



A STUDY ON THE EFFECTS OF SEAWEED LIQUID FERTILIZER ON THE GERMINATION AND GROWTH OF CAPSICUM LONGUM (APSARA)

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Abstract: The effect of seaweed liquid fertilizers of *Caulerpa racemosa* and *C. taxifolia* were investigated on *Capsicum longum*. The seeds of *C. longum* were treated separately with 1-5% algal solutions and the seeds are treated with water as control. The radicle length, hypocotyl length, seedling length, germination percentage, phytotoxicity, growth index and vigour index were calculated on the fifteenth day. *C. longum* seeds soaked in 4-5% solution of *C. racemosa* showed higher rates of germination.

Keywords: Germination percentage, Vigour Index, Phytomass, Productivity, Growth Index, Seaweed Liquid Fertilizer.

I. INTRODUCTION

India is one of the fastest growing countries in the world in terms of population and economics and country in the world with nearly fifth of the world's population. Agriculture is an important sector in India. It is indispensable for the sustenance of growth of the Indian economy. On an average, about 70% of the households and 10% of the urban population is dependent on agriculture as their source of livelihood (Limboore and Khillare, 2015). Application of fertilizers provides a better yield. To increase the productivity of vegetables, farmers used chemical fertilizers and it lead to the loss of fertility and damage of soil biodiversity and soil composition. So it is better to use the organic fertilizers. Organic fertilizers have reported to increase the yield and quality of crops as well as soil properties. Production of organic based fertilizers help to convert wastes would otherwise become a nuisance to the environment to environmentally friendly and agriculturally useful materials (Mustapha *et al.*, 2012). Seaweeds are also used for the production of organic fertilizers and it is called Seaweed Liquid Fertilizer (SLF). Seaweed is the common name for countless of species of marine plants that grow in the ocean. They are rich in vitamins, minerals and fibres. At about 12000 varieties of seaweed in the ocean are used as organic fertilizer and abundantly available free from the cost. The seaweeds used for SLF preparation is *Caulerpa racemosa* and *C. taxifolia* which belongs to the family *Caulerpaceae*. The seeds selected for this study is *Capsicum longum*(Apsara) variety. They are beneficial in alleviating and preventing many illness. It contains β -carotene, vitamin A and

vitamin C. It is also low in fat and calories and hence does not increase the level of bad cholesterol in the body. Chillies benefits are many and it forms vital part of a balanced and healthy diet. So an attempt is made to increase the productivity of *Capsicum longum* (Apsara) using the seaweed liquid fertilizers.

II. MATERIALS AND METHODS

Preparation of SLF

Seaweeds are collected from the coastal region of Thikkodi Beach, in Kozhikode District. SLF was prepared by following the method of Ganapathy and Sivakumar (2014). 1kg of seaweed was cut into small pieces and boiled with 1litre of distilled water for an hour. Then filter it with muslin cloth. The obtained solution is considered as the 100% solution. Then 1-5% concentration of SLF is prepared by adding distilled water and it is stored in refrigerator.

Selection of seeds:

The crop selected for the study was *Capsicum longum*(Apsara)which is a tropical legume plant. The seeds for this study were collected from home garden. Seeds with uniform size, color and weight were chosen for the experimental purpose. Then the seeds are treated with different SLF.Germination studies (Based on Chou and Muller (1972); Vilasini. G. (1975); Sharma and Saran (1992).

III. RESULTS AND DISCUSSION

Germination Studies

Germination percentage of chilly treated with *C. taxifolia* solution was maximum at 3% (T3), 4% (T4) and 2% (T2) solution, i.e. 90%. The phytotoxicity is 100 for 5% (T5) solution and hence seeds treated with this solution will not germinate. In case of growth index and vigour index highest value is seen at 4% (T5) solution.

Table 1: Growth of *C. longum* on fifteenth day when treated with *Caulerpa taxifolia*

	Radical length (cm)	Hypocotyl length (cm)	Seedling length (cm)	Germination percentage	Phytotoxicity	Growth index	Vigour index
T0	1.6	1.1	2.7	50	–	–	1.35
T1	2.7	4.4	7.1	60	-11	2.63	4.26
T2	3.3	4.3	7.6	90	-17	2.81	6.84
T3	3.9	2.9	6.8	90	-23	2.52	5.44

T4	4.2	4.2	8.4	90	-26	3.11	7.56
T5	–	–			100		

T4 solution has high phytomass i.e. 0.618 while the phytomass of control (T0) was only 0.226 and in the case of productivity also highest value was observed on T4 solution and the value is 0.0309.

Table 2. Phytomass and productivity of *C. longum* when treated with *C. taxifolia*

	Fresh weight (gm)	Dry weight (gm)	Phytomass (gm)	Productivity
T0	0.252	0.026	0.226	0.0113
T1	0.283	0.031	0.282	0.0125
T2	0.356	0.032	0.324	0.0162
T3	0.432	0.038	0.394	0.0197
T4	0.670	0.052	0.618	0.0309
T5	–	–	–	–

The seeds treated with *Caulerpa racemosa* solution has highest growth at 5% solution (R5) and the lowest at 2% solution (R2). R5 has 90% germination percentage. For the other parameters also highest value was observed for R5 and the values are 9.2 cm is the seedling length, -24 is the phytotoxicity, growth index is 2.30 and the vigour index is 8.28. The seedling length of R0 was 4cm and growth index is 3.20.

In the case of phytomass and productivity the highest value is at 4% solution. The lowest phytomass and productivity value is for R0.

Table 3: Growth of *C. longum* on fifteenth day when treated with *Caulerpa racemosa*

	Radical length (cm)	Hypocotyl length (cm)	Seedling length (cm)	Germination percentage (%)	Phytotoxicity	Growth index	Vigour index
R0	1.9	3.1	4	40	–	–	3.20
R1	3.4	4.1	7.5	60	-15	1.87	4.50
R2	2.9	4.5	7.4	60	-10	1.85	4.44
R3	4.3	3.4	7.7	60	-24	1.92	4.62
R4	3.6	4.5	8.1	70	-17	2.02	5.67
R5	4.3	4.9	9.2	90	-24	2.30	8.28

Table 4: Phytomass and productivity of *C. longum* when treated with *C. racemosa*

	Fresh weight (gm)	Dry weight (gm)	Phytomass (gm)	Productivity
R0	0.223	0.033	0.190	0.010
R1	0.238	0.022	0.216	0.011
R2	0.256	0.031	0.218	0.011
R3	0.457	0.026	0.431	0.022
R4	0.538	0.038	0.497	0.025
R5	0.326	0.018	0.308	0.015

Applying algal extract of *Hypnea musciformis* on the seeds of *Arachis hypogea* has high germination percentage and seedling length at 2% solution (Ganapathy and Sivakumar, 2014). The 20% extract of *Rosenvingea intricata* extract increased the shoot length and root length of *Cyamopsis tetragonolaba* (Thirumaran *et al.*, 2009). The effect of the liquid seaweed extracts of *Ulva lactuca* and *Padina gymnospora* at a concentration of 0.2% applied on *Solanum lycopersicum* gave a significant increase in germination percentage over control after 2 days (Rosalba *et al.*, 2013). *Vigna mungo* treated with lower concentration of

seaweed liquid fertilizer (SLF) of *Caulerpa racemosa* increased the vegetative growth. The fresh weight, dry weight, phytomass, productivity etc were at maximum for *Vigna mungo* when treated with 1% of SLF (Abhilash *et al.*, 2012).

In the present study treatment with the seaweed *C. racemosa* has highest growth in 5% extract. Phytotoxicity was least at 4% solution of *Caulerpa taxifolia* and 2% and 5% solution *C. racemosa*. Our result corroborated with the above discussed reports.

IV. SUMMARY AND CONCLUSION

In the present world usage of SLF is more successful than chemical fertilizers. Because they can avoid environmental pollution that occurred due to the usage of chemical fertilizer in the soil and it also fastens the growth to the plant. The major findings of the study are the treatment with specific concentration of SLF can increase the germination percentage of *Capsicum longum*. So such treatment could achieve the farmer maximum germination. *C. longum*(Apsara) seeds soaked with 5% concentration of *Caulerpa racemosa* extracts showed higher rates of germination. The seeds soaked with low concentration of *Caulerpa taxifolia* showed lower rate of germination, while increasing the concentration prompted the germination. While considering the overall growth of chilly in *Caulerpa racemosa* and *C. taxifolia*, it can be observed that the germination rate is higher to former than the later. So *Caulerpa racemosa* can be successfully used as a Seaweed Liquid Fertilizer for obtaining better yield in *Capsicum longum* (Apsara).

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