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Aqueous Seaweed Sprays for Enhancement of Growth and Yield of Sunflower Hybrid CO_2

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***Abstract* – Field experiments were carried out to identify the effect of seed treatment and foliar spraying of seaweed extracts *viz., Sargasum myricosysutum, Gracilaria edulis* and *Caulerpa racemosa* along with water and control. Seeds soaked for 10h 5 % seaweed extract followed by foliar spray 5 % at vegetative and flowering stage. The results of the study revealed that in all the seaweeds, seed treatment (5%) followed by foliar spray (5%) at vegetative stage and flowering stage enhanced the growth attributes *viz.,* plant height, dry matter production, leaf area index, crop growth rate, No of seeds / capitulum, seed yield/ plant and 100 seed weight resulting in higher yield. Among three seaweed extracts *Sargasum myricosysutum* was found to be very effective for the growth and yield parameters in sunflower.**

Keywords* – Seaweed, Sunflower, *Sargasum Myricosysutum, Gracilaria Edulis*, *Caulerpa, Racemosa.

I. Introduction

In recent years a growing interest has been observed with natural biostimulating substances. The group of leading biological factors showing a favourable effect on field crops include seaweeds. Seaweeds are one of the most important marine resources of the world. Seaweed extract is a new generation of natural organic fertilizers containing highly effective nutritious and promotes faster germination of seeds and increase yield and resistant ability of many crops. Seaweed extract being organic and biodegradable in nature is considered as an important source of nutrition for sustainable agriculture (Cassan *et al.,* 1992). Seaweeds contain various trace elements (Fe, Cu, Zn, Co, Mo, Mn & Ni), vitamins, aminoacids and plant growth hormones (IAA, IBA & Cytokinins) which cause many beneficial effects on plant growth and development (Metting *et al.,* 1990; Spinelli *et al.,* 2009; Abdel-Mawgoud *et al.,* 2010). The growth promoting effect of liquid extracts of seaweeds on seed germination, vegetative growth and biochemical characteristics in agricultural crops have been reported. Foliar application of growth regulators constitutes one of the important technology that caters to seed nutrition at the most vulnerable stage ie, seed filling. Reports about seaweed extracts on agricultural crops particularly yield and its improvement are very few. Hence, the present study was undertaken to identify the enhancement of growth and yield in Sunflower Hybrid CO 2.

II. Materials and Methods

The marine macro algae *Sargarsum myricocysutum*, *Gracilaria edulis* and *Caulerpa racemosa* collected from Mandapam coast, Tamil Nadu, India were washed with sea water initially to remove macroscopic epiphytes and sand particles finally with fresh water to remove adhering salt then shade dried for 4 - 5 days followed by oven drying at 40°C for 24 h and powdered from which 100g powder was taken and 100 ml of ethyl alcohol was added then kept it for overnight with intermittent stirring and extracted through rotary evaporator and extract collected and stored in air tight container. From this extract 5% concentration were prepared.

Field experiment was conducted at Agricultural College and Research Institute, Madurai, during june, 2013 with all recommended packages of practices for sunflower in RBD replicated thrice. Graded sunflower seeds are soaked for about 10 h along with water and control. Foliar spray 5% was given at vegetative and flowering stage and evaluated for biometric (plant height(cm), dry matter production(g seedling $^{-1}$), leaf area index and crop growth rate (g $m^{-2}d^{-1}$) and yield parameters (No of seeds / capitulum, seed yield /plant(g) &100 seed weight (g)). Mean data were analyzed statiscally following the method of snedecor and cochran (1961).

III. Results and Discussion

All the seaweed extracts had a positive influence on the parameters observed. Among the seaweeds *Sargarsum myricocysutum* was very effective in promoting all the growth yield parameters. Seed treatment with foliar application of *Sargarsum myricocysutum* (5%) at vegetative and flowering stage gave increase in dry matter production (108.4 g), leaf area index (5.38), crop growth rate (10.69 g $m^{-2}d^{-1}$), number of seeds per capitulum(1159), seed yield plant $^{-1}$ (29.60g) and 100 seed weight (5.54 g) than control (94.2 g, 4.60, 9.65 g $m^{-2}d^{-1}$, 985 Nos 25.30 g and 4.72 g respectively). The percent increase was 13, 14, 9, 15, 14 and 14 % for plant height, dry matter production, leaf area index, crop growth rate, number of seeds per capitulum, seed yield plant $^{-1}$ and 100 seed weight respectively.

Foliar spray application of mineral nutrients offers a quick method of supplying nutrients to higher plants than methods involving root application. The application of seaweed extract improved the plant growth which was visible in the plants supplemented with seaweed extract when compared with the control. At present it is extensively speculated that beneficial effect of the seaweed extracts on germination and growth of various plants may be due to the presence of plant growth-promoting substances/hormones in the extracts (Thorsen *et*

al, 2010; Prasad *et al,* 2010; Blunden *et al,* 2010). In addition, when applied to seeds, added to the soil or sprayed on crops and vegetative stages of flowering, seaweed extracts can stimulate seed germination (Hong et al., 2007), growth (Moore, 2004; Khan et al., 2009) and yield of various crops (Arthur et al., 2003; Norrie and Keathley, 2006; Masny et al., 2004; Ei-Zeiny, 2007; Kumar and Sahoo, 2011). The higher yield might be due to spraying of seaweed extract on critical growth stages which was effectively utilized by the crop and expressed in higer growth and yield attributes.

It could be concluded that seed treatment with foliar application at critical growth phases *viz.,* vegetative and flowering stage with *Sargarsum myricocysutum* seaweed extract enhance growth and yield parameters in sunflower.

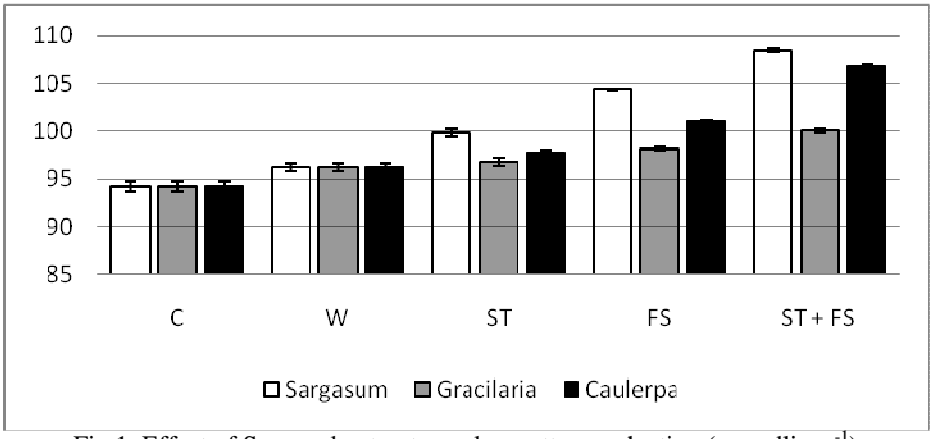

Fig.1. Effect of Seaweed extracts on dry matter production (g seedlings^{-1})

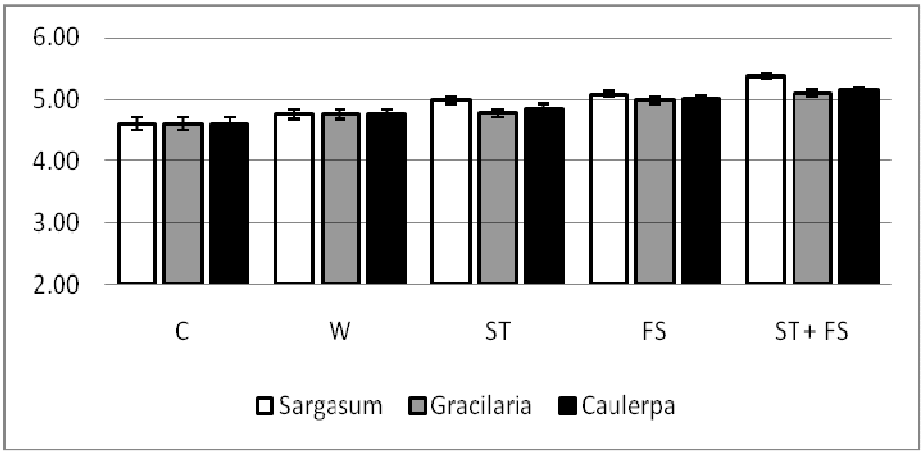

Fig.2. Effect of Seaweed extracts on leaf area index

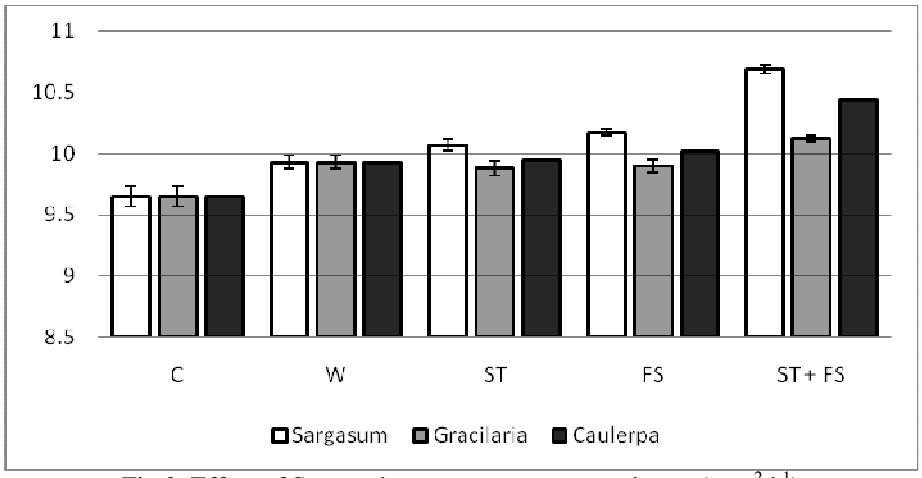

Fig.3. Effect of Seaweed extracts on crop growth rate (g m^{-2}d^{-1})

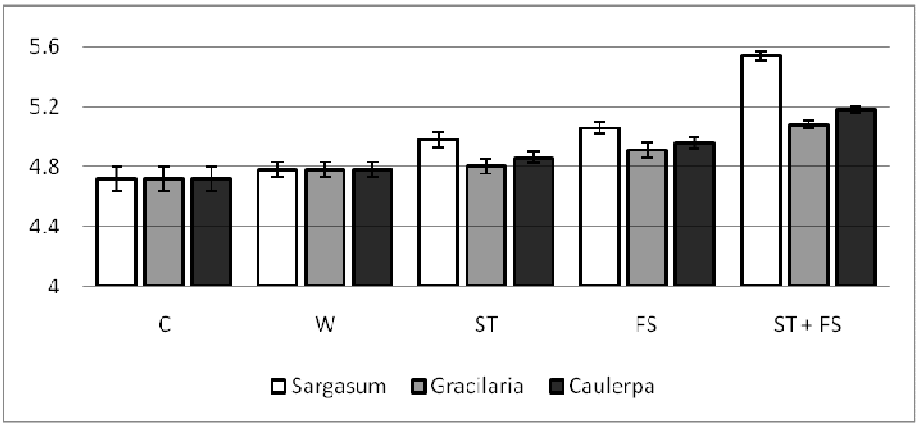

Fig.4. Effect of Seaweed extracts on 100 seed weight (g)

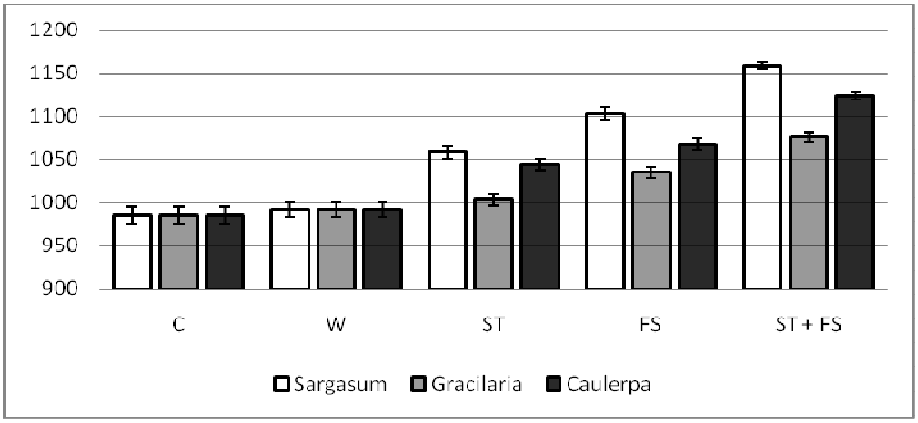

Fig.5. Effect of different Seaweed extracts on number of seeds per capitulum

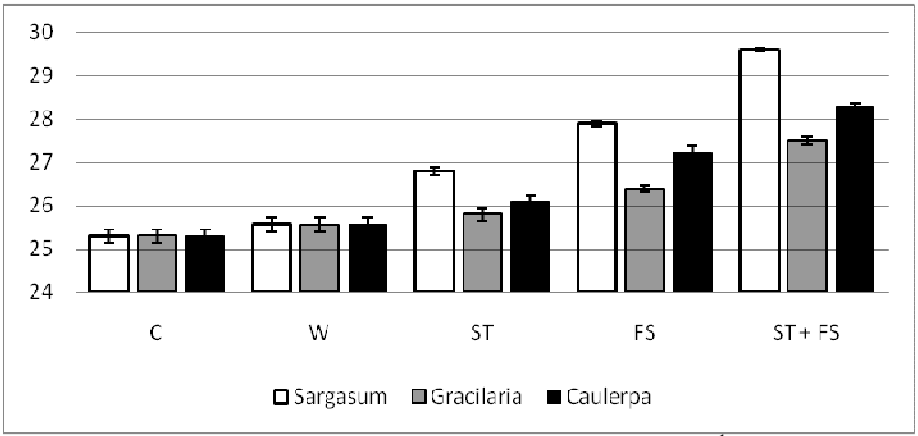

Fig.6. Effect of Seaweed extracts on seed yield plant^{-1} (g)

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