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G. Lakshmanan
Professor & Head, Post graduate & Research Department of Zoology, Aditanar College of Arts & Science, Virapandianpatnam, Thiruchendur (Taluk), Thoothukudi District - 628 216. India.

C. Rajeshkannan
Research Scholar, Manonmaniam Sundaranar University, Tirunelveli-627 012, Tamil Nadu, India.
E-mail: rajeshirdi@gmail.com

A. Kavitha
Post graduate & Research Department of Zoology, Aditanar College of Arts & Science, Virapandianpatnam, Thiruchendur (Taluk), Thoothukudi District - 628 216. India.
E-mail: akavi29@gmail.com

B. Mekala
Post graduate & Research Department of Zoology, Aditanar College of Arts & Science, Virapandianpatnam, Thiruchendur (Taluk), Thoothukudi District - 628 216. India.
E-mail: mekalamsc@gmail.com

N. Kamaladevi
Post graduate & Research Department of Zoology, Aditanar College of Arts & Science, Virapandianpatnam, Thiruchendur (Taluk), Thoothukudi District - 628 216. India.
E-mail: devikamal246@gmail.com

Correspondence:
G. Lakshmanan
Professor & Head, Post graduate & Research Department of Zoology, Aditanar College of Arts & Science, Virapandianpatnam, Thiruchendur (Taluk), Thoothukudi District - 628 216. India.
E-mail: menilax@gmail.com
Tel: +91-94423-71611

Preliminary screening of biologically active constituents of *Suaeda monoica and Sesuvium portulacastrum* from palayakayal mangrove forest of Tamilnadu

G. Lakshmanan*, C. Rajeshkannan, A. Kavitha, B. Mekala and N. Kamaladevi

ABSTRACT
Qualitative analysis of Protein, Resin, Tannin, Glycosides, Cardiac glycosides, Saponin, Terpenoids, Phenol, Flavonoid, Alkaloids and Acidic compounds from two mangrove species of *S. monoica and S. portulacastrum* was carried out. The distribution of aforementioned phytoconstituents were examined and compared. Both of the mangrove species shows the presence of Protein, Resin, Tannin, Glycosides, Cardiac glycosides, Terpenoids, Phenol, Flavonoid and Acidic compounds. Alkaloids and Saponin are absent in both of the species. The significance of the phytochemical constituents with the respect to the role of these plants in traditional medicine treatment is discussed.

Keywords: *Suaeda monoica, Sesuvium portulacastrum,* Phytoconstituents and Mangrove species.

1. Introduction

Mangroves are utilized in many parts of the world as a renewable resource. Harvested for durable, water-resistant wood, mangroves have been used in building houses, boats, pilings, and furniture. The wood of the black mangrove and buttonwood trees has also been utilized in the production of charcoal. Tannins and other dyes are extracted from mangrove bark. Leaves have been used in tea, medicine, livestock feed, and as a substitute for tobacco for smoking. Several workers have reported the usefulness of mangrove plants in traditional medicine [1-3]. In view of earlier research works the following mangrove species would be selected for the study of phytoconstituents. *Suaeda monoica* Forssk. ex J. F. Gmel belongs to Chenopodiaceae family is a salt marsh mangrove herb similar to *Suaeda maritima* in appearance. *S. monoica* is smaller in size, simple leaves which are edible. Traditionally, the leaf from *S. monoica* is known to use as a medicine for hepatitis and scientifically it is reported to be used as ointment for wounds and possess antiviral activity, because of the presence of triterpenoids and sterols [4, 5]. *Sesuvium portulacastrum* (L) belongs to Aizoaceae is a sprawling perennial herb that grows in coastal areas throughout the world, which is native to Africa, Asia, Australia, North America and South America, and has naturalised in many places. It is commonly known as shoreline purslane or sea purslane in English. It has smooth, fleshy, glossy green leaves that are linear and its flowers are pink or purple. The plant extract showed antibacterial and anticandidal activities and moderate antifungal activity. As well-known criteria of mangrove and mangrove associate plants are proved to have rich of high value secondary metabolites *viz*, saponins, alkaloids, polyphenols which possess antibacterial, antifungal, antiplasmodial and hepatoprotective activities [6]. Therefore, the present attempt has been made to identify the groups of phytoconstituent of *S. monoica and S. portulacastrum* qualitatively.

2. Materials and Methods

2.1 Collection of Plant Materials

The leaves of *S. monoica and S. portulacastrum* were collected from Palayakayal mangrove forest (Lat. 8 º34' 59.72" Long. 78 º07'24.96") Tamil Nadu. The collected samples were uniformly shade dried and it was granulated or powdered by using a blender and sieved in to coarse powder were utilized for the screening of phytochemical constituents qualitatively.

Fig 1: Suaeda monoica

Fig 2: *Sesuvium portulacastrum*

2.2 Qualitative analysis of phytoconstituents [7,8]

2.2.1 Tests for proteins-xanthoprotein test:
To 1 ml of extract, few drops of nitric acid was added by the sides of the test tube and observed for formation of yellow colour.

2.2.2 Tests for resins:
Five millilitre of distilled water was added to the extract and observed for turbidity.

2.2.3 Tests for tannins:
About 0.5 gm of the each extract was taken in a boiling tube and boiled with 20 ml distilled water and then filtered added few drops of 0.1% ferric chloride was added mixed well and allowed to stand some time. Observed for brownish green or a blue–black coloration.

2.2.4 Test for Alkaloid:
3 ml aqueous extract was stirred with 3 ml of 1% HCl on steam bath. Mayer and Wagner's reagent was then added to mixture. Turbidity of the resulting precipitate was taken as an evidence for the presence of alkaloid.

2.2.5 Tests for saponins:
To 0.5 gm of extracts was added to 5 ml of distilled water in a test tube. The solution was shaken vigorously and observed for a stable persistent froth. The frothing was mixed with 3 drops of olive oil and shaken vigorously after which it was observed for the formation of an emulsion.

2.2.6 Tests for cardiac glycosides
1ml of concentrated H_2So_4 is prepared in a test tube. 5 ml of aqueous extract from each plant sample is mixed with 2 ml of Glacial acetic acid containing 1 drop of $FeCl_3$. The above mixture is carefully added to the 1ml concentrated H_2SO_4 so that the concentrated H_2SO_4 is underneath the mixture. If cardiac glycosides is present in the sample, a brown ring will appear, indicating the presence of the cardiac glycosides constituents.

2.2.7 Test for terpenoids – Salkowski test:
To 0.5 g of the extract, 2 ml of the chloroform was added; Conc. H_2SO_4 (3 ml) was carefully added to form a layer. A reddish brown coloration of the interface indicates the presence of Terpenoids.

2.2.8 Test for flavonoids:
A few drops of 1% NH_3 solution is added to the aqueous extract of each plant sample in a test tube. A yellow colouration is observed if flavonoid compounds are present.

2.2.9 Tests for acidic compounds:
To the alcoholic extract sodium bicarbonate solution was added and observed for the production of effervescences.

2.2.10 Tests for phenols:
The extracts were taken in water and warmed. To this 2ml of ferric chloride solution was added and observed for formation of green or blue colour.

2.2.11 Tests for glycosides- Keller–Kiliani test:
About 0.5 ml of alcoholic extracts was taken and subjected to the following test, 1 ml of glacial acetic acid containing traces of ferric chloride and 1 ml of conc. Sulphuric acid was added to extract and observed for the formation of reddish brown colour at the junction of two layers and the upper layer turned bluish green in the presence of glycosides.

3. Result and discussion

3.1 Qualitative analysis

Primary metabolites are directly involved in normal growth, development and reproduction. Secondary metabolites are not directly involved in those processes, but usually have an important ecological function. The phytoconstituents of *S. monoica* and *S. portulacastrum* were qualitatively analyzed and the results were depicted in the Table. 1. It indicates that *S. monoica* and *S. portulacastrum* leaves possess some important primary and secondary metabolites *viz*., Protein, Resin, Tannin, Glycosides, Cardiac glycosides, Terpenoids, Phenol, Flavonoid, Acidic compounds. Alkaloids and Saponin are absent in both the species. Primary and secondary metabolites are very much important for the regular mechanism/survival of the species and also it can be used as therapeutic agents.

Flavonoids are associated with antioxidant, fever-reducing (antipyretic), pain-relieving (analgesic) and spasm-inhibiting (spasmolytic) activities. The decoction of the leaves is used in the treatment of fevers [9] and the flower has soothing properties which are used to relieve menstrual cramps and relax spasms and general cramping. Tannins are used to prevent urinary tract infection and intestinal disorders such as dysentery and diarrhoea [10]. Cardiac glycosides were found to be present in *C. asiatica* a compound that

has been shown to aid in treatment for congestive heart failure and cardiac arrhythmia. This is another reason why this plant is widely used in traditional medicine. Cardiac glycosides work by inhibiting the Na /K pump. This causes an increase in the level of sodium ions in the myocytes, which then leads to a rise in the level of calcium ions. This inhibition increases the 2+ amount of Ca ions available for contraction of the heart muscle, improves cardiac output and reduces distension of the heart. *E. officinalis* is also believed to be an aphrodisiac and is considered to be one of the strongest rejuvenate herbs in Ayurveda medicine. It is the primary ingredient used in one of the renowned Ayurveda herbal formula, called Chyavanaprasha which has great respect as a sexual vitality tonic[11]. This may be contributed by the presence of phenolic compounds, which acts as stimulating agent[12]. *E. officinalis* is also used to detoxify blood from chemicals and harmful toxic due to the presence of phenols, so that it acts as a detoxifying agent. Decoctions of the leaves and seeds of *E. officinalis* are used in the treatment of diabetes [13] and this may be due to the presence of terpenoids in *E. officinalis* [14]. Jayanta Kumar Patra *et al*., (2009) [15] reported that the potential for developing antimicrobial agents from mangrove species due to the presence of phytoconstituents. Similarly *S. monoica* and *S. portulacastrum* contains the group of biologically active molecules *viz*., Tannin, Glycosides, Cardiac glycosides, Terpenoids, Phenol and Flavonoid and its medicinal properties were discussed.

Table 1: Qualitative analysis of phytoconstituents in *S. monoica* and *S. portulacastrum*

S No.	Phytoconstituents	*S. monoica*	*S. portulacastrum*
1	Protein	+	+
2	Resins	+	+
3	Tannins	+	+
4	Alkaloids	-	-
5	Cardiac glycosides	+	+
6	Terpenoids	+	+
7	Flavonoids	+	+
8	Saponins	-	-
9	Phenols	+	+
10	Acidic compounds	+	+
11	Glycosides	+	+

(+) - Present (-) - Absent

4. Conclusion

Qualitative analysis of *S. monoica* and *S. portulacastrum* leaves showed that the presence of biologically important phytoconstituents *viz*., Flavonoids, Terpenoids, Tannin, Phenol and Cardiac glycosides. This research work has revealed the potential of two mangrove species could be useful in the area of life sciences. Further research work is need to determine the biological active molecules from *S. monoica* and *S. portulacastrum*, this would be the basic platform to be executed in various applications of life sciences.

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