



“EFFICIENCY OF FRESH WATER ALGAE AS A LIQUID BIO-FERTILIZER ON THE GROWTH OF SAFFLOWER (*Carthamus tinctorius* L.)”

*Varpe P. S. and Wabale A.S.

Department of Botany and Research Centre, Padmashri Vikhe-Patil College of Arts, Science and Commerce, Pravaranagar, Maharashtra, India 413 713.

*Gmail: priyankavarpe612@gmail.com

ABSTRACT:

The efficiency of fresh water algae as liquid biofertilizer was studied on the seed germination and seedling growth of safflower. The experimental analysis was carried out by soaking the seed overnight in various concentrations (1%, 5%, 10%, 15%, 20%, 25%, and the control D.W.) of a algae liquid extract in a present study, algal extract showed maximum activity in 15% concentration in term of increase in seed germination, root length, shoot length, total height and seedling vigour index (SVI) as compared to control and other concentrations. Thus, the result reveals that algae can be used as a effective source of liquid biofertilizer.

Key words: - Germination, Safflower Seedling, Growth, Biofertilizer Extract.

INTRODUCTION:

Safflower (*Carthamus tinctorius* L.) one of the popular nutritious, oil containing vegetable also known as “kardai” in Marathi and “safflower” in English. Safflower plants belong in the family Asteraceae native to part of Asia and Africa. The immature and green plant leaves used as vegetable in diet and its seed is used in preparation of vegetable oil. Safflower is a rich source of vitamin B6 and seed oil is naturally rich source of omega 6, vitamin E, polysaturated fatty acid. The healthy seed with uniform size, colour and weight of Bhima variety were obtained from agriculture centre, Loni, Tal: - Rahta Dist:- Ahamednagar. Applications of fertilizer play a vital role in the yield of crop. But continuous use of inorganic fertilizer has made their soil infertile for cultivation, pesticides eutrophication of surface water and contamination. In order to overcome this problem organic fertilizers can be utilized. There are many types of organic manures of which is the most abundant and easily available source is fresh water algae.

Seaweed and seaweed product are used worldwide to enhance crop growth and yield.

Certain fresh water algal extract is known to improve seed germination (Bhosale *et al.*, 1975, Rajeshwari *et al.*, 1983, Mohan *et al.* 1994). Fresh water algal extract is showing the increase in seed germination percentage, seed vigor index and improve total seedling growth. Booth, 1969 observed that the value of algal extract was not only due to nitrogen, phosphorous and potassium content but also due to the presence of trace element and metabolites similar to growth regulators. These include the shoot length, root length, total height of seedling, seedling vigor index and seedling germination percentage. In India many workers experimented on fresh water algae and sea weed as a liquid fertilizer. Hence, in a present investigation and attempt was made to study the efficiency of fresh water algae as a liquid bio-fertilizer on the growth of safflower.

MATERIALS AND METHODS:

A mixture of fresh water algae used in this experiment was collected from agriculture pond of Wakadi village of Rahata Taluka in Maharashtra. Healthy material was handpicked and brought to the laboratory, washed thoroughly under running tap water and epiphytes found were removed.

Then the material was shade dried for 4 to 6 days. The derived algal material from grinded with the help of mixer and powder was stored in air tight plastic bottles.

Extraction by boiling: 10 gm of fine powder of collected algal material from was mixed separately in 100 ml of sterile distilled water and boil at 100°C to reduce the volume up to 10ml. this extract was filtered through muslin cloth and cooled. The extract was used as stock solution (100%). The extract diluted with sterile distilled water for preparing 1%, 5%, 10%, 15%, 20% and 25% concentrations and was stored in air tight bottles for further study. The algal extract was prepared by using the method of Bhosale *et al.* (1975).

Experimental Setup:

In order to study the effect of fresh ware algal extract on safflower as test plant, paper towel method (Singh *et al.*, 1972) was used equal sized fifteen healthy seeds were presoaked in different concentrations of algal extract for 24 hrs. The experiment was carried in triplicates. Moist paper towel was stretched on a clean polythene paper and on the other side of the paper towel fifteen seeds were arranged on its half portion containing three rows each of 5 seeds. About three on space was left on lower and right side of the paper towel. The paper towel was rolled from the right end with plastic paper and end were tightented with rubber bands. The paper towel was placed vertically in beaker with some water for farther experimental work.

First count for germination percentage was carried out after 4 days and final count taken after 14 days (Agrawal R. L. 1976), for total seedling growth. Different parameters were used in the present investigation as follow :-

1. Germination percentage.
2. Shoot length.

3. Root length.
4. Total height of seedling.
5. Seedling vigour index (SVI)

Above mentioned parameters were calculated by the following formulae

- Germination percentage = $\frac{\text{no. of seed germination}}{\text{total no. of seed}} \times 100$
- Total height of seedling = shoot length + root length
- SVI = (mean root length + mean shoot length) × % of seed germination

RESULTS:

It was the obtained from the results that all parameters under study were generally influenced by the application of algal extract as compare to the control. Seed treated with 15% concentration of algal extract showed maximum shoot length, root length, total height of seedling, maximum seed germination and seedling vigour index as compared to control (Table-1). However, total height of plant and percent seed germination was also good at 1% algal extract. The increase trend has been reported in the outcome of all parameters starting from 1%, 5%, 10%, 15% and 20% algal concentration. However, all parameters have shown significance decrease in the outcome of concentration higher than 15%. It is reported that algal concentration of 15% are more effective in the seed germination, seedling vigour index and seedling growth as compare to control.

DISCUSSION:

Although the results have shown that, 15% concentrations of algal extract have stimulate. The germination, SVI and the growth of safflower seeds and seedlings respectively. Other concentrations have also proved to be effective in stimulating at least one or more parameters of

safflower under study. The total height of seedling at algal concentration of 1%, 5% and 10% was 25.54 cm, 24.60 cm and 21.82 cm respectively. Only the concentration of 15% had shown more seedling height and seedling vigour index than control. Percent seed germination at 1%, 5%, 10%, and 15% was 90%, 85%, 100%, which was more than the control (80%). Abhang A. R. (2009) was reported significant seed germination in the *Trigonalla* and safflower seeds treated with blue green algal extracts. They have further concluded from their study that, blue green algal extract are more effective in stimulating the growth of *Trigonalla* and safflower seedlings.

CONCLUSION:

From the above experimental result is clearly seen that the seed germination percentage, seedling vigour index (SVI) and total height of seedling in safflower has increased due to the application of algal extract as compare to control. The percentage findings will be useful to the marginal farmers for utilizing fresh water algal extract as liquid biofertilizer. Utilization of algal extracts in fertilizers will produce low cost eco-friendly commercial products which will help in reducing environmental pollution and pesticide tolerance. Moreover, the algal material will be available to the farmers in their own agricultural ponds and this biofertilizer is easy for farmers to handle. Further study will be carried out to screen out the algal mixture.

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1. Table -1: Effect of Water Algae Extract on The Seedling Growth of Safflower.

Sr. no.	Boiled water algal extract	Shoot length (cm)	Root length (cm)	Total height of seedling (cm)	Seedling vigour index(SVI)	Seed germination (%)
1.	1	9.73	15.81	25.54	2298.6	90
2.	5	10.7	13.9	24.60	2091	85
3.	10	10.03	11.79	21.82	2182	100
4.	15	11.73	15.66	27.39	2737	100
5.	20	10.59	15	25.59	1919.25	75
6.	25	9.81	13.52	23.33	2216.35	95
7.	Control	11.5	15.7	27.25	2180	80

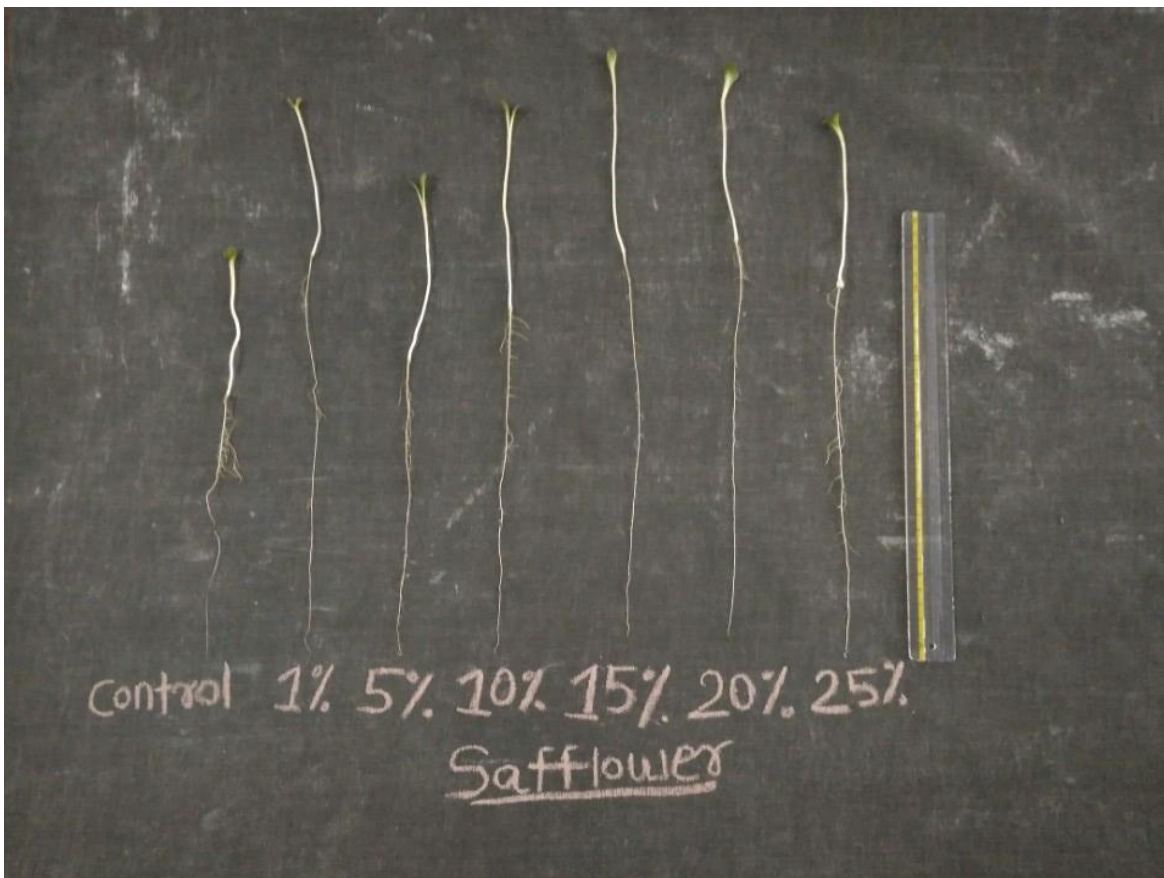


Fig : Seedling Growth At Different Concentration