

PHYTOCHEMICAL ANALYSIS OF ALGAL SPECIES SHOWS IN SUTRAPADA COASTAL REGION OF GUJARAT

Abstract:

The aim of the present study is to assess the phytochemicals nine marine algae species which is further divided in to three classes. The qualitative phytochemical analysis were done on nine different algae species of Saurashtra coastal belt in Gujarat. For the qualitative phytochemical analysis total 16 different parameters were analyzed on algae species. Extracts prepared in two solvents viz., chloroform extract (CE) and acetone-water extract (AWE). Amongst the two different extracts, acetone water extract showed the presence of maximum number of phytochemical compounds. Next to that, acetone, water extract showed steroid, glycosides, tannin, protein and flavonoids compounds were present in all algae species. The estimation of tannins, steroid, glycosides, reducing sugar, protein and flavonoids were observed in two extracts of three algal classes.

Keywords: Seaweed, phytochemical, qualitative, extracts, coast, Sutrapada.

Introduction:

Marine algae comprises more than 60 trace elements in a concentration much higher than in terrestrial plants. They also contain protein, iodine, bromine, vitamins and substances of stimulatory as well as antibiotic in nature. Marine macro algae are the renewable living resources which are also used as food, feed, and fertilizer in many parts of the world (Chapman, 1998). Seaweeds have been reported to contain secondary metabolites which

contain alkaloids, glycosides, flavonoids, saponins, tannins, steroids, and related active metabolites, and have been far used in the drug and pharmaceutical industry (Eluvakkal et al-2010). In *Ulva lactuca*, Qualitative phytochemical screening of the powdered green algae revealed the presence of alkaloids, flavonoids, saponins, terpenoids and cardiac glycosides were detected (Dalia F. Abd et al-2014). Seaweeds are used as an alternative source for anti-bacterial, anti-inflammatory, anti-oxidant and anti-cancer, in the near future (Melpha et al-2014). The presence of various phytochemicals compounds identified through this study, rationalise the use of marine algae for various ailments in traditional therapy (Sivakumar Dhevika et al.-2018). The presence of reducing agents in synthesizing nanoparticle can be potent antimicrobials in near future. The biosynthesized nanoparticles showed evidence of high anti-bacterial activity against all test pathogens compared to phytochemical constituents (Kumar et al-2012). Phenolic compounds are widely distributed in the plant kingdom and have been reported to have several biological activities including antioxidant properties. The phenolic compounds may affect the growth and metabolism of bacteria. They could have an activating or inhibiting effect on microbial growth according to their constitution and concentration (Vimala, Reginald et al-2015). The major algal classes observed on the coast of Sutrapada region were likely to be *Chlorophyta*, *Rhodophyta* and *Phaeophyta*. The seaweed recorded on the Sutrapada coastal region have many medicinal and economic uses, especially manufactory products for the food and it is a primary source for many industries. It is reported in literatures that seaweeds have extensive medicinal properties specifically in cardiac disorders, blood purification and many other uses as these seaweed also possess anti-microbial properties. The role of phytochemicals is important in seaweeds as a secondary metabolites because these secondary metabolites provide them the medicinal properties. Hence, these species of seaweed were analyzed for secondary metabolites like proteins, terpenoids, flavonoids, tannin, phytosterol, amino acid, etc. There were nine seaweed species

collected from the Sutrapada coastal area having many medicinal properties in different diseases. In the present study, we investigated phytochemical qualitatively from various extracts of seaweeds. Selected nine marine macro algae were divided in to three major classes which commonly occurs on the Gujarat coast.

There were three species of Chlorophyta class, (*Caulerpa racemosa*, *Chaetomorpha crassa* and *Ulva lactuca*). Three species in class Phaeophyta (*Padina tetrastrum*, *Giffordia mitchellae* and *Sargassum tenerrimum*) and Rhodophyta (*Scinaia carnosa*, *Halymenia venusta* and *Champia indica*) each found on the coastal belt of Sutrapada. The prime importance of study is to be highlighted is phytochemical analysis of six species of seaweeds *Scinaia carnosa*, *Chaetomorpha crassa*, *Giffordia mitchellae*, *Caulerpa veravalensis*, *Champia indica* and *Halymenia venusta* are not reported till date.

Methodology:

(i) Study Area:

Collection site is 5 km coastal belt of The Sutrapada which is situated in Gir Somnath District, Gujarat. (GPS location : 20.8437° N 70.4759° E)

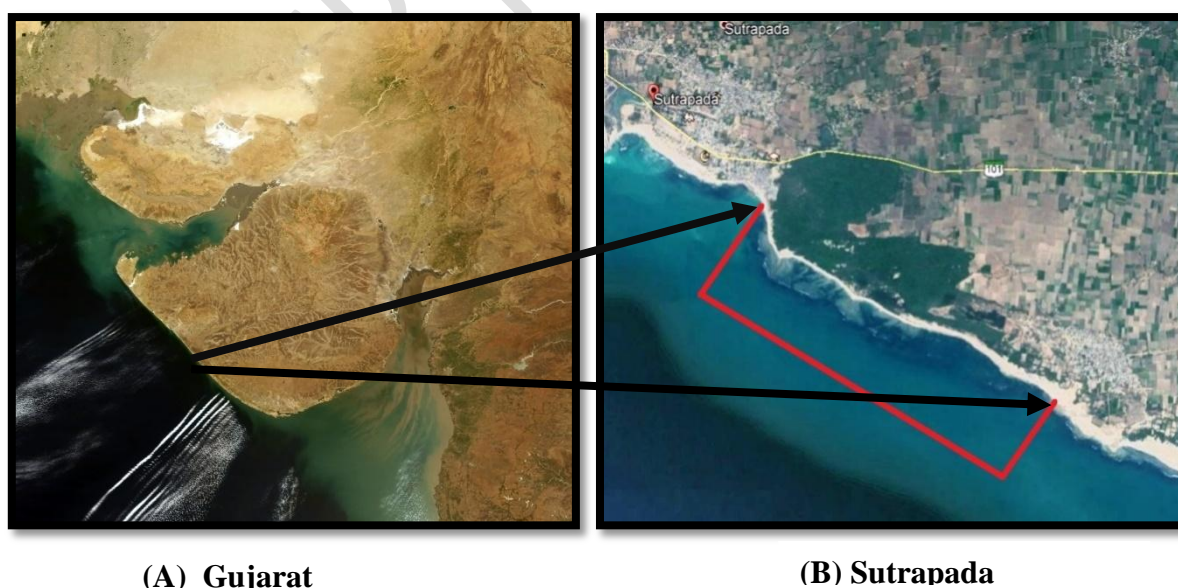


Fig 1: Map showing study area

(ii) Sample Preparation:

Seaweeds were collected for conducting qualitative phytochemical analysis of nine algal species, namely *Caulerpa racemosa*, *Scinaia carnosa*, *Padina tetrastomatica*, *Chaetomorpha crassa*, *Giffordia mitchellae*, *Caulerpa veravalensis*, *Ulva lactuca*, *Halymenia venusta*, *Champia indica* and *Sargassum tenerrimum* from the coastal belt of Sutrapada of Saurashtra coast. Seaweed were crushed by mortar pestle grinded to powder. The powder were used for preparing the extract in chloroform and acetone:water (1:1). 10 g. Powder of seaweeds were subjected to 50 ml of solvent for 24 hrs, after which it was filtered using whatman filter paper-no 1. The sample prepared were analyzed for different phytochemical qualitative analysis of various parameters like steroids (Nidal Jaradat et al-2015), tannin (Mercy Gospel Ajuru et al-2017), Coumarin (Mercy Gospel Ajuru et al-2017), Phytostetol (Ashok Kumar et al-2012), Phenolic compounds (Mercy Gospel Ajuru et al-2017), Flavonoids (Abdul Wadood et al-2013), carbohydrates (Nidal Jaradat et al-2015), Proteins (Nidal Jaradat et al-2015), Phiobatannis (Abdul Wadood et al-2013), Reducing sugar (Ashok Kumar et al-2012), Amino acids (Nidal Jaradat et al-2015), Glycosides (Ashok Kumar et al-2012) and Terpenoids (Nidal Jaradat et al-2015).

Results:

Table; 1 Phytochemical analysis of *Chlorophyta* class:

Sr. No.	Phytochemical test	<i>Caulerpa racemosa</i> (A)		<i>Chaetomorpha crassa</i> (B)		<i>Ulva lactuca</i> (C)	
		CE	AWE	CE	AWE	CE	AWE
1.	Steroid	-	+	-	-		+
2.	Phytostetol (Salkowski's test)	-	-	-	-	-	-
3.	Tannin	-	+	-	+	+	+
4.	Coumerins	-	-	-	-	-	-
5.	Phiobatannis	-	-	-	-	-	-

6.	Alkaline(Flavonoids)	-	-	-	-	+	+
7.	NH ₄ OH (Flavonoids)	-	-	-	-	-	+
8.	Zn-Test (Flavonoids)	-	+	-	-	-	+
9.	Carbohydrate(Fehling'S)	+	-	+	-	+	-
10.	Reducing sugar (Benedict's)	+	-	+	-	+	+
11.	Amino acids (Ninhydrin test)	-	+	-	-	+	+
12.	Protein (Million tests)	+	-	-	+	-	-
13.	Glycosides (Keller- Kiliani Test)	+	+	+	+	+	-
14.	Terpenoids (Salkowski test)	+	-	+	-	-	+
15.	Phenols compounds (Ferric chloride test)	+	-	-	-	+	+
16.	Carbohydrates (Molisch test)	-	-	-	-	+	-

*(CE; chloroform extract, AWE; acetone:water extract)

Here, steroid, tannin, flavonoids, carbohydrate, reducing sugar, amino acids, protein, glycosides, terpenoids and phenols compounds total ten phytochemical present in this class.

Where coumerins, phytostetol and phiobatannin is not present in this class.

Chart: 1 *Chlorophyta* seaweed phytochemicals

Chlorophyata



- Steroid (A,B)
- Tannin (A,B,C)
- Flavonoids (A,C)
- Carbohydrate (A,B,C)
- Reducing sugar (A,B,C)
- Amino acids (A,C)
- Protein (A,C)
- Glycosides (A,B,C)
- Terpenoids (A,B,C)
- Phenols compounds (A,C)

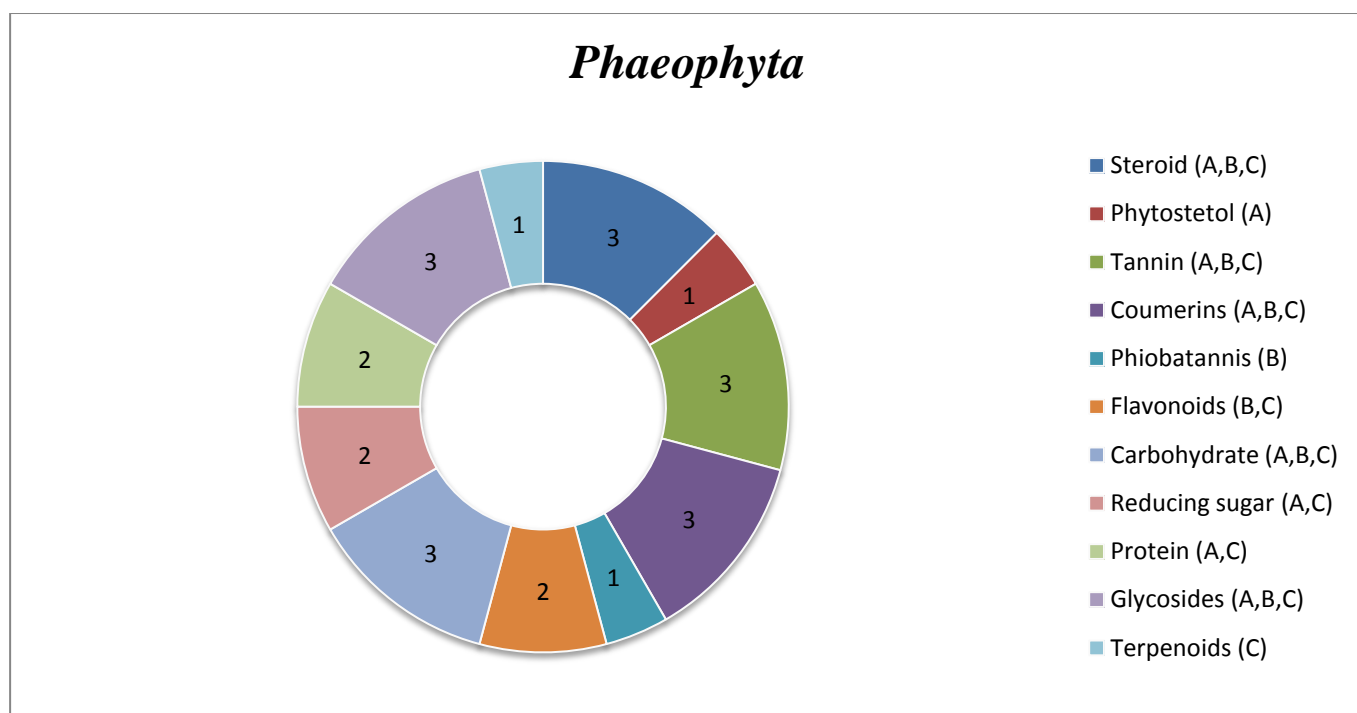
Table: 2 Phytochemical analysis of Phaeophyta class

Sr. No.	Phytochemical test	<i>Padina tetrastromatica</i> (A)		<i>Giffordia mitchellae</i> (B)		<i>Sargassum tenerrimum</i> (C)	
		CE	AWE	CE	AWE	CE	AWE
1.	Steroid	-	+	-	+	-	+
2.	Phytostetol (Salkowski's test)	+	-	-	-	-	-
3.	Tannin	+	+	+	-	+	+
4.	Coumerins	-	+	+	-	+	+
5.	Phiobatannis	-	-	+	-	-	-
6.	Alkaline(Flavonoids)	-	-	+	-	+	+
7.	NH ₄ OH (Flavonoids)	-	-	-	+	-	-
8.	Zn-Test (Flavonoids)	-	-	-	-	-	-
9.	Carbohydrate(Fehling'S)	+	-	+	-	-	-
10.	Reducing sugar(Benedict's)	-	+	-	-	+	+
11.	Amino acids (Ninhydrin test)	-	-	-	-	-	-
12.	Protein (Million tests)	-	+	-	-	+	+
13.	Glycosides (Keller-Kiliani Test)	+	+	+	+	+	+
14.	Terpenoids (Salkowski test)	-	-	-	-	+	+
15.	Phenols compounds (Ferric chloride test)	-	-	-	-	-	-

16.	Carbohydrates (Molisch test)	-	-	-	-	+	+
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*(CE; chloroform extract, AWE; acetone:water extract)

Chart: 2 Phaeophyta seaweed phytochemicals



Total 11 phytochemical present in three different species of **Phaeophyta** class. Which is steroid, phytostetol, tannin, coumerins, phiobatannin, flavonoids, carbohydrate, reducing sugar, protein, glycosides, terpenoids. Here phenols compounds and Amino acids absent with respective tests.

Table:3 Phytochemical analysis of Rhodophyta class

Sr. No.	Phytochemical test	<i>Scinaia carnosa</i> (A)		<i>Halymenia venusta</i> (B)		<i>Champia indica</i> (C)	
		CE	AWE	CE	AWE	CE	AWE
1.	Steroid	-	+	+	+	+	+
2.	Phytostetol (Salkowski's test)	-	+	+	-	+	+
3.	Tannin	+	-	-	+	+	+

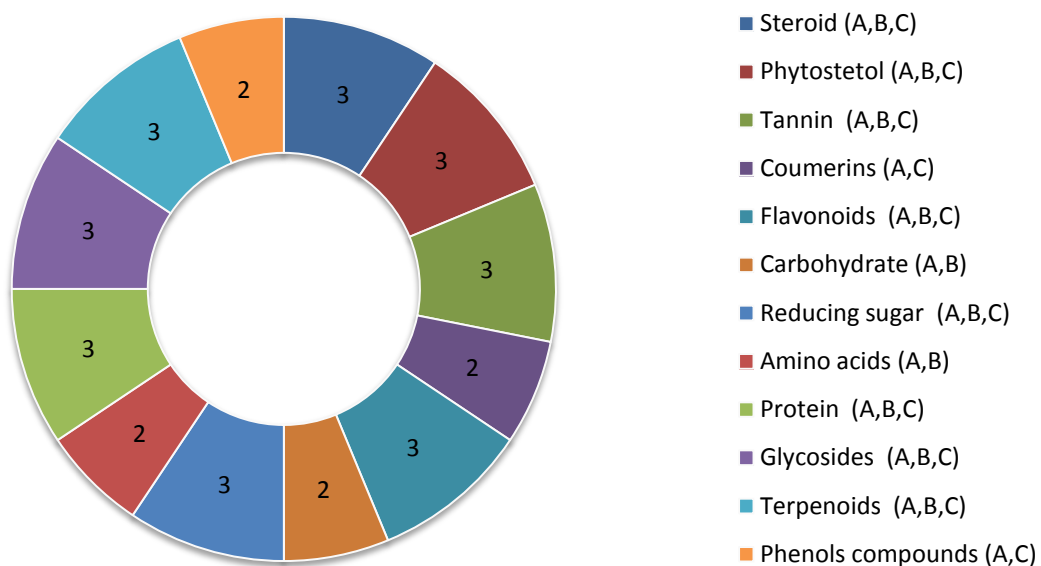
4.	Coumerins	+	+	-	-	+	-
5.	Phiobatannis	-	-	-	-	-	-
6.	Alkaline(Flavonoids)	+	+	-	+	+	-
7.	NH ₄ OH (Flavonoids)	+	+	-	-	-	+
8.	Zn-Test (Flavonoids)	-	-	-	-	-	-
9.	Carbohydrate(Fehling'S)	-	-	+	+	-	-
10.	Reducing sugar(Benedict's)	-	+	+	+	+	-
11.	Amino acids (Ninhydrin test)	-	+	-	+	-	-
12.	Protein (Million tests)	-	+	-	+	+	+
13.	Glycosides (Keller-Kiliani Test)	-	+	+	-	+	-
14.	Terpenoids (Salkowski test)	+	-	+	-	+	-
15.	Phenols compounds (Ferric chloride test)	-	+	-	-	+	+
16.	Carbohydrates (Molisch test)	-	+	+	+	-	-

*(CE; chloroform extract, AWE; acetone:water extract)

Here, steroid, phytostetol, tannin, coumerins, flavonoids, carbohydrate, reducing sugar, amino acids, protein, glycosides, terpenoids and phenols compounds total 12 chemical present in Rodophyta classes. In which Phiobatannin is not present in this class.

Chart:3 *Rhodophyta* seaweed phytochemicals

Rhodophyta

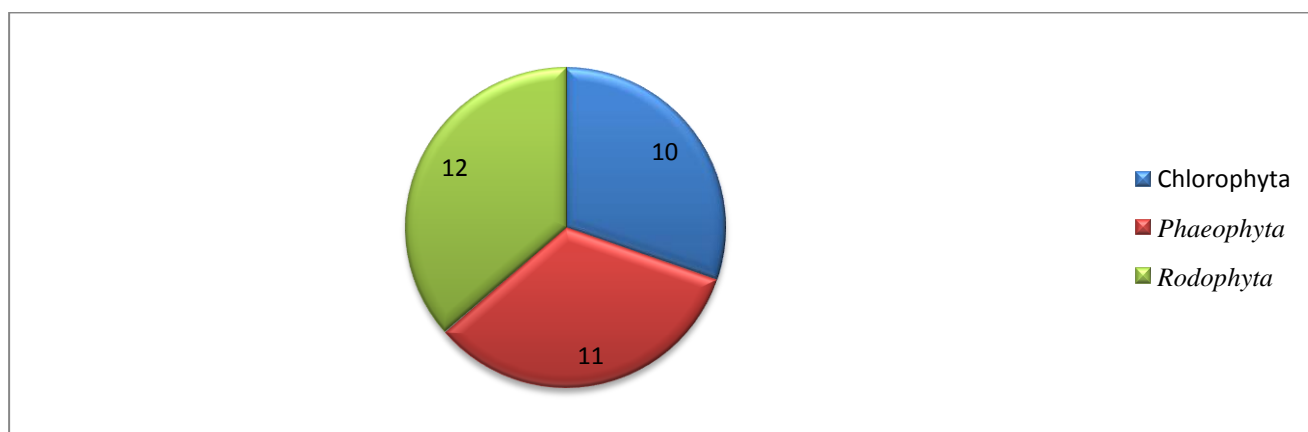


In **Rhodophyta** class total twelve phytochemical were present out of thirteen. And (A,B,C) indicates that particular algae name and present of phytochemical in any one or both solvent extracts. 1,2,3 shows the particular phytochemical present in how many algae species.

Table:4 Class wise phytochemicals.

Sr. No.	Class	Total seaweeds species	Present phytochemical
1.	Chlorophyta	3 (A,B,C)	10
2.	Phaeophyta	3 (A,B,C)	11
3.	Rhodophyta	3 (A,B,C)	12

Chart: 4 Total number of phytochemical present in each class.



In both extracts *Scinaia carnosa*, *Champia indica* (Rodophyta), *Ulva lactuca* (Chlorophyta) has good source of phytochemical.

Discussion:

Seaweeds are rich in majority of secondary metabolites and hence have high potential of curing many diseases. In the present study seaweed in chloroform and acetone:water extract showed immense results justifying its efficiency as medicinal properties. It is also concluded from the results which showed the maximum presence of phytochemicals in acetone:water extract class Rhodophyta comprises of more phytochemical constituents than that of other two classes. Three seaweed species *Scinaia carnosa*, *Champia indica* (Rhodophyta), *Ulva lactuca* (Chlorophyta), were having rich in secondary metabolites which could be further isolated for biological activities for conforming their role in specific diseases.

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