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Effect of different biostimulants on chilli crop under Prayagraj agro-climatic condition

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Abstract

The present experiment was carried out during August to December 2022-23 in Research field, Department of Horticulture, SHUATS, Prayagraj. The experiment was conducted in Randomized Block Design (RBD), with 16 treatments, replicated thrice with T1-Control; T2-Denim - 2 ml/L; T3-Denim - 2.5 ml/L; T4-Denim- 3 ml/L; T5-Rado- 2 ml/L; T6-Rado- 2.5 ml/L; T7-Rado- 3 ml/L; T8-Dollar- 2 ml/L; T9-Dollar- 2.5 ml/L; T10-Dollar- 3 ml/L; T11-Cobra- 2 ml/L; T12-Cobra- 2.5 ml/L; T13-Cobra- 3 ml/L; T14-Rcot- 2 ml/L; T15-Rcot- 2.5 ml/L; T16-Rcot- 3 ml/L. The data was collected for different parameters like growth, earliness, yield and quality. The results of the experiment revealed that T3 (Denim 2.5ml/L) has significant effect on all parameters. This study is used to evaluate the effect of bio stimulants on chilli. And the chilli responded significantly on application of bio stimulants under Prayagraj agro climatic conditions.

Keywords: Biostimulants, chilli crop, Prayagraj agro-climatic condition

Introduction

Vegetables play a major role in Indian agriculture and responsible in solving problems of malnutrition among human population. Growing vegetable crops generate greater employment potential in rural areas bringing national security. India is the second largest producer of vegetables after China and contributes about 12 percent of the world vegetable production (Nayak *et al.*, 2016) [1]

Vegetables are protective supplementary foods and rich sources of minerals and vitamins. Chilli (*Capsicum annum* L.) is an essential vegetable cum commercial spice crop around the world, not only because of its economic importance but also for the nutritional value of the fruit, primarily to the fact it is an excellent source of antioxidant compounds the term "Chilli" is derivative of the Mexican word, chilli. Chilli forms an essential ingredient of Indian curry. There is no spice probably as popular as chilli and no other spice has become such an indispensable ingredient of the daily food of majority people of the world Chilli (*Capsicum annum* L.) belongs to the family Solanaceae and originated in Southern and Central America.

Chilli (*Capsicum annum* L.) is one of the important vegetable crops of the Solanaceae family and is grown worldwide in large scale. It originates from South and Central America where it is still under cultivation. In Brazil, diverse Chilli varieties are grown on a large scale. It is well documented, chilli is the first spice to have been used by human being and there is archaeological proof of consumption of chillies of about 6000 years ago. Chilli contains proteins, vitamins including vitamin A and C and is also a rich source of various minerals including calcium, phosphorous and irons. In addition, hot types of chillies are rich in digestive stimulant capsaicin.

Materials and Methods

The experiment was conducted during the year 2022-23 in Departmental research field of Department of Horticulture and sciences, Naini Agriculture Institute, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj. The area is situated on the south of Prayagraj on the right bank of Yamuna at Rewa road at a distance of about 6km from Prayagraj city. It is situated at 250.8 °N latitude and 810.50°E longitudes on elevation of 98 meters from the sea level. This region has sub tropical climate with extreme of summer and winter the temperature falls down as low as 32F in December to January and very hot summer with temperature reaching up to 115 F in the months of May and June. During winter, frosts and during summer, hot scorching winds are also not uncommon. The average rainfall is around 1013.4 (cm) with maximum concentration during July to September with occasional

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showers in winters. The experiment was laid by the randomized block design (RBD) with 16 treatments and 3 replications. Recommended dose of fertilizers was applied to all the treatments. All the standard recommended cultural practices were followed to raise a successful crop during investigation.

Results and Discussions

The morphological, growth, yield and quality characteristics of the chilli, namely plant height (cm), number of branches, number of flower, fruit length (cm), average fruit weight(g), no of fruit/plant (kg), fruit yield/plant (kg), fruit-1 FYM, Dollar, Denim, Rado, Cobra, R cot. They not yield/ha (t/ha), fruit girth (mm), TSS and survival only increase the yield but also improve physical, chemical and biological properties of soils that improve productivity of crop. Bio stimulant Denim

gave better results than organic manure alone. The supply and use of plant nutrients from chemical fertilizers Denim has shown to produce higher crop yields.

The data related to various growth, yield and quality traits in chilli are presented in Table 1 and 2 and that regarding benefit cost ratio were presented in Table 3. Application of recommended dose of fertilizers had showed the least growth, yield and quality of the chilli compared to all other treatment combinations, namely plant height 30 DAT (29.44 cm), namely plant height 60 DAT(61.17 cm), namely plant height 90 DAT (91.17 cm), number of branches (17.61), number of flower (238.36), fruit length (3.81 cm), average fruit weight (3.81 g), no of fruit/plant (264.87), fruit yield/plant (800 g/plt), fruit yield/ha (40.04 t/ha-1), fruit girth (4.47 cm), TSS (4.87°brix).

Table 1: Impact of different bio stimulants on growth and characters of chilli.

Treatment combination	Plant Height (cm) [30 DAT]	Plant Height (cm) [60 DAT]	Plant Height (cm) [90 DAT]	No of branches/plant [45 DAT]	No of branches/plant [90DAT]	Days to first flowering [DAT]	Days to 50% flowering [DAT]
T1	21.46	53.87	78.13	5.63	9.73	44.67	51.11
T2	31.13	68.41	93.69	6.17	11.47	48.67	55.54
T3	33.37	70.17	102.63	10.03	20.25	32.67	39.33
T4	29.81	66.61	96.21	8.43	12.07	34.67	41.08
T5	23.81	64.21	88.41	8.61	13.57	39.67	46.39
T6	22.76	59.21	86.86	6.73	10.61	43.67	50.24
T7	23.01	58.01	82.81	7.19	13.47	46.67	53.24
T8	24.76	57.21	84.21	7.47	10.58	34.67	41.13
T9	29.42	54.61	78.81	6.59	12.76	39.67	46.02
T10	21.41	55.01	88.01	4.72	12.26	34.67	41.36
T11	24.37	53.17	88.13	5.60	13.76	37.67	44.41
T12	25.03	56.09	85.06	6.49	14.22	38.67	44.29
T13	21.93	58.13	86.59	7.24	13.39	39.67	45.05
T14	27.48	56.69	87.17	7.28	12.29	40.67	47.00
T15	26.14	53.46	91.17	7.38	12.35	42.33	47.05
T16	21.49	61.17	90.14	9.17	17.61	37.33	43.11
S.E. (m)	0.05	0.02	0.02	0.01	0.04	0.11	0.47
C.V.	0.37	0.04	0.05	0.02	0.53	0.49	1.77

Bio stimulant application had an important impact on all growth characteristics (Table 1). Significantly the highest plant height 30 DAT (33.37cm), namely plant height 60 DAT (70.17 cm), namely plant height 90 DAT (102.63 cm), number of branches (20.25), number of flowers (271.33). The maximum plant height was observed in Denim, might be due to the quick availability of nutrients especially nitrogen, the chief nutrient of protein for the formation of protoplasm which leads to cell division and cell enlargement. Similar results were found by Gudapati Ashoka Chakravarthy *et al.*, (2023) ^[11] that the interaction effect of bio stimulants could be attributed the growth of the plant.

Table 2 presents the yield attributing characters such as fruit length (8.58cm), no. of. fruit/ plant (264..87), fruit yield/plant

(995.48g), fruit yield/ha-1 (49.77t/ha-1), fruit diameter (4.47 cm), TSS (4.87 brix). There was a significant difference observed with the application of bio stimulants on fruit length. The reason of maximum fruit length might be due to increase in the production of leaves, ultimately in photosynthesis, higher amount of carbohydrates production and translocation from source (leaves) to sink (reproductive parts) resulted increase in fruit length observed by Saraswathi *et al.*, (2003) ^[4].

In terms of economic analysis, maximum gross return Rs. 4,97,739.00 was recorded in T3 - Denim with B:C ratio 6.40 followed by T 15 with gross return, net return and B:C ratio (Rs. 4,00,358.00, Rs. 3,27,808.00 and 4.52) respectively and the least was recorded in control.

Table 2: Impact of different bio stimulants on yield and quality characters of chilli

Treatment combination	No of flowers/plant	No of fruits/plant	Average Single fruit weight (g)	Average Single fruit length (cm)	Average Single fruit width (cm)	Fruit yield/plant (g/plant)	Fruit yield/plot (Kg/plot)	Fruit yield/hectare (t/ha)	TSS [°Brix]
T1	101.48	93.87	2.41	5.64	3.61	225.97	2.03	11.30	3.61
T2	332.53	228.80	3.17	7.88	3.76	725.47	6.53	36.27	4.08
T3	271.33	264.87	3.81	8.58	4.47	995.48	8.39	49.77	4.87
T4	181.48	170.80	2.67	7.48	3.80	456.02	4.10	22.80	4.58
T5	135.47	128.80	2.49	7.58	3.77	320.56	2.89	16.03	4.18
T6	111.54	105.80	2.83	8.14	4.44	299.18	2.69	14.96	4.38
T7	235.37	228.73	3.07	7.88	3.91	702.37	6.32	35.12	4.78
T8	219.87	208.87	3.29	6.98	4.14	687.31	6.19	34.37	3.98
T9	152.54	145.20	3.03	7.48	4.06	439.88	3.96	21.99	4.48
T10	125.55	113.40	3.21	7.88	3.95	363.48	3.27	18.17	4.38
T11	189.20	185.40	2.85	8.02	3.69	528.09	4.75	26.40	3.76
T12	174.60	172.40	3.28	7.26	3.94	565.13	5.09	28.26	3.79
T13	200.37	197.73	3.36	6.40	4.26	664.53	5.98	33.23	4.81
T14	210.32	203.00	2.87	7.36	4.13	583.25	5.25	29.16	4.46
T15	224.55	221.00	3.62	7.73	3.71	800.72	7.21	40.04	3.71
T16	238.36	231.00	2.69	8.27	4.05	621.24	5.59	31.06	4.66
S.E. (m)	0.09	0.07	0.06	0.03	0.01	15.66	0.17	0.78	0.02
C.V.	0.08	0.06	3.14	0.06	0.05	4.83	5.89	4.83	0.63

Table 3: Impact of different bio stimulants on economic analysis (B: C ratio)

Treatment combination	Fruit yield/ha (t/ha)	Cost of cultivation (INR)	Gross Return (INR)	Net return (INR)	BC Ratio
T1	11.30	63,800.00	1,12,985.00	49,185.00	0.77
T2	36.27	66,600.00	3,62,737.00	2,96,137.00	4.45
T3	49.77	67,300.00	4,97,739.00	4,30,439.00	6.40
T4	22.80	68,000.00	2,28,010.00	1,60,010.00	2.35
T5	16.03	66,800.00	1,60,278.00	93,478.00	1.40
T6	14.96	67,550.00	1,49,591.00	82,041.00	1.21
T7	35.12	68,300.00	3,51,183.00	2,82,883.00	4.14
T8	34.37	67,600.00	3,43,653.00	2,76,053.00	4.08
T9	21.99	68,550.00	2,19,941.00	1,51,391.00	2.21
T10	18.17	69,500.00	1,81,738.00	1,12,238.00	1.61
T11	26.40	68,200.00	2,64,046.00	1,95,846.00	2.87
T12	28.26	69,300.00	2,82,565.00	2,13,265.00	3.08
T13	33.23	70,400.00	3,32,266.00	2,61,866.00	3.72
T14	29.16	70,800.00	2,91,623.00	2,20,823.00	3.12
T15	40.04	72,550.00	4,00,358.00	3,27,808.00	4.52
T16	31.06	74,300.00	3,10,621.00	2,36,321.00	3.18

Conclusion

It is concluded from the present study that the chilli was subjected to impact with Bio stimulants. The treatment T3-Denim 2.5 ml/L was identified as a suitable treatment with better plant height at 30, 60 and 90 days (cm), more number of branches, maximum number of fruits per plant, fruit length (cm), Treatment T0 control with lowest was recorded. The application of bio stimulants can increase the yield, improve the input-use efficiency by the crop and can certainly lower down the expenditure on costly fertilizers to the farmers.

References

- Sakthivel, Manivannan K. Effect of foliar application of bio stimulants on growth, yield and quality parameters of chilli (*Capsicum annuum* L), Research journal of agricultural sciences, 2021.
- Sam Ruban J, Priya MR, Barathan G, Suresh Kumar SM. Effect of foliar application of bio stimulants on growth and yield of brinjal (*Solanum melongena*); Plant Archives, 2019.
- Naware S, Tapdiya GH, Gawande PP, Ulemale PH, Pillai RK, et al. Effect of growth regulators on quantitative characters of chilli (*Capsicum annuum* L), International Journal of Current Microbiology and Applied Sciences. 2018.
- Saraswathi T, Praneetha S. Effect of bio stimulants on yield and quality in tomato, J Horti. Science, 2013.
- Shankwar B, Nigam AK, Vasure N, Vishwakarma D. Effect of different plant growth regulators on growth of chilli (*Capsicum annuum* L) cv. PUSA JWALA; Agriculture Update, 2017.
- Saritha Sahu, Vijay Kumar, Sharma HG. Effect of plant growth regulators on growth and yield of chilli, Journal of Pharmacognosy and phytochemistry, 2019.
- Pickers gill B. Genetic resources and breeding of *Capsicum* spp, Euphytica, 1997;96:129-133.
- Costa LV, Lopes R, Lopes MT G, De Figueiredo AF, Barros WS, Alves SRM. Cross compatibility of domesticated hot pepper and cultivated sweet pepper, Crop Breeding and Applied Biotechnology. 2009;9:37-44.
- Hill TA, Ashrafi H, Reyes-Chin-Wo S, Yao J, Stoffel K, Truco MA, et al. Characterization of *Capsicum annuum* genetic diversity and population structure based on parallel polymorphism discovery with a 30 k unigenepopper gene chip, Plos One. 2013;8(2):1-16.

10. Bose TK, Som MG, Kabir J. Vegetable crops, Naya Prakash Pub Co. Calcutta. 1993, p. 234.
11. Nayak RR, Turnbaugh PJ. Mirror, mirror on the wall: which microbiomes will help heal them all?. BMC medicine. 2016 Dec;14:1-8.
12. Chakravarthy GA, Mohan KK. Response of Brinjal (*Solanum melongena* L.) to Bio-stimulants in Relation to Growth, Yield and Quality. International Journal of Environment and Climate Change. 2023 Mar 24;13(5):132-136.