DRUGS CONTAINING TANNINS-AN OVERVIEW

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ABSTRACT

Tannins are one of the most widely occurring groups of natural substances in different families of higher plants. These secondary metabolites are present in solution form in the cell sap and also in distinct vacuoles. They have been known since long time as the astringent substances, having the capacity to combine with tissue proteins and precipitate them. They are, therefore, used in medicines for allied purposes or as mild antiseptics, in treatment of diarrhoea, and to check small haemorrhage. Commercially, they find extensive application in leather industry, when the skins of animals are treated with tannins to prevent the putrefaction. The present review is explained the detailed of tannins and tannin containing pharmacognostical drugs. Total this review explored the tannins structure, identified the drugs presenting the tannins and their uses (Pharmacological activity). Every crude drug having particular tannin constituents also identified here.

Keywords
Tannins, Secondary Metabolites, Antiseptics, Diarrhoea, Haemorrhage.
INTRODUCTION

Tannins are mainly present in the natural substances in various plants; it is one of the secondary metabolites. Chemically, they contain the mixture of complex organic substances in which polyphenols are present, generally with o-dihydroxy or o-trihydroxy groups on a phenyl ring. Normally, they have fairly high molecular weight and unlike alkaloids, are devoid of nitrogen.

Tannins form colloidal solutions with water and are non-crystalline substances; they show acidic reaction due to phenols. They are also soluble in alcohol, glycerine, dilute alkalies, but practically insoluble in organic solvents, tannins exhibit some specific chemical reactions.

1. Solution of tannin precipitates gelatin, and alkaloids.
2. Tannins are precipitated by salts of copper tin, and lead.
3. They are precipitated by strong potassium dichromate solution or chromic acid solution.
4. They show colour reactions with iron salts. Ferric chloride gives bluish-black or brownish-green colour; potassium ferricyanide with ammonia gives deep red colour.
5. Goldbeater’s skin test: Goldbeater’s skin is a prototype of untanned fresh skin of an animal and is obtained as a membrane from the intestine of ox. This membrane is treated with hydrochloric acid, rinsed with distilled water and then placed in tannin solution for 5 minutes. It is followed by washing with distilled water and putting in ferrous sulphate solution. A brown or black colour is developed on the skin due to tannin.
6. Tannins are precipitated by 2 percent solution of phenazone, the tannin solution being prepared with sodium acid phosphate.

Classification

The tannins are broadly classified into two groups based on complexity of their chemical nature and according to their behavior on dry distillation.

Hydrolysable tannins:

As the name indicates, these tannins are hydrolysed by acids or enzymes quickly and the products of hydrolysis are gallic acid or ellagic acids. On dry distillation, gallic acid and other components get converted to pyrogallol. They respond to ferric chloride solution, producing blue colour. The examples of hydrolysable tannins are gallotannin in nutgall, rhubarb, clove and chestnut; ellagitannin from oak, myrobalans and pomegranate bark.

Condensed tannins:

They are also called as non-hydrolysable tannins, phlobatannins or proanthocyanidins. They are much resistant to hydrolysis. They are related to flavonoid pigments, because they are formed via derivatives of flavones, like catechin or flavan-3-ol or flavan-3, 4-diol. Unlike the hydrolysable tannins, on treatment with enzymes or mineral acids, they are polymerized or decomposed into red coloured substances called phlobaphenes, which are insoluble in water and or decomposed into red coloured substances called phlobaphenes, which are insoluble in water and indicate the typical brownish-red colour of many plants and drugs.

On dry distillation they yield catechol. Tannins with ferric chloride produce brownish-green colour. They are distributed in different parts of plants. The green tea and hamamelis leaves; cinchona, cinnamon and wild cherry bark; male fern rhizome; cocoa, cola and areca seeds; pale and black catechu contain these types of tannins.

Depending upon the source of the tannins, various modified methods are used for extraction. Methyl alcohol, hot water, acetone and ethyl acetate are the common solvents used for extraction, the extract is filtered and dried under vacuum.
Pseudotannins
This is not as such a separate group of tannins, but may be treated as sub group because they do not obey to goldbeater’s skin test and is low molecular weight compounds. Chlorogenic acid in coffee and nuxvomica, ipecacuanchic acid in ipecacuanha and catechins in cocoa are examples of pseudotannins. The detection test for chlorogenic acid is carried out by extracting the drug with water and treating this extract with ammonia solution, followed by exposure to air, which leads slowly to formation of green colour.

Tannins Containing Drugs

Table No: 1 Hydrolysable Tannins.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Drug name and synonyms</th>
<th>Biological Source</th>
<th>Active Constituents</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Myrobalan (Harda)</td>
<td>Dried mature fruits of Terminalia chebula, (Combretaceae)</td>
<td>Chebulic acid, chebulagic acid, gallic acid</td>
<td>Astringent, stomachic, purgative, ingredient of triphala churna.</td>
</tr>
<tr>
<td>2.</td>
<td>Bahera</td>
<td>Dried ripe fruits of Terminalia beferica, (Combretaceae)</td>
<td>Gallic acid, chebulagic acid</td>
<td>Astringent, ingredient of triphala churna</td>
</tr>
<tr>
<td>3.</td>
<td>Arjuna</td>
<td>Dried stem bark of Terminalia arjuna (Combretaceae)</td>
<td>Ellagic acid, β-sitosterol</td>
<td>Cardiotonic, hypotensive.</td>
</tr>
<tr>
<td>4.</td>
<td>Tannic acid</td>
<td>Fermented oak galls which are grown on young twigs of Quercus infectoria (Fagaceae)</td>
<td>Gallic acid and glucose</td>
<td>Astringent for mucous membrane</td>
</tr>
<tr>
<td>5.</td>
<td>Amla (Indian goose berry)</td>
<td>Dried as well as fresh fruits of Emblica officinalis (Euphorbiaceae)</td>
<td>Vitamin C, phyllemblin, tannins</td>
<td>Diuretic, laxative, ingredient of Triphala and Chyavanprash</td>
</tr>
</tbody>
</table>

Table No: 2 Condensed Tannins.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Drug and Synonym</th>
<th>Biological Source</th>
<th>Active Constituents</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>Ashoka bark</td>
<td>Dried stem bark of Sarcace indica, (Leguminosae)</td>
<td>Catehol, ketosterol</td>
<td>Uterine tonic, oxytocic</td>
</tr>
<tr>
<td>7.</td>
<td>Black catechu(cutch)</td>
<td>Dried aqueous extract of heartwood of Acacia catechu, (Leguminosae)</td>
<td>Acacatechin, quercetin</td>
<td>Astringent for boils, skin eruptions, mainly used for commercial purposes</td>
</tr>
<tr>
<td>8.</td>
<td>Pale catechu, (Gambier)</td>
<td>Dried aqueous extract of leaves and young shoots of Uncaria gambier, (Rubiaceae)</td>
<td>Catechin, catechutannic acid</td>
<td>Astringent for treatment of diarrhea</td>
</tr>
<tr>
<td>9.</td>
<td>pterocarpus</td>
<td>Dried juice of the plant Pterocarpus marsupium (Leguminosae)</td>
<td>Kinotannic acid, kinored, K-pyrocatechin</td>
<td>Hypoglycemic, powerful astringent</td>
</tr>
</tbody>
</table>

**MYROBALAN[3]**

![Myrobalan seeds](image-url)
Synonyms
Chebulic myrobalan, Harde, Haritaki

Biological Source
It consists of dried, ripe, and fully matured fruits of Terminalia chebula Retzr belonging to family Combretaceae. It contains not less than 5.0% of chebulagic acid and not less than 12.5% of chebulinic acid.

Geographical Source
Myrobalan tree is found in the sub-Himalayan tracks from Ravi to West Bengal, Assam and in all deciduous forests of India, specifically in Madhya Pradesh, Maharashtra, Bihar and Assam.

Cultivation
It is found growing at an altitude of 1800m. It is not cultivated and fruits are collected from wild grown forest plants. It is a tree, 15-25m in height, and 1.5-2.5m in diameter. The tree is rounded, crowned with spreading branches and oxate leaves. It has yellowish-white flowers in the terminal spike.

Macroscopic Characters
- Colour: Fruits are yellowish-brown
- Odour: Odourless
- Taste: Astringent, slightly bitter and sweetish at the end
- Size: 20-25 mm long and 15-25mm wide
- Shape: ovate and wrinkled longitudinally

Extra Features
The fruits are hard and stony with single seed which is light yellow in colour and 15-320mm in length. The pulp of the fruit is non-adherent to the seed.

Chemical Constituents
Myrobalan fruits are an important source of tannin. Depending upon the geographical source, they vary in tannin content and the fruits collected from madras are very rich in tannin. The approximate analysis of the fruits is as follows:
- Moisture: 10%; Tannin: 25 to 32%;
- Water: insoluble matter: 40 to 50%

The tannins of myrobalan are of pyrogallol type, which on hydrolysis yield chebulic acid and d-galloyl glucose. Chebulagic, chebulinic, ellagic and gallic acids are the other contents of myrobalan. Myrobalan also contains glucose and sorbital. During the maturation of the tree, the amount of tannin decreases, whereas the acidity of the fruits increases.

![Fig: 3 Chebulic acid.](image-url)

Uses
Myrobalan is used mainly as an astringent, laxative, stomachic and tonic. The laxative property of myrobalan is due to anthracene derivative present in the pericarp. It is also an anthelmintic. Fruit pulp is used to cure bleeding. It is an ingredient of ayurvedic preparation 'Triphala', used for treatment of variety of ailments. Commercially, it is used in dyeing and tanning industry and also in treatment of water used for locomotives. Myrobalan is also used in treatment of water used for locomotives. Myrobalan is also used in treatment of piles and external ulcers.

During 93-94, 94-95 and 95-96 India has exported Myrobalan fruit extract to the extent of about Rs. 218 lakhs, Rs. 325 lakhs and Rs. 284 lakhs, respectively.
ARJUNA

Synonyms
Arjun bar, Arjun

Biological Source
Arjuna consists of dried stem bark of the plant known as Terminalia arjuna Rob, belonging to family Comberataeae. It contains not less than 0.02% of arjungenin on dried basis.\(^3\)

Geographical Source
The tree is common in Indian peninsula. It is grown by the side of streams and very common in Chotta-Nagpur region.\(^1\)

Cultivation and Collection
Arjuna is found as naturally growing plant in the dense forests. It is very common in Baitul in Madhya Pradesh and also in Dehradun. Arjuna can be successfully raised by sowing seeds or by means of stumps. The seeds take about 21 days for germination. It needs moist fertile alluvial loam and rainfall in the range of 75-190 cm. it grows satisfactorily upto 45\(^0\) C. the bark is also collected from wild growing plants and it is reported that yield per tree varies from 9 - 55kg.

Macroscopic Characters
- Colour: Colour of the outer side, as well as, inner side of bark is identical and is greyish-brown.
- Odour: None
- Taste: Astringent
- Size: The pieces of various-sizes, about 15 x 10 x 1 cm.
- Shape: Flats

Extra Features
The presence of the cork is not reported in the commercial drug. As arjuna is collected from the old trees, the cork gets removed due to exfoliation. The appearance of the transversely cut surface is dark brown with characteristic grayish shining patches.\(^1\)

Chemical Constituents
Arjuna contains about 15% of tannins (hydrolysable). It also contains triterpenoid saponin, arjunolic acid, arjunic acid, arjunogenin. In addition, it contains \(\beta\)-sitosterol, ellagic acid, and arjunic acid. The crystallisable compounds reported are arjunine and arjunetine. Arjunetin, arjunolone and arjunone are the flavonoids reported in arjuna bark. Calcium, aluminium and magnesium salts, along with colouring matter and sugar are the other constituents of arjuna.\(^3\)

Fig: 4 Arjuna bark.

Fig: 5 Constituents of Arjuna bark.
Chemical test: Ethereal extract of arjuna shows pinkish fluorescence under ultra-violet light.

Uses Arjuna bark is used as a cardiotonic. It is also styptic, febrifuge and antidysenteric. It possesses diuretic and tonic properties. The drug exhibits hypotensive action with vasodilation and decreased heart rate. The diuretic activity is due to arjunolic acid. Arjuna bark is used extensively in the tanneries and also as a timber.

Adulterants The dried bark of the plant Terminalia tomentosa is used as an adulterant for the drug. However, it can be distinguished from arjuna bark by fluorescence test. Ethereal extract of arjuna gives pinkish fluorescence, while T.tomentosa gives pale blue.

BAHERA

Synonyms Belleric myrobalan, Baheda, Bibhitak.

Biological Source It consists of dried ripe fruits of the plant Terminalia belerica Linn. Belonging to family Combretaceae, and should contain not less than 0.3% of ellagic acid and 0.75% of gallic acid on dried basis.
**Geographical Source**

The tree is found in all deciduous forests of India, up to an altitude of 1000 m. It is found in abundance in Madhya Pradesh, Uttar Pradesh, Punjab, Maharashtra, and also in Sri Lanka and Malaya.

**Cultivation and Collection**

Cultivation of the drug, though not done on commercial scale, can be carried out by sowing the seeds. The seeds can retain the viability for a year and their rate of germination is about 80%. The plant can also be raised by transplantation. It takes about 15-30 days for germination of seed. The maximum height of the plant is about 40 m and the girth is 2-3 m. The stem of the plant is straight and the leaves are broadly elliptic and clustered towards the end of the branches. Flowers are simple, solitary and in auxiliary spikes.

**Macroscopic Characters**

- **Colour**: Fruits are dark brown to black
- **Odour**: None
- **Taste**: Astringent
- **Size**: 1.3 to 2 cm in length
- **Shape**: Fruits are globular and obscurely 5 angled

The fruits are pulpy with hard and stony seeds.

**Chemical constituents**

The fruits contain about 20-30% of tannins and 40 to 45% water-soluble extractives. It also contains colouring matter. It contains gallic acid, ellagic acid, phyllemblin, ethyl gallate and galloyl glucose. The seeds contain non-edible oil. The plant produces a gum. It also contains most of the sugars as reported in mrobalan.

**Uses**

Bahera is used as an astringent and in the treatment of dyspepsia and diarrhea. It is a constituent of triphala. The purgative property of half ripe fruit is due to the presence of fixed oil. The oil on hydrolysis yields an irritant recipe. Gum is used as a demulcent and purgative. Oil is used for the manufacture of soap.

**AMLA**

![Fig: 8 Amla.](image)

**Synonyms**

Emblica, Indian goose berry, Amalki

**Biological Source**

This consists of dried, as well as fresh fruits of the plant Emblica officinalis Gaerth (Phyllanthus emblica Linn.), belonging to family Euphorbiaceae. It contains not less than 1.0% w/w of gallic acid calculated on dry basis.

**Geographical Source**

It is a small or medium size tree found in all deciduous forests of India. It is also found in Sri Lanka and Myanmar. The leaves are feathery with small oblong pinnately arranged leaflets. The tree is characteristic greenish-grey and with smooth bark.
Cultivation and Collection

It is grown by seed germination. It can also be propagated by budding or cutting. It does not tolerate the frost or drought. It is normally found up to an altitude of 1500 m. Commercially, it is collected from wild grown plants.

Nowadays, the newly released varieties are selected for better yield. These are known as Banarasi, Kanchan, Anand-2, Balwant, NA6, NA7 and BS-1. Seeds or seedlings are placed at a distance of 4.5x4.5 meters in red loamy or coarse gravelly soil. Proper arrangement for irrigation is required. Drip irrigation is most suitable. Fertilizers in the dose-range of 750-900 gms of urea, 1 kg superphosphate and 1-1.5 kg of potash per annum depending upon the quality of soil are sufficient. The above dose is divided into two equal parts, one part is applied in September/October while the other in April to May every year. Pruning is done regularly and only 4-6 branches about 0.75-1.0 meter above the ground are retained. Plants bear male and female flowers separately. Male flowers are reported in the axil of the leaf, in the bunches. While female flowers in the axil of the branches and are solitary. The extent of fertilization is 25-30% of flowers. Cultivated plants bear comparatively large fruits. The tree flowers in hot season and the fruits ripen during the winter.

Alternative crops to the extent of 7-8 years age of amal果树 can be undertaken. Black gram, tomato, gaur, sunflower, ground nut etc. are the common alternative crops of choice. Fruits each of 25-30-35 gm can be expected from healthy plants each plant can bear 175-300 kg of fruits. Plant hormones like gibberlic acid or planofix in the range of 30-50 ppm are most useful to increase the yield per hectare.

Pesticides:

Diathase – 78, DDT are useful to get rid of rust, blue mold or other fungal infections.

Macroscopic Characters

 Colour – green changing to light yellow or brick red when matured.
 Odour – none
 Taste – sour and astringent
 Size – 1.5 to 2.5 cm in diameter
 Shape – the fruits are depressed, globose

Extra Features

Fruits are fleshy obscurely 4 lobed with 6-trygonus seeds. They are very hard and smooth in appearance.

Chemical Constituents

Amla fruit is a rich natural source of vitamin C and contains 600 to 750 mg per hundred g of the fresh pulp. Apart from that, fruits also contain about 0.5% fat, phyllemblin and 5% tannin. Amla fruits are also rich in mineral matters lime phosphorus, iron and calcium. It contains appreciable amount of pectin. The fresh fruits contain about 75% moisture. The fruits are dehydrated and stored. It is found that vitamin content of dried fruits is not lost considerably. It may be due to the presence of tannins, which retards oxidation of vitamin C.

Chemical Tests

1. Alcoholic or aqueous extract of the drug gives blue colour with ferric chloride solution.
2. To aqueous extract add gelatin and sodium chloride milky white colour is produced.
3. To the aqueous extract of Amla add lead acetate remove ppt by filtration. To the filtrate add solution of 2:6 dichlorphenol – indophenols colour disappears.

Uses

Amla fruits are largely used in Indian medicine. It is used as an acrid, diuretic, refrigerant and laxative. Dried fruits are given in diarrhea and dysentery. They are also administered in jaundice, dyspepsia and anaemia along with iron compound. Fruits are also used in preparation of inks, hair oils and shampoo. It is reported that fixed oil from fruits possesses the property of promoting hair growth. Seeds of the fruits are given in treatment of asthma and bronchitis. The leaves are used as fodder. Alcoholic extract of the fruit is anti-viral. It is a popular ingredient of ‘Triphala’ and ‘chyawanprash’. Amla, being a rich source of vitamin C, is considered important to slow the ageing radicals. Vitamin C is a scavenger of free radicals which breaks them down. It has an antioxidant synergism with vitamin E (which prevents peroxidation of lipids). Amla is a major ingredient of ancient Ayurvedic preparation “chyawanprash”, believed to prolong ageing process (longevity) and to keep young.
CONDENSED TANNINS

ASHOKA

Fig: 9 Ashoka.

Synonyms
Ashoka, Ashoka bark

Biological Source
Ashoka consists of dried stem bark of the plant Saraca indica Linn. Belonging to family Leguminosae.

Geographical Source
It is distributed in south Asia, i.e. in Malaysia, Indonesia, Sri Lanka and India.

Cultivation and Collection
It is one of the most sacred trees of the Hindus. It is frequently grown as an ornamental and avenue tree in India. It is not found to be cultivated on commercial scale. It can be easily propagated from seeds. It is found growing suitably at an altitude of 750 m in the Himalays, Khasi, Garo and Lushai hills. It is an evergreen tree, bearing dark red coloured flowers reaching a maximum height of 9 m. Bark is collected from the plant by making transverse and longitudinal incisions.

Macroscopic Characters
Colour – outer side is dark brown or almost black with warty surface. Internally, it is reddish-brown with fine longitudinal striations.
Odour – None
Taste – Astringent and bitter
Size and shape – It occurs in the form of channels of various sizes upto 50 cm length and 1 cm in thickness. The bark is marked by bluish and ash white patches of lichens.

Microscopic Characters
Phellem (cork) and phelloderm form the outer most layers. Cortex shows the presence of stone cells. Sclerenchymatous patches are reported in phloem. Medullary rays are multiseriate.

Chemical Constituents
Ashoka contains about 6% tannin, haematoxylin, ketosterol, saponin and organic calcium and iron compounds. The tannins are found to be of condensed type. The ketosterol seems to be androgenic in nature. Leucopelargonidin and leucocyanidin have been isolated from the ashoka bark. The activity of drug is due to the presence of steroidal component and the calcium salt. Bark is found to contain powerful oxytocic principle, a phenolic glycoside P₂.

Uses
It is used as uterine tonic and also a sedative. It stimulates the uterus by the prolonged and frequent uterine contractions. It is also suggested in all cases of uterine bleeding, where ergot can also be used. It is reported to have a stimulant effect on the endometrium and ovarian tissue and useful in menorrhagia.
BLACK CATECHU

Fig: 10 Black catechu.

Synonyms
Kattha, Cutch, Khadir-catechu, Catechu

Biological Source
It consists of dried aqueous extract prepared from the heart-wood of Acacia catechu Wild and Acacia chundra Willd, family Leguminosae. Plants used for preparation of catechu are grown in India and Myanmar.

History
Possibly, the use of black catechu could be traced back in history from the time of chewing betel leaf, in which it has been used as adjuvant. In old days, it was used by women as a colouring agent for the feet. Since 15th century, this natural material has been exported to Europe.

The old information about Catechu is by a Portuguese writer Garcia de Orta in 1574. Dr. Wrath first used the scientific process to extract catechu, and showed that catechu consists of two parts, viz. kattha and cutch.

Manufacture of Black Catechu
In the traditional method, the separated heart wood is boiled in earthen vessels, fired by sap wood, till all the soluble portion is extracted from it. It is cooled naturally till it is converted to semisolid mass. On cooling less soluble fraction separates out. The latter is removed as kattha and semi solid mass as cutch. It is transferred to rectangular pits, at the bottom of which sand and clay are placed. It is kept for several days, till the cutch part is absorbed by clay and solid mass, called kattha, is taken out and moulded into blocks. In modern methods, the red heart wood obtained by felling the tree and separating the bark and sapwood, is cut into chips mechanically and put into extractors. The steam is passes through the drug for maximum extraction. The extract is concentrated under vacuum and is cooled by refrigeration. It is then centrifuged to isolate the cake of kattha. The cake is moulded in desired sizes and dried in proper condition. By this way, a good quality of kattha, ready for market is obtained. The mother liquor, left behind during centrifugation is concentrated, which on cooling gives cutch.

Description
Colour – Light brown to blacked
Odour – None
Taste – Very astringent
Size – About 2.5 to 5 cm
Shape – cube or irregular fragments of broken cubes or brick shaped pieces

Extra Feature
The cubes as well as brick shaped pieces of catechu show the presence of vegetable debris and break with a short fracture. The broken pieces are angular with pale cinnamon-brown colour. It is friable and porous.

Chemical Constituents
Black catechu contains about 10% of acacatechin. It is distereoisomer of 5, 7, 3, 4 tetrahydroxy flavan-3-ols. Acacatechin is also known as acacia catechin. Acacatechin undergoes oидation to catechutanic acid in presence of water and the latter constitutes about 30% of the drug. The other contents of black catechu are catechu red, quercetin, gum and quercitrin. Black catechu does not contain chlorophyll and also the fluorescent – substance present in pale catechu.
Chemical Tests
1. Because of the presence of catechin, black catechu gives pink or red colour with vanillin and hydrochloric acid.
2. Catechin when treated with hydrochloric acid produces phloroglucinol, which burns along with lignin to give purple or magenta colour. For this purpose, tannin extract is taken on match stick dipped in hydrochloric acid and heated near the flame.
3. Lime water when added to aqueous extract of black catechu gives brown colour, which turns to red precipitate on standing for some time.
4. Green colour is produced when ferric ammonium sulphate is added to dilute solution of black catechu. By the addition of sodium hydroxide, the green colour turns to purple.

Standards
a) Ash value – not more than 6% w/w
b) Water insoluble residue – not more than 25% w/w
c) Alcohol insoluble residue – not more than 90% w/w

Uses
Kattha is used as an astringent externally for boils, skin eruptions and ulcers. It is also used in cough and diarrhea. Kattha has cooling and digestive properties.
Cutch is not much used medicinally, but for other purposes like dyeing and colouring, water softening, reducing the viscosity of drill mud, removal of mercaptans from gasoline, protective agent for fishing nets and in the manufacture of ion-exchange resins.¹

PALE CATECHU

Synonyms
Gambier, Gambir, Catechu

Biological Source
It is a dried aqueous extract of the leaves and young shoots of Uncaria hambier Roxburgh, belonging to family Rubiaceae.

Geographical Source
The plant is native of South East Asian regions like Arachipelago in Malaysia. It is also cultivation in Singapore and Indonesia.

Cultivation and Collection
The cultivation is carried out in fields upto 170 m height and propagation is done by sowing seeds in damp soil. Nursery beds are raised and after 9 months, the seedlings are transplanted in open fields.
The first harvesting is done when the plant reaches a height of 2 m. the plant yields the drug upto 20 years. The leaves and young shoots collected are boiled in pot called Cauldron, made up of wood and with iron bottom for 3 hours and decotion obtained is concentrated till it becomes a pasty mass with yellowish-green colour. This mass is moulded in cubes and dried.

Description
Pale catechu occurs as reddish-brown coloured cuboidal mass quite friable in nature. When broken, it shows cinnamon brown colour and porou nature. The drug has no odour, but highly astringent taste which first appears bitter and then sweet. When mounted in water, it shows minute acicular crystals.²³

Chemical Constituents
The drug contains condensed tannins in the form of catechins (7-33%), catechutannic acid (22-50%), and catechu red. The drug also contains quercetin and gambier fluorescin.
Chemical Tests
1. It gives test for catechin by dipping a match stick in hydrochloric acid and warming it near flame similar to black catechu.
2. Test for gambier-fluorescin : The drug is extracted with alcohol and sodium hydroxide is added to extract, followed by addition of few drops of light petroleum. The mixture is shaken and kept for some time. Green fluorescence is observed in light petroleum layer.
3. Small quantity of drug is warmed with chloroform and filtered in porcelain dish and evaporated to dryness. Due to presence of chlorophyll, it shows greenish yellow colour.
4. With a mixture of vanillin and hydrochloric acid, it shows pink or red colour.

Uses
It is used as an astringent in treatment of diarrhea and also as a local astringent in the form of lozenges. Pale catechu is mainly used in dyeing and tannin industries, and also for protecting the fishing nets.

CONCLUSION
Tannins are natural substances present in plant sources only. The various types of tannins like hydrlysable and condensed tannins. The Tannins containing crude drugs like amla, pale catechu, black catechu, arjuna, myrobalan, and ashoka was discussed. Accoding to solubility we find out the tannins. The tannins chemical reaction based uses also very useful for researcher. So this review is based on the secondary metabolites on the tannins and tannins presenting crude drugs and chemical constituents of tannins in different crude drugs and uses. This review article is more useful in future researchers for further works.

REFERENCE