

TANNINS

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INTRODUCTION

- One of mostly widely occurring group of natural substance in plant kingdom.
- Tannins are phenolic compounds that precipitate proteins.
- Within angiosperm, dicot plants have more tannins than that if the monocot plants.
- Some families rich in tannin of dicot are: Leguminosae (acacia), Combretaceae (myrobalan), Myrtaceae.
- They are secondary metabolites present in the vacuoles or surface wax or cell sap of the plant.
- The tannins serve as a protective agent during the plant growth.

- The tannins present at these sites do not interfere with the plant metabolism and they act only after the death or the breakdown of the cell.
- The most common locations of tannins in a plant include bark, wood, fruit, fruit pods, leaves, roots and plant galls.
- They have been known since long time as the astringent substances, having the capacity to combine with tissue proteins and precipitate them.
- Therefore, they are used in medicines for allied purposes or as mild antiseptics, in treatment of diarrhoea, and to check small haemorrhages.

- Commercially they find extensive application in leather industry, when the skins of animals are treated with tannins to prevent the putrefaction.
- Chemically they are mixtures of a very diverse group of oligomers and polymers, generally with the O-dihydroxy or O-trihydroxy group on a phenyl ring.
- These have higher molecular weight and do not contain any nitrogen.
- Tannins belong to the phenolic class and all phenolic compounds either primary or secondary are in one way or another, formed via the shikmik acid pathway.

- Tannins are mainly biosynthesized from three large classes of secondary metabolites in plants which are:
- Nitrogen containing compounds,
- Terpenoids and
- Phenolics.
- Tannins form colloidal solutions with water and are non-crystalline substances.
- In solution, they show acidic reaction due to phenols.
- They are also soluble in alcohol, glycerine, dilute alkalies, but practically insoluble in organic solvents except acetone.

Chemical reactions

- Tannins exhibit some specific chemical reactions.
- 1. Solution of tannin precipitates gelatin, and alkaloids
- 2. Tannins are ppted by salt of copper, tin and lead.
- 3. They are ppted by strong potassium dichromate solution or chromic acid solution.
- 4. They show colour reaction with iron salts. Ferric chloride gives bluish-black or brownish green colour and potassium ferricyanide with ammonia gives deep red colour.

- 5. Gold beater's skin test: Gold beater'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 HCl, rinsed with DW and then placed in tannin solution for 5 minutes. It is followed by washing with DW and putting in ferrous sulphate solution. A brown or black colour is developed on the skin due to tannin.
- 6. Tannins are ppted by 2% solution of phenazone, the tannin solution being prepared with sodium acid phosphate.

CLASSIFICATION

- Broadly classified into two groups based on complexity of their chemical nature and according to their behaviour on dry distillation.
- 1. Hydrolysable Tannins
- 2. Condensed Tannins

1. Hydrolysable Tannins

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

2. CONDENSED TANNINS

- Non-hydrolysable tannins, phobatanins or proanthocyanidins.
- Resistant to hydrolysis
- Related to flavonoid pigments, because they are formed via derivatives of flavones, like catechin or flavan-3-Ol or flavan-3,4-diols.
- 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 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 contains these types of tannin.
- Depending upon the source of the tannins, various modified methods are used for extraction. Me-OH, hot water, acetone and ethyl acetate are the common solvents used for extraction, the extract is filtered and dried under vacuum.

PSEUDOTANNINS

- Not a separate group of tannins, but may be treated as sub group because they do not obey to goldbeater's skin test and are low molecular weight compounds.
- Chlorogenic acid in nux vomica and coffee, ipecacuanhic acid in ipecacuanha and catechin 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.



THANK YOU