

Phytochemical Constituents of Leaves of *Celastrus Paniculatus* Wild: Endangered Medicinal Plant.

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ABSTRACT

Alkaloids, tannins, saponins, steroid, terpenoid, flavonoids, phlobatannin and cardiac glycoside distribution in different parts of *Celastrus paniculatus* belonging to Celastraceae family was assessed and compared. All the plant parts were found to contain alkaloids, tannins on large scale respectively. The significance of the plant parts in traditional medicine and the importance of the distribution of these chemical constituents were discussed with respect to the role of these plant parts in ethnomedicine worldwide.

Keywords: Medicinal plants, ethnomedicine, phytochemical constituents.

INTRODUCTION

Medicinal plants are of great importance to the health of individuals and communities. The medicinal value of these plants lies in some chemical substances that produce a definite physiological action on the human body. The most important of these bioactive constituents of plants are alkaloids, tannins, flavonoids, and phenolic compounds (Hill, 1952). Many of these indigenous medicinal plants are used as spices and food plants. *Celastrus paniculatus* is extensively used in herbal medicine worldwide. This study investigates the fundamental scientific bases for the use of *C. paniculatus* as medicinal plant by defining and quantifying the percentage of crude phytochemical constituents present in these plants.

MATERIALS AND METHODS

Collection and authentication: The leaves of *C. paniculatus* were collected from the forest areas of Satara, Murbad and Kokan in month of August to October when it is flowering and fruiting. Care was taken to select healthy, full grown plants and normal organs. The plant was authenticated from Blatter Herbarium, Department of Botany, St.Xavier's College, Mumbai (Specimen Accession No.1235 of H. Satapau). The leaves were air-dried and ground into powder form. The aqueous, ethanolic, methanolic and pet ether extract of each sample were prepared by standard methods^{1,4,6,7}.

Phytochemical screening: Phytochemical investigation involves the following features,

- To extract the active constituents from plant material.
 - To identify the phytochemical constituents of extracts.
- Chemical tests were carried out on the aqueous and other extracts and on the powdered specimens using standard procedures to identify the constituents as described by Trease and Evans, Harborne and Khandelwal^{2,3,5}

Tests for Alkaloids

Mayer's test: (Potassium mercuric iodide solution).To extract/sample solution, add few drops of Mayer's reagent, creamy white precipitate is produced.

Dragendroff's test: (Potassium bismuth iodide solution).To extract/sample solution, add few drops of Dragendroff's reagent, reddish brown precipitate is produced.

Wagner's test: (Solution of Iodine in Potassium Iodide). To extract/sample solution, add few drops of Wagner's reagent, reddish brown precipitate is produced.

Hager's Test: (Saturated solution of Picric acid) To extract/sample solution, add few drops of Hagers reagent, yellow precipitate is produced.

Tests for Carbohydrates

Molisch's test: Treat the extract solution with few drops of



Fig.1 *C. paniculatus*

Observation Table 1: Preliminary phytochemical analysis of Leaf of *C. Paniculatus*

Sr. No.	Chemical Test for	Water	Petroleum Ether	Ethanol	Chloroform
1)	Alkaloids	+	+	+	+
2)	Carbohydrates	+	-	-	-
3)	Glycosides	-	-	-	-
4)	Protein & Amino acids	-	-	-	-
5)	Sterols and Triterpenoids	+	-	+	-
6)	Phenolic Compounds	+	-	-	-
7)	Flavanoids	+	-	-	-
8)	Tannins	+	+	+	+
9)	Saponins	+	-	-	-
10)	Fixed oils	+	+	+	+
11)	Gum & Mucilage	-	-	-	-

alcoholic α -naphthol. Add 0.2 ml of concentrated H_2SO_4 slowly through the sides of the test tube, purple to violet color ring appears at the junction.

Benedict's test: Treat the extract solution with few drops of Benedict's reagent (alkaline solution containing cupric citrate complex) and upon boiling on water bath, reddish brown precipitate forms if reducing sugars are present.

Barfoed's test: General test for monosaccharides. Heat the test tube containing 1ml reagent and 1 ml of extract solution in a beaker of boiling water; if red cuprous oxide is formed within two minutes, a monosaccharide is present. Disaccharides on prolonged heating (about 10 min) may also cause reduction, owing to partial hydrolysis to monosaccharides.

Fehling's test: Equal volume of Fehling's A (Copper sulphate in distilled water) and Fehling's B (Potassium tartrate and Sodium hydroxide in distilled water) reagents are mixed along with few drops of extract solution, boiled, a brick red precipitate of cuprous oxide forms, if reducing sugars are present.

Test for glycosides

Legal test: To the hydrolysate, 1ml of pyridine and few drops of sodium nitroprusside solution were added and it was made alkaline with sodium hydroxide. Appearance of pink to red colour, indicate the presence of glycoside.

Borntragers test: Hydrolysate was treated with chloroform and the chloroform layer was separated. To this, dilute ammonia solution was added. Pink colour in the ammonia solution indicates the presence of glycosides.

Tests for Proteins & Amino acids

Millon's Test: Extract solution + 2 ml of Millon's reagent (Mercuric nitrate in nitric acid containing traces of nitrous acid) white precipitate appears, which turns red upon gentle heating.

Ninhydrin Test: Amino acids and proteins when boiled with 0.2% solution of Ninhydrin (Indane 1, 2, 3 trione hydrate) produces violet color.

Tests for Sterols and Triterpenoids

Liebermann-Burchard test: Extract treated with few drops of acetic anhydride, boil and cool, concentrated sulphuric acid is added from the side of the test tube, A brown ring at the junction of two layers and the upper layer turns green indicates the presence of sterols and formation of deep red color indicates the presence of triterpenoids.

Salkowski's test: Treat extract in chloroform with few drops of concentrated Sulphuric acid, shake well and allow to stand for some time, red color appears in the lower layer indicates the presence of sterols and formation of yellow colored lower layer indicating the presence of triterpenoids.

Tests for Phenolic Compounds

Ferric chloride test: Extract solution gives blue-green color with few drops of $FeCl_3$.

Zinc-Hydrochloride reduction test: To the extract solution, add a mixture of Zinc dust and conc. Hydrochloric acid. It gives yellowish, yellow- orange occasionally orange color after few minutes.

Tests for Flavonoids

Shinoda Test (Magnesium Hydrochloride reduction test): To the extract solution add few fragments of magnesium ribbon and concentrated Hydrochloric acid drop wise, pink scarlet, crimson red or occasionally green to blue color appears after few minutes.

Zinc-Hydrochloride reduction test: To the extract solution, add a mixture of Zinc dust and conc. Hydrochloric acid. It gives red color after few minutes.

Alkaline reagent test: To the extract solution, add few drops of Sodium hydroxide solution; formation of an intense yellow color that turns to color less and addition of few drops of dilute acetic acid indicates the presence of flavonoids.

Tests for Tannins

Gelatin test: Extract solution with 1% gelatin solution containing 10% sodium chloride gives white precipitate.

Ferric chloride test: Extract solution gives blue-green color precipitate with $FeCl_3$.

Vanillin Hydrochloride test: Extract solution when treated with few drops of Vanillin Hydrochloride reagent gives purple red color.

Alkaline reagent test: Extract solution with sodium hydroxide solution gives yellow to red precipitate within short time.

Test for saponins: **Froth formation test:** The extracted was diluted with distilled water and agitated in a granulated cylinder for 15 minutes. The formation of 1cm layer of stable froth (foam) indicates the presence of saponins.

Test for fixed oil: A small quantity of various extract was separately pressed between two filter papers. Appearance of stain in the paper indicates the presence of fixed oil.

Test for gums and mucilage: A small quantity of extract was slowly added into a test tube containing alcohol with constant stirring. Formation of precipitate indicates the presence of gums and mucilage.

RESULTS

The phytochemical screening analysis of leaf extracts of *Celastrus paniculatus* shows that all the four extracts i.e aqueous, petroleum ether, chloroform and ethanolic extracts showed the presence of alkaloids, tannins and fixed oils. Carbohydrates, Phenolic compounds, flavanoids and saponins are present in only aqueous extract while Sterols and triterpenoids are present in aqueous, ethanolic extracts.

DISCUSSIONS

The phytochemical screening analysis of Leaf extract of *Celastrus paniculatus* has showed the presence of different constituents in the extracts. The alkaloids, tannins and flavanoids were found to be present in petroleum ether, chloroform and ethanolic and aqueous extracts. The sterols and triterpenoids content was identified in aqueous and ethanolic extract, Saponin content was mainly present in water extract while glycosides, protein & amino acids, gum & mucilage were totally absent in all the extracts.

CONCLUSION

It has been concluded that the leaf extracts of the *Celastrus paniculatus* Willd. (Celastraceae) showed the presence of alkaloids, tannins and fixed oil in all the extracts.

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