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Analysis and Comparision of Antioxidant Activity of Gracilaria Edulis and Gelidium Acerosa

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***Abstract* – The present study investigates about the antioxidant activity of red algae *Gracilaria edulis* and *Gelidium acerosa* by radical scavenging method, DPPH assay. The ethyl acetate and ethanolic extracts of the two red algae was prepared keeping BHT as a standard.*Gelidium acerosa* showed the highest antioxidant activity compared to *Gracilaria edulis*. The absorbance was recorded at 517 nm.**

***Keywords* – DPPH Assay, Ethyl Acetate, Ethanol.**

I. INTRODUCTION

Seaweeds belong to the group of marine plants known as algae. The estimated range of seaweeds is probably 45,000 species [1].Seaweeds are extensive profile source of secondary metabolites. More than 600 secondary metabolites have been isolated from marine algae[3].The importance of seaweeds for human consumption is well known since 300 B.C in china and japan. These two countries are the major seaweed cultivators, producers and consumers in the world[6]. It has been reported that seaweeds contain high levels of minerals, vitamins, essential amino acids, indigestible carbohydrates and dietary fiber[1].Seaweeds with their diverse bioactive compounds [8] have opened up potential opportunities in pharmaceutical and agri-food processing industries. The consumption of seaweeds as a part of diet has been shown to be one of the prime reasons for low incidience of breast and prostrate cancer in Japan and China compared to North America and Europe [8]

A free radical is a molecule with one or more unpaired electrons in the outer orbital. Many of these free radicals are in the form of reactive oxygen and nitrogen species, these can occur, due to oxidative stress brought about by the imbalance of the bodily antioxidant defense system and free radical formulation.[9].

Oxidative stress has been linked to cancer, aging, ischemic injury, inflammation and neurodegenerative diseases (Parkinson's and Alzheimers's). Reactive oxygen species (ROS) such as superoxide radical, hydroxyl radical, peroxyl radical, and nitric oxide radical, attack biological molecule such as lipids, enzymes, DNA and RNA, leading to cell or tissue injury associated with aging, artherosclerosis carcinogenesis[9] and may lead to the development of chronic diseases related to the cardiac and cerebro vascular systems [9]. Antioxidants are micronutrients that have gained importance in recent years due to ability to neutralize free radicals or their action[11].

A study shows that antioxidant substance which scavenge free radicals play an important role in the prevention of free radical-induced diseases[1]. This helps in protecting the body from degenerative diseases. *Gracilaria edulis* and *Gelidium acerosa* contain phytochemicals and possess the capacity to destroy free radicals. The principle agents responsible for the protective effects could be the presence of antioxidant substance that exhibit their effects as free radical scavengers, hydrogen donating compounds, singlet oxygen quenchers and metal ion chelators[1].

The two red algae belongs to the family Rhodophta which is considered as an important species for industrial and biotechnological uses[5] .*Gracilaria edulis* and *Gelidium acerosa* are the major Indian agarophytes. The members of Gelidiales are among the most economically important agarophytes,and are cultivated and harvested as sources of agar and agarose[7].Compounds with antioxidant, antiviral, antifungal and antimicrobial activities have been detected in brown,red and green algae[4]. The aim of the study is to compare the antioxidant activity of both the species.

II. MATERIALS AND METHODS

DPPH free radical scavenging activity

A. Reagents required

- DPPH
- Leaf extracts (1mg/ml)
- BHT
- Methanol

B. Procedure

The ability of the extracts to annihilate the DPPH radical (1,1-diphenil-2-picrylhydrazyl) was investigated by the method described by Harbone, J.B (Harbone, J.B and Baxter, H 1995). Stock solution of leaf extracts was prepared to the concentration of 1mg/ml. 100µg of each extracts were added, at an equal volume, to methanolic solution of DPPH (0.1%). The reaction mixture is incubated for 30min at room temperature; the absorbance was recorded at 517 nm. The experiment was repeated for three times. BHT was used as standard controls. The annihilation activity of free radicals was calculated in % inhibition according to the following formula

% of Inhibition =

*(A of control – A of Test)/A of control * 100*

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III. Result and Discussion

Seaweeds have received the special attention as a source of natural antioxidants [9]. Several studies were subsequently performed to verify the antioxidant properties of algae [9].

The environment in which seaweeds grow is harsh as they are exposed to a combination of light and high oxygen concentration. These factors can lead to the formation of the free radicals and other strong oxidizing agents but seaweeds seldom suffer any serious photodynamic damage during metabolism. This fact implies the seaweed cells have some protective mechanisms and compounds[4]

The results of DPPH assay shows the presence of antioxidant activity in both *Gracilaria edulis* and *Gelidium acerosa* which is represented in table 1. Plant phenolics are a major group of compounds that act as primary antioxidants of free radical scavengers [9]

Ethyl acetate and ethanolic extract of *Gelidium acerosa* showed 74.8% and 73.8% of inhibition while ethyl acetate and ethanolic extract of *Gracilaria edulis* showed 50% and 46.8% of inhibition. The comparative study reveals the fact that *Gelidium acerosa* recorded the highest antioxidant activity than *Gracilaria edulis*. The phenolic compounds are commonly found in edible brown, green and red seaweeds in which the antioxidative property has been correlated to their phenolic content [9]. Polyphenols are electron-rich compounds,which can intervene with efficient electron donation reactions and in turn produce phenoxyl radical species as intermediates in the presence of oxidizing agents [10].

Table I

S. No.	Extract	Absorbance of control	Absorbance of sample	% of inhibition
1	Ethyl acetate – GA	0.3658	0.092	74.84
2	Ethanol – GA	0.3399	0.089	73.81
3	Ethyl acetate – GE	0.018	0.009	50
4	Ethanol – GE	0.016	0.0085	46.87

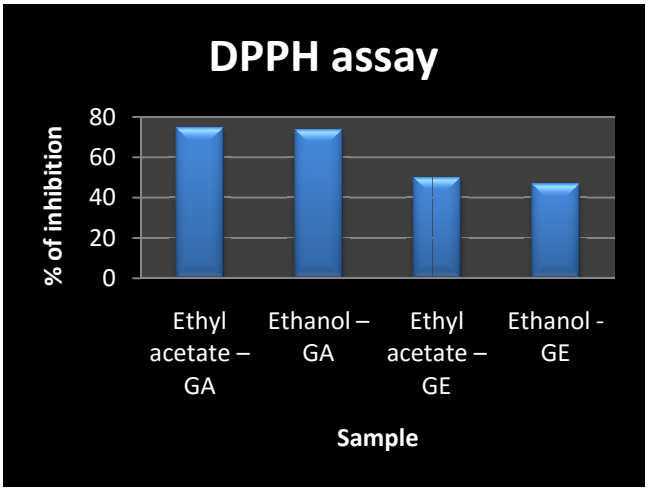

Fig.I. The peak shows the comparative activity of *Gelidium acerosa* and *Gracilaria edulis*.

The proposed result of antioxidant activity of two seaweeds shows good peak. The percentage of inhibition varies depends on the choice and the concentration of the solvent used. We have very little information on the antioxidant potentials of marine algae [11]. The result of a proposed work could be an accurate finding and hence this may support future exploration. Futher studies are required to identify the active principles responsible for the significant antioxidant effect [11].

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