DETECTION OF SECONDARY METABOLITES IN *TERMINALIA SPP*.

Ms. Khotare Sneha P.[1], Dr. Rothe Sahadeo P.[2]

[1] *Research Student, P.G. Department of Botany, Shri Shivaji College Akola (M.S.)*
[2] *Prof. and Head, P.G. Department of Botany, Shri Shivaji College Akola (M.S.)*
Email address: sprothe@rediffmail.com

ABSTRACT

Present paper deals with the chemical analysis of Terminalia species found in Akola district, for the observation of secondary metabolites. All the species of Terminalia are having medicinal value, used in Ayurvedic, Homeopathic and regularly by the tribals as a traditional medicine. A slight variation in secondary metabolites observed in these species. Most of the plant parts like bark are known to be used in Ayurvedic medicine and traditionally against heart problem while the fruits of three plants are regularly used by the tribals while fruits of T. bellerica and T. chebula along with Emblica officinalis are used in preparation of "Triphala" churan, which is against digestive disorder. T. catappa is running wild, also mostly planted in gardens, along hedges of farm houses. Fruits are edible. Fruit pulp and seeds are regularly eaten by tribals and villagers. The fruits of T. catappa are characterized by the presence of steroids, which is in higher percentage than rest of the three species of Terminalia. T. catappa is of less value than rest of the species; probably due to percentage of steroids while phenolics are totally absent in T. catappa.

Keywords: *Terminalia species, Akola district, T. bellerica, T. chebula, T. catappa, steroids, phenolics, heart problem, etc.*

INTRODUCTION

The use of plants as medicine goes back to early man. Certainly the great civilization of the ancient Chinese, Indians, and North Africa provided a written evidence of man's ingenuity in utilizing plants for the treatment of wide variety disease. Plants have a great potential medicine with a source of novel structure that are unobtainable from sources such as combinatorial synthesis nature is capable of producing complex molecules with multiple chiral centres that are design to interact with biological system. It has been estimated that, of the approximate 2.5 lakh plant only 5 to 15 percent have been investigated for bioactive compound.

Terminalia, a tree genus comprising of 8 species in Vidarbha region out of which three species of *Terminalia* are used for medicine viz. *Terminalia arjuna*, *Terminalia bellerica*, and *Terminalia chebula*. In traditional Ayurvedic medicine, *Terminalia arjuna* has been used to balance the three "humors": kapha, pitta, and vata. It has also been used for asthma, bile duct disorders, scorpion bites, etc. The bark of *Terminalia arjuna* has been used in India for more than 3000 years, primarily as a heart remedy. Vagbhata, an Indian physician, has been credited as the first to use this product for heart disorders in the 7th century A.D. Research on *Terminalia* has been going on since the 1930s, but studies have provided mixed results. Its role, if any, in heart disease still remains uncertain. Neverthless, today *Terminalia arjuna* has been used for disorders of the heart and blood vessels, including heart disease and related chest pain, high blood pressure, and high cholesterol. It is also used as "a water pill," and for earaches, dysentery, sexually transmitted diseases (STDs), diseases of the urinary tract, etc.

Terminalia chebula also used against high cholesterol and digestive tract disorders, including diarrhea and constipation, and indigestion. *Terminalia bellerica* and *Terminalia chebula* are used as a lotion for sore eyes. *T. chebula* is also used topically as a mouthwash and gargle. Intravaginally, *Terminalia chebula* is used as a douche for treating vaginal infections. In traditional Ayurvedic medicine, *Terminalia bellerica* has been used as a "health-harmonizer" in combination with *Terminalia chebula* and *Emblica officinalis*. This combination is also used to lower down the cholesterol level and prevent from heart failure. *Terminalia* contains ingredients that help stimulate the heart. It might also help the heart by lowering cholesterol and blood pressure. Clinical studies have

been conducted in coronary heart disease using *T. arjuna* bark extract at doses of 500 mg every 8 hours for up to 3 months. Dosages for other *Terminalia* species have not been clinically defined. Present work is aimed to find the phytochemical contents in medicinally used three species of *Terminalia* i.e. *T. bellerica, T. chebula, T. arjuna* and comparing them with medicinally less important *T. catappa.*

MATERIALS AND METHODS:

Collection of plant material:

The plants selected for the study are *Terminala bellerica , T. chebula, T. arjuna* and *T. catappa* were collected during month of November, 2015 from Patur forest in Akola district (MH). The plant material and specimens was identified by using standard floras like Cooke (1901-1908), Naik (1998), Singh (2000, 2001).

Table 1: Name of plants selected for study

Sr. No.	Name of plant	Family	Vernacular Name
1.	*Terminalia bellerica (*Garetn.) Roxb	Combretaceae	Behda
2.	*Terminalia chebula* **(**Retz**.)**	Combretaceae	Hirda
3.	*Terminalia arjuna(*Roxb.) Wight and Arn.	Combretaceae	Arjun dhavla
4.	*Terminaila catappa* Linn.	Combretaceae	Kadu badam

The collected plant material (fruits) were washed with tap water and then distilled water. Then the material is shade dried for 4-5 days and grinded well to obtain homogenous fine powder. The 5gm powdered material soaked in each 50 ml of water and alcohol for 1 hour. The solvent was filtered and the preliminary tests were carried out.

Phytochemical Analysis:

For the phytochemical analysis of following Phytochemicals, prepared from the three types of solution that is leaves extracts with distilled water, alcohol of above mentioned plant species.

Preliminary phytochemistry:-

The preliminary phytochemical studies are done for detection of various constituents i.e. alkaloids, glycosides, carbohydrates etc. present in plant extract, which is responsible for the pharmacological activity. Chemical tests were carried out on the successive extracts separately using standard procedures to identify the constituents as described by (Harborne, 1973; Sofowora, 2000 and Krishnaiah *et al*, 2009).

Test for Alkaloid:

Weigh about 0.2 gm of plant extract in seperate test tube and warmed with 2% sulphuric acid for 2 min. and it was filtered in separate test tube and few drops of Dragendorff's reagent was added and observed for the presence of orange red precipitate for the presence of alkaloid.

Test for cardiac glycosides:

0.5 gm of plant extract in separate test tube with 2ml of glacial acetic acid containing of drops of ferric chloride solution and observe for brown ring formation at the interface, confirms the presence of cardiac glycosides.

Test for Terpenoids:

Weight about 2 ml extract in separate test tube and add 2 ml chloroform and 3 ml of sulphuric acid in it. A reddish brown colouration at interface confirms the presence of terpenoids.

Test for Reducing sugar:

1ml aqueous extract in 4 ml distilled water taken in test tube and shake well, filter the extract and add few drops of Fehling solution A and B and boil for 2 min. Orange red precipitate confirms the presence of reducing sugar.

Test for steroids:

To the plant extract add 2ml of acetic anhydride and add 0.5 gm of ethanol with 2ml of sulphuric acid. Violet to blue or green colour indicates the presence of steroids.

Test for saponins:

2gm of sample was added in 10 ml of distilled water and shaken well. Froth formation confirms the presence of saponins.

Test for Tannins and Phenolics:

1 gm of was added in 2 ml distilled water and heated in water bath, then filtered and 5% Ferric chloride was added. Dark green-black colour indicates the presence of tannins.

Test for flavonoids:
To 2ml of plant extract add 10% NaOH, yellow colour appears which faint on addition of concentrated HCl, which confirms the presence of flavonoids.
Test for carbohydrates:
A small portion of filtrate was treated with Molish reagent and sulphuric acid, formation of a violet ring indicates the presence of carbohydrates.
Test for proteins and amino acids:
Add few drops of Millon's Reagent to 2 ml of plant extract. White coloured precipitate confirms the presence of proteins.

OBSERVATION AND RESULTS:

Preliminary phytochemical screening was done of the fruits of the 4 species of *Terminalia* viz. *T. bellerica, T. chebula, T. arjuna and T. catappa*. Followinfg results were obtained.

Table 2: Qualitative test for *Teminalia spp.* fruits.

Sr. No.	Phytochemical Tested	*T. arjuna* (Roxb.)		*T. bellerica* (Gaertn.) Roxb.		*T. chebula* Retz.		*T. catappa* Linn.	
		EtOH	D.W.	EtOH	D.W.	EtOH	D.W.	EtOH	D.W.
1	Alkaloids	+	+	+	+	+	+	-	-
2	Cardiac glycosides	-	+	-	-	+	+	-	-
3	Terpenoids	+	+	+	-	+	+	+	+
4	Reducing sugar	-	-	-	-	-	-	-	-
5	Saponin	+	+	-	-	-	-	-	-
6	Tannin	+	-	+	+	+	+	-	-
7	Flavonids	+	-	+	+	+	+	+	+
8	Phenolics	+	+	+	+	+	+	-	-
9	Steroids	+	-	+	-	-	-	+	+
10	Carbohydrates	-	-	-	-	-	-	-	-
11	Protein and amino acid	-	-	-	-	-	-	-	-

DISCUSSION AND CONCLUSION:

The morphological and microscopic characteristics of *T. arjuna, T. berellica, T. chebula, T.catappa* were corresponding to the general feature of Combretaceae family. The preliminary photochemical studies were carried out in the solvent like distilled water and alcohol.

In aqueous solvent of fruit of *T. arjuna (*Roxb.) when the extract were studied the test were positive for alkaloid, cardiac glycoside, terpenoids, saponin, phenolics, carbohydrates, where as negative for reducing sugar, tannin, flavonoids, steroids, protein and amino acid. In alcoholic solvent of fruit of *T. arjuna (*Roxb.)when the extract were studied the test were positive alkaloid, terpenoids, saponin, tannin flavonoids, phenolics, steroid, where as negative for cardiac glycosides, carbohydrates , protein and amino acid.

In aqueous solvent, of fruit of *T. bellerica (*Gaertn.) Roxb. when the extract were studied the test were positive for alkaloids, phenolics, whereas negative for cardiac glycosides, terpenoide, saponin, steroids, reducing sugar, carbohydrates, protein and amino acid. In alcoholic solvent, of fruit *T. bellerica (*Gaertn.) Roxb. when the extract were studied the test were positive for alkaloids, terpenoids, tannin, flavonoids, phenolics, tannin steroid and carbohydrates, whereas negative for cardiac glycosides, reducing sugar, saponin, Protein and amino acid.

In aqueous solvent, of fruit of *T. chebula* Retz. when the extract were studied the test were positive for alkaloids, cardiac glycosides, tannin, flavonoids, phenolics, carbohydrates, whereas negative for terpenoids reducing

sugar, saponin, steroids, protein and amino acid. In alcoholic solvent, of fruit *T. chebula* Retz. when the extract were studied the test were positive for alkaloids cardiac glycosides, terpenoids, reducing sugar, tannin, flavonoids, phenolics, whereas negative for saponin steroids carbohydrates, protein and amino acid.

In aqueous solvent of fruit of *T. catappa* Linn. when the extract were studied the test were positive for terpenoids, flavonoids, steroids, whereas negative for alkaloids, reducing sugar, saponin, tannin, phenolics, carbohydrates and protein and amino acid. In alcoholic solvent of fruit of *T. catappa* Linn. when the extract were studied the test were positive for terepenoids, flavonoids, steroids, whereas negative for alkaloids, cardiac glycosides, reducing sugar, carbohydrates, saponin, tannin, phenolics, protein and amino acid.

From above data we conclude that, the chemicals like alkaloids, terpenoids, saponin, tannin are present in *T. arjuna (*Roxb.), *T. bellerica (*Gaertn.) Roxb., *T. chebula* Retz. the species. So that give a similarities with each other but almost the species like *T. catappa* differs slightly from others. That may be the reason why *T. catappa* Linn., is not used in the medicine**.**

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