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## Phytochemical analysis of fruit pulp of *Albizia saman* (Jacq.) Merr, fabaceae

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### Abstract

The fruit pulp of *Albizia saman* (Jacq.) Merr, a Fabaceae member is analyzed to estimate the phytochemicals present in it. Studies of crude powder prepared from the fruit pulp of *A. saman* is a rich source of medicinally active compounds like Terpenoids, Flavonoids, cardiac glycosides, catalases.

**Keywords:** *Albizia saman* (Jacq.) Merr, cow tamarind, phytochemical analysis, catalase

### 1. Introduction

Human race depends on plants not only for food but for medicines also. Researchers are in continuous quest for identifying various plants and exploring its uses. Different parts of the same plant are used as medicine for various ailments. But still many plants remain unexplored for food as well as medicine. Phytochemical analysis helps us to understand the potential of a particular plant and such compounds become medicines for many difficult ailments such as cancers, vitamin deficiencies, heart ailments, auto immune diseases etc (Wadood A *et al.*, 2013) [7]. Many of these plant derived compounds have been identified as a rich source of antioxidants, which can prevent cell damages. Routine use of antioxidant rich food can even prevent different types of cancers disease (Upadhyay NK, 2010) [6].

This paper deals with the qualitative and quantitative phytochemical analysis of fruits of *Albizia saman* (Jacq.) Merr. for different components present in its fruit.

#### 1.1 *Albizia saman* (Jacq.) Merr.

*Albizia saman* (Jacq.) Merr. is a species of flowering tree in the Fabaceae family and is commonly called as rain tree, monkey pod, cow tamarind, Shiriisha in Sanskrit, Thoogumoonji maram in Tamil and Chakaravaraty maram in Malayalam. This tree is very distinctive with its huge canopy, which can grow if unobstructed to 200 feet. This tree is native to Central and South America and is also naturalized in Hawaii. It has a wide distribution in Asia, Africa, North America, South America, Central America and Caribbean (Staples GW & Elevitch CR, 2006) [5]. The tree is called monkey pod tree perhaps because monkeys are fond of the pods and sit in the tree eating them. The pods and flowers are nitrogen rich and when they fall and decay, this nitrogen goes into the soil. Farmers like this tree because they are nitrogen fixers and they also grow quickly, the durable hardwood is sustainable and eco-friendly, so can be used for furniture and hand-carved bowls and decorative pieces (Staples GW & Elevitch CR, 2006) [5].

The pods are more or less straight with conspicuously thickened edges, 12 - 20cm long, 1 - 2cm wide and 1.2cm thick. The fruit is a legume and pods contains a sweet liquorice like, brownish, sweet flavored pulp which is edible and a lemonade like drink is made from this pulp (Staples GW & Elevitch CR, 2006) [5].

#### 1.2 Uses of *Albizia saman* (Jacq.) Merr.

It is commonly planted as a shade tree as it has a large canopy. The pods and flowers are nitrogen rich and farmers like the tree because they are nitrogen fixers and they also grow quickly. The durable hardwood is sustainable and eco-friendly, so can be used for furniture and hand-carved bowls and decorative pieces. The leaves and pods of rain tree are used as food due to the high nutritive content. A huge number of uses are documented for *A. saman*. It naturalizes generously almost everywhere it has been introduced. The different therapeutic activities of *A. saman* have been reported. The leaves are chewed to relieve toothache. Root decoction is used as hot baths for stomach cancer. An infusion of the leaves is given as a remedy for constipation. A decoction of inner bark and leaves is given for diarrhea. *A. saman* shows several bioactive compounds which possess various medicinal properties such as

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antioxidants, antibacterial, anti-diabetic, analgesic, anti-ulcer, insecticidal, antifungal, and cytotoxic activities (Staples GW & Elevitch CR, 2006) [5].

## 2. Materials and Methods

### 2.1 The fruit sample collection and identification

The fruits of *Albizia saman* (Jacq.) Merr. was collected from the premises of S.D. College, Alappuzha. The plant identification was performed using various floras and also by getting consultation with the experts in angiosperm taxonomy. Collected fruits were subjected to different processes for studying its activity.

### 2.2 Phytochemical analysis

Screening of phytochemical constituents of the plant was done using standard procedures described. Both qualitative and quantitative analysis are done to understand the composition of different compounds present in the fruits.

### 2.3 Test for Flavonoids

A portion of crude powder was heated with 10 ml of ethyl acetate over a steam bath for 3 min. The mixture was filtered and 4 ml of the filtrate was shaken with 1 ml of dilute ammonia solution and a yellow coloration indicated the presence of flavonoids.

### 2.4 Test for Tannins

0.5 g of the crude powder was stirred with 10 ml of distilled water. This was filtered and ferric chloride reagent was added to the filtrate and the presence of a blue-black precipitate indicates the presence of tannins.

### 2.5 Test for Terpenoids

The extract was mixed with 2 ml of chloroform and concentrated  $H_2SO_4$  (3 ml) is carefully added to form a layer. A reddish brown coloration of the interface confirms the presence of terpenoids.

### 2.6 Test for Steroids

0.5 g of crude powder was dissolved in 5 ml of methanol. 1 ml of the extract was treated with 0.5 ml of acetic acid anhydride and cooled in ice. This was mixed with 0.5 ml of chloroform and 1 ml of concentrated sulfuric acid was then added carefully by means of a pipette. At the separation level of the two liquids, the formation of a reddish-brown ring is considered as an indication of the presence of steroids.

### 2.7 Test for Cardiac Glycosides

5 ml of each methanolic plant extract was mixed with 2 ml of glacial acetic acid containing one drop of ferric chloride ( $FeCl_3$ ) solution followed by the addition of 1 ml concentrated sulfuric acid. Brown ring formed at the interface indicates the presence of deoxysugar of cardenolides. A violet ring may appear beneath the brown ring, while in the acetic acid layer, a greenish ring may also form just gradually throughout the layer.

### 2.8 Test for Alkaloids

Methanolic extract was warmed with 2%  $H_2SO_4$  for two minutes. It is filtered and a few drops of Dragendorff's reagents were added and a red precipitate formation indicates the presence of alkaloids.

### 2.9 Test for Phenols

A 2 ml of test solution in alcohol is added with one drop of neutral ferric chloride (5%) solution. Formation of an intense blue color indicates the presence of phenols.

### 2.10 Test for Sterols

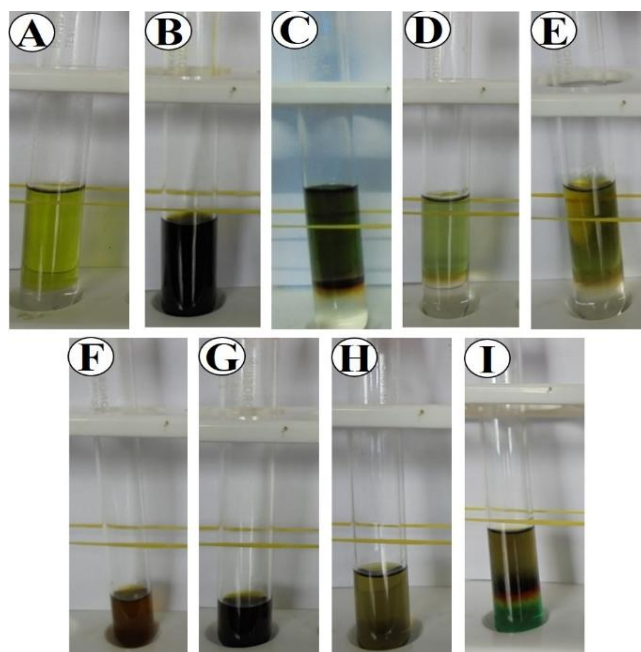
A 2 ml of test solution and a minimum quantity of chloroform added with 3-4 drops of acetic anhydride and one drop of concentrated  $H_2SO_4$ . Formation of purple color changes into green color that indicates the presence of sterols.

### 2.11 Test for Carbohydrate

To 1 ml of the extract few drops of Molish's reagent was added and mixed well. Followed by the addition of 1 ml concentrated  $H_2SO_4$  to form a layer below the aqueous solution. A brown ring formation is at the interface indicating a positive result.

## 3. Results and discussion

The result of phytochemical analysis of qualitative determination of various phytochemicals in *A. saman* showed positive results for flavonoids, tannins, terpenoids, steroids, cardiac glycosides, alkaloids, phenols, carbohydrates and negative result for sterols.



**Fig 2:** Qualitative analysis of phytochemicals; A) Flavonoids B) Tannins C) Terpenoids D) Steroids E) Cardiac Glycosides F) Alkaloids G) Phenols H) Sterols I) Carbohydrates

**Table 1:** Various compounds found to be present in the fruit pulp of *A. saman* during qualitative and quantitative techniques

Name of the compound	Qualitative	Quantitative
Flavonoids	✓	✓
Tannins	✓	
Terpenoids	✓	
Steroids	✓	
Cardiac Glycosides	✓	
Alkaloids	✓	
Phenols	✓	
Sterols	x	
Protein		✓
Carbohydrate	✓	✓
Fat		✓
Catalase		✓

The phytochemical screening and quantitative determination showed that the fruit pulp is rich in proteins, carbohydrates, fats, flavonoids, terpenoids, cardiac glycosides, alkaloids, phenols and catalase (Fig.1, Table 1). It contains 64.6 mg

carbohydrates and 1.26 mg protein, which makes it a good food source which can be explored for extraction of carbohydrates as well as protein. It also contains 47mg free fatty acid as oleic acid and it is a monounsaturated omega-9 fatty acid with many health benefits like super charger of brain and muscles (Neha Babbar, 2015). 2.12 mg flavonoids are present in 1 gm of this fruit pulp. Flavonoids are now used in various nutraceutical, pharmaceutical, medicinal and cosmetic applications. They are also well established for their ability to act as antimicrobial, anti-inflammatory, anticancer and antioxidant agents by influencing the cellular function (Panche AN *et al.*, 2016) [3]. The fruit pulp contains Catalase enzyme with activity of  $1.1 \times 10^{-3}$  U/Sec and it could be used as a medicine to release oxidative stress of cells through which it will act as a new source of natural antioxidant (Lee SE *et al.*, 2003) [2]. The fruit pulp contains terpenoids, which are reported to have properties like anti-inflammatory, anti-viral, anti-malarial, inhibition of cholesterol synthesis and anti-bacterial. Hence this could be used as a medicine with wide range of application. Plants having alkaloids are used in medicines for reducing headache and fever (Babbar N., 2015) [1]. These are attributed for medicinal properties like antibacterial, analgesic properties and many more. Alkaloid containing compounds are also used as pesticides. Cardiac glycosides present in the extract help in the treatment of heart failure and atrial arrhythmia, and latest studies have shown their ability to promote the proliferation of normal cells and inhibit cancer cells (Prassas I & Diamandis EP, 2008) [4].

#### 4. Conclusion

The fruit pulp extract of *Albizia saman* (Jacq.) Merr was found to contain cardiac glycosides and other phytochemicals which is of great medicinal properties. These compounds may be analyzed to find their specific uses. This study leads to the need of further detailed search on the immense potentials of this plant.

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