Foliar spray effect of *Ulva lactuca* L. on growth and yield of rice (Oryza *sativa* L).

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Abstract:

Field experiment was conducted during January 20018 to study the effect of seed soaking and foliar spraying of marine algae on growth and yield of Gunjavali rice variety. 50 % algal extract of *Ulva lactuca* L was used for seed soaking and spray on the foliage of rice at different growth stages along with control (no spray). Spraying marine algae extract on the foliage of rice significantly influenced the growth, yield attributes and grain yield. Spraying of 50% algal extract three times after 25 days interval on foliage of rice increased growth significantly as compared to control in case of all parameters.

Key words: Gunjavali rice, *Ulva lactuca,* Marine algae, *Oryza sativa* L,

Introduction:

Rice is a staple food crop of India, providing 43 per cent of calorie requirement for more than 70 per cent of India's population. The productivity of rice is low in India (3,000 kg ha-1) when compared to the world average of 4,004 kg ha-1 and leading rice growing countries like China, India etc (FAO, 2006). Rice (*Oryza sativa* L) is one of the first leading ancient cultivated crops of the world. In terms of area 55% of the total cultivated land is under rice cultivation. The poor germination and standard establishment of direct seeded rice is a major restriction for achieving an optimal crop growth and better productivity especially under drought stress during emergence (Liu *et al*., 2004). Marine algae are primitive type of plants lacking true roots, stems and leaves (Krishnamurthy, 1966). Marine algae commonly grow on coral reefs or in rocky landscape or can grow at greater depths if sunlight can penetrate through the water. Tangaraju (2008) showed that the extract of marine algae *Sargassum* sp.1, *Sargassum* sp.2, *Sargassum polycistum*, *Hydroclathrus* sp., *Turbinaria ornata*, and *Turbinaria murayana* are able to induce.Vegetative growth of rice plants. However, only the extract of *Hydroclathrus* sp. that influences the growth and yield of rice. The use of blue green algae for rice production is a promising strategy to reduce the dependence on expensive chemical fertilizers. Integrated management of rice production reduces production cost, and transplanting is currently replaced by direct seedling. The efficacy of blue green algae in promoting rice growth and yield under field conditions of direct seedling rice is still unsolved, and detailed studies on the efficacy of blue green algae in promoting rice growth and yield are necessary (Paudel Y P *et* al 2012).

Marine algae are rich source of growth promoting substances (Sylvia *et al.,* 2005). Supply of nutrients at critical growth periods in rice from non-soil sources can further enhance the plant growth and yield. One such source is foliar application and direct assimilation through rice foliage. Azolla, blue-green algae, leguminous plants and other organic manures have been shown to increase the rice yield (De Datta *et al* 1981). Compost and use of blue green algae (BGA) as biofertilizer in wetland rice are the common practices (Begum *et al*., 2009).

Material and methods:

A field experiment was conducted in farmer's field at Govalkot villege of taluka Chiplun for one season during January 2018. Experiment was laid out in randomized block design which consisted of thee treatments with three replications using Gunjavali rice variety. First 5kg Gunjavali rice seeds were sown in field after soaking in 50% algal extract of *Ulva lactuca* L for 7 hours. Then twenty five two old seedlings were transplanted at a spacing of 15 cm x 10 cm after proper puddling and preparing individual plot size of 10f x 8f. Alga *Ulva lactuca* L. was collected from the coastal area of Hedvi in Guhagar tehsil of Ratnagiri district. The algal sample was washed thoroughly with seawater to remove all the unwanted impurities, adhering sand particles and epiphytes. The sample was placed in polythene bags, kept inside an icebox and transported to the laboratory. These were washed thoroughly using tap water to remove surface salt and spread on blotting paper to remove excess water. One kilogram of *Ulva lactuca* L. was cut into small pieces and crushed separately with 1-L distilled water and filtered with 4 layered muslin cloths. The filtrate was considered as 100% extract and 50 % extract was prepared using distilled water.

Rice variety Gunjavali was purchased from agricultural shop in Chiplun. Algal extract of *Ulva lactuca* L was sprayed at different growth stages of rice after 25 days interval. During the harvest of the crop, observations on growth parameters viz.; plant height, number of leaves per plant and yield parameters viz.; total number of tillers, panicle length, number of grains per panicle, (1000 grain weight), grain and straw yield were recorded. The grain and straw yield were expressed in per plot separately.

RESULT AND DISCUSSION:

In observation table number 1 it is revealed that application of 7 hour seeds soaking and three foliar sprays of *Ulva lactuca* L was found superior over two sprays, one spray and control in all parameters of Gunjavali rice such as avg. no. of leaves/plant (42.93), avg. length of stem (58.50 cm), avg. length of leaves (35.54 cm), avg. width of leaves (1.43 cm), no. of tiller/plant (7.33), no. of panicles /plant (6.26), Flowering period in days after seed soaking (62.33), Days required for grain maturation (103), fresh wt. of straw with grains/plot (14.174kg), total wt. fresh of grain/plot (4.52kg), dry wt. of grains/plot(4.33 kg), wt. of immature grains(136.33gm), wt. of 100 seeds (2.515 gm) as compared to control that is avg. no. of

leaves/plant (28.6), avg. length of stem (45.54 cm), avg. length of leaves (26.48cm), avg. width of leaves (1.326cm), no. of tiller/plant (4.2), no. of panicles /plant (3.1), Flowering period in days after seed soaking (71), Days required for grain maturation (109), fresh wt. of straw with grains/plot (10.251), total wt. fresh of grain/plot (2.485), dry wt. of grains/plot(2.34), wt. of immature grains (251), wt. of 100 seeds (2.386gm) . Zodape *et al*., 2009) reported that increased yield and yield attributes in wheat crop due to presence of some growth promoting substances such as IAA and IBM, gibberllins, cytokinins, micronutrients, vitamins and amino acids. Growth hormones like cytokinins and gibberllins. Many workers have already evaluated the stimulatory effect of algal extract on plants such as wheat, rice, bean, peas (Aitken *et al*., 1965).

Babu and Rengasamy (2012) studied the effect of marine algal extract of *Kappaphycus alvarezii* on efficacy of germination, growth potential, biochemical changes during seedling growth and yield response in paddy (*Oryza sativa* L.), groundnut (*Arachis hypogea* L.) and chilli (*Capsicum annum* L.), at different concentrations viz., 1, 2, 5 and 10 per cent. Growth of plumule, radicle and fresh weight of seedlings of paddy and chilli registered a significant improvement to 2% *K. alvarezii* algal extract treatment. Mukesh *et al*. (2013) compared the effect of foliar applications of *Kappaphycus alvarezii* and *Gracilaria edulis* sap on growth and yield response of wheat variety 'GW 496'. Increase in the grain yield was observed significantly by 19.74% and 13.16% for plants receiving 7.5% and 5.0% concentrations of *K. alvarezii and G. edulis* sap compared to control. Win and Saing (2008) revealed appropriate dilution of the seaweed extract (*Sargassum sp*.) for rice plant as organic fertilizer. Four dilutions of seaweed extract were applied to rice plant.

References:

[**1**] Aitken J B and Senn T L (1965). Seaweed products as a fertilizer and soil conditioner for horticulture crops. Bot.Mar, 8:144-148.

[2] Babu, S. And Rengaswamy, R (2012) Effect of Kappaphycus alvarezii SLF treatment seed germination, growth and development of seedling in some crop plants. J. Acad. Indus. Res., 1(4):186-195.

[3] Begum, Z. N. T, Mandal, R. and Islam, M.S. (2009). Effect of blue-green algae and urea-N on growth and yield performance of traditional variety of rice. Journal of Phytological Research 22 (2): 211-214.

[4] De Datta, S.K. (1981). Principles and practices of rice production. John Willey & Sons, Inc., U.S.A, p. 171.

[5] FAO. (2006). Online databases http://taostat.fao.org/collections

[6] Krishnamurthy V (1966) Marine algal cultivation, in proceedings of the seminar on sea salt and plants, Bhavnager, India, 327–33.

[7] Liu S, *et al*. (2004) Identification of the proteins required for biosynthesis of diphthamide, the target of bacterial ADP- ribosylating toxins on translation elongation factor 2. *Mol Cell Biol* 24(21):9487-97.

[8] Mukesh, T. S., Zodpe, S. T., Chaudhary, D. R., Eswaran, K. and Chikara, J.(2013), Seaweed sap as an alternative liquid fertilizer for yield and quality improvement of wheat, J. pl. nutri., 36(2):192-200.

[9] Paudel YP, Pradhan S, Pant B, Prasad BN (2012) Role of blue green algae in rice productivity. Agr Biol J N Am 3, 332–5.

[10] Sylvia S M, Baluswami M, Vijaya Parathasarathy M D, Krishnamurthy V (2005). Effect of liquid seaweed fertilizers extracted from *Gracilaria edulis* (Gmel.) Silva, *Sargassum wightii* Greville and *Ulva lactuca* Linn. On the growth and yield of *Abelmoschus esculentus* (L) Moench, *Indian Hydrobiol***7**: 69-88.

[11]Thangaraju N (2008). Efficacy of seaweed liquid fertilizers (SLFs) of Sargassum wightii Grev. and *Ulva lactuca* on the growth and yield of paddy (*Oryza sativa* L. var ADT 36) under greenhouse conditions. Proceeding of The 11th International Conference on Applied Phycology. Galway-Ireland, June 21-27, 2008.

[12] Win, L. L. and Saing , K. M., (2008) Effectiveness of Myanmar brown seaweed (*Sargassum spp*.) extract as organic fertilizer in pot trial of rice. Intl. Conference on Sustainable Develop. pp. 1-4.

Table no. 1. R. B. D. for Gunjavali rice after seed soaking treatment and foliar sprays of marine alga *Ulva lactuca* L.

Parameters	Control (D.W)	Seed treatment and 1st spray	Seed treatment and 2nd spray	Seed treatment and 3 rd. spray
Avg. no. of leaves/plant	28.6 ± 0.016	35.86 ± 0.24	37.66 ± 0.09	**42.93** ± 0.18
Avg. length of stem(cm)	45.54 ± 0.08	55.29 ± 0.016	56.35 ± 0.03	**58.50** ± 0.065
Avg. length of leaves(cm)	26.48 ± 0.04	31.36 ± 0.03	33.42 ± 0.05	**35.54** ± 0.09
Avg. width of leaves(cm)	1.326 ± 0.09	1.38 ± 0.02	1.4 ± 0.02	**1.43** ± 0.09
No. of tiller/plant	4.2 ± 0.01	5.66 ± 0.09	6.8 ± 0.10	**7.33** ± 0.09
No .of panicles/plant	3.13 ± 0.43	3.73 ± 0.24	5.8 ± 0.010	**6.26** ± 0.09
Flowering period in days after seed soaking	71 ± 0.01	65.33 ± 0.43	64.33 ± 0.047	**62.33** ± 0.47
Days required for grain maturation	109 ± 0.01	105.66 ± 0.47	104.66 ± 0.47	**103** ± 0.01
Fresh wt. of straw with grains/plot(kg)	10.251 ± 0.06	12.55 ± 0.7	13.673 ± 0.03	**14.174** ± 0.02
Total wt. fresh grain/plot (kg)	2.485 ± 0.12	3.641 ± 0.09	3.969 ± 0.01	**4.52** ± 0.03
Dry wt.	2.344	3.536	3.73	**4.33**

grains/plot(kg)	± 0.06	± 0.09	± 0.01	± 0.03
Wt. of immature grains (gm)	251 ± 1.63	155.66 ± 0.47	144 ± 2.16	**136.33** ± 0.47
Wt. of 100 seeds (gm)	2.386 ± 0.09	2.407 ± 0.012	2.451 ± 0.03	**2.515** ± 0.15

Note: Values are mean ± SD