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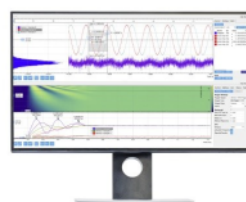
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Growth and Yield of Rice Plants Sprayed with *Sargassum polycystum* Extracted with Different of Concentration

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Abstract. Many reserches reported that brown algae is main source of by fertilizer and biostimulant for supporting growth and development of agriculturaland horticultural plants. This article reports growth and yield of rice plant sprayed with different concentration of *Sargassumpolysistum*, one of brown algae species. Since the age of rice plant was 21 days after planting. The plants were sprayed with 0, 5, 10,15, 20% of *Sargassumpolysistum* extract. The plants were sprayed one a week during vegetative growth. The results show that concentration of *Sargassumpolysistum*increased the growth of rice plants until maximum concentration 10%. However, when this extract applied in more than 10%, the growth was decreased similar phenomena was also demonstrated in yield parameters, such as penicle number and seed weights.

INTRODUCTION

Extensive application of chemical fertilizers to increase crop productivity has caused considerable damage to theecology of agricultural systems and has even reduced the nutritional quality of crops. For health considerations, andalso to meet the stringent consumer standards, agricultural practices are increasingly being modified with a focus onorganic farming [1]. Organic farming is a system of ecological soil management that relies, in part or in full, on building organic matter through crop rotation, organic waste amendments, balanced mineral nutrientmanagement, and mechanical and biological controls with minimum adverse effects on soil health. The use ofbiofertilizers to enhance plant growth and yield has gained momentum due to hazardous effects of chemical fertilizers.

The use of seaweeds as biofertilizers in horticulture and agriculture has increased in the recent years ²Seaweeds can be used in liquid extract form as foliar spray or soil ³or in granular/powder form as soil conditioner and manure. Seaweed extracts from *Sargassumwightii* and *Kappaphycusalvarezii* have been found to increase the yield of Vignasinensis and Phaseolusradiata, respectively [2,3].For seaweeds to be utilized as a biofertilizer, availability of biomass in plenty is one of the major criteria. Seaweeds are abundantly available in warm temperate and tropical waters of the world.

MATERIALS AND METHODS

Design Experiment

Experiment was designed by completely randomized design in plastic house in Jatisela West Lombok. Experiment consisted of one factor that is spraying in vegetative with five series concentrations 0%, 5%, 10%, 15%, and 20%. There were five combination and each combination was three replicates. Therefore the 15 experimental pots. Growth parameters such as shoot dry weigh (gram), root dry weigh (gram), panicle number, and seed weigh per plants (gram), were measured during harvesting time. In addition, yield parameters, like panicle number and seed weight per plants (gram) also measured during harvesting time.

Sample Collection and Extraction

Seaweed samples, *Sargassumpolycystum* was collected in BatuLayarcoastal beach west Lombok. It was runs with fresh water and dried in shadow place post riddance. Sample short cut into small pieces. Than the sample wereextracted using water according to modified procedure of [4] 1 kg sample was placed in 4 liters chemicalflask added with 3 liters water and stir it until homogenize. In addition homogeneous sample were built in 65°C water bath for 30 minutes. And filter it using Whatman filter paper number one. Solution attained is considered as 100% liquid extract, which were ready to be use in this experiment.

Preparation Rice Seedling and Growth Media

Seedling media was 6 kilograms soil and 2 kilograms sand into 15 liters pot and stir it until homogenize. Adding with water until saturated and left overnight. Rice were shown in media and it was let to growth for 3 weeks. Growth media was prepared by addition 6 kilograms soil 2 kilograms organic fertilizer in 15 liters plastic pot, than mix it until homogenize and it was added water to the media until saturated. And they were left overnight than seedling (2 seedlings) was planted/each pot, after that the plant were left to growth until harvesting time. Any maintain outside the treatments were polluted recommended literature about growing rice plant. One week after that, liquid extract according to the concentration was sprayed to the plant. Application of liquid extract was conducted once week during vegetative growth.

RESULTS AND DISCUSSION

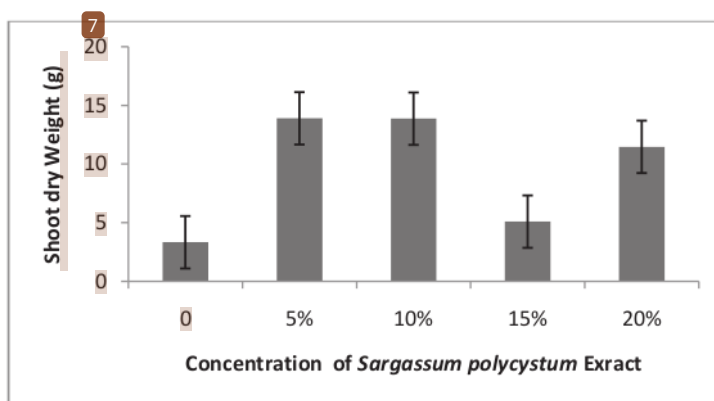


FIGURE 1. Effect of formulation of *Sargassumpolycystum* extract on shoot dry weight (g) of rice plants

The application of liquid extract of *Sargassumpolycystum* enhances shoot dry weight. An increase in shoot dry weight occurred at concentrations of 5% and 10% seaweed extract. However the administration of seaweed extracts above 10% actually reduces the amount of shoot dry weight. Higher concentration of seaweed extract cause detrimental effect.

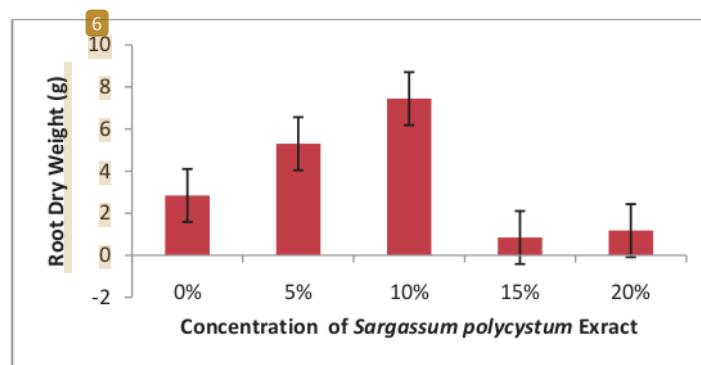


FIGURE 2. Effect of formulation of *Sargassumpolycystum* extract on root dry weight (g) of rice plants

The application of liquid extract of *Sargassumpolycystum* enhances root dry weight. An increase in root dry weight occurred at concentrations of 5% and 10% seaweed extract. However the administration of seaweed extracts above 10% actually reduces the amount of shoot dry weight. Higher concentration of seaweed extract cause detrimental effect.

Effect of application time of liquid extract on yield parameter, such as panicle number and grain weight, is shown in Fig 3 and Fig 4 respectively.

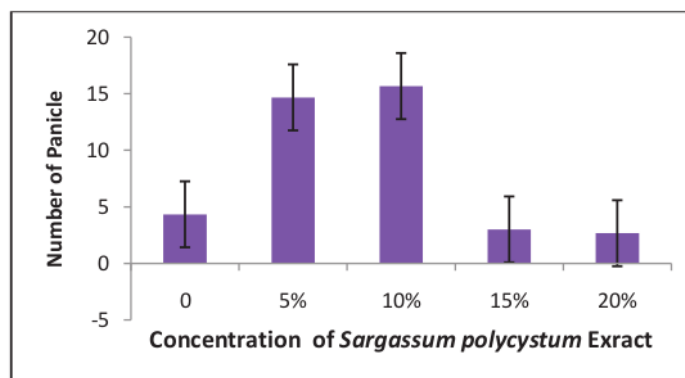


FIGURE 3. Effect of formulation of *Sargassumpolycystum* extract on number of panicle of rice plant

As response of vegetative growth, response of generative was similar. The application of liquid extract of *Sargassumpolycystum* enhances panicle number. an increase in panicle number occurred at concentrations of 5% and 10% seaweed extract. However the administration of seaweed extracts above 10% actually reduces the amount of rice panicles.

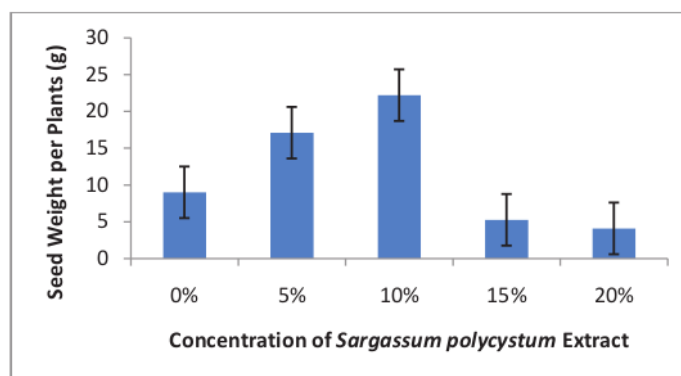


FIGURE 4. Effect of formulation of *Sargassumpolycystum* extract on seed weight per plants (g) of rice plants

As response of vegetative growth, response of generative was similar. The application of liquid extract of *Sargassumpolycystum* seed weight. An increase in seed weight occurred at concentrations of 5% and 10% seaweed extract. However the administration of seaweed extracts above 10% actually reduces the amount of rice seed weight. *S. wightii* on biochemical constituents of *V. radiata* was studied by Sivasankari et al. [5,6], where the lowest (10%) concentration increased the pigment content, protein, amino acid, total sugar content, catalase, peroxidase and polyphenol oxidase activities. The seaweed liquid fertilizer (SLF) and seagrass liquid fertilizer (SGLF) not only promoted the seedling growth but also increased the chlorophyll 'a' and 'b' contents in the leaf up to 12 days of germination in *Zea mays* which was reported by AsirSelin Kumar et al. [7]. The lowest concentration of SLF (10%) has shown remarkable effect on plants than higher concentrations.

CONCLUSIONS

The results show that concentration of *Sargassumpolycystum* increased the growth of rice plants until maximum concentration 10%. However, when this extract applied in more than 10%, the growth was decreased similar phenomena was also demonstrated in yield parameters, such as panicle number and grain number.

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