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Studies on *Sargassum myricocystum* Seaweed on Seed Quality and Biochemical Attributes in Sesame cv. TMV 3. (*Sesamum indicam* L.)

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ABSTRACT

Use of synthetic chemicals over a longer period of time to increasing the productivity has resulted in deterioration of soil health, stagnation in productivity and insecurity of quality food. The objective of the present study is to overcome chemical fertilizers and their impact on agriculture, organic seed fortification was made to increasing seed performance and yield through *Sargassum myriocystum* on seed quality and biochemical attributes in sesame cv. TMV 3. Seeds of TMV 3 sesame were soaked in different concentrations of Seaweed Liquid Fertilizers (SLF) @ 0.50, 0.75, 1.0, 5.0 and 10.0 % with 3:1 ratio of seed to solution for 8 h and investigated for seed quality and biochemical attributes such as, germination (%), shoot length (cm), dry matter production (mg), dehydrogenase (OD) activity and peroxidase ($\text{mg g}^{-1} \text{min}^{-1}$) activity. Sesame seeds treated with 5% *Sargassum* seaweed liquid fertilizer for 8 h in 3:1 ratio (seed to solution ratio) performed better in all estimated parameters and could be attributed with presence of macronutrients, micro nutrients, growth promoting substances as well as antioxidants and were completely isolated in the SLF obtained through rotary evaporation and can be recommended as a pre sowing seed treatment.

Key words: *Sargassum myricocystum*, seed quality, biochemical attributes, sesame seeds

INTRODUCTION

Seaweeds are marine macro algae with no true leaves, stem and root, photosynthetically active and can synthesize their own food materials. Seaweeds are classified as red, green, brown algae based on their pigmentation, good source of minerals, vitamins, micro, macronutrients and antioxidants and used for food, feed, fodder, phytochemical, cosmetics, biofertilizers and manures. Seaweeds exploited very well in all aspects of life sciences, whereas in the field of agriculture it is not fully exploited and underutilized. In the present scenario of agriculture, Organic farming is the safest remedy to maintain the soil health, sustainability in food production and meet out the demand of food grain.

Seaweeds are rich source of growth promoting substances (Sylvia *et al.*, 2005) such as IAA, kinetin, zeatin and gibberellins (Zodape *et al.*, 2009) auxins and cytokinins (Zhang and Ervin, 2004); metabolic enhancers (Zhang and Schmidt, 1997), macro and micro elements (Stirk *et al.*, 2003), amino acids, vitamins and beneficial results from their use in crop plants like early seed germination and establishment, improved crop performance and yield, elevated resistance to biotic and abiotic stress and enhanced post harvest shelf life of seeds

(Hankins and Hockey, 1990; Blunden, 1991; Booth, 1965). Reports about seaweed liquid fertilizers on sesame seed quality are scanty or nil, Hence study was undertaken to assess the effect of *Sargassum myricocystum* on sesame seed quality and biochemical properties.

MATERIALS AND METHODS

The marine brown algae *Sargassum myricocystum* 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 20 g powder was taken and 75 mL of alcohol was added then kept it for overnight with intermittent stirring and extracted through rotary evaporator with 40°C and 45 RPM and liquid fertilizer collected and stored in air tight container.

Sesame cv. TMV 3 with 77% germination and 8% moisture used as base material for the study. The laboratory studies were carried out in the Department of Seed Science and Technology, Agricultural College and Research Institute, Madurai, TamilNadu, India. Seeds were treated with *Sargassum* seaweed liquid fertilizer with different concentrations such as, 0.50, 0.75, 1.0, 5.0 and 10% with 1:3 (seed to solution ratio for 8 h) (standardized through pilot studies) and subjected to germination test with four replicates of 100 seeds in paper towels. The untreated seeds used as control. The test conditions were 25±2°C and 95±5% RH, illuminated with fluorescent light. The treated seeds were observed for the biochemical attributes such as electrical conductivity (Presley, 1958) Dehydrogenase (Kittock and Law, 1968), peroxidase activity (Malick and Singh, 1980) and catalase activity (Luck, 1974). The experimental design was completely randomized design (FCRD) with four replicates of each 25 seeds. An Analysis of Variance (ANOVA) was made using SAS software. Correlation was assessed by using Microsoft Excel software. Significance of mean difference of the variable means was separated using LSD at p = 0.05.

RESULTS AND DISCUSSION

Results revealed that seed treatments significantly influenced the seed quality and biochemical attributes. Among all those concentrations tried, seeds treated with 5% liquid fertilizer performed significantly for germination % (94), shoot length (8.40 cm), dry matter production (23.70 mg), dehydrogenase activity (0.030 OD) and peroxidase activity (0.040 mg gw⁻¹ min⁻¹) (Fig. 1). Correlation studies also revealed that germination percent was significantly and positively correlated with shoot length (0.981), dry matter production (0.926), dehydrogenase activity (0.975), peroxidase activity (0.985) and catalase activity (0.991) (Table 1) of *Sargassum* treated sesame seeds (Fig. 2).

Table 1: Correlations between various vigor parameters of sesame seedlings

	Germination (%)	Shoot length (cm)	Dry matter production (mg)	Dehydrogenase (OD)	Peroxidase (mg g ⁻¹ min ⁻¹)	Catalase (unit g ⁻¹)
Germination (%)	1					
Shoot length (cm)	0.981**	1				
Dry matter production (mg)	0.926**	0.950**	1			
Dehydrogenase (OD)	0.975**	0.947**	0.933**	1		
Peroxidase (mg g ⁻¹ min ⁻¹)	0.985**	0.961**	0.935**	0.995**	1	
Catalase (unit g ⁻¹)	0.991**	0.975**	0.946**	0.993**	0.996**	1

*Significant at 5% level; **Significant at 1% level

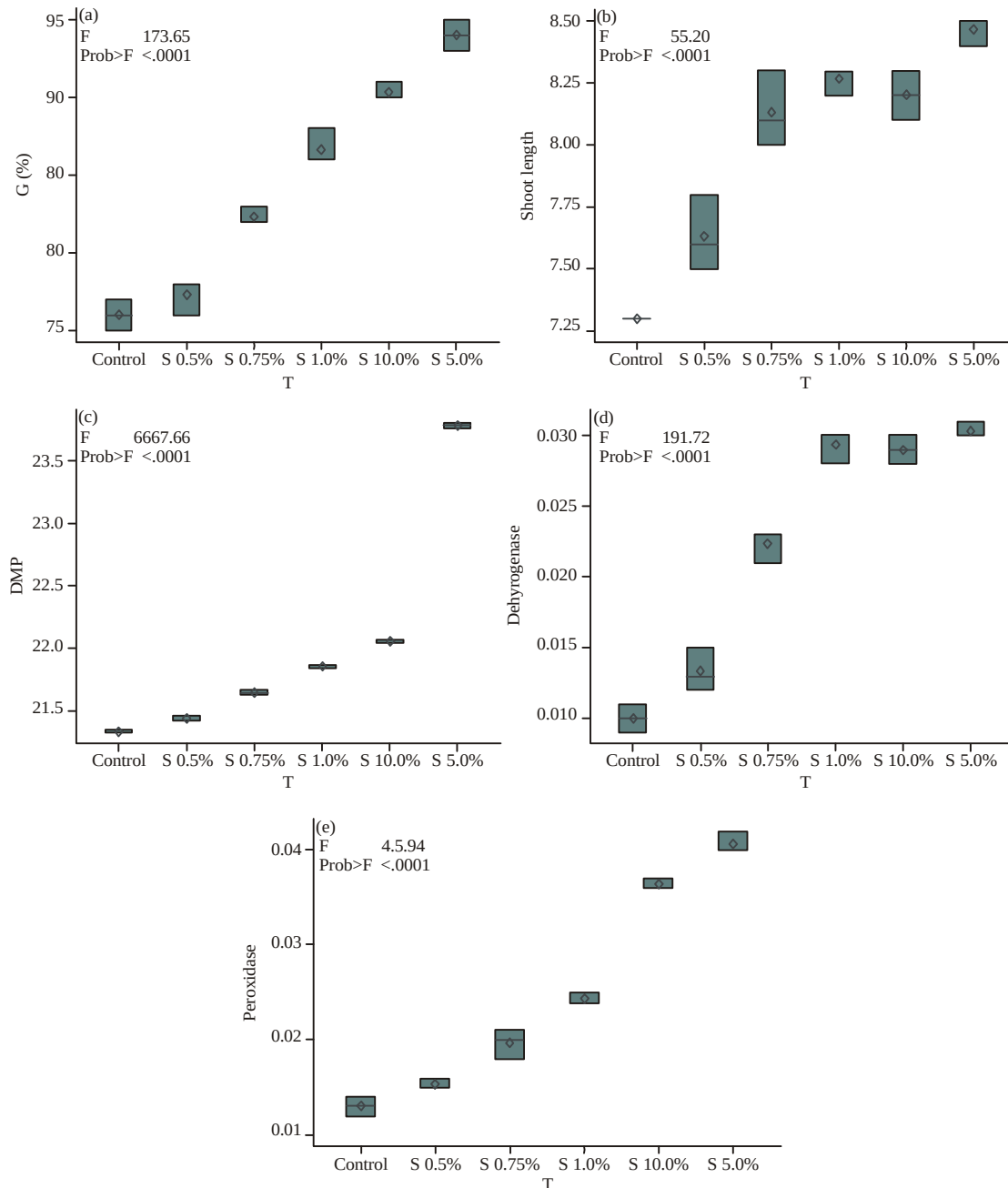


Fig. 1(a-e): Seaweed liquid fertilizers on seed quality attributes of sesame seeds (a) Germination (%), (b) Seedling length, (c) Dry matter production ($\text{mg } 10 \text{ seedling}^{-1}$), (d) Dehydrogenase activity (OD) and (e) Peroxidase activity ($\text{mg g}^{-1} \text{ min}^{-1}$) of treated seeds. Control = Untreated. S = *Sargassum* treated with 0.5, 0.75, 1, 5 and 10% concentrations

The beneficial effect of *Sargassum myricocystum* seaweed liquid fertilizer could be attributed with the presence of macronutrients (Nitrogen, Phosphorous, Potassium, Calcium and Magnesium), micro nutrients (Iron and Zinc), growth promoting substances viz., gibberellic acid (Rabie, 1996), cytokinin (Mooney and Van Staden, 1987) as well as antioxidants like α -tocopherol, ascorbic acid,

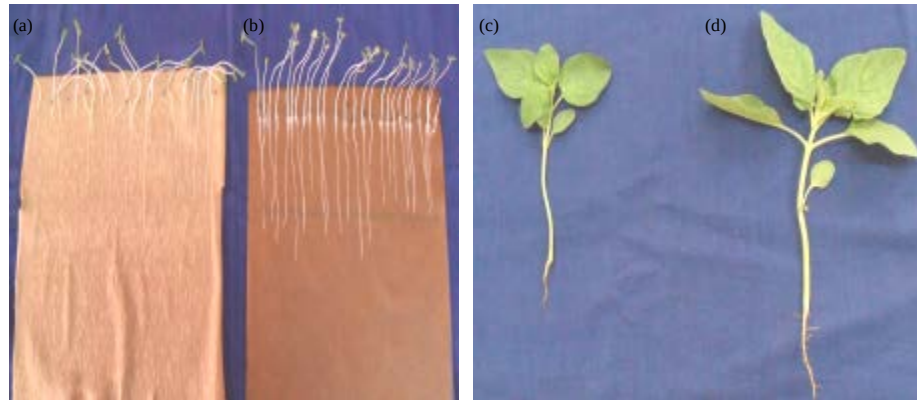


Fig. 2(a-d): *Sargassum myriocystum* liquid fertilizer on sesame seeds (a-b) 6 days old seedling (a) Untreated (b) 5% *Sargassum* SLF treated (c-d) 15 days old seedling (c) Untreated and (d) 5% *Sargassum* SLF treated

superoxide dismutase (Arnold *et al.*, 1993; Ananthi *et al.*, 2008; Banuselvi and Raju, 2008) and these ingredients were completely isolated in the seaweed liquid fertilizers obtained through rotary evaporation.

CONCLUSION

It could be concluded that sesame seeds treated with *Sargassum myriocystum* seaweed liquid fertilizer obtained through rotary evaporation @ 5% for 8 h soaking with 1:3 (seed to solution ratio) can be recommended for pre sowing treatment to improving seed vigour and viability.

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