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Research Article

QUALITATIVE AND QUANTITATIVE EVALUATION OF *DENDROPHTHOE Falcata* (L.F.) ETTINGSH GROWING ON *Chloroxylon swietenia* DC

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ABSTRACT

Dendrophthoe falcata (L.f.) Ettingsh is an angiospermic hemi-parasite which grows on a number of host species. Also, it has medicinal importance and used in traditional medicine practices by the tribals of the Melghat Region. Present paper deals with the Qualitative and Quantitative study of Dendrophthoe falcata (L.f) Ettingsh, plant parts growing on the host plant Chloroxylon swietenia DC. belonging to Family: Meliaceae which is a common host in this region. Preliminary study revealed the presence of Carbohydrates, Anthraquinone glycosides, Cardiac glycosides, Coumarins, Quinones, Steroids, Alkaloids, Flavonoids, Phenolics, Tannins, Saponins and Terpenoids while quantitative study showed ample presence of Alkaloids, Flavonoids, Phenolics and Saponins in the plant.

INTRODUCTION

Medicinal plants are part of human society to combat diseases, from the dawn of civilization (Krishnaveni and Mirunalini, 2001). Nature has bestowed our country with an enormous number of medicinal plants therefore India has often referred to as the medicinal garden of the world. In the harmony of modern medicine, the components of synthetic drugs or the medicinally accepted plants are evaluated for their efficacy against certain diseases, thus forming a valuable source of therapeutic agents (Hikino, 1991; Lamartimere *et al*., 1998). The important advantages claimed for therapeutic use of medicinal plants in various ailments due to their safety besides being economical, effective and their easy availability (Atal and Kapoor, 1989; Siddiqui, 1993). Dendrophthoe falcata(L.f.) Ettingsh (Family-Loranthaceae) is a large bushy hemi-parasitic shrub with grey bark, branched, leavesthick, opposite, orange-red or scarlet flowers and ovoid – oblong berries (Chan, 2003). Also known as Loranthusfalcatus Linn. f., it is indigenous to India, Srilanka, Thailand, and Australia. The numbers of host reported for this parasite is over 3009 all around the world. About 7 species are found in India. The bark has narcotic properties. It is used in wounds and menstrual troubles and also as a remedy in consumption, asthma and mania. The bark is used as a substitute for betel-nut (Chopra *et al*., 1956). Dendrophthoe falcata is reported to contain biological active substances such as tannins, β-sitosterol, stigmasterol, β-amyrin, oleanolic acid (Anjaneyula *et al*., 1993), flavonoid, quercetin, kempferol, rutin (Ramchandran and Krishanakumary, 1999).

MATERIALS AND METHODS

Plant material: The Dendrophthoe falcata (L.f.) Ettingsh, leaf and stem were collected from the host Chloroxylon swietenia DC.during March- April of 2016 from Melghat forest region of West Vidarbha, Maharashtra, India and were authenticated by taxonomist, Dr. S. P. Rothe, Head, Department of Botany, Shri Shivaji College of Arts, Commerce and Science, Akola. The herbarium specimens were given voucher number and deposited in the herbarium of Department of Botany, Shri Shivaji College of Arts, Commerce and Science, Akola, Maharashtra, India.

Preliminary Phytochemical Screening

All the extracts were subjected to preliminary phytochemical qualitative screening for the presence or absence of various primary and secondary metabolites in 8 solvents viz., Acetone, Benzene, Chloroform, Distilled water, Ethanol, Ethyl Acetate, Methanol and Petroleum Ether. (Harborne, 1973).

Quantitative Phytochemical Analysis

All plant parts in which preliminary qualitative analysis showed presence of specific groups of secondary metabolites like Flavonoids, Alkaloids, Saponins and Phenolics were subjected to quantitative analysis. The crude quantification of major phytochemicals present was done using precipitation and spectrophotometric method as per suitability. Each sample was analyzed in triplicates. Only Alkaloids, Flavonoids, Saponins and Phenolics were quantified by the standard procedures given below.

Flavonoids: 10 gm of sample was extracted repeatedly in 100 ml of 80% aqueous methanol at room temperature. The whole

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solution was filtered through Whatman paper no. 42. The filtrate then transferred to a crucible and evaporated to dryness over a water bath and weighed (Bohm and Kocipai- Abyazan, 1994).

Alkaloids: 5 gm of sample was weighed in 250 ml beaker and 200 ml 20% acetic acid in ethanol was added and covered to stand for about 4 hrs. This was filtered and extract was concentrated using water bath to 1/4th of original volume. Concentrated Ammonium hydroxide was added drop wise to the extract till its complete precipitation. The whole solution was allowed to settle and precipitate was collected and weighed (Harborne, 1973).

Saponins: 10 gm of plant powder was taken in 200 ml 20% ethanol to make a suspension. This was heated for about 4 hrs over hot water bath (55oC) continuous stirring. The mixture was filtered and the residue was re-extracted with 200 ml 20% ethanol. The combined extract was reduced to 1/10th of the original volume. The concentrate was taken into 250 ml separating funnel, to this added 20 ml diethyl ether and shaken vigorously. The aqueous layer was recovered while the ether layer was discarded.

Table 1 Qualitative Phytochemical screening of *Dendrophthoefalcata* (L.f.) Ettingsh leaf growing on *Chloroxylon swietenia* DC.

S.N.	Constituents	Chemical Tests	Extract solvent							
			Ac	B	Ch	Aq.	E	EtAc	M	PE
1	Carbohydrates	Fehling's Reagent	+	-	-	+	+	-	+	-
		Benedict's Reagent	+	-	-	+	+	+	+	-
		Molisch's Reagent	+	-	-	+	+	-	+	-
2	Proteins	Biurret Reagent	-	-	-	-	-	-	-	-
		Millon's Reagent	-	-	-	-	-	-	-	-
3	Anthraquinone glycosides	Borntrager's Reagent	+	-	+	-	+	-	+	-
		Alkali Test	-	-	-	-	+	-	+	-
4	Cardiac Glycosides	Keller-Killiani Test	-	+	+	-	+	+	+	-
		H_2SO_4 Test	-	-	+	-	-	-	-	-
5	Coumarins	Extract + 10% NaOH	-	-	+	-	+	-	-	+
6	Quinone	Extract + Conc. H_2SO_4	-	-	-	-	-	-	-	+
		Alc. KOH Test	-	-	-	-	-	-	-	-
7	Steroids	Salkowski Test	-	-	+	-	+	-	-	-
8	Alkaloids	Hager's Reagent	-	-	-	-	+	-	+	-
		Dragendroff's Reagent	+	-	+	+	+	+	+	-
		Mayer's Reagent	-	-	-	-	+	+	+	-
		Wagner's Reagent	-	-	+	+	+	+	+	-
9	Flavonoids	Shinoda Test	+	-	+	+	+	+	+	-
		Lead Acetate Test	-	-	+	+	+	+	+	-
		NaOH Test	-	-	-	-	+	-	+	-
10	Phenolics & Tannin	$FeCl_3$ Test	+	-	+	+	+	+	+	-
		Lead Acetate Test	-	-	-	+	+	+	+	-
		Alkaline Test	-	-	-	-	+	-	+	-
11	Saponins	Foam Test	+	-	-	+	+	-	+	-
12	Lignins	Furfuraldehyde Test	-	-	-	-	-	-	-	-
13	Fixed Oil & Fat	Spot Test	-	-	-	-	-	-	-	-
14	Terpenoids	$CHCl_3 + H_2SO_4$	-	-	+	-	+	-	-	-

Table 2 Qualitative Phytochemical screening of *Dendrophthoefalcata* (L.f.) Ettingsh stem growing on *Chloroxylon swietenia* DC.

S.N.	Constituents	Chemical Tests	Extract solvent							
			Ac	B	Ch	Aq.	E	EtAc	M	PE
1	Carbohydrates	Fehling's Reagent	-	-	-	-	-	-	-	-
		Benedict's Reagent	-	-	-	+	+	-	+	-
		Molisch's Reagent	+	-	-	+	+	-	+	-
2	Proteins	Biurret Reagent	-	-	-	-	-	-	-	-
		Millon's Reagent	-	-	-	-	-	-	-	-
3	Anthraquinone glycosides	Borntrager's Reagent	-	-	-	-	-	-	-	-
		Alkali Test	-	-	-	-	-	-	-	-
4	Cardiac Glycosides	Keller-Killiani Test	-	-	-	-	-	-	-	-
		H_2SO_4 Test	-	-	-	-	-	-	-	-
5	Coumarins	Extract + 10% NaOH	-	-	-	-	-	-	-	-
6	Quinone	Extract + Conc. H_2SO_4	-	-	+	-	-	-	-	-
		Alc. KOH Test	-	-	+	-	-	-	-	-
7	Steroids	Salkowski Test	-	-	-	-	-	+	-	-
8	Alkaloids	Hager's Reagent	-	-	-	-	-	-	-	-
		Dragendroff's Reagent	-	-	+	+	+	+	+	-
		Mayer's Reagent	-	-	-	-	-	-	-	-
		Wagner's Reagent	-	-	-	-	-	-	+	-
9	Flavonoids	Shinoda Test	-	-	-	-	+	-	-	-
		Lead Acetate Test	-	-	-	-	-	-	-	-
		NaOH Test	-	-	-	-	-	-	-	-
10	Phenolics & Tannin	$FeCl_3$ Test	-	-	-	+	-	-	+	-
		Lead Acetate Test	+	-	-	-	-	-	+	-
		Alkaline Test	-	-	-	-	-	-	-	-
11	Saponins	Foam Test	-	-	-	-	-	-	-	-
12	Lignins	Furfuraldehyde Test	-	-	-	-	-	-	-	-
13	Fixed Oil & Fat	Spot Test	-	-	-	-	-	-	-	-
14	Terpenoids	$CHCl_3 + H_2SO_4$	-	-	-	-	-	+	-	-

Ac- Acetone; B- Benzene; Ch- Chloroform; Aq.- Distilled water; E- Ethanol; EtAc- Ethyl Acetate; M- Methanol; PE- Petroleum ether.

This purification process was repeated for 2-3 times. Then 60 ml n-butanol was added to it. The combined solution was then washed twice with 10 ml 5% aqueous sodium hydroxide. The remnant was heated in a water bath for complete evaporation and dried. This dried content was calculated as Saponin percentage in a sample (Obadoni & Ochuko, 2001).

Phenolics: The total phenolics in the extract were determined using Folin-Ciocalteu method.

To each sample solution (1.0 ml) and standard (Gallic acid) was added 5 ml of Folin-Ciocalteu and 4 ml sodium carbonate (7 % w/v). The mixture was shaken and allowed to stand for 30 min in the dark at room temperature; after which absorbance was measured at 765 nm using a spectrophotometer. The amount of total phenolics was expressed as Gallic acid equivalent (GAE) in milligram per gram dry plant extract using the expression; C = c x (V/m); (where C= Total phenolics content of plant extract in mg/g GAE, c= concentration of Gallic acid established from calibration curve mg/g, V= volume of the extract (ml) and m= weight of pure plant extract (g) (Vermerris*et al*., 2006).

RESULTS AND DISCUSSION

The result of Preliminary phytochemical screening of leaf of Dendrophthoe falcata (L.f.) Ettingsh, growing on Chloroxylon swietenia DC., in various extracts i.e. Acetone, Benzene, Chloroform, Distilled Water, Ethanol, Ethyl acetate, Methanol and Petroleum Ether, revealed the presence of Carbohydrates, Anthraquinone glycosides, Cardiac glycosides, Coumarins, Quinones, Steroids, Alkaloids, Flavonoids, Phenolics, Tannins, Saponins and Terpenoids. The majority of phytoconstituents were found in Chloroform, Ethanol and Methanol extracts. Coumarins were found only in Chloroform, Ethanol and Petroleum Ether extracts. Quinones were only found in Petroleum Ether extracts. Steroids were only found in Chloroform and Ethanol extracts. Terpenoids were present only in Chloroform and Ethanol extracts, while Proteins, Lignins, Fixed Oil and Fats, were absent in all extracts. (Table 1)

The result of Preliminary phytochemical screening of stem of Dendrophthoe falcata (L.f.) Ettingsh, growing on Chloroxylon swietenia DC., in various extracts i.e. Acetone, Benzene, Chloroform, Distilled Water, Ethanol, Ethyl acetate, Methanol and Petroleum Ether, revealed the sparse presence of phytoconstituents. Carbohydrates were present only in Acetone, Distilled Water, Ethanol and Methanol extracts. Quinones were present only in Chloroform extract. Steroids were found only in Ethyl Acetate extract. Alkaloids showed presence in Chloroform, Distilled water, Ethanol, Ethyl acetate, and Methanol extracts. Flavonoids were present only in Ethanol extract. Phenolics and Tannins were found in Acetone, Distilled water and Methanol extracts. Terpenoids were present only in Ethyl Acetate extract, while, Proteins, Anthraquinone glycosides, Cardiac Glycosides, Coumarins, Saponins, Lignins, Terpenoids, Fixed Oil and Fats, were absent in all extracts. (Table 2)

Quantitative Phytochemical Analysis

The secondary metabolites in plant contain appreciable concentrations of Alkaloids, Flavonoids, Phenolics and Saponins. Table No. 4.10 shows the concentration of bioactive compounds in leaf and stem.

Leaf: In the quantification of leaf, the following concentration was observed, the Alkaloids 7.4 (± 0.13) mg/100g, Flavonoids 8.1 (± 0.14) mg/100g, Phenolics 7.8 (± 0.16) mg/100g and Saponins 10.4 (± 0.18) mg/100g.

Stem: Quantification of stem, showed concentrations as for, the Alkaloids 3.5 (± 0.08) mg/100g, Flavonoids 4.7 (± 0.06) mg/100g, Phenolics 2.6 (± 0.14) mg/100g and Saponins 9.7 (± 0.13) mg/100g.

The quantification studies of leaf and stem of Dendrophthoe falcata (L.f) Ettingsh collected from Chloroxylon swietenia DC. shows that, concentration of Alkaloids, Flavonoids and Phenolics is higher in leaf than to amount in stem, whereas, the concentration of Saponins is near about same, in leaf and stem. (Table 3)

Table 3 Quantitative Phytochemical analysis of Dendrophthoe falcata (L.f) Ettingsh leaf and stem growing on Chloroxylon swietenia DC.

Sr. No.	Phytochemicals	Leaf (mg/100g)	Stem (mg/100g)
1	Alkaloids	7.4 (± 0.13)	3.5 (± 0.08)
2	Flavonoids	8.1 (± 0.14)	4.7 (± 0.06)
3	Phenolics	7.8 (± 0.16)	2.6 (± 0.14)
4	Saponins	10.4 (± 0.18)	9.7 (± 0.13)

CONCLUSION

The Preliminary phytochemical screening of Dendrophthoe falcata (L.f) Ettingsh growing on Chloroxylon swietenia DC. revealed the presence of major phytoconstituents viz., Anthraquinone glycosides, Cardiac glycosides, Coumarins, Quinones, Steroids, Alkaloids, Flavonoids, Phenolics, Tannins and Terpenoids. Quantitative estimation showed ample concentration of Alkaloids, Flavonoids, Phenolics, and Saponins. From the present study, the ethnomedicinal values of Dendrophthoe falcata (L.f.) Ettingsh can be justified, by the presence of the bioactive compounds. The bioactivity of plant extracts is attributed to phytochemical constituents. Tannin content shows remarkable antibacterial potential due to the basic character, that allows them to react with proteins, to form stable water-soluble compounds, thereby killing the bacteria directly by damaging its cell membrane (Mohamed *et al*., 2010). Alkaloids in plants generally, show antimicrobial properties (Ahmed *et al*., 2010). Flavonoids are known to show, antiviral properties (Mehrangiz *et al*., 2011).

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