

CONSEQUENCE OF FOLIAR RELEVANCE OF BGA EXTRACT ON AUGMENTATION OF TOMATO (*LYCOPERSICON ESCULENTUM* MILL.) CVS. PHULE RAJA(RTH2)

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ABSTRACT

The field trials were conducted to study the effect of BGA on the growth and yield of Tomato (*Lycopersicon esculentum* Mill.) cultivar Phule Raja (RTH2). In all eight treatments (T₁- *Nostoc calcicola* extract, T₂- *Lyngbya majuscula* extract, T₃- *Scytonema millei* extract, T₄- *Oscillatoria subbrevis* extract, T₅- Bioforce, T₆- Amruta (19:19:19), T₇- Recommended dose (NPK) and T₈- Control) were applied through foliage at pre-flowering, flowering and post-flowering stages. The results of field trials that application of *Nostoc calcicola* and *Scytonema millei* extracts recorded highest plant height, number of branches, number of leaves, leaf area, plant spread, number of flowers, 50% flowering, number of fruits and crop yield (693.99 q/ha) as compared to the commercial fertilizers. The control (unspread) recorded lowest plant growth and crop yield (289.26 q/ha). The use of BGA extracts proved as an efficient alternative to the conventional chemical fertilizers.

Figure : 00

References : 18

Tables : 02

KEY WORDS : BGA, Biofertilizer, Extract, Tomato.

Introduction

Tomato (*Lycopersicon esculentum* Mill.) belongs to family Solanaceae is one of the main fruit vegetable crop grown in Maharashtra and most of the states in India. It is a rich source of Vitamin A and vitamin C and plays a key role in processing industries. In India, it is cultivated under varied agro climatic conditions which extend from tropics to temperate region. It is grown on an area of 8.21 lakh hectares with an annual production of about 80.2 lakh tones². There is an ample scope to enhance the productivity of Tomato by adopting various techniques.

Contemporary agriculture has managed to increase the productivity of horticultural crop with the minimum use of plant nutrients. However, the intensive application of chemical fertilizers deteriorated the soil productiveness and distributed

the biological balance of biodiversity⁸. Hence the current effort is to explore the possibility of an alternative for chemical fertilizers.

There are many evidences^{3,5,10,15,18} for the presence of growth hormones in many algal members, but their effect on the growth of crops has not been investigated. As the green revolution started in agriculture, the concept of the use of fertilizers for enhancing growth and yield of crop has changed. Instead of application of fertilizer to the soil, various kinds of fertilizers in the form of liquid are sprayed on crop plants. Such liquid fertilizers are found to be more beneficial than the soil application.

Therefore, an attempt was made to assess potentiality of some blue-green algal extract on economically significant crop plant like Tomato. The aim of the work was to determine the nature and

TABLE- 1: Concentration percentage used for treatment and time of sprayings.

Sr. No.	Treatment	Symbol	Conc. %	Remark	
				Spraying	Time of spraying (DAS)
1	<i>Nostoc calcicola</i> extract	T ₁	15-20	1 st spraying	Pre flowering
2	<i>Lyngbya majuscula</i> extract	T ₂	20		
3	<i>Scytonema millei</i> extract	T ₃	15-20	2 nd spraying	At flowering
4	<i>Oscillatoria subbrevis</i> extract	T ₄	20		
5	Bioforce	T ₅	2 ml/lit	3 rd spraying	Post flowering
6	Amruta (19:19:19)	T ₆	0.5 g/lit		
7	Recommended dose (NPK) kg/ha	T ₇	300:150:150		
8	Control	T ₈	Distilled water		

extent of any effect on growth and yield of vegetable crops like Tomato, due to spraying of blue-green algal extract as a liquid biofertilizer in the form of foliar spray.

Materials and Methods

The present investigation on Tomato (*Lycopersicon esculentum* Mill.) var. Phule Raja (RTH2) was carried out during 2014-15.

Materials

The seeds of Tomato var. Phule Raja (RTH2) were obtained from All India Co-ordinated Vegetable Improvement Project on MPKV, Rahuri. BGA cultures were developed from the soil samples by the serial dilution technique.

After isolation and identification unialgal cultures were used as starter for mass cultivation.

Methods

Mass cultivation: Simple pit method¹⁶. The algal mass dried under shade for a week and then powdered the extract⁴. Algal concentration: 1%, 5%, 10%, 15% and 20% were made.

Plan of layout: Factorial Randomized Block Design (FRBD) with seven treatments, which were replicated thrice.

Plot size: Season : Rabi

Gross plot size : 4.2 x 3.0 m²

Net plot size : 3.6 x 2.4 m²

Spacing : 60 x 60 cm

Crop variety : Phule Raja (RTH2)

Total plants per plot : 24

Source of irrigation was Well and Mula left canal Irrigation. Concentration percentage of algal extract, Bioforce, Amruta (19:19:19) and recommended dose applied on Tomato (Table- 2).

Growth and yield parameters such as plant height, number of branches, number of leaves, plant spread (cm), days for flower initiation, days required for 50% flowering, diameter of fruit, number of fruits per plant, weight of fruit per plant and yield of crop (q/ha) were recorded by using standard methods. Then the yield per hectare was calculated.

Results and Discussion

The foliar applications of various compounds (Algal extract, Bioforce and Amruta) had significant influence on plant height, number of leaves and branches, plant spread and yield characters like days required for flower initiation and 50% of flowering, length and diameter of fruit, number of fruits, fruit weight and yield of crop (fruit). The foliar application of blue green algal extract and two commercial preparations, Bioforce (an organic liquid plant vitaliser) and Amruta (19:19:19) (100% water soluble chemical fertilizer) performed

TABLE-2: Effect of BGA extract, Bioforce, Amruta and RCD as foliar application on growth and yield of Tomato (*Lycopersicum esculantum* Mill.) cv. Phule Raja.

Treatments	Symbol	Plant height (cm.)	Nos. of Branches	Nos. of leaves	Plant spread (cm.)	Days for flower initiation	Days required for 50% flowering	Diameter of fruits (cm)	Nos. of fruits per plant	Weight of fruit per plant (g)	Yield of crops q/ha
<i>Nostoc</i> extract	T ₁	159.33	9.67	115.55	79.350	58.00	73.00	55.36	52.00	70.067	693.99
<i>Lyngbya</i> extract	T ₂	132.00	9.00	103.22	77.833	61.00	78.00	5.39	44.00	74.470	625.12
<i>Scytonema</i> extract	T ₃	134.00	9.33	109.66	77.862	57.00	72.33	5.37	48.00	75.753	692.59
<i>Oscillatoria</i> extract	T ₄	124.13	7.67	100.44	77.810	62.00	79.67	5.41	38.44	76.840	650.43
Bioforce	T ₅	121.00	7.33	98.66	77.748	61.00	79.00	5.43	35.91	79.503	543.79
<i>Amruta</i> (19:19:19)	T ₆	120.00	7.00	91.66	77.379	63.00	82.00	5.48	32.31	80.00	492.34
Recommended dose	T ₇	119.00	6.67	93.11	75.564	64.00	85.67	5.50	29.00	84.620	467.42
Control	T ₈	88.00	4.67	84.88	72.340	65.00	88.00	5.10	22.30	68.100	289.26
Mean		124.68	7.660	99.647	77.022	61.375	79.708	5.380	38.495	67.169	556.74
SE		0.289	0.083	0.175	0.339	1.086	0.556	0.090	0.618	0.190	166.67
CD 5%		0.861	1.138	0.520	1.008	3.220	1.653	0.267	1.837	0.565	494.98
CD 1%		1.181	1.561	0.713	1.382	4.427	2.267	0.367	2.520	0.776	678.83

better than control in improving the growth and yield of Tomato. Between the two commercial preparations tried, Bioforce performed better than Amruta, but blue green algal extracts were excellent in improving the growth yield attributes and yield of Tomato. Application of blue green algal extract like *Nostoc calcicola* extract recorded the tallest plant height (159.33 cm), highest number of leaves (115.55), number of branches (9.67), plant spread (79.350 cm), number of fruits per plant (52) and fruit yield (693.99 q/ha). However, maximum days required for flower initiation (64), 50% flowering (85.87), diameter of fruit (5.50 cm) and weight of fruit (84.620 gm) recorded in recommended dose. On the contrary, control (T_0) registered the shortest plant height (88 cm), lowest number of leaves (84.88), number of branches (4.67), plant spread (72.340), fruit diameter (5.10 cm), number of fruits per plant (22.30), fruit weight (68.100 g) and yield of crop (289.26 q/ha).

The blue green algal extract proved its superiority over the commercially available formulation in influencing the growth and yield of Tomato. It is more vivid that algal extract application in crops promotes the proliferation of root and root hair formation^{1,6,7,11,13,14}. Further the low molecular

weight blue green algal extract reported to be directly absorbed by plant when it is applied on foliage^{9,12,17}. It has been speculated that the treatment comparison of blue green algal extract application with Bioforce and Amruta had given significantly better results. This might be due to the stimulatory action of blue green algal extract that contain growth hormones which increased uptake from soil^{3,5,10,18}. Effective utilization of foliar applied nutrients promotes photosynthesis and respiration contributed by the protein-quinine groups respectively of accumulated blue green algal extracts.

Conclusion

The present study clearly concluded that, by using the low cost technology *i.e.* use of blue green algal liquid biofertilizer has exhibited its assorted influence on growth and yield with great boost over control as well as other commercial liquid fertilizer treatments. It was also observed that different blue green algal extract proved to be superior in increasing height, leaves, branches, plant spread, length and diameter of fruit, number of fruits, fruit weight, yield of crops *etc.* So the inorganic fertilizers are known to be away from this aspect and long term, algal organic fertilizers are more useful.

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