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# INFLUENCE OF *STOECHOSPERMUM MARGINATUM* SLF ON *ORYZA SATIVA* L. SEEDLINGS

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## ABSTRACT

*This paper has been made to deals with the study of aqueous alcohol method extraction of Stoechospermum marginatum SLF ( Seaweed liquid fertilizer) on growth and biochemical parameters of Oryza sativa seedlings. Different concentrations (0.25%,0.50%,0.75%,1.00%,1.50%,2.00%) of SLF were prepared using aqueous alcohol method. The SLF prepared form S.marginatum was observed to have positive effect on shoot ,root, number of leaves, fresh weight and dry weight. The biochemicals such as chlorophylls, carotenoid, protein, lipid, carbohydrate increased when the Oryza sativa seedlings treated up to 2.00%. The toxic chemicals from the chemical fertilizers accumulate in the plant products and causing health problems in human beings by bio-magnification in recent years. The use of natural seaweed products as substitutes to the conventional synthetic fertilizers has assumed importance. Therefore, we can also concluded that the Stoechospermum marginatum SLF increases the growth and biochemical parameters of Oryza sativa seedlings.*

**KEYWORDS:** *Seaweeds, seedlings, alcohol, growth, biochemical.*

## INTRODUCTION

Seaweeds are marine macroalgae growing in the intertidal and subtidal zones of marine waters. Based on pigmentation, seaweeds are classified as green seaweeds (Chlorophyta), brown seaweeds (Phaeophyta) and red seaweeds (Rhodophyta). Seaweeds are thalloid plants having immense economic uses as human food, animal feed, fuel, fertilizers, source for fine chemicals, iodine, mannitol and phycocolloids. The major uses of seaweeds are (i) production of phyto - chemicals such as agar-agar, carrageen and alginate (Kaliaperumal and Uthirasivan, 2011) and as food for human consumption as green vegetable, salad and also in the form of jelly, jam, chocolates and pickles (Krishnamurthy et al., 1981). Apart from that seaweeds are used as raw for cosmetics (Fujimura et al., 2002) and medicine (Maeda *et al*., 2007). These phytochemicals find use in various industries as solubilizer, solidifier and sizer agents (Venkataraman Kumar, 2005, 2010). Application of fertilizers plays an important role in the yield of crops. But the continuous use of inorganic fertilizers has made the soil infertile for cultivation, besides eutrophication of surface water and with nitrogen of sub surface water. In order to overcome this problem, the use of organic fertilizers is recommended now-a-days. There are many types of organic manures; they are blood, bones, farmyard manure, fish, garden reifies, horn shavings, leaves, malt dust, night soil, woolen rags and seaweeds. Of these, the most abundant and easily available source is seaweeds. Seaweeds can be used in many ways to increase soil fertility (Sylvia *et al,* 2005). So the present investigation was taken up to study the effect of *Stoechospermum marginatum* SLF on the growth and biochemical parameters of paddy seedlings.

## Collections of seaweeds

*Stoechospermum marginatum* (C.Agargh) Kutzing collected from the Red Gate end of Hare Island , Tuticorin.

## Preparation of SLF (Seaweed Liquid Fertilizer)

After collection the seaweeds were brought to the laboratory and washed thoroughly with water for the complete removal of extraneous matter and then subjected to extraction by **Aqueous -Alcohol method**

**Aqueous- Aquous method (Ramamoorthy and Sujatha, 2007)**

In this method, the seaweed after thorough washing was sun dried followed by oven drying at 40°C for 36 hours and then powdered. 500g of the dry powder was soaked in 200ml alcohol for 12 hours and shaken vigorously to dissolve the alcohol soluble constituents and the supernatant saved. The residue was boiled in 300ml of distilled water for 30 minutes, cooled and filtered. Alcohol and water soluble supenatants were mixed and the volume was made up to 500ml with distilled water to get 100% extract.

## Experimental Design for comparative study

Certified seeds of *Oryza sativa* L. - AD-45 were procured from Tamil Nadu Agricultural College and Research Institute, Killikulam,Tamil Nadu.

## Treatment

7 batches of seeds of *Oryza sativa* were surface sterilized in 0.1% mercuric chloride for 1 minute followed by thorough washing to remove traces of mercuric chloride. Then each batch of seeds was soaked in the *Stoechospermum marginatum* SLF obtained by aqueous-alcohol method were prepared; 100% SLF obtained by aqueous alcohol method was diluted to six different concentrations viz., 0.25, 0.50, 0.75, 1.00, 1.50 and 2.00% using appropriate amount of distilled water. Then each batch of seeds was soaked in the respective SLF dilution of 12 hours while the control batches of seeds were soaked in distilled water. Then the sterilized soaked seeds were sown in earthen pots filled up with 500 g of red soil: clay soil: composite (1.00:0.80:0.20). The pots with sown seeds were treated on alternative days with respective diluted SLF as soil drench. The seedlings were allowed to grow from 21 days. On the 22$^{nd}$ day, the seedlings were harvested for estimation of morphological characters; shoot length, root length, number of lateral roots, number of leaves, fresh weight and dry weight (Venkataraman Kumar *et al,* 1993). Biochemical parameters; expect for chlorophylls and carotenoids, rest of the biochemicals were estimated in oven dried powdered samples. The biochemical estimated; chlorophyll a, chlorophyll b, total chlorophyll, carotenoids, protein, amino acid, carbohydrate and lipid.

**Estimation of chlorophyll a, b, Total chlorophyll and carotenoids [Arnon(1949) as modified by Harborne (1973)]**

**Sugar (Sheifter *et al,* 1950)**

**Amino acid (Rosen, 1957)**

**Protein (Lowry *et al,* 1951)**

**Lipid (Bligh and Dyer, 1959)**

**Table 1-Effect of *Stoechospesrmum marginatum* SLF on growth parameters of Paddy seedlings**

| parameters | Control | SLF concentration (%) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 0.25 | 0.50 | 0.75 | 1.00 | 1.5 | 2.0 |
| Root length (cm) | 14.17±.6000 | 11.66±1.33 | 17.33±0.067 | 17.06±1.59 | 18.00±0.74 | 16.53±1.00 | 10.00±1.52 |
| Shoot length (cm) | 5.88±0.16 | 6.00±0.57 | 6.67±0.44 | 6.33±0.33 | 10.33±0.84 | 6.33±1.45 | 5.63±0.31 |
| No of lateral roots | 68.00 ±0.57 | 106±2.51 | 115±2.08 | 112±1.85 | 114±3.17 | 137±3.51 | 115±1.52 |
| No of leaves | 2.67±0.33 | 3.00±0 | 3.67±0.33 | 3.333±0.33 | 3.67±0.33 | 4.00±0 | 3.00±0 |
| Fresh weight (g) | 0.183±0.008 | 0.210±0.025 | 0.223±0.014 | 0.206±0.032 | 0.203±0.088 | 0.200±0.005 | 0.100±0.005 |
| Dry weight (g) | 0.060±0.006 | 0.067±0.012 | 0.063±0.018 | 0.076±0.018 | 0.080±0.005 | 0.097±0.006 | 0.037±0.006 |

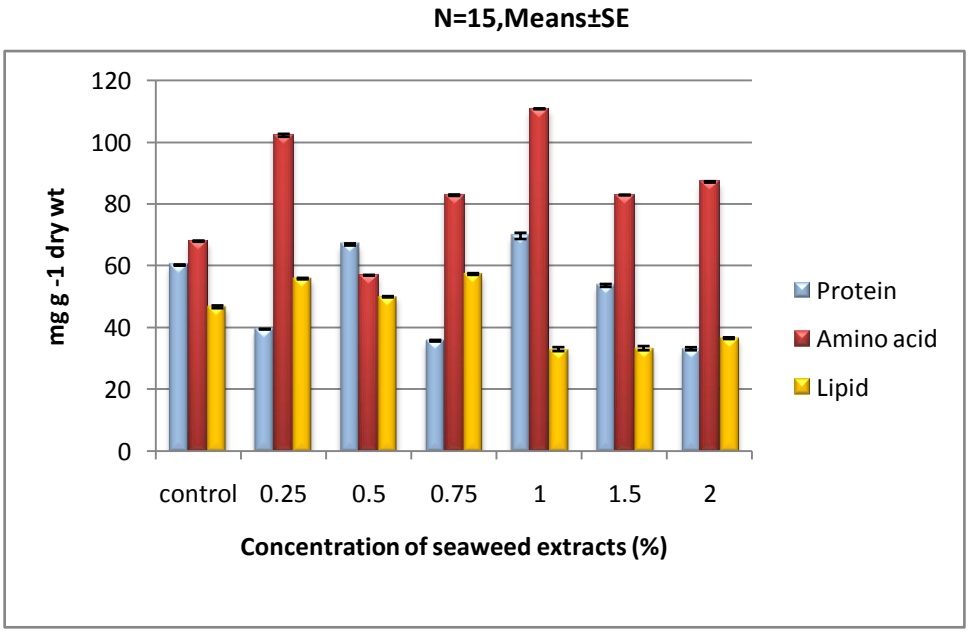


**Fig -1.Effect of *Stoechospesrmum marginatum* SLF on protein, amino acid and lipid content of Paddy seedlings**

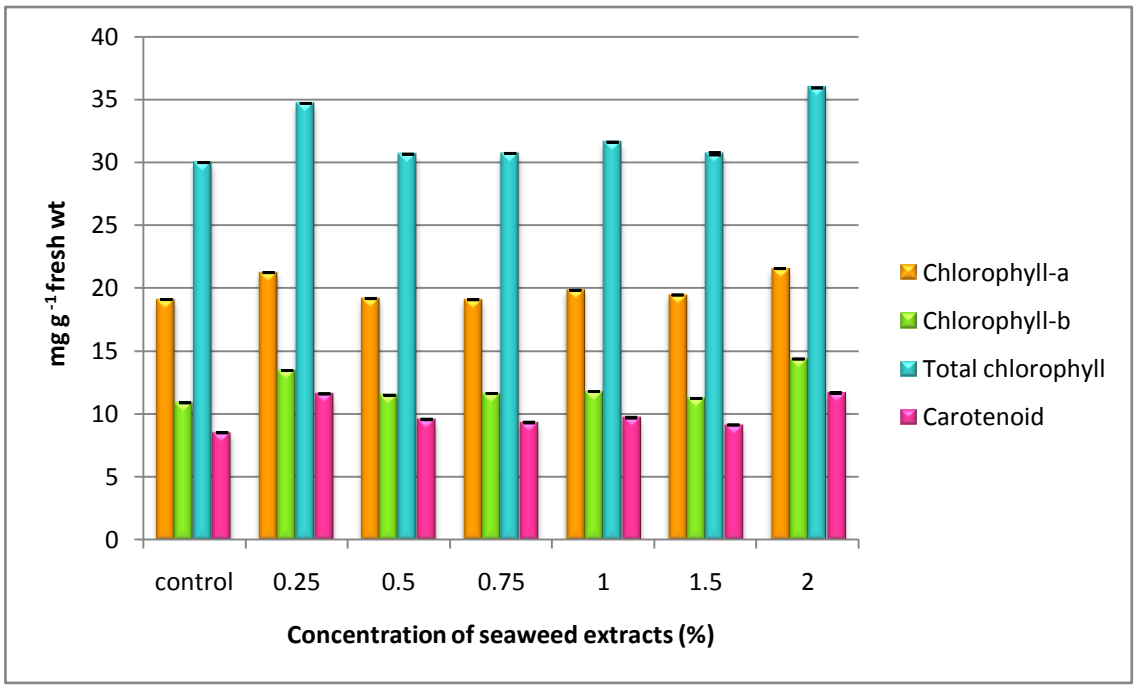


**Fig-2.Effect of *Stoechospesrmum marginatum* SLF on Chlorophyll a,Chlorophyll b, Total chlorophyll and Carotenoid content of Paddy seedlings**

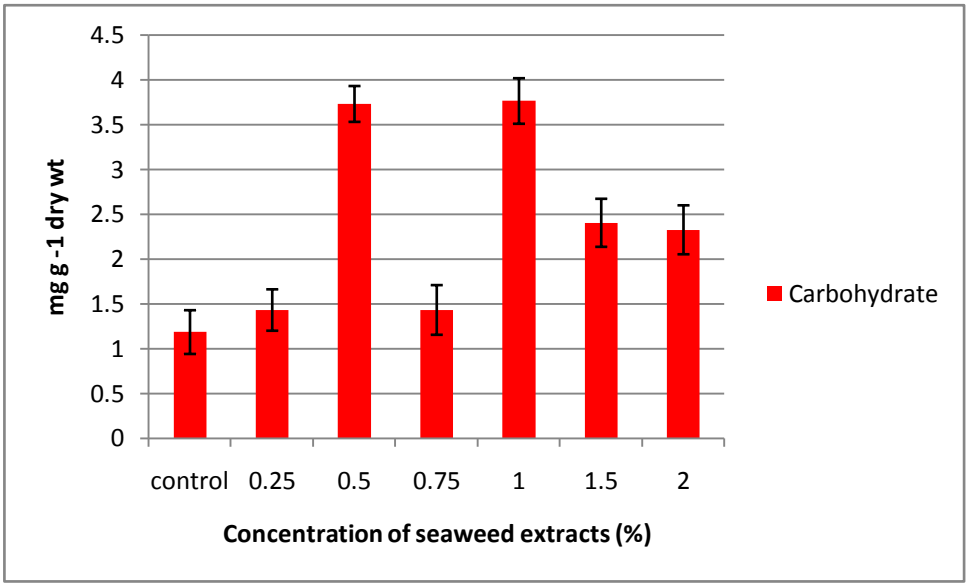


**Fig-3.Effect of *Stoechospesrmum marginatum* SLF on Carbohydrate content of Paddy seedlings**

## RESULT AND DISCUSSION

Shoot length, root length, number of lateral roots, fresh weight and dry weight were found to exceed over that of control at all the concentration of SLF with peak values of shoot length and root length, number of lateral roots attained at 1.00% SLF while rest of the parameters peaking at 1.5 % SLF(Table-1). Asir Selin Kumar and Saravana Babu (2004) have reported root length and shoot length enhancing effect of the *Spyridia* SLF in *Oryza sativa* (paddy). In the cereal *Pennisetum typhoids* (Cumbu), Balakrishnan *et al.,*

2007 observed maximum root length and shoot length induced by *Padina* SLF while that of number of lateral roots by *Gracilaria* SLF (red seaweed SLF). Number of leaves was found to be more than the control at 0.50, 1.00 and 1.5 % SLF.

(Fig-1)The amount of chlorophyll a, b, total chlorophyll and carotenoids was more than the control at 0.25 and 2% SLF . Kumari *et al*. (2011) observed a linear increase in the pigment concentrations, protein, total soluble sugar, reducing sugar, starch, phenols, lycopen and vitamin C content of Lycopersicon esculentum upon treatment with liquid extract of *Sargassum* sp. (Fig-2) The amount of protein exceeded over the control at 0.5, 1.00 and 2.00% SLF, amino acid was more than the control at 0.25, 0.75, 1.00% and lipid at 0.25,0.50, 0.75%. . The amount of the carbohydrate was more than the control at all the concentrations of SLF (Fig-3). The liquid extract of *Ulva fasculata, Sargassum ilicifolium* and *Gracilaria corticata* influenced the photosynthetic pigments, carbohydrate, proteins and free aminoacids content of *Trigonella foenum - graecum* (Pise and Sable 2010). Zodape *et al*. (2011) reported that foliar application of liquid extract of *Kappaphycus alvarezii* triggers the yield potency of *Lycopersicon esculentum.*

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