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Original article

Phytochemical Evaluation of Two Varieties of *Syzygium Cumini* l. Skeels

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ABSTRACT:

Aim: *Syzygium cumini* has been traditionally used in folk medicine for various purposes, namely for diarrhoea, obesity, menstrual disorders and the bark as an astringent. The fruits are highly recommended for diabetes. Two different varieties of jamun fruits are available in the market, hence the present study was conducted to compare them. In the present study the leaves, bark, fruit and seeds of *Syzygium cumini* wild and hybrid varieties were compared for their phytochemical content. **Methodology and Result:** Phytochemical screening for the secondary metabolite was performed with acetone, chloroform, petroleum ether and ethanol as solvents by using standard methods. **Conclusion:** The results suggested that the phytochemical properties of the plant for curing various ailments. Biochemical analysis for flavonoids was performed by Shinoda test for steroids. Salkowski test and Liebermann burchard test was performed for alkaloids using ferric chloride.
Significance and impact of study: The findings from the study provide support for the use of various parts of the plant in traditional medicine and for its further investigation.

Keywords: *Syzygium cumini*, phytochemical screening, Traditional medicine, Acetone, secondary metabolite.

1. INTRODUCTION

Syzygium cumini, is a evergreen tree that flowers in the month of March/April and fruits ripens during July to August and is a rich source of antioxidants. It is preferred for its antidiabetic properties. In the market two types of Jamun fruits are available: wild species with smaller fruit and more astringent, and the second one is a hybrid oval shaped larger fruit which is juicier, fleshy and less astringent. Most prefer the largeronefor its taste. It has been traditionaly used in folk machine for various elements. Jamun is the common name. Jamun is a large evergreen tree of the Indian subcontinent, producing blue black coloured berries. The scientific name of Jamun is *Eugenia jambolana* Lam or *Syzygiumcumiini* Lin, belongs to the family Myrtaceae. The medicinal plant is used in the treatment of various diseases in particular, diabetes, cough, dysentery & inflammation. The plant has been viewed as an antibiotic plant. They are fairly rich in protein and calcium. Java plums are rich in sugar, mineral salt vitamins C, which fortified the beneficial effect of vitamin C. The aim of the study is to determine the phytochemical content of various parts of the pkant, namely fruit pulp, seed, bark and leaf of both the plants [1, 2].

2. MATERIALS AND METHODS

Collection of plant material:

These plant materials were collected from single tree Ponneri, Thiruvallur District, Tamil Nadu. The collected fruit were wasted under running tap water to remove the dust particles, fruit pulp was separated, seeds were cleaned thoroughly, dried at room temperature for one or two weeks and finally crushed into the power by using an electrical blender [3, 4].

Preparation of plant extracts:

The powered samples were percolated by using soxhlet apparatus successively with the organic solvent such as acetone, ethanol, chloroform, petroleum ether respectively. The extracts were evaporated to near dryness and redissolved and stored for analysis [5].

Screening for phytochemical compounds:

The extracts were analyzed for the presence of phyto-constituents such as alkaloids, tannins saponins, flavonoids, phenols, terpenoids, steroids, amino acids, coumarin and anthraquinone glycosides according to the standard methods as seen in figure 1.

Fig 1: Various phytochemical analysis included; Phenol , Flavonoid, Terpenoids, Saponin, Protein, Tannin, Anthracyanine, Cardiac

glycosides, Quinones, Carbohydrates, xanthoprotein, Glycosides, Alkaloids, Leucoanthocyanin, Oxalate, , Terpenoids, Amino acids, Coumarin.

Test for alkaloids [Mayer's Test]:

Mercuric chloride 1.36 g was dissolved in 60ml and 5g of potassium iodide were dissolved in 10ml of distilled water respectively. These two solvents were mixed and diluted to 100ml using distilled water. To 1ml of acidic aqueous solution of test samples few drops of the reagent was added. Formation of white or pale precipitates showed the presence of alkaloids.

Test for Tannins:

Ferric Chloride Test: The extract (50 mg) is dissolved in 5 ml of distilled water. To this few drops of neutral 5% ferric chloride solution was added. A dark green or back coloured precipitate indicated the presence of tannins.

Test for saponins:

A drop of sodium bicarbonate was added in the test tube containing 50 ml of the sample. The mixture was vigorously shaken and kept for two minutes. A honeycomb-like froth was formed and it showed the presence of saponins.

Test for Flavonoids:

In a test tube containing 0.5 ml of alcoholic extract of the sample, 5-10 drops of diluted Hydrochloric acid and a small amount of Mg or Zn was added and the solution was boiled for a few minutes. Appearance of reddish pink or dirty brown colour indicated the presence of flavonoids.

Test for Phenols:

To 1 ml of the alcoholic solution of the sample, 2 ml of distilled water followed by a few drops of the 10% aqueous solution of ferric chloride were added. Formation of blue or deep green colour indicated the presence of phenols.

Test for Terpenoids:

In a test tube, 2 ml of chloroform and 5-10 drops of conc.H2SO4 were added to 1 mg of extract and observed for a reddish brown colour that indicated the presence of terpenoids.

Test for steroids [Salkowski's Test]:

About 100 mg of dried extract of the sample was dissolved in 2 ml of $CHCl_3$, H_2SO_4 was added carefully to form a lower layer. A reddish brown colour at the interface was an indication of a steroidal ring.

Test for Amino acids:

Sample 2 ml was treated with the 1-2 drops of ninhydrin reagent. Appearance of violet or purple colour indicated the presence of amino acids.

Test for cardiac glycoside:

Sample 5 ml of was treated with 2 ml of glacial Acetic Acid containing one drop of ferric chloride solution. This was underlayered with 1 ml of concentrated sulfuric acid. A brown ring at the interface indicated the sugar characteristics of cardiac glycosides. A violet ring may appear below the ring while in the acetic acid layer, a greenish ring may be formed.

Test for quinone:

One ml of the sample was mixed with 1 ml of concentrated H_2SO_4. The appearance of red colour shows the presence of Quinone.

Test for protein:

The extract powder (50 mg) was dissolved in 10ml of distilled water and filtered through Whatman No. 1 filter paper .To the filtrate, 1ml of 40 % NaOH was added. Then, 1 or 2 drops of 2% copper sulphate solution was added. Appearance of violet colour indicated the presence of protein.

Test for Xanthoprotein:

Sample 1 ml was treated with few drops of concentrated HNO3 and NH3 solution. formation of reddish Orange precipitate indicates the presence of xanthoproteic.

Test for glycosides:

Sample (50mg) was mixed with concentrated H_2SO_4 (5ml), then heated for 3 minutes, thereafter it was filtered, and mixed with 0.5 ml of 10% NaOH and allowed to stand for 3 minutes, Appearance of reddish Brown precipitate indicated the presence of glycosides.

Test for carbohydrates:

To 2ml of extract, 3 drops of α -naphthol (20% in ethanol)was added. Then 1ml of concentrated sulfuric acid was added along the side of the test tube. Reddish violet ring at the junction of the two layers indicated the presence of carbohydrates.

Test for Leucoanthocyanins:

Sample 1 mg was treated with 0.5 ml of concentrated HCL (12M). A change in colour of the solution was observed. Then the solution was warmed for 15 minutes in a water bath. Any further changes in colour was observed within an hour and was compared with the control.A strong red or violetcolour indicated the presence of Leucoantho cyanins.

Test for coumarin:

Sample 2 ml was taken in a test tube. The mouth of the tube was covered with filter paper treated with 3ml of IN NaOH solution. Test tube was placed for a few minutes in boiling water and then the filter paper was removed and examined under the UV light for yellow fluorescence that indicated the presence of coumarins.

Test for anthocyanin:

To 1 ml of plant extract 2 ml of HCL and 2 ml of NH3 added. Appearance of pink colour indicated the presence of anthocyanin.

Test for oxalate:

Two mL of the extract was treated with a few drops of glacial Acetic and appearance of dark green colouration indicated the presence of oxalates.

3. RESULTS

In the present study, the phytochemical screening was done with ethanol, acetone, petroleum ether, chloroform and aqueous extracts of the leaves, bark, seed & fruit pulp of the plant *Syzygium cumini* wild and hybrid. The results of

phytochemical screening studies shows the *Syzyguim cumini* seeds, leaf, bark and fruit pulp were rich in alkaloids, tannins, saponins, flavonoids, phenols, terpenoids, steroids and amino acids (Tables 1 to 10).

Phytochemical screening of different parts of the *Syzygiumcumini* plantnamely leaf, bark, seed and fruit pulp using standard procedure to identify the phytoconstituents and results are presented in tables. The extracts revealed the presence of alkaloids, tannins, saponins, flavonoids, cardiac glycosides, phenols, steroids. terpenoids and phytosterols were present in bark, seed and pulp extract but absent in leaf extract. Anthocyanin glycosides were present in leaf and bark extracts but absent in seed and pulp extracts [6, 7].

Table 1: Phytochemical constituents found in ethanol extract of *S. cumini* wild

S.No	Metabolites	Leaf	Bark	Seed	Fruit pulp
1	Alkaloid	+	+	+	-
2	Flavonoid	+	+	+	-
3	Phenols	+	+	+	+
4	Tannins	+	+	+	+
5	Steroids	+	+	+	+
6	Carbohydrates	+	+	+	-
7	Saponins	-	+	-	+
8	Glycoside	-	+	+	+
9	Protein	+	+	+	+
10	Anthracyanine	+	+	+	+
11	Oxalate	+	+	+	-
12	Leucoanthocyanin	+	+	-	-
13	Xanthoprotein	+	_	+	+
14	Quinine	+	+	+	+
15	Cardiac Glycoside	+	+	+	+
16	Terpenoids	+	+	+	+
17	Amino acids	+	+	+	+
18	Coumarin	+	+	+	+

Table 2: Phytochemical constituents found in acetone extract of *S. cumini* wild

S.No	Metabolites	Leaf	Bark	Seed	Fruit pulp
1	Alkaloid	+	+	+	-
2	Flavonoid	+	+	+	-
3	Phenols	+	+	+	+
4	Tannins	+	+	+	+
5	Steroids	+	+	+	+
6	Carbohydrates	+	+	+	-
7	Saponins	-	+	-	+
8	Glycoside	-	+	+	+
9	Protein	+	+	+	+
10	Anthracyanine	+	+	+	+
11	Oxalate	+	+	+	-
12	Leucoanthocyanin	+	+	-	-
13	Xanthoprotein	+	_	+	+
14	Quinine	+	+	+	+
15	Cardiac Glycoside	+	+	+	+
16	Terpenoids	+	+	+	+
17	Amino acids	+	+	+	+
18	Coumarin	+	+	+	+

Table 3: Phytochemical constituents found in petroleum ether extract of *S. cumini* wild

S.No	Metabolites	Leaf	Bark	Seed	Fruit pulp
1	Alkaloid	+	+	+	-
2	Flavonoid	+	+	+	+
3	Phenols	+	+	+	+
4	Tannins	+	-	+	+
5	Steroids	-	+	+	+
6	Carbohydrates	-	-	+	+
7	Saponins	-	+	+	+
8	Glycoside	+	-	+	+
9	Protein	-	-	+	-
10	Anthracyanine	-	-	-	-
11	Oxalate	+	+	+	-
12	Leucoanthocyanin	-	-	-	-
13	Xanthoprotein	-	-	+	+
14	Quinine	+	-	+	+
15	Cardiac Glycoside	+	+	+	-
16	Terpenoids	+	+	+	+
17	Amino acids	+	+	-	+
18	Coumarin	+	+	-	-

Table 4: Phytochemical constituents found in Chloroform extract of *S.cumini* wild .

S.No	Metabolites	Leaf	Bark	Seed	Fruit pulp
1	Alkaloid	+	+	+	-
2	Flavonoid	+	+	+	-
3	Phenols	+	+	+	+
4	Tannins	+	+	+	+
5	Steroids	+	+	+	+
6	Carbohydrates	+	+	+	-
7	Saponins	-	+	-	+
8	Glycoside	-	+	+	+
9	Protein	+	+	+	+
10	Anthracyanine	+	+	+	+
11	Oxalate	+	+	+	-
12	Leucoanthocyanin	+	+	-	-
13	Xanthoprotein	+	_	+	+
14	Quinine	+	+	+	+
15	Cardiac Glycoside	+	+	+	+
16	Terpenoids	-	-	-	-
17	Amino acids	-	-	-	-
18	Coumarin	-	-	-	-

Table 5: Phytochemical constituent found in aqueous extract of *Syzygium cumini* wild .

S.No	Metabolites	Leaf	Bark	Seed	Fruit pulp
1	Alkaloid	+	+	+	-

2	Flavonoid	+	+	+	-
3	Phenols	+	+	+	+
4	Tannins	+	+	+	+
5	Steroids	+	+	+	+
6	Carbohydrates	+	+	+	-
7	Saponins	-	+	-	+
8	Glycoside	-	+	+	+
9	Protein	+	+	+	+
10	Anthracyanine	+	+	+	+
11	Oxalate	+	+	+	-
12	Leucoanthocyanin	+	+	-	-
13	Xanthoprotein	+	_	+	+
14	Quinine	+	+	+	+
15	Cardiac Glycoside	+	+	+	+
16	Terpenoids	-	-	-	-
17	Amino acids	-	-	-	-
18	Coumarin	-	-	-	-

Table 6: Phytochemical constituents found in ethanol extract of *S. cumini* hybrid .

S.No	Metabolites	Leaf	Bark	Seed	Fruit pulp
1	Alkaloid	-	+	+	-
2	Flavanoid	+	-	-	+
3	Phenols	+	-	+	-
4	Tannins	+	+	-	+
5	Steroids	-	+	+	-
6	Carbohydrates	-	+	+	+
7	Saponins	-	+	-	-
8	Glycoside	+	-	-	+
9	Protein	+	-	+	-
10	Anthracyanine	+	+	-	-
11	Oxalate	-	-	-	-
12	Leucoanthocyanin	-	+	-	-
13	Xanthoprotein	+	_	+	+
14	Quinine	+	+	-	-
15	Cardiac Glycoside	-	+	-	+
16	Terpenoids	-	+	+	+
17	Amino acids	-	+	-	-
18	Coumarin	+	+	-	-

Table 7: Phytochemical constituents found in acetone extract of *S. cumini* hybrid

S.No	Metabolites	Leaf	Bark	Seed	Fruit pulp
1	Alkaloid	+	+	+	+
2	Flavonoid	+	+	-	-
3	Phenols	+	+	+	+
4	Tannins	+	+	+	+
5	Steroids	+	+	+	+
6	Carbohydrates	+	+	+	+
7	Saponins	+	+	+	+
8	Glycoside	+	+	+	+
9	Protein	-	+	+	+
10	Anthracyanine	+	+	+	+
11	Oxalate	+	-	-	-
12	Leucoanthocyanin	+	+	+	+
13	Xanthoprotein	+	+	+	+
14	Quinine	-	+	-	+
15	Cardiac Glycoside	+	+	+	-
16	Terpenoids	+	+	+	+
17	Amino acids	+	+	-	-
18	Coumarin	+	+	+	-

Table 8: Phytochemical constituents found in petroleum ether extract of *S.cumini* hybrid.

S.No	Metabolites	Leaf	Bark	Seed	Fruit pulp
1	Alkaloid	-	+	-	+
2	Flavonoid	-	-	+	-
3	Phenols	-	-	-	+
4	Tannins	-	+	-	+
5	Steroids	-	-	-	-
6	Carbohydrates	+	+	-	-
7	Saponins	-	-	-	-
8	Glycoside	-	-	-	-
9	Protein	-	-	+	-
10	Anthracyanine	-	-	-	+
11	Oxalate	-	-	+	-
12	Leucoanthocyanin	-	+	-	+
13	Xanthoprotein	-	-	-	-
14	Quinine	-	-	-	-
15	Cardiac Glycoside	-	-	-	-
16	Terpenoids	+	-	-	-
17	Amino acids	-	+	-	-
18	Coumarin	-	-	+	+

Table 9: Phytochemical constituents found in Chloroform extract of *Syzygium cumini* hybrid

S.No	Metabolites	Leaf	Bark	Seed	Fruit pulp
1	Alkaloid	-	-	-	-
2	Flavonoid	-	-	-	-
3	Phenols	-	-	-	-
4	Tannins	-	-	-	+
5	Steroids	-	+	-	-
6	Carbohydrates	-	-	-	+
7	Saponins	-	-	-	-
8	Glycoside	-	-	-	+
9	Protein	-	-	-	-
10	Anthracyanine	-	-	-	-
11	Oxalate	-	-	-	-
12	Leucoanthocyanin	-	-	-	+
13	Xanthoprotein	-	-	-	-
14	Quinine	-	-	-	-
15	Cardiac Glycoside	-	-	-	-
16	Terpenoids	-	-	-	-
17	Amino acids	-	-	-	-
18	Coumarin	-	-	-	-

Table 10: Phytochemical constituent found in aqueous extract of *Syzygium cumini* hybrid

S.No	Metabolites	Leaf	Bark	Seed	Fruit pulp
1	Alkaloid	-	-	-	-
2	Flavonoid	-	-	-	-
3	Phenols	-	-	-	-
4	Tannins	-	-	-	+
5	Steroids	-	-	-	-
6	Carbohydrates	-	+	-	+
7	Saponins	-	-	-	-
8	Glycoside	-	-	-	+
9	Protein	-	-	-	+
10	Anthracyanine	-	-	-	-
11	Oxalate	-	+	-	-
12	Leucoanthocyanin	-	-	-	-
13	Xanthoprotein	-	-	-	-
14	Quinine	-	+	-	-
15	Cardiac Glycoside	-	-	-	+
16	Terpenoids	-	-	-	-
17	Amino acids	-	-	-	-
18	Coumarin	+	+	-	+

4. DISCUSSION

Phytochemical screening of the *Syzygium cumini* was carried out on different parts of the plants.

The standard procedure is used to identify the phytochemical constituents preceded by Harbone (1998) [3] and Kokate (2001) [6, 8].

Most of the people in Asia rely on the use of different traditional herbal formulations for therapeutic purposes. Among these, *Syzygium cumini* in one of the most important one, a number of studies have been conducted to elucidate the therapeutic and nutritional activity of its different plant parts of *Syzygium cumini.*

In the present study, most of the biologically active phytochemicals such as flavonoids, alkaloids, glycosides, steroids, phenols, saponins, terpenoids, cardiac glycosides and tannins were found to be present in the ethanolic and acetone extracts of different parts of the *Syzygium cumini* plant. The medicinal properties of *Syzygium cumini* plant extracts may be due to the presence of above-mentioned phytochemicals. *Syzygium cumini* is a worldwide medicinal plant traditionally used in herbal medicines due to its vaunted properties against cardiometabolic disorders, which include: antihyperglycemic, hypolipemiant, antiinflammatory, cardioprotective, and antioxidant activities. These properties have been attributed to the presence of bioactive compounds such as phenols, flavonoids, and tannins in different parts of the plant, albeit the knowledge on their mechanisms of action is scarce.

Studies on the efficiency of medicinal plants with respect to the control of infectious diseases are more essential to know their therapeutic value and hence in pharmaceutical arenas.

Though both the fruits are good for health the wild fruit is more preferable for its phytochemical content and thereby healing properties. *S. cumini* is known to possess wide range of medicinal properties, which have been attributed to the presence of bioactive compounds in different parts of the plant. The leaves are used in dermopathies, gastropathies, constipation, leucorrhea, and diabetes; fruits are used in the treatment of pharyngitis and splenic diseases; whereas barks are used as astringents, anthelmintic, and carminative. Furthermore, seeds are used as astringents, diuretic, and especially in the treatment of diabetes [4, 7, 9]. Further analysis of the fruits and seeds will reveal the identity of the phyto compounds and their pharmaceutical usage.

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