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Study on the response of integrated nutrient management on sustainable growth of Tomato

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Abstract
Study on the response of INM on sustainable growth parameter of Tomato (*Solanum lycopersicum* L.) was conducted at department of horticulture rajaula farm of MGCGV, Chitrakoot, Satna, (M.P.) during 2019-20 in *rabi* season. The experiment was consisting of 14 treatments with organic manures, biofertilizer and Recommended Dose of Fertilizer (RDF 100:80:80 kg each of N2,P2O5,K2O ha^{-1}) with three replications was laid out in Randomized block design. The growth attribute parameters *viz.*, plant height (36.7,48.7,67.14), and number of branches (8.59,11.81,17.89), no. of flower cluster per plant (17.8), was recorded highest in the treatment T_2 recommended dose of fertilizers (N2,P2O5,K2O 100:80:80) respectively. Maximum no. Of flower cluster (5.81) per plant was recorded at 60 days after transplanting in recommended dose of fertilizers (N_2,P_2O_5,K_2O 100:80:80).

Keywords: organic manure, Bio-fertilizers, N2, P2O5, K2O, tomato and Growth

Introduction
The cultivated tomato *Solanum lycopersicon* L. It belongs to the family Solanaceae family and has diploid (2n=24). The role of various organic and inorganic source of nutrients in tomato is examined in this brief review article by analysing earlier research and investigations. A fertilizer is any substance which is of natural or synthetic origin, that is applied to soils in order to provide one or more essential plant nutrients and hence addressing plant nutritional deficiencies to improve better plant growth coupled with higher returns in the form of output yield. Synthetic fertilizers have a negative effect that begins with the manufacturing process since they produce hazardous byproducts and toxic gases such as CO2, CH4, and NH4etc., that significantly reduce the air quality and cause alarming environment conditions. Also, application of fertilizers, pesticides and herbicides plays crucial role in reaching very high productivity per unit area, but their excess use can lead to issues like environment pollution (air, water and soil pollution).In light of all the aforementioned issues, farmers must manage soil fertility and nutrients in an integrated manner in order to satisfy the demand of expanding population for food in the first decade of the twenty-first century. As a result, nutrient management is a strategy that combines both organic (FYM, compost, green manure, Gobar gas plant manure, oil cake, fish manure, wood ash, sewage, sludge, coir pith, sugar cane press mud, biological sources, biofertilizers) and inorganic (major nutrients and micro nutrients) plant nutrients to achieve maximum crop yield, prevent soil degradation and supports to future food supply needs.

Importance of nutrient application in vegetable
Crops Proper crop growth and development requires sixteen key plant nutrients. Each nutrient has an equal importance and necessary for the plant in proper amounts and these nutrient components are divided into different categories based on their essentialities in plants. There are three types of nutrients like essential (macro) nutrients, secondary vitamins and micronutrients [3]. Nutrients enhances the growth and root development of the soil flora and fauna [4]. Nitrogen (N) plays a vital function in the plant metabolism and hence it is recognised as a key nutrient for growth and development [5]. The primary factor for the yield reduction in global agricultural production system is low phosphorus (P) availability and less availability of phosphorus at all phases of crop growth can minimize yields up to 5-15% [6, 7]. Magnesium is a significant component of cell walls, is pivotal for the process of photosynthesis in the plants. Sulphur (S) is now considered as fourth main nutrient after N,P and K and its significance is being acknowledged due to its significant contribution to crop quality improvement.

Boron (B) is a essential micronutrient crucial for plant growth regulation and is required for the synthesis of cell wall, transport of sugars, the formation of nodules in legumes crops and regulation of carbohydrate metabolism. Zinc (Zn) is regarded as indispensable component for the plant growth and has been found in a variety of enzymes involved in various biochemical activities.

Impact of Organic manure, bio-fertilizers and INM on Growth Parameters

Meena and Verma [21] conducted an experiments on growth and yield of tomato (*Solanum lycopersicum* L.) with different sources of organic manures and bio fertilizers. On the basis of experimental findings, application of Recommended Dose of Fertilizer (100:50:60 N2, P2O5, K2O kg/ha) resulted into maximum plant height of 117.13 cm and number of primary branches (12.07). Chauhan *et al*. [22] carried out an experiment on effect of varieties and INM on growth and productivity of chilli (*Capsicum annum* L.). Significant grow in plant height (71.6 cm) and no. r of branches per Ramesh *et al*. Int. J. Environ. Clim. Change, vol. 13, no. 5, pp. 1-10, 2023; Article no.IJEC.965844 plant (24.7) at 90 days after transplanting were recorded with application of Recommended dose of fertilizer and vermi-compost 2.5 tons/ha. Mengistu *et al*. [23] studied the integrated use of excreta-based vermi-compost and inorganic Nitrogen, Phosphorus fertilizer on tomato (*Solanum lycopersicum* L.) fruit yield, quality and soil fertility at Dire Dawa. Results recorded that maximum plant height (75.20cm) and number of main branches (8.90) were obtained with the application of 75% Recommended dose of fertilizer and 11.25 ton/ha vermi-compost. Rani *et al*. [24] evaluated the integrated nutrient management practices on growth, yield and economics of green chilli cv. Pusa Jwala (*Capsicum annuum* L.). Findings revealed that the combined application of 150 kg nitrogen/ha + 10 t/ha of FYM + 0.5 t/ha of neem cake resulted into maximum plant height (59, 58 cm) and number of branches per plant (23, 23) respectively. Singh *et al*. [25] carried out an experiment at research farm of ICAR research complex for NEH Region, Mizoram to study the effect of vermicompost and N2,P2O5,K2O fertilizer on morpho-physiological traits of plants, yield and quality of tomato fruits (*Solanum lycopersicum* L.). According to the research findings, maximum plant height (96.4cm and 106.5cm) and stem thickness (14.7mm and 16.2mm) was recorded in T4(N2,P2O5,K2O 30:15:15 kg/ha and vermicompost 11.25 t/ha) and T3(N2, P2O5, K2O 60:30:30 kg/ha and vermicompost 7.50 t/ha) respectively in both the years of study. Narayan *et al*. [26] studied the effect of organic manures and inorganic fertilizers on fruit yield of tomato and reported that the combined application of FYM (20 t/ha) and recommended dose of N2, P2O5, K2O (150:60:60 kg N2, P2O5, K2O/ha) recorded maximum plant height (47.06 cm).

Materials and Methods

The experiment was carried out during rabi season of 2019-20 of tomato *Solanum lycopersicon* L cv. Local variety at Department of Horticulture, rajaula farm, MGCGVV, Satna, Chitrakoot (M.P.), India. This exploration are done in cool season are months (October to January). The attribute of treatments is as follows total 14 are T1 FYM @ 20 t ha-1,T2 RDF (N2,P2O5,K2O 100:80:80),T3 SPNF Seed treatment with Bijamrut + soil supplication of Jivamrut 3 times 1+2 as irrigation water ring at 30 days,T4 Bio-fertilizer consortium (Azotobacter+Phosphate Solubilizing Bacteria)+Bio enhancer (Panchagavya) Spyays at 15 days interval from 20 days + seedling treatment, T5 50% FYM+50% RDF (N2,P2O5,K2O 50:40:40),T6 50% FYM+ T4,T7 RDF (N2,P2O5,K2O 100:80:80) + T4,T8 25% N2 equivalent from organic source +75% RDF (75:60:60 kg),T9 25% Nitrogen from organic source + T4,T10 50% N equivalent from organic manures + 50% from chemical fertilizer + T4,T11 25% Nitrogen equivalent from organic manures source +75% RDF (N2,P2O5,K2O) + T4,T12 Zero budget (SPNF)+ T4,T13 FYM @ 20 t ha-1 + T4,T14 Farmer practices farm yard manure @ 1 t ha-1+ Urea + DAP (approximate 100:40).

Statistical analysis: The data on growth, components were subjected to Fisher's method of analysis of variance (ANOVA) as outlined by Sundararaj *et al*. (1972) where the 'F' test was significant for comparison of the treatment means, CD values were worked out at 5% probability level.

Results and Discussion

Response of Integrated nutrient management on growth and development characteristic are different treatments of tomato (local cultivars) are available in (Table no. 1).

The maximum plant height (cm) (67.14) 90 days after transplanting was recorded in the treatment T_2 RDF (N2,P2O5,K2O 100:80:80). Where as the minimum plant height (24.47, 38.40 and 53.80) was write down T_{14}: Farmer practices FYM @ 1 t ha^{-1}+ Urea + DAP (approx 100:40).

The maximum number of branches per plant (17.89) 90 day after transplating was recorded in the treatment T_2 RDF (N2,P2O5,K2O 100:80:80). Whereas the minimum number of branches per plant (12.33) was write down $Treatment_{14}$+ Urea + DAP (approx 100:40).

The maximum number of flower cluster per plant (17.80) was recorded in the treatment (T_2). Whereas the minimum number of flower cluster per plant (12.23) was write down $Treatment_{14}$+ DAP (approx 100:40).

The maximum number of flower cluster (5.81) was recorded in the treatment T_2 RDF (N2,P2O5,K2O 100:80:80). Whereas the minimum number of flower cluster (3.09) was write down T_{14}: Farmer practices FYM @ 1 t ha^{-1}+ Urea + DAP (approx 100:40).

Table 1: Response of INM on sustainable growth parameter on Plant height (cm), No. of branch, Number of flowers cluster per plant, Number of flowers cluster of tomato (*Solanum lycopersicon* L.). Local cultivar at different intervals during of crop growing period.

S.No.	Treatment No.	Plant height (Cm.)			No. of branch			No. of flowers cluster per plant	NO. of flowers cluster of tomato
		30 DAT	60 DAT	90 DAT	30 DAT	60 DAT	90 DAT		
1	T_1	35.36	47.04	63.64	7.73	11.07	16.3	16.48	5.24
2	T_2	36.7	48.77	67.14	8.59	11.81	17.89	17.8	5.81
3	T_3	31.43	44.57	64.23	8.29	10.43	14.79	15.38	4.82
4	T_4	28.47	46.42	60.87	7.65	9.58	13.78	15.38	4.42
5	T_5	25.4	43.64	59.4	6.4	9.31	14.49	14.34	4.51
6	T_6	28.37	42.75	59.7	7.28	10.38	13.35	13.26	4.49
7	T_7	30.25	43.12	60.44	6.5	10.32	14.34	15.39	4.31
8	T_8	35.41	41.38	60.4	6.21	10.72	16.35	14.48	4.42
9	T_9	35.83	40.35	62.14	7.44	11.43	16.3	13.34	5.31
10	T_{10}	31.89	43.32	59.42	7.5	11.53	12.54	16.28	5.32
11	T_{11}	33.68	44.24	59.91	7.6	11.41	14.3	16.22	4.42
12	T_{12}	34.62	44.46	62.27	7.48	11.51	13.68	14.25	4.83
13	T_{13}	31.87	43.35	63.6	7.23	11.38	14.29	13.25	4.32
14	T_{14}	24.47	38.4	53.8	4.97	8.32	12.33	12.23	3.09
	C.D. at5%	0.941	1.596	5.007	0.493	0.488	1.111	0.409	0.308
	S.Ed. (+)	0.457	0.777	2.436	0.24	0.237	0.541	0.199	0.15

Conclusion

In view of experimental results, treatment T_2 RDF (100:80:80), in relation to growth and treatment T_{11}:25% N equivalent from organic manures source +75% RDF (N2,P2O5,K2O) + Bio-inoculants emerged as excellent result all other treatments, in relation to yield. and attributes of tomato under Bundel Khand agro-climatic condition.

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Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

1. Annonymous. Horticulture Data Base, National Horticulture Board, Ministry of Agriculture, Government of India, Gurgaon; c2019, p. 146-53.
2. Gulati AS, Sharma IJS, Prasad M. Sudieson N2, P2O5, K2O drip-fertigation with organic manuresfor tomato (Lycopersicon esculentum Mill.) underarid condition. Annals of Agri. Bio Res. 2013;18(2):182-185.
3. Chatterjee R, Choudhuri P, Laskar N. Influence of nutrient management practices for minimizing whitefly (*Bemisia tabaci* genn) in tomato (Lycopersicon esculentum Mill.) Int. J Sci. Environ. Tech. 2013;2(5):956-962.
4. Rani P, Tripura U. Effect of integrated nutrient management on growth and yield of tomato: A review. Reddy, C. S., Narayanamma, M., Chiiranjeeyi, C. H.and Reddy, I. P. 2002. Effect of nutrient sources on the fruit yield of tomato (*Lycopersicon esculentum* Mill.). Veg. Sci. 2021;29(2):193-194.
5. Mishra BK, Nandi AK. Effect of micronutrients spray on growth and yield oftomato cv. Utkal Urbashi (BT-12). Orissa J Horti. 2007;35(2):57-60.
6. Biswas M, Sarkar DR, Asif MI, Sikder RK, Mehraj H, Jamaluddin AFM. Nitrogen levels on morphological and yield response of bare tomato-9. J Sci. Tech. Environ. Inform. 2015;1(2):68-74.
7. Ehizogie Joyce Falodun. Response of tomato (*Lycopersicum esculentum* Mill.) varieties to different animal manure 2020. 12. Eliakira Kisetu, Peter Heri. Effects of poultry manure and N2, P2O5, K2O fertilizer on tomato. Asian journal of crop science. 2014;6:165-175. 13.
8. Ewulo BS, Eleduma AF, Sanni KO. Effects of urea and poultry manure on growth and yield attributes of tomato and soil chemical composition. 2016;3(3).
9. Parmar MN, Patel SY, Pandey AK. Effect of organic spray on growth parameters of tomato (*Solanum lycopersicum* L.). International journal of creative research thoughts 2020;8(5).
10. Ranakrishan G, Selvakumar. Effect of biofertilizers on enhancement of growth and yield on tomato (Mill.); c2012.
11. Kanaujia SP, Singh VB. Effect of integrated nutrient management on growth, yield and quality of cabbage (*Brassica oleracea var. capitata*). J Soil. Crop. 2012;22(2):233-239.
12. Sharma KC, Sharma LK. Effect of biofertilizers and N2, P2O5, K2O levels on growth and yield of mid-maturity group of cauliflower under mid hill sub-humid conditions of Himachal Pradesh. J. Hill Agric. 2010;1:19-22.
13. Thilagam VK, Lalitha M, Natesan R. 'Integrated nutrient management for sustaining cauliflower productivity - a review'. Agric. Rev. 2011;32(1):26-31.
14. Singh DP, Maurya BK, Kumari M, Singh RP, Singh DB, Kumar P. Response of integrated nutrient management (INM) on growth and yield attributes in tomato (*Solanum lycopersicum* L.) Ann. Agric. Res. New Series. 2023;44(1):120-126.