granatum*, rind) Kadamb (*Anthocephalus cadamba* bark) were collected. They were shade dried and powdered with grinder. The coarse particles were sieved out and the finely grind powder was used in the present study for estimation of Glycoside and Tannin.

Collected plant bark is powdered and placed in a test tube. Add distilled water and boil it. Now add few drops of 5% FeCl₃ solution. It gives green colored precipitates which show the presence of tannin in the sample⁸.

Another method to test the presence of tannic acid in tree bark is also can be followed. Tree bark is boiled in water and the extract now diluted in a ratio of 1:4. To this water solution add two or three drops of 10% FeCl₃ solution. A blue or green colour appears⁹. It shows the presence of tannic acid in sample. Plant parts treated with cold concentrated H₂SO₄ produce intense red colour shows presence of glycoside.

Extraction of Crude Tannins: In the laboratory weigh 5 grams of each of the tree barks. Then take 50 ml. of distilled water in 250-ml. beaker and boil it, then add first sample of bark to it and boil for ten minutes. Cool and filter the solution. To the filtrate add about one gram of solid CaCO₃ and boil till the tannic acid get precipitated and filtered. Calcium tannate obtained is hydrolyzed by warming with 3 ml. of conc. HCl. The tannic acid obtained is crystallized from water and weighed. Repeat the steps with other sample and recorded the observations.

Results and Discussion

In plants phytochemicals are naturally present. They give colour, flavor, smell and texture. A part from that, phytochemicals could prevent diseases including cancer and cardiovascular diseases and inhibit pathogenic microorganisms¹⁰. Nowadays the use of medicinal plants rapidly increases in medicine¹¹.

Preliminary phytochemical screening of barks of different plants revealed a moderate presence of the major secondary metabolites specially tannin and glycoside. The high tannin contain species are; monocot -Typhaceae, Najadeace, in dicots Anacardiace, combrataceae, ceasalpinoide, meliaceae, mimosidae, and solonaceae. Bark, leaf bud, seed root, and stem contain tannin. Similarly numbers of medicinal plants containing organic constituents in conjugation with a sugar moiety. It can be 1 or 2 such compounds are glycosides. They exert therapeutically significant effect on human and animals. Traditionally used in modern medicine because of their cardio tonic, purgative, analgesic, anti-arrhythmic, demulcent action.

The screening of tannin and glycoside in important trees were done in the laboratory, investigation report the data which are near to the standard tannin percentage (table 1).

Anthocephalus cadamba (Family: Rubiaceae) is commonly known as Kadamba-vriksha and is a genus of trees, distributed

throughout the India. A medium sized tree attaining 2 m girth and 18 m height, branches spreading horizontally and slightly enlarged at their junction with the main stem¹². It is cultivated all over India. Leaves are about 7.5-18 X 4.5-16 cm in size, flower head globes, yellow, solitary, terminal, 3.7 cm in diameter consisting of small, yellow or orange colored, scented flowers; fruits are fleshy, orange, globes pseudo carp of compressed angular capsules with persistent calyx; seeds small, muriculate¹³ Bark is greyish-green and irregular externally and reddish brown internally. In present study % of tannin is 14.04% which is almost in the slandered range. Thus the plant can produced significant amount of Tannin (table 2).

Azadirachta indica Linn. (Fam. Meliaceae); is commonly known as neem. Neem is an evergreen tree and height of the tree is 10-16m. The thickness of Bark depends on age of tree and part of tree. The surface of bark is rusty and rough. The inner surface is yellow. In present investigation percentage of tannin is 17.76% which is almost in the standard range. Thus the plant can produced significant amount of Tannin (table 2).

Bauhinia variegata Linn. Kachnar family ceasalpieace: It is a deciduous tree. The height of tree is 10 to 15 m. The outer surface bark is light brown and inner surface pink in color. Bark contain 25% tannin in our study we get 18.06 % is again in the range and have significant amount for commercial extraction of Tannin (table 2).

Delonixregia: Gulmohar Family: Fabaceae Gulmohar is a fast growing, tree and foliage bipinnate leaves. Pods are green and flaccid when young and turn dark brown due to tannin. Mature stem bark, 0.5 - 1 cm thick, greyish to pale brown, In our results shows 19.4% tannin extracted from bark (table 2).

*Mangifera indicia*Mango Linn.Anacardiaceae: Mango trees are grown abundantly everywhere in India. *Mangifera indica*, family Anacardiaceae, in local plants the potential sources ranged from 9.2 to 14 %

The mango bark contain 16% to 20% tannin and has been employed for tanning hides¹⁴ In present study we got 15.06% tannin which is in the standard range. We conclude that our college campus has good environment for the growth and development of trees yielded tannin for medicinal and commercial purposes (table-2).

Medicinal importance: Kademba- The leaves are used in stomatitis¹⁵ in hydrocoele¹⁶ and in pyorrhoea¹⁷. The decoction of leaves is good for ulcers, wounds and metrorrhea¹⁸. The leaves and bark contained 0.2 and 0.18% of alkaloids respectively¹⁹ and hentriacontanol, sitosterol²⁰ and two non-glycoside alkaloids Cadamine and Isocadamine²¹.

Kachnar- The tannin obtained from the bark of Kachnar produce brown colour dye. Medicinally, it is used in diarrhea, skin diseases and ulcers. The bark is astringent, antileptotic, anti goitrogenic, antitumor and used in fever and wound healing²² and also reported in obesity.

Delonixregia medicinal Bark and flower showed significant analgesic and anti-inflammatory activity.

Tannic acid is act as a clarifying agent in alcoholic drinks. It is also used as aroma ingredient in alcoholic as well as soft drinks.

The bark of mango is used in the treatment of Gum inflammation, throat diseases and also used in treatment of diphtheria and rheumatism.

Tannin rich food used in the treatment of HFE. It is a hereditary disease. In this disease excessive absorption of dietary iron, gives in a pathological increase in total body iron stores. Now a day's tannic acid very important in pharma industry. It accelerates blood clotting, decreases blood pressure, serum lipid level.

Neem -Tannins act as insect repellent.

Juices of Apple, grape and berry have high tannins. Tannins are added to juices to create a more astringent feel for the taste.

Table-1

S. No.	Botanical Name	Vernacular Name	Family	Tannin	Glycoside	Plant parts present
1	Abutilon indicum Linn.	Kanghi,	Malvaceae.	-	+	Root
2	Acacia Arabica Willd.	babool	Mimosaceae.	+	-	Bark
3	Acacia leucophloea	Safedbabool	Mimosaceae.	+	-	Bark
4	Aeglemarmelos Linn.	Bel	Rutaceae.	+	-	Root, leaves, bark, fruits.
5	Andrographispanicultata Wall.	Kaalmegha	Acanthaceae.	+	-	Whole plant
6	Anthocephaluscadamba Miq.	Kadam.	Rubiaceae.	+	+	Bark
7	Asparagus racemosus willd.	Shataavari	Asparagaceae.	-	+	Cladode
8	Azadirachtaindica Linn.	Neem	Meliaceae.	+	+	Leaves, bark.
9	Bauhinia variegata Linn.	Kachnaar.	Caesalpinaceae.	+	+	Bark, Stem.
10	Bombaxceiba Linn.	Sameal	Bombacaceae.	-	+	Whole plant
11	Cassia fistula Linn.	Amaltaas,	Caesalpinaceae	-	+	Flower.
12	Calotropisprocera R.Br.	Aakh,	Asclepiadaceae..	+	+	-----
13	Delonixregia Rafin.	Gulmohar	Caesalpinaceae.	+	-	Bark
14	Euphorbia hirta Linn.	Dudhi	Euphorbiaceae	+	-	-----
15	Ficusreligiosa Linn.	Peepal	Moraceae.	+	-	Bark
16	Mangiferaindica Linn.	Mango.	Anacardiaceae	+	-	Bark

Table-2

S.No.	Botanical name of plants	Local name	Weight of Bark in gms	Weight of tannic acid obtained in gm.	Percentage of Tannic acid.
1.	Anthocephalus Cadamba	Kadamba	5	0.702	14.04
2.	Azadirachta Indica Linn.	Neem	5	0.824	17.76
3.	Bauhinia Variegata Linn	Kachnar	5	0.903	18.06
4.	Delonix Regia Rafin.	Gulmohar	5	0.97	19.04
5.	Mangifera Indica Inn.	Mango	5	0.753	15.06

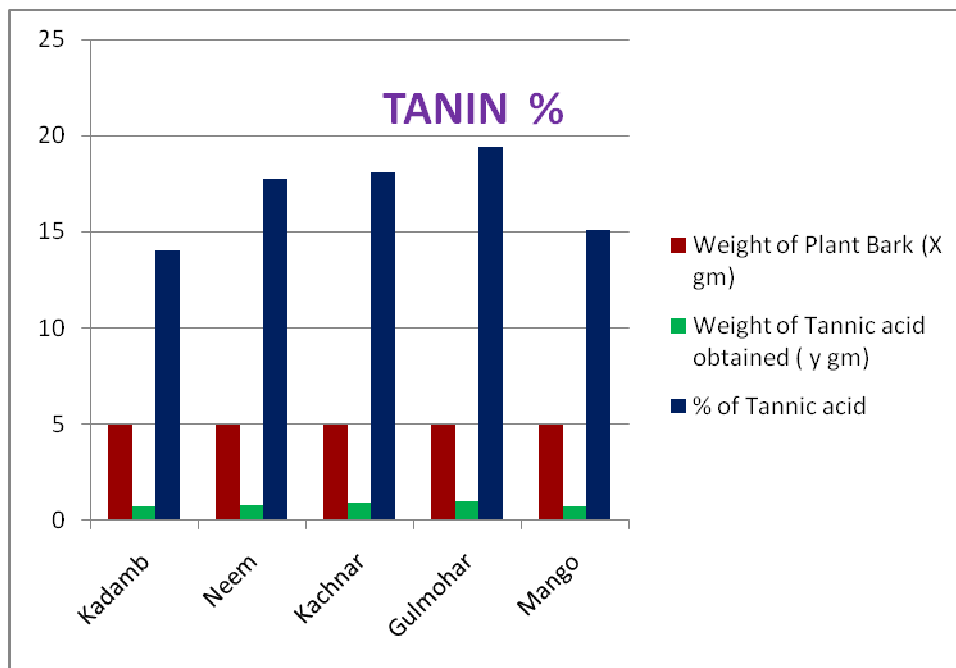


Figure-1
 Variation in Tannin percentage in Trees

Conclusion

Phytochemical screening of plant bark analyzed that glycoside and percentage of tannin which are used as medicinally and commercial purposes. Our results showed variation in percentage tannin. The figure number 01 indicates that high percentage of tannin in Gulmochar and low percentage in Kadamba.

References

1. Fetrow W.C. and Avoila I.R., In, The Complete Guide to Herbal Medicine. Spring house corporation, Springhouse, PA11-13 (2000)
2. Pandey A.K. and Kori D.C., Variations in tannin and oxalic acid content in *Terminaliaarjuna* (Arjuna) bark, Pharmacogn. Mag., **5**, 159-164 (2009)
3. Sati S.C., Sati N., Rawat U. and Sati O.P., Medicinal plants as a source of antioxidants, *Res. J. Phytochem.*, **4**, 213-224 (2010)
4. Nelson K.E.A.N. Pell, P. Schofield and S. Zinder, Isolation and cherecterisation of an anaerobic ruminal bacterium capable of degrading hydrolysable tannin, *Applied Environ. Microbiol.*, **61**, 3293-3298 (1995)
5. Rana N.K. and Bhat T.K., Effect of Fermentation System on the Production and Properties of Tannase from *Aspergillusnigervan* Tighem MTCC 2425, *Journal of Applied Microbiology*, **51**, 203-212 (2005)
6. Smith and Swain, Flavonoid compounds, In Florkin M., Mason H. S. *Comparative biochemistry III*, New York: Academic Press, 75-809 (1962)
7. Simon Mole, The Systematic Distribution of Tannins in the Leaves of Angiosperms: A Tool for Ecological Studies, *Biochemical Systematics and Ecology*, **21(8)**, 833-846 (1993)
8. Akinjogunla O.J., Yah C.S., Eghafona N.O. and Ogbemudia F.O., Antibacterial activity of leave extracts of *Nymphaea lotus* (Nymphaeaceae) on Methicillin resistant *Staphylococcus aureus* (MRSA) and Vancomycin resistant *Staphylococcus aureus* (VRSA) isolated from clinical samples, *Annals of Biological Research*, **1(2)**, 174-184 (2010)
9. Phytochemical Analysis and Antimicrobial Activity of *Scopariadulcis* and *Nymphaea lotus*, Jonathan Yisa, *Australian Journal of Basic and Applied Sciences*, **3(4)**, 3975-3979 (2009)
10. Renu S., Useful metabolites from plant tissue cultures, *Biotechnology*, **4(2)**, 79-93 (2005)
11. i HY, Cui L. and Cui M., Hot topics in Chinese herbal drugs research documented in PubMed/MEDLINE by authors inside China andoutside of China in the past 10 years: Based on co-word cluster analysis, *J. Altern. Complement Med.*, **15**, 779-785 (2009)
12. Kirtikar K.R. and Basu B.D., Indian Medicinal Plants. Bishen Singh Mahendra Pal Singh, Dehradun, 1251 (1984)

13. The Wealth of India; A dictionary of Indian Raw Materials and Industrial Products; Raw Materials, Publications and Information Directorate, CSIR New Delhi, **1**, 305 (1985)
14. H.I. El Sissi, Saleh, Sherbeiny Ansary, Local plants as potential sources of tannins and the isolation of their free and combined sugars *Qualitas Plantarum et Materiae Vegetabiles* 30 - IX -, **12(3)**, 262-268 (1965)
15. Vartak V.D., Kumbhojkar M.S. and Nipunge D.S., *Bull Med Ethnobot Res*, **8**, 77-84 (1987)
16. Mohan K. and Singh A.K., Ethno-medico-botany of Tharus, *Adv Plant Sci.*, **9**, 1-16 (1996)
17. Mandal S. and Yonzone R., Ethno botanical studies on some plants of Darjeeling, India, *EnvEcol.*, **6**, 849-854 (1988)
18. Prajapati N.D., Purohit S.S., Sharma A.K. and Tarun K., A handbook of Medicinal Plants, Agro House, Chopasani Rd. Jodhpur 53 (2003)
19. Handa S.S., Borris R.P., Cordell G.A. and Phillipson J.D., *J Nat Prod.*, **46**, 325-330 (1983)
20. Chowdhury A.R. and Labdev J., *SciTechnol*, 10A, 104 (1972)
21. Brown R.T., Chapple C.L., *Tetrahedron Lett number*, **19**, 1629-1630 (1976)
22. Kurien J.C., *Plants that Heal*. 4th Edn., Orient Watchman Publishing House, Pune, India (2001)