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Phytochemical Screening of *Sargassum swartzii* (Seaweeds- Brown algae)

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Abstract: Seaweeds or marine algae are potential renewable resource in the marine environment. The medicinal uses of seaweed are vast and range from tropical burn therapy to softening of tumours. The Phaeophyceae or brown algae is a large group of marine multicellular algae and play an important role in marine environments both as food and for the habitats. In the present study, brown algae was selected and the secondary metabolites like carbohydrates, reducing sugar, cycloglycosides, flavonoids, terpenoids and phenols are found to be high in the methanolic extract of *Sargassum swartzii*. Powder and fluorescence analysis of dried powder of *Sargassum swartzii* were observed. From the study, it may be concluded that the methanolic extract of *Sargassum swartzii* is a good source of phytoconstituents.

Keywords: Seaweeds, brown algae, *Sargassum swartzii*, fluorescence, qualitative analysis and phytoconstituents.

INTRODUCTION

Seaweeds are macroscopic marine algae attached to solid substratum, growing in the shallow waters of sea. They belong to the primitive group of Thallophyta and are classified into three major classes viz. Chlorophyceae (green algae), Phaeophyceae (brown algae) and Rhodophyceae (red algae). Seaweeds are important marine resources exploited for their commercial value as the source of

phycocolloids such as agar, agarose, algin and carrageenan, besides their use as food, source of enzymes, dyes, drugs and growth promoters, etc. Seaweeds are excellent source of vitamin A, B₁, B₂, C, D and E. Quality of protein and lipid in seaweeds are most acceptable for consumption compared to other vegetables mainly due to their high content in essential amino acids and relatively high level of unsaturated fatty acids¹. Seaweed draws an extraordinary wealth of mineral elements from the sea that can account for up to 37% of its dry mass and it includes sodium, calcium, magnesium, potassium, chlorine, sulphur and phosphorous. The Phaeophyceae or brown algae is a large group of marine multicellular algae including many seaweeds of colder Northern Hemisphere waters². They play an important role in marine environments both as food and for the habitats they form *Sargassum* which creates unique habitats in the tropical waters of the Sargasso Sea. The brown colour of the phaeophyceae results from the dominance of the pigment fucoxanthin which masks the other pigments (including chlorophyll a and c, betacarotene and other xanthophylls)³.

Seaweeds provide an excellent source of three bioactive compounds such as carotenoids, dietary fibers, proteins, essential fatty acid, vitamins and minerals⁴. Recent research implies that polysaccharides like inulin, oligofructose, galactooligosaccharides and lactulose⁴ from *Sargassum* species. Similarly, fucoidan and guluronic acid rich alginate derivative derived from *Sargassum tenerrimum* which has been proven to show its antiviral activity against the Herpes simplex viruses⁵. Considering the chemical and immense pharmacological properties of brown algae, the present study was carried to analyze the qualitative phytochemical constituents of methanolic extract of *Sargassum swartzii*.

MATERIALS AND METHODS

Collection of aquatic plant material: The study was carried out on the seaweeds which were collected from Mandapam coastal regions, South east coast of India. Seaweed samples were picked with hand and immediately washed with sea water to remove the foreign particles, sand particles and epiphytes. Then it was kept in an ice box containing slush ice and immediately transported to the laboratory and washed thoroughly with the tap water to remove the salt on the surface of the sample. Then the seaweeds were spread on blotting paper to remove excess water and dried.

Then the seaweed sample was authenticated namely *Sargassum swartzii* C. Agardh by Botanical Survey of India, Coimbatore, Tamilnadu, India.

Preparation of the methanolic extract *Sargassum swartzii*: The *Sargassum swartzii* were cleaned, chopped into small pieces, air dried, and stored at freezer. The 400g of *Sargassum swartzii* material was refluxed in methanol for 6 hrs at room temperature. The resulting solution was concentrated and evaporated to dryness under vacuum using rotatory evaporator. The dried powder of *Sargassum swartzii* was used for further analysis.

- Powder analysis such as colour, consistency, odour and texture was observed.
- The fluorescence analysis of dried powder of *Sargassum swartzii* was observed in daylight, short UV and long UV light (UV :254nm), treated with sodium hydroxide in methanol, sodium hydroxide in water and sodium hydroxide in HCl.

Phytochemical screening: Phytochemical screening of *Sargassum swartzii* was done according to standard procedures⁷⁻⁸.

RESULTS AND DISCUSSION

Characterization of the *Sargassum swartzii*: The aquatic plant kingdom is a treasure of potential bio active compounds. In recent years, there has been an increasing awareness about the importance of research in aquatic plants. Active constituents present in the plant materials might be responsible for the benefit of humans. Aquatic plants contain some organic compounds which provide definite physiological action on the human body and these bioactive substances include alkaloids, terpenoids, steroids, phenolic compounds, tannins and flavonoids. These compounds are synthesized by primary and secondary metabolism of living organism.

Powder characteristics and fluorescence analysis of *Sargassum swartzii*: Much attention in seaweeds are devoted to the characterization, isolation and identification of secondary constituents in a particular species or group of species or with the expectation that some of the constituents may be novel or of an unusual structure. The results of the powder and fluorescence analysis of *Sargassum swartzii* was characterized in **Table 1 and 2**.

Table 1: Powder Characteristics of *Sargassum swartzii*

S.No	Characteristics	Properties
1.	Colour	Brownish green
2.	Odour	Fishy
3.	Consistency	Solid
4.	Texture	Smooth and soft. After pressing a little amount of powder between filter paper, no greasy stain was found.

Table 2: Fluorescence analysis of powdered form of *Sargassum swartzii*

S.No	Sample	Day light	Shot UV UV=254nm	Long UV
1.	Powder	Brownish green	Brownish green	Brownish green
2.	Powder+NaOH in methanol	Brownish pale green	Brownish pale green	pale green
3.	Powder + NaOH in water	Brown	Brownish green	Brownish green
4.	Powder + 1N HCl	Reddish brown	Pale greenish brown	Pale fluorescence green

Phytochemical analysis: Nature has been a some of medicinal agent for thousands of years and an impressive number of modern drugs have been isolated from natural sources⁹. The results of the preliminary phytochemical investigation of methanolic extract of *Sargassum swartzii* are summarised in **Table 3**. In **Table 3**, indicated the methanolic extract of *Sargassum swartzii* contains alkaloids, saponins, aminoacids, tannins and phlobotannins. Phyto constituents such as carbohydrates, reducing sugar, cycloglycosides, flavonoids, terpenoids and phenols are found to be high in methanolic extract of *Sargassum swartzii*. It is clearly evident from the tabulation that the other phyto constituents like coumarins, quinones and anthraquinones were absent. Literature survey shows that seaweed contain large amount of polysaccharides but less amount of proteins and aminoacids¹⁰. The total phenol content of edible Irish brown seaweed, *Himanthalia elongate* was found to be at higher level¹¹. Studies on brown seaweed, *Sargassum Wightii* showed the presence of flavonoids and steroids¹². Seaweeds are low in fats but contain vitamins and bioactive compounds such as terpenoids and sulfated poly saccharides, they are potential natural anti-oxidant which are not found in land

plants¹³⁻¹⁴. These results suggest the presence of primary bioactive metabolites of commercial importance which acts on the precursors for the synthesis of secondary metabolites.

Table 3: Phytochemical constituents present in methanolic extract of *Sargassum swartzii*

S.No	Phyto chemicals	Inference
1.	Carbohydrates	++
2.	Reducing sugars	++
3.	Cycloglycosides	++
4.	Alkaloids	+
5.	Saponins	+
6.	Tannins	+
7.	Flavonoids	++
8.	Terpenoids	++
9.	Phlobotannins	-
10.	Coumarins	++
11.	Total phenols	++
12.	Quinones	-
13.	Anthraquinones	-
14.	Aminoacids	+

Note: '++' – active compound copiously present; '+' – active compound present; '-' – active compound absent.

CONCLUSION

The marine environment hosts a wide range of bio-resources that have tremendous potential phytochemicals. From the study, it may be concluded that methanolic extract of *Sargassum swartzii* is a good source of phytochemicals. So, the marine organisms contain a wide range of novel compounds with pharmacological activities mainly from algae.

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