International Journal of Plant & Soil Science

Volume 35, Issue 6, Page 172-176, 2023; Article no.IJPSS.97657
ISSN: 2320-7035

Effect of Bio-stimulants on Growth, Development and Yield of Chilli (*Capsicum annum L.*)

Gudapati Ashoka Chakravarthy [a*] and K. Krishna Mohan [b]

[a] School of Agricultural Sciences, Malla Reddy University, Hyderabad, Telangana - 500100, India.
[b] Department of Botany and Forestry, Government Arts and Science College, Kamareddy, Telangana, India.

Authors' contributions

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

Article Information

DOI: 10.9734/IJPSS/2023/v35i62852

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/97657

Original Research Article

Received: 16/01/2023
Accepted: 19/03/2023
Published: 22/03/2023

ABSTRACT

A field experiment was conducted during December 2018 to April 2019 at the Student's farm, Department of Agriculture Science & Rural Development, Loyola Academy, Secunderabad to know the effect of bio-stimulants on growth and yield of Chilli. The experiment was laid out in Randomised Block Design (RBD) and the treatments comprised of: T_1- Folicist @ 3 ml/L, T_2 – Fylloton @ 3 ml/L, T_3 – Globalga @ 3 ml/L, T_4 – Tata Bahar @ 2.5 ml/L, T_5 – Neo-Alpha @ 2.5 ml/L, T_6 – Daiwik @ 2.5 ml/L, T_7 – Recommended dose of NPK, 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 (85 and 82 cm), no. of branches (29 and 26) and number of leaves/plant (288 and 262) were significantly increased by the application of Folicist @ 3.0 ml/L and Tata Bahar @ 2.5 ml/L compared to other treatments and control (54 cm, 13 and 150). Same treatment application resulted in significant increase interms of no. of flowers/plant (78 and 75), number of fruits/plant (128 and 124) and % fruit set (80.5 and 78.2%). The highest number of fruits/ plant, average fruit weight (110.5 and 105.6 g/ 10 fruits), yield/plant (682 g) were recorded in

**Corresponding author: E-mail: ashokachakravarthi1994@gmail.com;*

foliar application of Folicist @ 3 ml/L closely followed by Tata Bahar (674 g) and Daiwik (650 g) and the lowest values were observed in control (410 g). Application of biostimulants significantly increased the vitamin-C content of fruits compared to control.

Keywords: Biostimulants; growth; yield; Vit. C; chilli.

1. INTRODUCTION

Chilli (*Capsicum annum L.*) is an important spice cum vegetable crop cultivated extensively in India. Chilli forms an essential ingredient of Indian curries. It is famous for this for its pleasant aromatic flour, pungency and high colouring substance. It is widely used in culinary, pharmaceutical and beverage industry. Application of commercial inorganic fertilizers has resulted in drastic reduction in soil microbial population and whole rhizosphere is getting polluted [1]. Continuous deterioration in soil physical properties, nutrient imbalance and rapid depletion of soil fertility are added disadvantages of chemical fertilization [2]. The growth, development and yield of chilli can be increased by the balanced application of N, P and K nutrients [3]. However, growth regulation of any crop is manipulated by the exogenous application plant growth regulations (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 [4]. High yielding varieties and hybrid Chilli has got good market preference due to its size and appealing attractive colour [5]. With this backdrop, the present field experiment was conducted to study the effect of biostimulants on growth, yield and quality of Chilli.

2. MATERIALS AND METHODS

The present investigation was conducted at student's farm, dept. of Agriculture Sci & Rurak Development, Loyola Academy Degree and PG College, Alwal, Secunderabad (TS) during December 2018 to April 2019. The topography of the experimental field was uniform with adequate irrigation and drainage facility. The experimental soil was red sandy loam texture, medium organic carbon (0.7%), slightly alkaline pH (7.7), medium in available-N and P, high in available K. The experiment was laid out in Randomized Block Design (RBD) with 8 treatments replicated thrice. The field layout and randomization of treatments were made with plot size of 3x3 m (9.0 m^2). The seedlings of Chilli cv. LCA-235 of one month old were obtained from Centre of Excellence, dept of Horticulture, Jeedimetla, Secunderabad. They were transplanted in the well prepared main field at a spacing of 60 x 45 cm. Farm yard manure was applied @ 20t/ha as soil application at last ploughing. NPK nutrients were applied @ 100-60-40 kg/ha 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 crop was raised under protected irrigation. Weeding, intercultivation and timely plant protection measures were taken up. They were applied as foliar spray at pre-flowering, flowering and fruitsetting stages. The treatments of this trial consist of T_1- Folicist @ 3 ml/L, T_2 – Fylloton @ 3 ml/L, T_3 – Globalga @ 3 ml/L, T_4 – Tata Bahar @ 2.5 ml/L, T_5 – Neo-Alpha @ 2.5 ml/L, T_6 – Daiwik @ 2.5 ml/L, T_7 – Recommended dose of NPK, T_8 – Control. The biometrical parameters viz, plant height, number of branches per plant, number of leaves, number of flowers per plant, number of fruits per plant, % fruitset, fruit weight (g), yield per plant and yield per plot were recorded. The vitamin-C content of the fruits was expressed as mg/100 g. The statistical analysis was done as per the procedure outlined by [6].

3. RESULTS AND DISCUSSION

3.1 Growth Parameters

Plant height in Chilli was significantly increased by the application of biostimulants along with recommended NPK. Among the treatments, Folicist @3ml/L and TataBahar @2.5 ml/L recorded the highest plant height (85 and 82 cm) compared to other treatments and the lowest (54 cm) was observed in control (Table 1). 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 [7]. Number of leaves and branches per plant contributes greatly to the growth and development of the crop (Table 1). Application of Folicist and Tatabahar significantly increased the number of branches (29 and 626) and leaves (288 and 262) per plant compared to other

Table 1. Effect of biostimulants on growth parameters and flowering of Chilli

Treatment	Plant height (cm)	No. of branches /Plant	No. of Leaves/plant	No. of flowers /plant	No.of Fruits /Plant
T_1- Folicist @ 3 ml l^{-1}	85	29	288	78	128
T_2 – Fylloton @ 3 ml l^{-1}	77	22	233	60	115
T_3 – Globalga @ 3 ml l^{-1}	72	20	192	58	102
T_4 – Tata Bahar @ 2.5 ml l^{-1}	82	26	262	75	124
T_5 – Neo-Alpha @ 2.5 ml l^{-1}	68	21.5	220	58	96
T_6 – Daiwik @ 2.5 ml l^{-1}	80	24	235	71	115
T_7 - Recommended dose of NPK	70	18	175	54	82
T_8 – control	54	13	150	42	65
SEd	1.35	1.56	6.2	1.3	2.78
CD (p=0.05)	3.11	3.25	15.1	2.74	6.0

Table 2. Effect of bio stimulants on fruit set, yield and quality of Chilli

Treatment	% Fruit set	Average weight of 10 Fruits (g)	Fruit Diameter (Cm)	Fruit length(cm)	Fruit Yield /Plant (g)	Fruit yield /Plot (5 m^2) kgs	Vit-C (mg/100 g))
T_1- Folicist @ 3 ml l^{-1}	80.5	110.5	3.2	14.8	682	13.64	98.92
T_2 – Fylloton @ 3 ml l^{-1}	74.0	98.3	2.5	12.5	640	12.80	95.33
T_3 – Globalga @ 3 ml l^{-1}	65.0	90.4	2.0	9.8	600	12.00	95.00
T_4 – Tata Bahar @ 2.5 ml l^{-1}	78.2	105.6	2.9	13.6	674	13.48	98.61
T_5 – Neo-Alpha @ 2.5 ml l^{-1}	68.0	90.7	2.3	10.0	565	11.30	96.90
T_6 – Daiwik @ 2.5 ml l^{-1}	75.0	100.0	2.6	12.0	650	13.00	97.12
T_7 - Recommended dose of NPK	60.0	80.2	2.0	9.3	495	9.90	98.20
T_8 – control	51.0	64.5	1.5	7.0	410	8.20	94.11
SEd	0.67	2.8	0.12	0.6	5.5	0.5	0.25
CD (p=0.05)	1.54	6.4	0.26	1.3	11.6	1.35	0.66

treatments and less in control (13 and 150). This increased number of branches and leaves is due to easy transfer of nutrients, increased meristemetic activity and enhanced supply of photosynthates [8].

3.2 Floral Characters and Yield Parameters

Number of flowers per plant was significantly influenced by the application of bio-stimulants. Among the treatments, Folicist and Tata Bahar recorded the highest number of flowers per plant (78 and 75) followed by Fylloton and Daiwik applied plots and lowerst in control (42). The significant increase in flower production is due to combined application of inorganic nutrients and biostimulatns which has led to the synthesis of auxins and their translocation towards reproductive growth to promote flower production [9-11]. The highest number of fruits per plant, fruit weight (g) and yield per plant were observed in treatment Folicist followed by Tata Bahar and Daiwik. Percent fruitset was recorded the highest in Folicist (80.5%) and Tata Bahar (78.2 %) applied plots and the lowest was recorded in the Control (51%). Fruit yield per plant was recorded the highest (682 g) in Folicist applied plants closely followed by Tata Bahar (674 g) and Daiwik (650 g) and the lowest was observed in control (410 g). Fruit yield per plot was also significantly increased by the application of Folicist and tatabahar (13.64 and 13.48 kg/plot) and lowest yield was recorded in control (8.2 kg/plot). 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 flowers per plant and weight of the fruits [12-14].

3.3 Vitamin- C Content

Application of biostimulants significantly influenced the quality of the fruits in terms of vitamin-C content (Table 2). The highest vit-C content was recorded in the treatment Folicist and Tatabahar 98.92 and 98.61 mg/100 g followed by recommended NPK (98.2) and Daiwik (97.12). The lowest vit. C content was recorded in control plots.

4. CONCLUSION

From the present experimental findings, it can be concluded that application of biostimulants: Folicist @ 3 ml l^{-1} (T_1) along with balanced application of inorganic fertilizers will help in increasing growth, yield and quality of Chilli. If Folicist not available in the market, formers can opt Tata Bahar @ 2.5 ml l^{-1} (T_4) and also Daiwik (T_6) @ 2.5 ml l^{-1}. By applying these biostimulants will fetch remunerative price to the farmers.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Devi R, Kaur T, Kour D, Yadav AN, Suman A. Potential applications of mineral solubilizing rhizospheric and nitrogen fixing endophytic bacteria as microbial consortium for the growth promotion of chilli (*Capsicum annum* L.). Biologia. 2022; 77(10):2933-2943.
2. Selim MM. Introduction to the integrated nutrient management strategies, and contribution on yield and soil properties. J. Plant Sci. 2021;9(4):139-150.
3. Aslam Zubair, Ahmad A, Bashir Safdar, Hussain S, Belliturk K, Ahmad JN, Ahmed E, Ullah S, Tanvir, Abbas T. Effect of integrated nutrient management practices on physiological, morphological and yield parameters of chilli (*Capsicum annum* L.). Pak. J. Bot. 2022;54(6):2143-2150.
4. Dhanasekaran K, Bhuvaneswari R. Effect of nutrient enriched humic acid on growth and yield of Tomato. Int. J. Agri. Sci. 2005;1(1):80-83.
5. Perez-Caselles C, Brugarolas M, Martinez-Carrasco L. Traditional varieties for local markets: a sustainable proposal for agricultural SMEs. Sustainability. 2020; 12(11):4517.
6. Panse, V.G and P. V. Sukhatme. 1985. Statistical methods for agricultural workers. ICAR. New Delhi.
7. Anbukkarasi V, Prabhu M, Paramaguru P, Pugalendhi L and Jeyakumar P. Effect of nutrients and biostimulants on growth, yield and quality of Tomato. Int. J. Curr. Microbial. App. Sci. Special Issue. 2018; 6:49-55.

8. Marschner P. Rhizosphere biology. In Marschner's Mineral Nutrition of Plants. Academic Press. 2023;587-614
9. Netam JL, Sharma R. Efficacy of plant growth regulators on growth characters and yield attributes in brinjal (*Solannum annum L.).* IOSR. J. Agri. and veterinary Sci. 2014;7(7):27-32.
10. Rouphael, Y., and Colla, G. 2020. Biostimulants in agriculture. *Frontiers plant sci.*, *11*, 40.
11. Ali O, Ramsubhag A, Jayaraman J. Biostimulant properties of seaweed extracts in plants: Implications towards sustainable crop production. Plants. 2021;10(3):531.
12. Vandana P, Verma LR. Effect of spray treatment of growth substances at different stages on growth and yield of sweet pepper. Int. J. Life Sciences Research. 2014;2(4):235-240.
13. Patel VP, Plal E, John S. Comparative studt of the effect of the plant growth regulators on growth, yield and physiological attributes of chilli (*Capsicum annum L*.) cv. Kashi Anmol. Int. J. Farm Sci. 2016;6(1):199-204.
14. Passioura JB. Translational research in agriculture. Can we do it better?. Crop and Pasture Science. 2020;71(6): 517-528.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/97657