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Phytochemical Analysis and Evaluation of Total Phenolic Content of Algal Biomass Found in Tapi River in Surat

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Abstract*: *The present study aims to assess the phytochemicals of algal biomass which has seven species identified microscopically. The qualitative phytochemical analysis was done on all the biomass in the Tapi River, Surat in Gujarat. For the qualitative phytochemical analysis total 12 different parameters were analysed and used on algal biomass. Extract prepared in water. Amongst the water extract showed the presence of a maximum number of phytochemical compounds. Next to that, water extract showed alkaloids, glycosides, flavonoids, saponins, terpenoids, phytosterol, coumarins, tannins, diterpenes, and quinones, carbohydrates, The protein present in algal biomass. The evaluation of total phenolic content presence in algal biomass.
Keywords: Algal biomass, Phytochemical analysis, Algae, Phytochemicals, Total phenol content, Qualitative analysis of biomass, Tapi, Biomass Extract, Algae extract.

I. INTRODUCTION

River algae comprise 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. River macroalgae are renewable living resources that are also used as food, feed, and fertilizer in many parts of the world. 1. Algal biomass has 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. 2. In stagnant or river water algal biomass, Qualitative phytochemical screening of the powdered green algae revealed the presence of alkaloids, flavonoids, saponins, terpenoids, and cardiac glycosides detected. 3.

Algal dried or wet biomass is used as an alternative source for anti-bacterial were anti-inflammatory, anti-oxidant, and anticancer shortly. 4. The presence of various phytochemicals compounds identified through this study rationalizes the use of river algae for various elements in traditional therapy. 5. In the presence of high lipid content, these lipids are esterified by FAME methods and future third-generation biofuel can be produced. 6.

Algal biomass contains a high amount of Total phenol content Phenolic compounds are widely distributed in the plant kingdom and have been reported to have several biological activities including antioxidant properties The presence of Phenol concentration affect the growth and nutritional cycle of bacteria. They could have an activating or inhibiting effect on microbial growth according to their chemical structure and concentration. 7. The major seven algal species observed in algal biomass in the frothy Tapi river were likely to be *Rhizoclonium* spp., *Spirogyra* spp., *Oedogonium* spp., *Ulothrix* spp., *Cladophora* spp., *Volvox* spp., *Hydrodictyon* spp., The Algal biomass recorded on the Tapi river has many medicinal and economic uses, especially in manufacturing products for food and it is a primary source for many industries.

It is reported in the literature that Algae have extensive medicinal properties specifically in cardiac disorders, blood purification, and many other uses as this algal biomass also possess anti-microbial properties. The role of phytochemicals is important in Algae as secondary metabolites because these secondary metabolites provide them with medicinal properties. Hence, these species of algae were analyzed for secondary metabolites like proteins, terpenoids, flavonoids, tannins, phytosterol, amino acids, etc. There were seven Algal species collected from the Tapi river Algal biomass are having many medicinal properties in different diseases. In the present study, we investigated phytochemical qualitatively from aqueous extracts of Algal biomass. Selected seven marine macro algae were collectively in algal biomass which commonly occurs in the Tapi River. The prime importance of this study is to highlight the phytochemical analysis of mix species of algae in collectively algal biomass and the quantitative measurement of total phenol concentration.

II. MATERIALS AND METHODS

A. *Sample Collection*

Algae biomass samples are collected from the Tapi River.

1) Collection Site: Collect the green or brown algal biomass.

Tapi River; Causeway Katargam; Taluka Surat; District Surat, Gujrat. GPS LOCATION (Latitude: N 21° 13.4023'. Longitude: E 72° 48.5673'.)

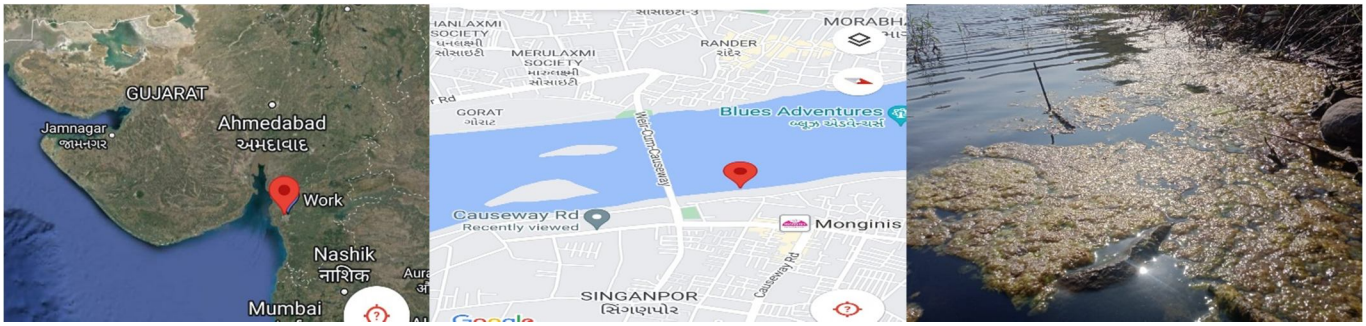

Figure 1.1: Tapi River, Causway Katargam, Surat, Gujrat. GPS Location (Latitude: N 21° 13.4023'. Longitude: E 72° 48.5673'.)

B. *Extraction of cell Biomass*

Biomass collected after filtration was crushed and dried in a hot air oven or through a natural process (using sunlight for drying).

C. *Phytochemical Analysis*

Aqueous extracts obtained by the above method were used for phytochemical analysis which includes the presence or absence of tannins, alkaloids, flavonoids, terpenoids, steroids, saponins, glycosides, phytosterol, Diterpenes, etc [16]

D. *Quantitative estimation of Total phenolic content by using the colorimetric Method*

1) Gallic acid Assay Method: The phenolic content of the algal extract was determined with Folinciocalteu's reagent. Different concentrations of extraction mixed with the 0.5 ml of Folinciocalteu's reagent. After 5 min of incubation at room temperature, added 1.5 ml of 20% Na_2Co_3 (sodium carbonate) and 2 ml of distilled water. After 2hr of incubation, the absorbance of the sample was measured against blank at 750 nm. The result was compared with the Gallic acid standard test [17].

III. RESULTS AND DISCUSSION

A. *Result of Phytochemical Analysis*

Preliminary phytochemical screening of algae extraction was done to check the presence of bioactive components.

Table no 1.1: Represent the result of the phytochemical Test :

Phytochemical test			
Sr no.	Test	Inference	Observation
Detection of Alkaloids			
1.	Brownish-yellow	brownish-yellow precipitate	+ve
2.	Hager's test	Yellow colour precipitate	+ve
3.	Mayer's test	Creamy white/yellow precipitate	+ve
Detection of Glycosides			
4.	Sulphuric acid test	Occurrence of red colour	+ve
Detection of Flavonoids			
5.	Zinc – hydrochloride test	Occurrence of yellow colour	+ve
Detection of Saponins			
6.	Foam test	Soluble emulsion	+ve
Detection of Terpenoids			

7.	The reddish	Reddish-brown colour at interference	+ve
		Detection of Phytosterol	
8.	Salkowski's test	The brownish-red colour ring at acid interference	+ve
		Phytochemical test	
Sr no.	Test	Inference	Observation
		Detection of Coumarins	
9.	NaOH test	Formation of yellow colour	+ve
		Detection of Tannins	
10.	Gelatin test	A white precipitate form	+ve
		Detection of Diterpenes	
11.	Copper acetate test	Emerald green colour form	+ve
		Detection of Quinones	
12.	Sulphuric acid test	Red colour formation	+ve
		Detection of carbohydrates	
13.	Molisch's test	Violet /Purple ring at the junction	+ve
14.	Fehling's test	Brick red precipitates	+ve
		Detection of phenol	
15.	Ferric chloride test	Formation of blue/ green colour precipitate	+ve
		Detection of protein	
16.	Hopkin's test	Formation of purple/ brown ring	+ve
17.	Nin – hydration test	Formation of reddish/ brown colour	+ve

Whereas, "+ve" = Positive and "-ve" = Negative

The phytochemical screening conducted on algae extract is showing the presence of some bioactive components such as alkaloids, phenol, flavonoids, glycosides, quinone etc., the presence of this compound shows that it is also helpful in the pharmaceutical industry.

B. Total Phenol Concentration

Sample	Aliquot (ml)	Optical. Density. (O.D.)	Concentration (µg/ml)
Aqueous extracts of algal biomass.	Blank	0.0	0.0
	0.1ml	0.03	2.21 µg/ml
	1ml	0.43	27.37 µg/ml

Table no.2.1: Results of Total phenol concentration

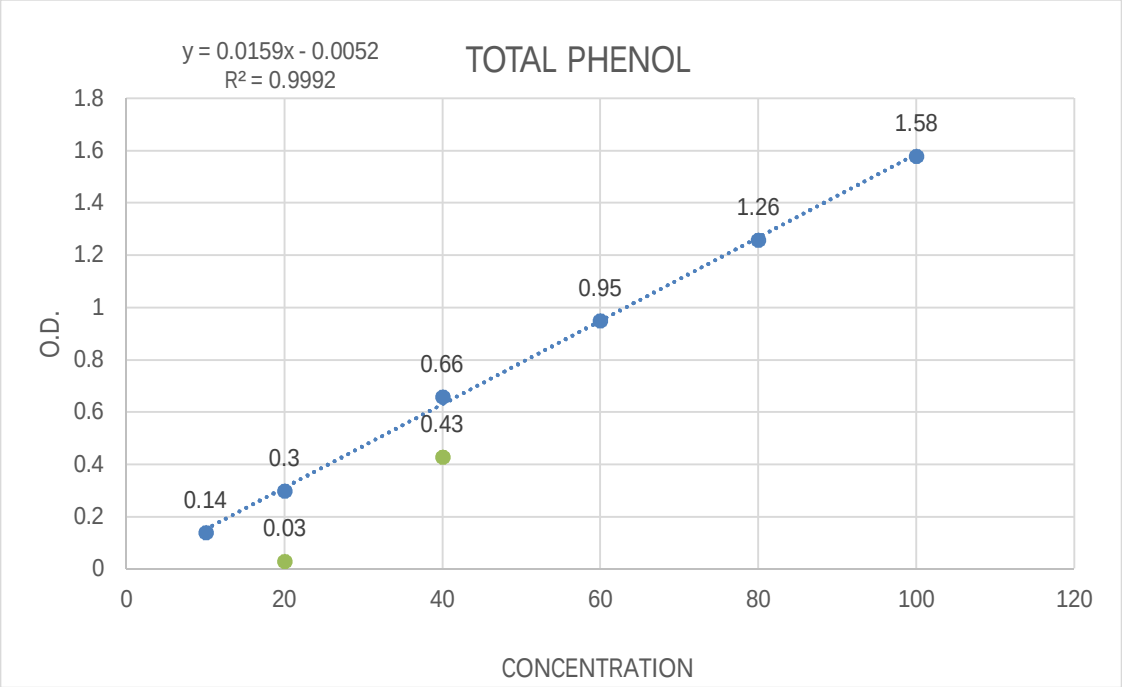

Figure: 2.1 Standard value of Gallic acid assay for total phenol estimation.

III. CONCLUSION

Algal biomass is rich in the majority of secondary metabolites and hence has high potential in healing many diseases. The present study of algal biomass by making aqueous 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 water extract this algal biomass is rich in secondary metabolites which could be further isolated for check their biological activities for conforming their precise role in specific diseases. Algal biomass is used as medicine, food and fertilizer by the presence of these kinds of phytochemicals .study of total phenol content shows the Phenolic compounds are important constituents with redox properties responsible for antioxidant activity. The hydroxyl groups in algal biomass extracts are responsible for facilitating free radical scavenging. The selected algal biomass with high antioxidant activity might be proposed for impeding toxic oxidation in nutraceuticals or drugs for the treatment of coronary diseases.

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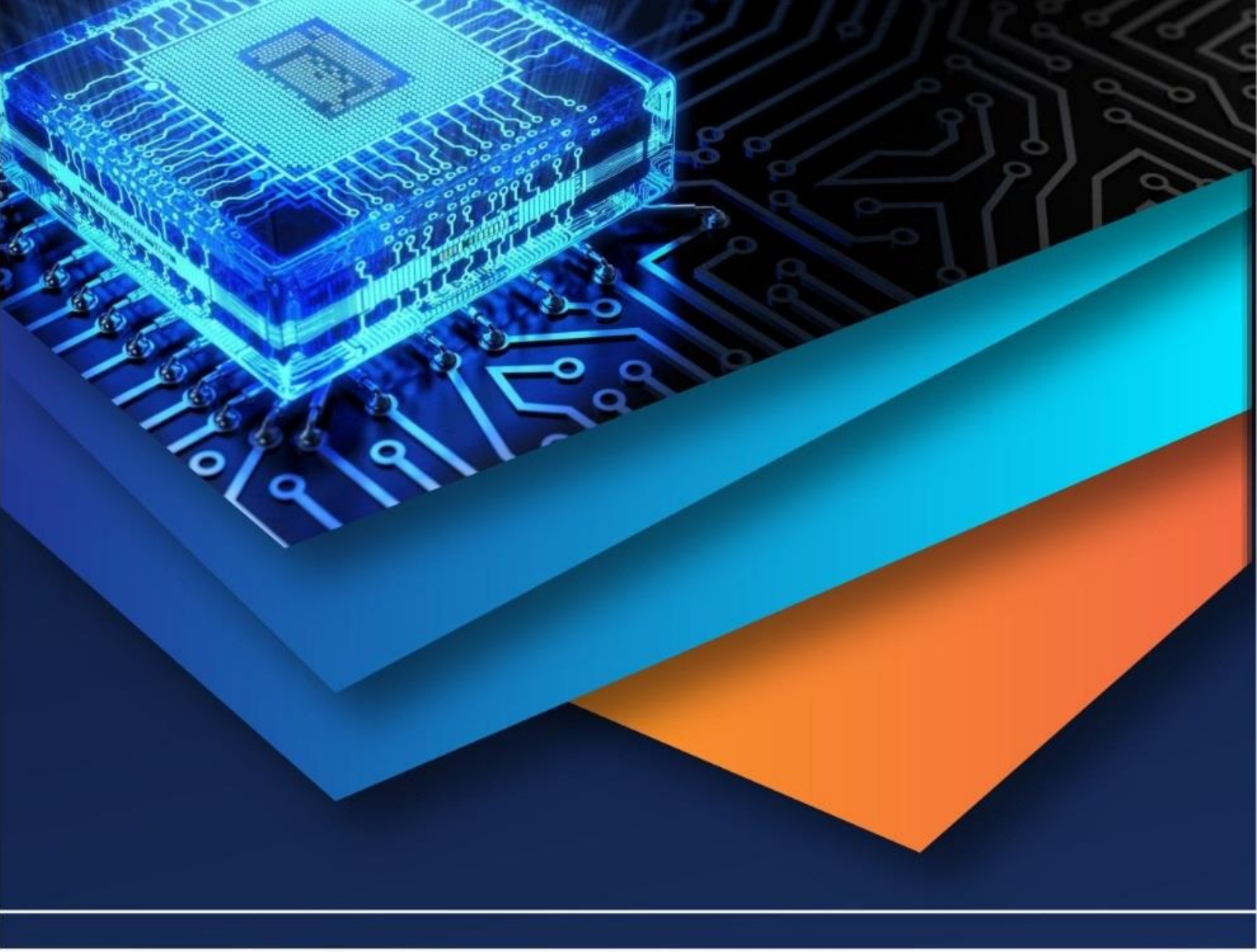

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