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Response of Brinjal (*Solanum melongena L.*) to Bio-stimulants in Relation to Growth, Yield and Quality

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Original Research Article

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ABSTRACT

Field experiment was conducted during December 2018 to April 2019 at the Student's farm, Department of Agriculture Science & Rural Development, Loyola Academy degree and pg college, Secunderabad to find out the effect of bio-stimulants on growth and yield of Brinjal var. Utkarsha. The experiment was laid out in Randomized Block Design (RBD) and the treatments comprised of: T_1- Folicist @ 3 ml l^{-1}, T_2 – Fylloton @ 3 ml l^{-1}, T_3 – Globalga @ 3 ml l^{-1}, T_4 – Tata Bahar @ 2.5 ml l^{-1}, T_5 – Neo-Alpha @ 2.5 ml l^{-1}, T_6 – Daiwik @ 2.5 ml l^{-1}, T_7 – Recommended dose of NPK alone and T_8 – control. Biostimulants were applied as foliar spray at pre-flowering, flowering and fruit setting stages. From the results of the experiment, it was observed that all the growth parameters i.e., plant height (92 cm), number of branches (12 plant^{-1}) and number of leaves (38 plant^{-1}) were significantly increased by the application of folicist @ 3.0 ml l^{-1} and it was at par with tata bahar @ 2.5 ml l^{-1}. Same treatment also resulted significant increase in terms of number of flowers (68 plant^{-1}), number of fruits (29 plant^{-1}). The fruit length (7.8 cm), fruit diameter (8.35 cm), average fruit weight (90 g fruit^{-1}), fruit yield (2.55 kg plant^{-1}) were recorded in foliar application of folicist @ 3 ml l^{-1} and it was

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onpar with foliar application of tata bahar 2.5 ml l^{-1}. The lowest values of growth parameters, yield attributes and yield were observed in control (T_8). From the present study it can be concluded that application of folicist @ 3.0 ml l^{-1} will fetch the remuneration to the farmers.

Keywords: Biostimulants; brinjal; growth; yield.

1. INTRODUCTION

Brinjal (*Solanum melongena L.*) is an important vegetable crop cultivated extensively in India [1]. It can be grown throughout the year in almost all parts of India. Brinjal forms an essential ingredient of Indian curries. It contains high amount of carbohydrates (6.4%), protein (1.3%), fat (0.3%), calcium (0.02%), phosphorous (0.02%), iron (0.0013%) and other mineral matters [2]. It has medicinal value for the treatment of diabetes, Asthama, Cholera, bronchitis and diarrhea and also lowering the blood cholesterol [3]. Due to continuous hazardous effects of chemical fertilizers and pesticides on environment, a major interest is been shown in use of ecofriendly bio products to regulate the plant growth [4]. Application of commercial inorganic fertilizers has resulted in drastic reduction in soil microbial population and whole rhizosphere is getting polluted [5]. Continuous deterioration in soil physical properties, nutrient imbalance and rapid depletion of soil fertility are added disadvantages of chemical fertilization [6]. The growth, development and yield of brinjal can be increased by the balanced application of N, P and K nutrients. However, growth regulation of any crop is manipulated by the exogenous application of plant growth regulators (PGR). But in the recent past instead of PGR, biostimulants are being used for crop regulation. The synergistic and complementary effect of biostimulants and essential nutrients is utilized for the synthesis of proteins which eventually leads to stimulated growth and yield [7]. Bio-stimulants can modify the morpho-physiological processes in plants at very lower concentration to improve plants natural self defence system which results in healthier crop with low stress pressure [8]. High yielding varieties and hybrid brinjal has got good market preference due to its size and appealing attractive colour and taste under minimal use of synthetic chemicals [9]. Keeping these in view, the present field experiment was aimed to find out the effect of biostimulants on growth, yield and quality of brinjal.

2. MATERIALS AND METHODS

The present investigation was conducted at student's farm, Department of Agriculture Science & Rural Development, Loyola Academy Degree and PG College, Alwal, Secunderabad, Telangana during December 2018 to April 2019 as a suitable season for brinjal and also most of the farmers go for this season in Telangana. The experimental soil was red sandy loam texture, medium organic carbon (0.7%), neutral pH (7.7), medium in available N and P and high in available K. The experiment was laid out in Randomized Block Design (RBD) with eight treatments replicated thrice viz., T_1- Folicist @ 3 ml l^{-1}, T_2 – Fylloton @ 3 ml l^{-1}, T_3 – Globalga @ 3 ml l^{-1}, T_4 – Tata Bahar @ 2.5 ml l^{-1}, T_5 – Neo-Alpha @ 2.5 ml l^{-1}, T_6 – Daiwik @ 2.5 ml l^{-1}, T_7 – Recommended dose of NPK and T_8 – control. Foliar application of biostimulants are prepared from the sea weed extracts *Ascophyllum nodosum* and *Sargassum spp.* by protein hydrolysis were applied at pre flowering, flowering and fruit setting stages. The field layout and randomization of treatments were made with each plot size of 3 x 3 m (9.0 m^2). The seedlings of brinjal var. Utkarsha of one month old were obtained from Centre of Excellence, Department of Horticulture, Jeedimetla, Secunderabad and transplanted in the well prepared main field at a spacing of 60 x 45 cm. Farm yard manure was applied @ 12.5 t ha^{-1} as soil application at last ploughing. NPK nutrients were applied @ 100:60:60 kg ha^{-1} to all the treatments except control. Nitrogen was applied in two split doses, i.e., half as basal and the remaining as top dressing. Entire dose of P and K were applied as basal. The spray fluid was 500 lit ha^{-1}. The crop was raised under protected irrigation. Weeding, inter cultivation and timely plant protection measures were taken up. The biometric parameters viz, plant height, number of branches $plant^{-1}$, number of leaves, number of flowers $plant^{-1}$, number of fruits $plant^{-1}$, fruit length (cm), fruit diameter (cm), fruit weight (g), yield $plant^{-1}$ and yield $plot^{-1}$ were recorded and mentioned in Tables 1 and 2. The vitamin-C content in brinjal fruits was estimated using 2, 6

Table 1. Effect of biostimulants on growth parameters and yield attributes of brinjal

Treatment	Plant height (cm)	No. of Branches Plant^{-1}	No. of Leaves Plant^{-1}	Fruit Diameter (cm)	Fruit length (cm)
T_1- Folicist @ 3 ml l^{-1}	92	12	38	8.3	7.8
T_2 – Fylloton @ 3 ml l^{-1}	79	09	27	8.0	7.4
T_3 – Globalga @ 3 ml l^{-1}	74	08	25	7.8	7.3
T_4 – Tata Bahar @ 2.5 ml l^{-1}	90	12	35	8.2	7.7
T_5 – Neo-Alpha @ 2.5 ml l^{-1}	86	10	30	8.1	7.5
T_6 – Daiwik @ 2.5 ml l^{-1}	82	11	29	8.1	7.5
T_7 - Recommended dose of NPK	65	08	24	7.3	6.6
T_8 – control	54	05	18	5.8	5.6
SEd	1.35	0.85	1.8	0.12	0.22
CD (p=0.05)	3.11	1.81	3.82	0.38	0.5

Table 2. Effect of biostimulants on yield and quality of brinjal

Treatment	No. of Fruits Plant^{-1}	Average Fruit Weight (g)	Fruit Yield Plant^{-1} (Kg)	Vitamin-C (mg 100g^{-1})
T_1- Folicist @ 3 ml l^{-1}	29	90	2.5	9.0
T_2 – Fylloton @ 3 ml l^{-1}	23	80	2.0	8.3
T_3 – Globalga @ 3 ml l^{-1}	20	78	1.9	7.7
T_4 – Tata Bahar @ 2.5 ml l^{-1}	28	88	2.4	8.8
T_5 – Neo-Alpha @ 2.5 ml l^{-1}	24	83	2.2	8.0
T_6 – Daiwik @ 2.5 ml l^{-1}	24	85	2.3	8.5
T_7 - Recommended dose of NPK	18	72	1.7	7.3
T_8 – control	14	51	0.71	5.20
SEd	1.66	2.3	0.18	0.42
CD (p=0.05)	3.5	5.0	0.4	1.45

dichlorophenol indophenol titration method and was expressed as mg 100 g^{-1} [10]. The statistical analysis was done as per the procedure outlined by Panse and Sukhatme [11].

3. RESULTS AND DISCUSSION

3.1 Growth Parameters and Yield Attributes

Foliar application of Folicist @ 3 ml l^{-1} (T_1) was significantly registered taller plant height (92 cm), highest number of branches (12 plant $^{-1}$), number of leaves (38 plant $^{-1}$), fruit diameter (8.3 cm) and fruit length (7.8 cm) and it was statistically onpar with foliar application of tata bahar @ 2.5 ml l^{-1} (Tab.1). The lowest values of plant height, number of branches plant $^{-1,}$ number of leaves plant $^{-1}$, fruit diameter (cm) and fruit length (cm) observed in control. This might be due to the accelerated cell division and cell expansion as N, P and K nutrients plays an important role in cell division and multiplication which ultimately results in maximum vegetative growth [12,13]. This increased number of branches and leaves is due to easy transfer of nutrients, increased meristemetic activity and enhanced supply of photosynthates [14,7].

3.2 Floral Characters and Yield Parameters

The maximum number of fruits (29 plant^{-1}), average fruit weight (90 g) and yield (2.5 kg plant^{-1}) were observed in Folicist @ 3 ml l^{-1} (T_1) followed by tata bahar (Tab. 2) compared to other treatments and the lowest values of number of fruits plant^{-1}, average fruit weight (g) and yield (kg plant^{-1}) recorded in control (T_8) (Table 2). The increased yield components and yield could be explained that upon onset of flowering phase, there was improvement of anabolic activities as well as redistribution of metabolites. Thus, the nitrogen which was earlier utilized by vegetative parts was translocated towards reproductive organs to form amino acids, which upon condensation formed proteins and ultimately used for increasing the number of

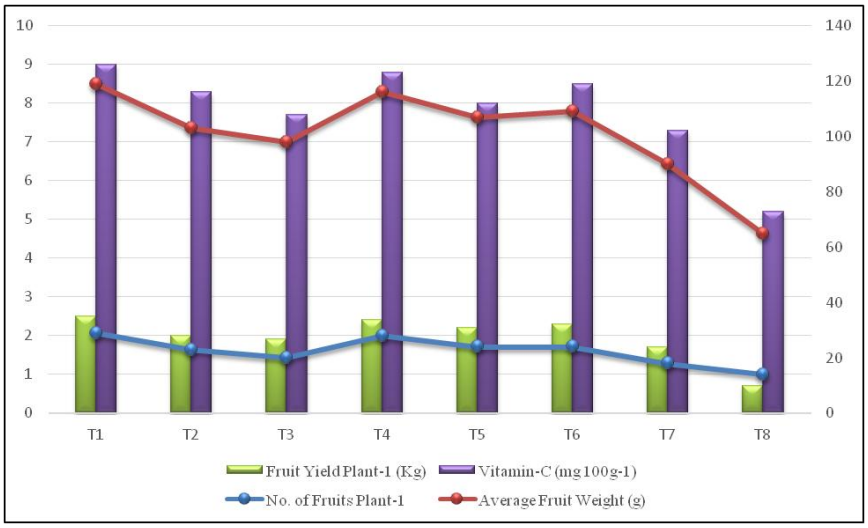

Fig. 1. Effect of biostimulants on yield and vitamin C content

flowers per plant and weight of the fruits [15,16, and 17]. Numerically the maximum vitamin C (9.0 mg $100g^{-1}$) content in the brinjal fruits was observed with foliar application of folicist @ 3 ml l^{-1} (Fig. 1). However the control treatment (T_8) registered the lowest vitamin C content in brinjal.

4. CONCLUSION

From the present experimental findings, it can be concluded that for better growth, yield and quality and lesser pest damage of brinjal crop can be achieved with the application of biostimulant Folicist @ 3 ml l^{-1} (T_1) at different stages in combination with balanced application of recommended inorganic fertilizers which will fetch a remunerative price to the farmers.

5. FUTURE SCOPE

In futurology, application of biostimulants alone can be done by avoiding or limited application of the inorganic fertilizers. There is a scope of combine application of biostumulants as well as foliar nutrition to bring down the cost of cultivation also find the effectiveness in combination.

Comparison between best four treatments

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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