SCREENING OF PHYTOCHEMICAL COMPONENTS FROM SOME MANGROVE LEAF EXTRACTS

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Abstract

Chemicals produced by plants' primary or secondary metabolism are known as phytochemicals. Due to the wide range of applications for phytochemicals, they have attracted a lot of attention. Five locally and abundantly growing plant sources were chosen for the study in order to investigate the anti-microbial properties of the phytochemicals present in their leaves for textiles. Using distilled water and 70% ethanol, leaf extracts were created. Standard tests were used to determine if different types of phytochemicals were present in the extracts, and the total phenolic content of each extract was also determined. The findings showed that tannins and phenolic compounds were considerably present in all of the extracts. Avicennia leaf extract had little flavonoid content, whereas Rhizophora leaf extract had a large amount. All extracts, with the exception of the Avicennia leaf extract, had weak levels of alkaloids and saponin. With the exception of Rhizophora leaf extract, terpenoids were completely missing. The greatest Total Phenolic Content was found in the ethanol extract of Avicennia leaf extract (156.79 mg/g of dry material), followed by Rhizophora leaf extract (117.99 mg/g). Rhizophora leaf extract had the greatest concentration of 106.05 mg/g among distilled water extracts, followed by Avicennia leaf extract at 100.27 mg/g.

Keywords:- Phytochemical components, Mangroves, *Avicennia, Rhizophora , Acanthus, Sonneratia.*

Introduction

Since ancient times, India has been renowned around the world for its ayurvedic therapies. For the extraction of raw medicines, a variety of medicinal plant components including roots, stems, flowers, fruits, twig exudates, and altered plant organs have been employed. Manikandan et al. (2016), Chandra M. (2013). Selvakumar Sivagnanam et al. (2016) found that these plants' medicinal benefit is derived from a few chemical compounds that have a clear physiological effect on the human body. Phytochemicals are the name given to these substances.

Chemicals produced by plants through their primary or secondary metabolism are known as phytochemicals. They usually play a significant role in plant growth and have biological activity in the plant host. They are naturally found in plants and help them fight themselves from a variety of dangerous microorganisms by acting as inhibitors or killers of bacteria. Traditional medicine's most abundant supply of pharmaceuticals comes from medicinal plants, which also give plants their unique hues, smells, and odours. Pradeep and colleagues (2014). Due of their numerous applications, phytochemicals have recently attracted a lot of attention Pushpa Ruwali et al., (2019), and Saranraj et al., (2016).

As antibacterial agents and antioxidants, phytochemicals are essential components of many preparations, including food, cosmetics, pharmaceuticals, flavors, and agrochemicals. According to Akindele et al. (2007), phytochemical screening is crucial for finding novel sources of

therapeutically and commercially significant substances such alkaloids, flavanoids, phenolic compounds, saponins, steroids, tannins, and terpenoids. According to Mallikharjuna et al. (2007), they endow plants with flavour (capsacin), pigmentation (tannins and quinines), and scent (terpenoids). They are a natural component of a plant's defence mechanism. These bioactive components are said to be responsible for the antimicrobial effects of plant extracts in vitro Ankita Sood et al., (2012). The mode of action of plants producing antimicrobial effects on selected textile materials can be better investigated if the active ingredients are identified and characterized Vastrad et al., (2016). There is worldwide realization that any plant known for a particular bio-efficacy should be explored. Muhammad Gulfraz et al., (2011). All the plant sources selected for the study were available locally and in abundant. The leaves of the plants were used for procuring the extract for testing the presence of phytochemical compounds.

Materials and Methods

Information about the plants selected for the study

S. No	**Name of the plant source**	**Botanical name**	**Family**	**Part used**
1	*Avicennia*	*Avicennia alba*	*Avicennia*	Leaves
2	Acanthus	*Acanthus ilicifolius*	Acanthaceae	Leaves
3	*Sonneratia*	*Sonneratia alba*	*Sonneratia*ceae	Leaves
4	*Rhizophora*	*Rhizophora mucronata*	*Rhizophora*ceae	Leaves

Collection and Processing of plant material

All the plants were collected from coastal area of Alibag. The leaves were next thoroughly cleaned in distilled water before being dried on a cloth to remove extra water. The leaves were dried further in the shade. The leaves were then pulverised into a powder after drying. The undesirable residue was then separated from the powder, and fine powder was obtained by sieving it using a sieve with mesh number 150.

Extraction

30 grammes of the plant source powder were dissolved in 60 millilitres of distilled water and 70:30 ethanol for 24 hours at room temperature. Centrifuged at 5000 RPM, then filtered the supernatants. The process was then repeated for the following 24 hours after adding 25 mL of the appropriate solvent to the residue.

Whatman filter paper was used to refine the resultant extract.

Phytochemical tests

Qualitative phytochemical screening was done for the identification of various classes of phenolic constituents, i.e. alkaloids, flavonoids, terpenoids, saponins etc. Different chemical tests performed for detecting these phenolic groups. The qualitative results are expressed as phytochemicals were (+++) for significantly present, (++) for moderately present, (+) for poorly present, (-) for absent.

Test for Tannins and Phenolic compounds

(a) Ferric chloride test: One mL of extract was separately stirred with 10 mL of distilled water and then filtered. A few drops of 5% $FeCl_3$were added to the filtrate. Blue-black or blue-green colouration or precipitation was taken as an indication of the presence of tannins.

(b) Lead acetate test: Three mL of 10% lead acetate solution was added to 1mL of extract. Appearance of bulky white precipitate confirmed the presence of phenolic compounds.

Test for Flavonoids

(a) Ammonia test: A few drops of 1% NH_3 solution was added to 1mL of the extract in a test tube. A yellow coloration was observed for the presence of flavonoids.

(b) Sodium hydroxide test: Few drops of 20% NaOH solution was added to 1mL of extract. On addition of HCl, the changed yellow colour of the extract turned to a colourless solution that depicted the presence of flavonoids.

Test for alkaloids

(a) Dragendorff test: To 1 mL of extract, few drops of Dragendorff's reagent were added. A prominent yellow precipitate indicatedpresences of alkaloids.

(b) Wagner test: Few drops of Wagner's reagent were added by the side of test tube to 1mL of extract. A reddish-brown precipitate confirmed the test as positive.

Test for saponins

Foam test: About 1mL of the extract was boiled in 20 mL of distilled water in a water bath and filtered, 10 mL of the filtrate was mixed with the 5 mL of distilled water and mixed vigorously for 15 min to form a stable persistent froth. The presence of froth after 5 min was taken as an indication of presence of saponins.

Test for Terpenoid

Salkowski test: One mL of each extract was mixed with 0.5mL of chloroform and 1mL of concentrated H_2SO_4 was carefully added to form a layer. A reddish brown colouration of the interface formed showed positive results for the presence of terpenoids.

Estimation of Total Phenolic Content (TPC)

Total Phenolic Content was determined using the Folin-Ciocalteu Assay method (Singleton and Rossi 1965) using Gallic acid as the reference standard. To one mL of solvent extract 100µL of Folin-Ciocalteu reagent, was added and incubated at room temperature for 3 minutes then added 2mL of 10% Na_2CO_3 solution to the mixture.

The resulting solution was incubated for 90 minutes at room temperature under dark conditions, the absorbance was measured at 765nm using the UV-Visible Spectrophotometer. Total Phenolic Content is expressed as gallic acid equivalent (GAE) in milligrams per gram of sample.

Results and Discussion

Table 1 showed presence of phytochemicals in *Avicennia* leaf extract. *Avicennia* leaf extracts in ethanol as well as in distilled water showed tannins and phenolic compounds significantly, flavonoids poorly, alkaloids and saponins moderately while terpenoids were absent.

Table.1 Phytochemical screening of *Avicennia* leaf extract

S.No	**Phytochemical tests**	Solvents	
		Distilled water	Ethanol
1	**Test for tannins and phenolic compounds**		
a	Ferric chloride test	+++	+++
b	Lead acetate test	+++	+++
2	Test for flavonoids		
a	Ammonia test	+	+
b	Sodium hydroxide test	+	+
3	Test for alkaloids		
a	Dragendorff test	+	+
b	Wagner test	++	++
4	Test for saponins		
a	Foam test	++	++
5	Test for terpenoids		
a	Salkowski test	-	-

+++ = Significantly present ++ = moderately present + = Poorly present - = Absent

Table.2 Phyto- chemical screening of *Acanthus* leaf extract

S.No	**Phytochemical test**	**Solvents**	
		Distilled water	Ethanol
1	**Test for tannins and phenolic compounds**		
a	Ferric	+	-

	chloride test		
b	Lead acetate test k	+++	+++
2	**Test for flavonoids**		
a	Ammonia test	-	-
b	Sodium hydroxide test	-	-
3	**Test for alkaloids**		
a	Dragendorff test	+	+
b	Wagner test	+	+
4	**Test for saponins**		
a	Foam test	+	+
5	**Test for terpenoids**		
a	Salkowski test	-	-

+++ = Significantly present, + = Poorly present, - = Absent

Table.3 Phytochemical screening of *Sonneratia* leaf extract

	cal tests	**Solvents**	
		ed water	
	nins and phenolic compounds		
	Ferric chloride test	+	+
	Lead acetate test	-	-
	Test for flavonoids		
	Ammonia test	-	-
	Sodium hydroxide test	-	-
	Test for alkaloids		
	Dragendorff test	+	+
		-	-
	Test for saponins		
		+	+
	Test for terpenoids		

	Salkowski test	-	-

+ = Poorly present - = Absent

Table.4 Phytochemical screening of *Rhizophora* leaf extract

S. no.	Phyto- chemical tests	Solvents	
		Distilled water	Ethanol
1	**Test for tannins and phenolic compounds**		
a	Ferric chloride test	+++	++
b	Lead acetate test	+++	+++
2	**Test for flavonoids**		
a	Ammonia test	+++	+
b	Sodium hydroxide test	-	-
3	**Test for alkaloids**		
a	Dragendorff test	+	-
b	Wagner test	+	-
4	**Test for saponins**		
a	Foam test	-	-
5	**Test for terpenoids**		
a	Salkowski test	+	+

+++ = Significantly present + = Poorly present - = Absent

Table. 5 Total phenolic content of leaf extracts

Sl. No.	Plant source	TPC (mg/g of dry material)	
		Distilled water	Ethanol
1	*Sonneratia*	19.75	41.82
3	*Acanthus*	27.29	55.47
5	*Rhizophora*	106.05	117.99
6	*Avicennia*	100.27	156.79

Table 2 exhibits presence of phyto-chemicals in *Acanthus* leaf extract. *Acanthus* leaf extracts in ethanol as well as distilled water contained tannins and phenolic compounds significantly, alkonoids and saponins poorly while, flavonoids and terpenoids were absent.

Table 3 indicates phytochemical screening of *Sonneratia* leaf extract. *Sonneratia* leaf extracts in ethanol as well as distilled water contained tannins poorly but phenolic compounds were absent, alkonoids and saponins were poorly present while flavonoids and terpenoids were absent.

Table 4 shows presence of phytochemical in *Rhizophora* leaf extract. In ethanol and distilled water extracts of *Rhizophora* leaf, tannins and phenolic compounds were

significantly present. Extract in distilled water showed flavonoids significantly but ethanol extract contained flavonoids poorly. Alkonoids were poorly present in water extract and absent in ethanol extract. In both the extracts terpenoids poorly present while saponins were absent.

Table 5 showed Total Phenolic Content of leaf extracts in distilled water and ethanol. Highest phenolic content was found in *Avicennia* leaf extract in ethanol i.e. 156.79mg/g of dry leaf powder followed by *Rhizophora* leaf extract in ethanol (117.99 mg/g). Distilled water extract of *Rhizophora* leaves had TPC 106.05 mg/g and *Avicennia* leaf extract had 100.27 mg/g.

Total Phenolic Content of *Sonneratia*, and Acathus leaf extracts obtained using ethanol were, 41.82 and 55.47 mg/g of material respectively while TPC of the extracts of them taken out in distilled water were 27.29, 19.75 and 18.93 mg/g of dry weight respectively. It is observed that Total Phenolic Content of the leaf extract taken out in ethanol was more than the TPC of the respective leaf extracts taken out in distilled water.

In conclusion the extracts of leaves of all the selected plants contained tannins and phenolic compounds significantly. Flavonoids were poorly present in Acanthus leaf extract and significantly present in *Rhizophora* leaf extract. Alkaloids and saponin were poorly present in all extracts except moderate presence in *Avicennia* leaf extract. Terpenoids were totally absent in all except *Rhizophora* leaf extract. Ethanol extracts of *Avicennia* leaf extract exhibited the highest Total Phenolic Content i.e. 156.79 mg/g of dry material followed by *Rhizophora* leaf extract
117.99 mg/g.

Among distilled water extracts *Rhizophora* leaf extract exhibited highest i.e. 106.05 mg/g followed by *Avicennia* leaf extract i.e. 100.27 mg/g. Total Phenolic Content of the leaf extract taken out in ethanol was more than the TPC of the respective leaf extract taken out indistilled water.

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