

Studies on preliminary phytochemical analysis of some true mangrove species in Kerala

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Abstract

The mangrove plants examined, *Acanthus ebracteatus* Vahl., *Acanthus ilicifolius* Linn., (*Acanthaceae*), *Aegiceras corniculata* (L.) Blanco., (*Myrsinaceae*), *Avicennia marina* (Forssk.) Vierh., *Avicennia officinalis* L., (*Avicenniaceae*), *Bruguiera cylindrica* (L.) Blume., *Bruguiera gymnorrhiza* (L.) Lam., *Bruguiera sexangula* (Lour.) Poir., *Kandelia candel* (L.) Druce., *Lumnitzera recemosa* Willd., (*Combretaceae*) *Rhizophora apiculata* Blume., *Rhizophora mucronata* Lam., (*Rhizophoraceae*), *Excoecaria agallocha* L., (*Euphorbiaceae*), *Sonneratia alba* Sm., *Sonneratia caseolaris* (L.) Engl. (*Sonneratiaceae*). The current study was aimed to have investigation into the active metabolites of phytochemical analysis of the sequential extracts of all species leaves revealed the presence or absence of various bioactive components like alkaloids, flavonoids, tannin, terpenoids, saponins, reducing sugar, phenols, steroids and glycosides.

Keywords: phytochemicals, alkaloids, steroids, *Acanthus*, *Avicennia*

Introduction

Mangroves thrive under stressful and extreme tropical environmental conditions such as high solar radiation, temperature, salinity, and anaerobic conditions that may have unfavorable effects on the photosynthesis of these plants. Hence, mangroves have evolved special adaptation to survive these conditions^[1]. Mangrove plants are potential sources of biologically active chemicals that are discernible from their wide spread application in ethno pharmaceutical practices^[2]. One of these attributes are the secondary metabolites produced by the mangroves which have been used traditionally by medicinal local practitioners due to their proved medicinal values^[3].

Materials and Methods

The mangrove plants examined were *Acanthus ebracteatus* Vahl., *Acanthus ilicifolius* Linn., (*Acanthaceae*), *Aegiceras corniculata* (L.) Blanco., (*Myrsinaceae*), *Avicennia marina* (Forssk.) Vierh., *Avicennia officinalis* L., (*Avicenniaceae*), *Bruguiera cylindrica* (L.) Blume., *Bruguiera gymnorrhiza* (L.) Lam., *Bruguiera sexangula* (Lour.) Poir., *Kandelia candel* (L.) Druce., *Lumnitzera recemosa* Willd., (*Combretaceae*) *Rhizophora apiculata* Blume., *Rhizophora mucronata* Lam., (*Rhizophoraceae*), *Excoecaria agallocha* L., (*Euphorbiaceae*), *Sonneratia alba* Sm., *Sonneratia caseolaris* (L.) Engl. (*Sonneratiaceae*).

The collected leaves were washed with tap water and shade dried at room temperature. The dried leaves were powdered using electrical blender. Ten grams of material was stirred overnight in 70% methanol (100 ml) and then centrifuged at 10,000 rpm for 10 min. The resultant supernatant was collected and the methanol was removed by evaporation. This extract was used for further phytochemical analysis. Qualitative phytochemical tests for the identification of alkaloids, flavonoids, steroids, tannins, terpenoids, saponins, glycosides, reducing sugar and phenols were carried out in the extract as per the method^[4, 5, 6].

Test for Tannins: A small portion of the extract was diluted with 20 ml of distilled water and boiled in a boiling tube. Then few drops of 0.1% ferric chloride was added. The appearance of brownish green or blue-black colour indicates the presence of tannins.

Test for Saponins: One mL of the extract was diluted with 20 ml of distilled water and shaken vigorously. The formation of stable foam indicates the presence of saponins.

Test for Flavonoids: About 1 ml of the extract was mixed with few fragments of magnesium ribbon and concentrated hydrochloric acid. The appearance of pink or magenta-red colour indicates the presence of flavonoids.

Test for Phenols: A small portion of the extract was mixed with 2 ml of ferric chloride solution. The appearance of green or blue colour indicates the presence of tannins.

Test for Alkaloids: Two ml of the extract was mixed with 0.2 ml of 1% HCl. Then 1 ml of Mayer's reagent was added. Any precipitate or turbidity indicates the presence of alkaloids.

Test for Steroids: A small portion of the extract 2 ml of sulphuric acid was added by the sides of the test tube. The appearance of bluish-green or violet colour indicates the presence of steroids.

Test for Terpenoids: A small portion of the extract was mixed with 2 ml of chloroform. Then 3 mL of sulphuric acid was carefully added. The appearance of reddish brown or pinkish brown ring/colour indicates the presence of terpenoids.

Test for Glycosides: A small portion of the extract was mixed with 2 ml of glacial acetic acid containing 1-2 drops of

ferric chloride solution. The mixture was then poured into another test tube containing 2 ml of concentrated sulphuric acid. The appearance of brown ring indicates the presence of glycosides.

Reducing suger-fehling's test: Few drops of Fehling's solution A and B in equal volume were added in dilute extracts and heated for 30 min and observed for the formation of brick red colored precipitate.

Results and Discussion

The phytochemicals found in various taxa of mangrove plants are shown in Table 1. In Avicenniaceae leaf extracts of *A.*

officinalis showed saponins, phenols, terpenoids, glycosides and absence of tannins, steroids, alkaloids, flavanoids [7]. Preliminary phytochemical analysis on *Avicennia*. The study reveals presence of alkaloids, tri terepenoids, saponins, tannins, triple suger, amino acids, anthroquinones, steroids, protens, cardiac glycosides. Plant extracts were used against pathogens. Phytochemical studies of leaves *A. officinalis* revealed that the screening process of leaves of both plants indicated presence of protein, resin, steroid, tannin, glycosides, redusing suger, carbohydrates, saponins, sterols, terpenoids, sterols, cardioglycosides, and catachol [8].

Table 1: Phytochemical constituents of mangrove plants

No	Plants	Saponins	Flavanoid	Phenols	Alkaloids	Steroids	Terpenoids	Glycosides	Tannins	Reducing sugar
1	<i>Bruguiera gymnorrhiza</i>	+	+	+	-	-	+	+	-	-
2	<i>Bruguiera sexangula</i>	+	-	+	-	-	+	+	-	+
3	<i>Rhizophora apiculata</i>	+	+	+	-	-	+	+	-	+
4	<i>Rhizophora mucronata</i>	+	+	+	-	+	+	-	-	+
5	<i>Sonneratia caseolaris</i>	+	+	+	-	-	+	+	+	+
6	<i>Excoecaria agallocha</i>	+	+	+	-	+	-	+	+	-
7	<i>Avicennia officinalis</i>	+	-	+	-	-	+	+	-	-
8	<i>Avicennia marina</i>	+	+	+	-	-	+	+	+	-
9	<i>Bruguiera cylindrica</i>	+	+	+	-	+	+	+	+	-
10	<i>Acanthuus ilicifolius</i>	-	+	+	-	-	+	+	-	-
11	<i>Aegiceras corniculata</i>	+	+	+	-	-	+	+	+	-
12	<i>Kandelia candel</i>	-	+	+	-	+	+	+	-	-
13	<i>Lumnitzera recemosa</i>	+	+	+	-	+	+	+	-	+
14	<i>Acanthus ebracteatus</i>	-	+	+	+	+	+	-	-	-
15	<i>Sonneratia alba</i>	+	+	+	+	+	+	+	-	+

In Sonnerataceae *S. caseolaris* showed presence of saponins, flavanoids, phenols, terpenoids, glycosides, tannins and absence of alkaloids, steroids. And in *S. alba* all compounds were present except tannin.

In Euphorbiaceae *E. agallocha* showed presence of saponins, flavanoids, phenols, steroids, tannins, glycosids and absence of alkaloids and terpenoids. Antimicrobial properties of *E. agallocha* against some pathogenic micro organisams [9]. Preliminary phytochemical studies of the root, stem and leaf extracts of mangrove plant *E. agallocha* [10]. And it showed presence of plant constituents like alkaloids, glycosides, flavonoids, carbohydrates, anthraquinone, tannins, phenols, terpenoids, fixed oil and fats.

In Rhizophoraceae four taxa were studied *B. sexangula*, *B. gymnorrhiza*, *R. mucronata* and *R. apiculata*. Saponins, phenols and terpenoids present in all four taxa. Alkaloids and tannins present in all taxa, Steroids present and glycosides absent in *R. mucronata*, flavanoids absent in *B. sexangula*. Leaf extract of *B. gymnorrhiza* used for treating *staphylococcus aureus* infection [11]. Phytochemical screening ethanolic extract of mangrove plant *B. cylindrica* [12]. The study revealed that the presence of various components of which alkaloids, flavonoids, tannin, tri terpenoids, saponins, phenols, glycosides, steroids and this compounds possess various medicinal properties for the treatment of many diseases [13]. Triterpenoids like betulin, lupeol, ursolic acid α -amyrin in *B. gymnorrhiza*. Phytochemical compounds like alkaloids, flavonoids, steroids, tannins, terpenoids, saponins, glycosides and phenols in different mangrove species [14].

Conclusion

Phytochemical analysis is a good technique to check the genetic variability present in plant species. Further research helps to distinguish the phytoconstituents and to implemented quantitative estimation with the help of markers and it helpful for pharmacuetical applications.

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