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Effect of integrated nutrient management on growth, yield and quality of Brinjal (*Solanum melongena* L.) cv. 'Pant Rituraj'

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Abstract
The present investigation was carried out at Agricultural Research Farm, Department of Horticulture, Suresh Gyan Vihar University, Jagatpura, Jaipur (Rajasthan) to study the effect of integrated nutrient management on growth, yield and quality of Brinjal (*Solanum melongena* L.) cv. 'Pant Rituraj' during *rabi* season of the year 2022-23. The experiment was laid down in Randomized Block Design which consisted 9 treatment combinations *viz;* Control (T_0), 100% RDF (T_1), FYM (20 t/ha) (T_2), Vermicompost (10 t/ha) (T_3), Azospirilium (1250 ml/ha) (T_4), FYM (10 t/ha) + 50% RDF (T_5), Vermicompost (5 t/ha) + 50% RDF (T_6), Azospirilium (625 ml/ha) + 50% RDF (T_7) and FYM (5 t/ha) + Vermicompost (2.5 t/ha) + Azospirilium (312 ml/ha) + 50% RDF (T_8) and treatments were replicated three times. Appraisal of the result indicated that the influence of integrated nutrient management on important parameters like vegetative growth, yield and quality attributes of Brinjal were significantly influenced by integrated nutrient management under local agro-climatic conditions.

The treatment (T_8) had significant effect on various vegetative growth, yield and quality parameters and the highest (79.22 cm) plant height, maximum (91.21) leaves per plant, (7.44) primary and (19.52) secondary branches per plant at 90 days after transplanting (DAT), the maximum (16.79) flowers per plant, (15.50) fruits per plant, (8.30 cm) fruit diameter, (135.76 g) fruit weight, longest (31.44 cm) fruit length were recorded in FYM (5 t/ha) + Vermicompost (2.5 t/ha) + Azospirilium (312 ml/ha) + 50% RDF (T_8). The application of integrated nutrient management significantly influenced the fruit yield and the highest (2.25 kg/plant) and (32.72 t/ha) yield were recorded in FYM (5 t/ha) + Vermicompost (2.5 t/ha) + Azospirilium (312 ml/ha) + 50% RDF (T_8) treatment followed by (2.17 kg/plant) and (30.04 t/ha) yield in Vermicompost (5 t/ha) + 50% RDF (T_6). Whereas, the lowest (1.36 kg/plant) and (18.81 t/ha) yield were recorded in control (T_0). The non-significant effects were observed in application of different levels of integrated nutrient management on number of days to 50% flowering.

Results further indicated that the highest (2.37) benefit: cost ratio was observed in FYM (5 t/ha) + Vermicompost (2.5 t/ha) + Azospirilium (312 ml/ha) + 50% RDF (T8) treatment followed by (2.16) in Vermicompost (5 t/ha) + 50% RDF (T6) and (2.06) in FYM (10 t/ha) + 50% RDF (T_5). Whereas the lowest B:C ratio (1.57) was recorded under control (no use of manures and fertilizers).

Keywords: Nutrient management, yield, quality, *Solanum melongena* L.

Introduction
Brinjal or Eggplant (*Solanum melongena* L.), is one of the most common vegetable crops grown in India. Brinjal is a staple vegetable and its nutritive value varies among varieties. It contains vitamin A and B. It has chromosome number (2n = 24), also known as Eggplant or Aubergine or Guinea squash is one such vegetable crop which belongs to the family *solanaceae*, originated from India. Brinjal is widely cultivated in tropics, sub tropics and warm regions throughout the year. The fruits of Brinjal are used in various ways of cooking, sauting, grilling, backing, frying and even barbecuing by both poor and rich in India. It is having high nutritive value and rich in vitamins and minerals. It is considered as one of the leading and the second major vegetable crops next to tomato (Kiran *et al*., 2010) [8]. India contributes about 28% of the total world production (Daunay *et al*., 2001) [4]. It is highly productive and usually finds a place as "poor man's crop". Purple fruits have higher amino acid content. Brinjal fruits have medicinal properties (Rajan and Markose, 2002) [14]. Some medicinal use of eggplant tissues and extract include treatment of diabetes, asthama, cholera, bronchitis and diarrhea, its fruit and leaves are reported to lower certain levels of blood cholesterol.

Vegetables are being cultivated in an area of 49 million hectares with the production potential of 487 million tonnes in the world. India is the second largest producer of vegetables in the world, accounting for 10 percent of the world's production. The maximum number of vegetable crops are grown in India due to diversity of agro-climatic conditions. In India vegetables occupy nearly 10.23 million hectares with a production of 17.82 million tonnes in the year 2016- 2017 (NHB, 2021) [12]. This accounts for 2.8 percent of total cropped area in the world. In India, Brinjal is cultivated in an area of about 0.728 million hectares with the production of 12.66 million tonnes and the productivity of 17.39 metric tonnes per hectare (NHB, 2021) [12]. However, Brinjal is producing almost all state and West Bengal is the largest producer of Brinjal followed by Maharashtra and Bihar. In Rajasthan, Brinjal cultivated under 5,138 ha area with 23,356 metric tonnes production (DOH, 2021) [5] and Jaipur, Sirohi, Sikar, Tonk producing districts in Rajasthan.

Eggplant is a long duration crop with high yield which removes large quantities of nutrients from the soil. An eggplant crop yielding 60 t ha^{-1} of fruit removes 190 kg N, 10.9 kg P and 128 kg K from soil (Hedge, 1997) [6]. It is understood that the existing production of Brinjal cannot able to meet the ever growing demand of the burgeoning population. Nowadays demand for Brinjal as a vegetable is increasing rapidly among the vegetable consumers in view of its better fruit color, size, and taste. Average productivity of Brinjal crop is quite low and there exists a good scope to improve its average productivity in India to fulfill both domestic and national needs. The productivity of Brinjal can be increased by using several techniques *viz.,* organic farming, integrated nutrient management and good hybrid seeds. Since the nutrient turnover in soil plant system is considerably high in intensive vegetable cultivation, neither the chemical fertilizer nor the organic manure alone can help achieve sustainable production (Khan *et al.,* 2008) [7]. The organic manure stimulate plant growth, improve both soil structure and conditions, restore natural soil fertility and provide protection against drought and some soil borne diseases (Bashan *et al.,* 2004) [2]. On the other hand, application of organics improves the soil physical, chemical and biological properties and has direct impact on moisture retention, root growth and nutrient conservation etc. Many countries have already introduced the organic production system with specific logo to provide individuality to the organic products in commercial trade (Sharma, 2011) [17]. In recent years, importance of combined use of these inorganic fertilizers, organic manures, biofertilizers and micronutrients is being realized particularly in Brinjal to boost up plant growth, productivity and also on seed quality. The application of high input technologies such as chemical fertilizers, pesticides, herbicides improve the production but there is growing concern over the adverse effects of the use of chemicals on human health, soil health, soil productivity and environment quality. Although a lot of research work on the integrated nutrient management in Brinjal has been done in past on earlier released varieties, but information is lacking on newly developed varieties under Jaipur region. It is therefore, highly imperative for testing the newly developed varieties.

Keeping in this view, the present investigation was undertaken with the objective to find out best combination of integrated nutrient management for Brinjal cultivation under plain semi-arid conditions of Jaipur.

Materials and Methods

The present investigation was carried out at Agricultural Research Farm, Department of Horticulture, Suresh Gyan Vihar University, Jagatpura, Jaipur (Rajasthan) to study the effect of different weed management practices on plant growth, yield and quality attributes on tomato under semi-arid condition during *kharif* season of the year 2022-23. The experiment was laid down in Randomized Block Design which consisted 9 treatment combinations *viz;* Control (T_0), 100% RDF (T_1), FYM (20 t/ha) (T_2), Vermicompost (10 t/ha) (T_3), Azospirilium (1250 ml/ha) (T_4), FYM (10 t/ha) + 50% RDF (T_5), Vermicompost (5 t/ha) + 50% RDF (T_6), Azospirilium (625 ml/ha) + 50% RDF (T_7) and FYM (5 t/ha) + Vermicompost (2.5 t/ha) + Azospirilium (312 ml/ha) + 50% RDF (T_8) and treatments were replicated three times. Different intercultural practices like gap filling, irrigating, staking, weeding etc. were performed as per crop requirement. The five plants of each plot were randomly selected and tagged. The data were recorded for various growth, yield and quality parameters in tomato during the course of investigation subjected to statistical analysis by using factorial RBD for analysis of variance (ANOVA) as suggested online opstat software by Sheoran *et al.* (1998) [18].

Results and Discussion

Effect of integrated nutrient management on vegetative growth parameters

The data presented in Table 1 revealed that the application of integrated nutrient management significantly influenced the plant height and the tallest (41.22 cm), (50.22 cm), and (79.22 cm) plant height was recorded in FYM (5 t/ha) + Vermicompost (2.5 t/ha) + Azospirilium (312 ml/ha) + 50% RDF (T_8) treatment at 30, 60 and 90 DAT, respectively. Whereas, the smallest (29.12 cm), (37.45 cm), and (53.45 cm) plant height was recorded in control (T_0) at 30, 60 and 90 DAT, respectively. The maximum (19.52), (43.22), and (91.21) leaves per plant were produced in FYM (5 t/ha) + Vermicompost (2.5 t/ha) + Azospirilium (312 ml/ha) + 50% RDF (T_8) treatment at 30, 60 and 90 DAT, respectively. Whereas, the minimum (13.67), (31.52), and (74.55) leaves per plant were recorded in control (T_0) at 30, 60, and 90 DAT, respectively. The Vermicompost (5 t/ha) + 50% RDF (T_6), Vermicompost (10 t/ha) (T_3), 100% RDF (T_1) and FYM (10 t/ha) + 50% RDF (T_5) also had significant effect over control. Treatment $T_{1,}$ $T_{3,}$ T_5 and T_6 were observed at par with treatment $T_{8.}$ It might be due to the availability more nitrogenous compounds to the plant from organic and inorganic sources as well as bio-fertilizers which increase the foliage of the plant and thereby increases in the photosynthesis rate resulting the increase in height of the plants. It is also due to the cell elongation by the presence of nitrogenous compounds as it is the basic functions. These results are accordance to the findings of Patil *et al.* (2004) [3]; Chumei *et al.* (2014) [3] and Manickam *et al.* (2021) [111].

It is apparent from the data presented in Table 1 revealed that the maximum (7.44) primary and (19.52) secondary branches per plant were recorded in FYM (5 t/ha) + Vermicompost (2.5 t/ha) + Azospirilium (312 ml/ha) + 50% RDF (T_8) treatment followed by (6.67) primary and (17.87) secondary branches per plant in Vermicompost (5 t/ha) + 50% RDF (T_6) and 100% RDF (T_1) at 90 DAT. Treatment T_6 were observed at par with treatment T_8 and had significant effect on production of number of primary and secondary branches per plant.

Whereas, the minimum (4.20) primary and (13.07) secondary branches per plant were recorded in control (T_0) at 90 DAT. The higher availability of nutrients especially nitrogen in the initial stages helped to acquire definite advantages over other treatments in respect of growth. Better partitioned of photosynthesis from source to sink might have led to increase the number of primary and secondary branches. Role of NPK, organic and biofertilizer in a balanced combination is enhancing the number of branches has been well documented by Kumaran *et al.* (1998) [10]; Anburani and Manivannan (2002) [1] and Reddy *et al.* (2002) [16]. Patil *et al.* (2004) [13] and Manickam *et al.* (2021) [11] also reported the similar results. A non-significant effects were observed in application of different levels of integrated nutrient management on number of days to 50% flowering.

Table 1: Effect of integrated nutrient management on vegetative growth parameters.

Treatments	Plant height (cm)			Number of leaves per plant			No. of branches per plant		No. of days to 50% flowering
	30 DAT	60 DAT	90 DAT	30 DAT	60 DAT	90 DAT	Primary	Secondary	
Control (no use of manures and fertilizer) (T_0)	29.12	37.45	53.45	13.67	31.52	74.55	4.20	13.07	41.12
100% RDF (T_1)	37.80	46.13	63.83	17.75	37.81	85.40	6.67	16.67	45.13
FYM (20 t/ha) (T_2)	30.58	39.58	57.58	14.38	34.97	80.08	5.80	14.40	43.25
Vermicompost (10 t/ha) (T_3)	32.50	42.17	62.17	15.27	36.14	86.08	6.13	15.60	44.50
Azospirilium (1250 ml/ha) (T_4)	28.51	36.84	54.51	13.40	33.64	78.19	5.20	14.53	43.84
FYM (10 t/ha) + 50% RDF (T_5)	33.61	41.94	59.28	15.80	39.96	82.80	6.20	15.93	45.14
Vermicompost (5 t/ha) + 50% RDF (T_6)	35.32	43.99	64.32	16.59	42.31	87.48	6.67	17.87	44.66
Azospirilium (625 ml/ha) + 50% RDF (T_7)	31.19	39.52	58.52	14.66	34.26	81.68	5.80	15.40	43.19
FYM (5 t/ha) + Vermicompost (2.5 t/ha) + Azospirilium (312 ml/ha) + 50% RDF (T_8)	41.22	50.22	79.22	19.52	43.22	91.21	7.44	19.52	44.89
S.Em+	2.25	2.04	2.45	1.00	1.83	2.81	0.34	0.63	1.33
C.D. (p=0.05)	6.80	6.17	7.40	3.03	5.52	8.50	1.04	1.91	NS
CV (%)	11.68	8.41	6.90	11.07	8.53	5.86	9.87	6.88	5.25

Table 2: Effect of integrated nutrient management on fruit quality and yield parameters

Treatments	No. of flowers per plant	No. of fruits per plant	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	Yield			B:C Ratio
						(kg/plant)	(kg/plot)	(t/ha)	
Control (no use of manures and fertilizer) (T_0)	8.26	7.62	18.34	4.44	82.10	1.36	19.53	18.81	1.57
100% RDF (T_1)	11.76	10.86	30.30	6.65	122.54	2.03	29.06	28.00	2.12
FYM (20 t/ha) (T_2)	10.71	9.89	28.63	6.29	115.42	1.91	27.49	26.47	1.89
Vermicompost (10 t/ha) (T_3)	12.21	11.28	29.62	6.82	117.62	1.95	27.90	26.88	1.83
Azospirilium (1250 ml/ha) (T_4)	10.29	9.50	28.43	5.52	101.46	1.68	24.17	23.28	1.93
FYM (10 t/ha) + 50% RDF (T_5)	14.21	13.12	30.70	7.78	122.84	2.04	29.13	28.07	2.06
Vermicompost (5 t/ha) + 50% RDF (T_6)	14.65	13.52	31.02	7.76	131.06	2.17	31.19	30.04	2.16
Azospirilium (625 ml/ha) + 50% RDF (T_7)	13.17	12.17	29.72	5.64	104.55	1.73	24.79	23.89	1.89
FYM (5 t/ha) + Vermicompost (2.5 t/ha) + Azospirilium (312 ml/ha) + 50% RDF (T_8)	16.79	15.50	31.44	8.30	135.76	2.25	33.98	32.72	2.37
S.Em+	0.29	0.28	1.52	0.62	5.70	0.10	1.30	1.28	
C.D. (p=0.05)	0.89	0.85	4.59	1.88	17.24	0.29	3.93	3.86	
CV (%)	4.10	4.23	9.15	16.37	8.60	8.65	8.20	8.37	

Effect of integrated nutrient management on fruit quality parameters

It is evident from data presented in Table 1 revealed that the integrated nutrient management had significant difference on number of flowers and fruits per plant. The maximum (16.79) flowers and (15.50) fruits per plant were recorded in FYM (5 t/ha) + Vermicompost (2.5 t/ha) + Azospirilium (312 ml/ha) + 50% RDF (T_8) treatment. Whereas, the minimum (8.26) flowers and (7.62) fruits per plant were recorded in control (T_0). Hence, the combination of FYM + Vermicompost + Azospirilium + 50% RDF performed significantly superior over control and other treatments. The present findings are in agreement with the findings of Kumaran *et al.* (1998) [10]; Kumar and Sharma (2006) [9] and Manickam *et al.* (2021) [11].

The maximum (31.44 cm) fruit length, (8.30 cm) fruit diameter and (135.76 g) fruit weight were recorded in FYM (5 t/ha) + Vermicompost (2.5 t/ha) + Azospirilium (312 ml/ha) + 50% RDF (T_8) treatment followed by (31.02 cm) in Vermicompost (5 t/ha) + 50% RDF (T_6), (30.70 cm) in FYM (10 t/ha) + 50% RDF (T_5), (30.30 cm) in 100% RDF (T_1), (29.62 cm) in Vermicompost (10 t/ha) (T_3), (28.63 cm) in FYM (20 t/ha) (T_2) and (28.43 cm) in Azospirilium (1250 ml/ha) (T_4), respectively. Treatments T_1 to T_7 were observed at par with treatment T_8 and showed significant effect on fruit length. Whereas, the minimum (18.34 cm) fruit length, (4.44 cm) fruit diameter and (82.10 g) fruit weight were recorded in control (T_0) in no use manures and fertilizers. The possible reason for increase in fruit weight is might be due to better inorganic nitrogen utilization in the presence of organic and biofertilizers, enhanced biological nitrogen fixation, better development of root system and possible synthesis of plant growth hormones. This might be due to increasing fruit length and fruit diameter that ultimately increases the fruit weight. Kumaran *et al.* (1998) [10]; Singh and Asrey (2005) [19]; Raut *et al.* (2003) [15] and Chumei *et al.* (2014) [3] also agreed with the present findings.

Effect of integrated nutrient management on yield parameters

Yield (kg/plant and t/ha)

It is evident from the data presented in Table 2 revealed that the significant difference was observed among different combinations of integrated nutrient management applied on fruit yield per plant/plot/hectare. The highest (2.25 kg/plant), (33.98 kg/plot) and (32.72 t/ha) yield were recorded in FYM (5 t/ha) + Vermicompost (2.5 t/ha) + Azospirilium (312 ml/ha) + 50% RDF (T_8) treatment followed by (2.17 kg), (2.04 kg) and (2.03 kg) yield per plant in Vermicompost (5 t/ha) + 50% RDF (T_6), FYM (10 t/ha) + 50% RDF (T_5) and 100% RDF (T_1), respectively. Treatment $T_{1,}$ T_5 and T_6 were observed at par with treatment T_8 and showed significantly superior results over control and other treatments. Whereas, the minimum (1.36 kg/plant), (19.53 kg/plot) and (18.81 t/ha) yield were recorded in control (T_0). The higher availability of nutrients especially nitrogen in the initial stages helped to acquire definite advantages over other treatments in respect of growth. Better partitioned of photosynthesis from source to sink might have led to higher yield attributes, which finally resulted in to higher yield attributing characters and yield of Brinjal. Role of NPK, organic and biofertilizer in a balanced combination is enhancing yield attributes and yield of Brinjal. The increase in the yield is also might be due to the additional nutrient supply through organics, inorganic and biofertilizers as well as improvement in the physical and biological properties of soil. The present findings are in close conformity with the findings of Reddy *et al*. (2002) [16]; Patil *et al*. (2004) [13] and Waskel *et al.* (2019) [21]. Chumei *et al.* (2014) [3] and Manickam *et al.* (2021) [11] also reported the similar results.

The highest (2.37) benefit: cost ratio was recorded in in FYM (5 t/ha) + Vermicompost (2.5 t/ha) + Azospirilium (312 ml/ha) + 50% RDF (T_8) treatment followed by (2.16) in Vermicompost (5 t/ha) + 50% RDF (T_6) and (2.06) in FYM (10 t/ha) + 50% RDF (T_5). Chumei *et al.* (2014) [3] and Manickam *et al.* (2021) [11] also reported the similar findings.

References

1. Anburani A, Manivannan K. Effect of integrated nutrient management on growth in Brinjal (*Solanum melongena* L.) cv. Annamalai. South Indian Horti. 2002;50(4-6):377-386.
2. Bashan Y, Holguinm G, De-Bashanl LE. Azospiriilum-plant relationships: Physiological, molecular, agricultural and environmental advances. Canadian Journal of Microbiology. 2004;50:521-577.
3. Chumei, Kanaujia SP, Singh VB. Integrated nutrient management in Brinjal. Progressive Agriculture. 2014;13(1):106-113.
4. Daunay MC, Jullian E, Dauphin F. Management of eggplant and pepper genetic resources in Europe: networks are emerging. Proceedings of 11th EUCAR-PIA meeting on genetics and breeding of Capsicum and eggplant, 9-13, April 2001, Antalya, Turkey, Adana, Turkey; c2001. p. 1-5.
5. Department of Horticulture. Area and production of crops; c2021. https://agriculture.rajasthan.gov.in/content/agriculture/en/Directorate-of-Horticulture-dep/area-production.html
6. Hedge DM. Nutrient requirement of Solanaceous vegetable crops. Ext. Bull. 441. Food fertilizer technology center. Asian and Pacific Council, Berkeley CA; 1997.
7. Khan MS, Shil NC, Noor S. Integrated Nutrient Management for Sustainable Yield of Major Vegetable Crops in Bangladesh. Bangladesh Journal of Agriculture and Environment. 2008;4:81-94.
8. Kiran J, Vyakarana BS, Raikar SD, Ravikumar GH, Deshpande VK. Seed yield and quality of Brinjal as influenced by crop nutrition. Indian Journal of Agricultural Research. 2010;44(1):1-7.
9. Kumar S, Sharma SK. Response of tomato seed to different bioinoculants at different levels of nitrogen, phosphorus and potassium. Envi. and Ecol. 2006;24S(2):327-330.
10. Kumaran SS, Natarajan S, Thamburaj S. Effect of organic and inorganic fertilizers on growth, yield and quality of tomato. South Indian Hort. 1998;46(3-6):203-205.
11. Manickam S, Suganthy M, Ganesh R. Influence of Different Nutrient Management Practices on Growth, Yield, Quality and Economics of Brinjal (*Solanum melongena* L), Madras Agricultural Journal; c2021. https://doi.org/10.29321/MAJ.10.000594
12. National Horticulture Board. Annual Report 2021-22; c2021. p. 60.
13. Patil MB, Mohammed RG, Ghadge PM. Effect of organic and inorganic fertilizers on growth, yield and quality of tomato. J Maharashtra Agric. Univ. 2004;29(2):124-127.
14. Rajan S, Markose BL. Propagation of Horticultural Crops. Horticultural Science Series. 2002;6:94.
15. Raut RL, Naidu AK, Jain PK, Rajwade VB. Influence of organic and chemical sources of nutrients on the yield, fruit quality and storage of tomato in Madhya Pradesh, India. JNKVV Res. J. 2003;37(1):30-33.
16. Reddy CS, Narayanamma M, Chiranjeevi C, Reddy IP. Effect of nutrient sources on the fruit yield of tomato (*Lycopersicon esculentum* Mill.). Veg. Sci. 2002;29(2):193-194.
17. Sharma JP. Organic Vegetables: production and protection technology In: quality seed production of vegetable crops. (Ed. J. P. Sharma). Kalyani Publishers New Delhi. 2011;1:123-143.
18. Sheoran OP, Tonk DS, Kaushik LS, Hasija RC, Pannu RS. Statistical Software Package for Agricultural Research Workers. Recent Advances in information theory, Statistics & Computer Applications by D.S. Hooda & R.C. Hasija, Department of Mathematics Statistics, CCS HAU, Hisar; c1998. p. 139-143.
19. Singh R, Asrey R. Integrated nutrient management in tomato (*Solanum lycopersicum* L.) under semi-arid region of Punjab. Veg. Sci. 2005;32(2):194-195.
20. Singh VH, Malik CVS, Singh BP. Influence of FYM and phosphorus application on grain yield and economics of cowpea. Crop Res. 2005;29(1):87-90.
21. Waskel S, Jatav SK, Singh SS. Effect of Integrated Nutrient Management on Growth and Yield attributes of Brinjal. International Journal of Current Microbiology and Applied Sciences. 2019;8(11):1849-1853.