



P-ISSN: 2349-8528
 E-ISSN: 2321-4902
 IJCS 2019; 7(4): 1640-1642
 © 2019 IJCS
 Received: 16-05-2019
 Accepted: 18-06-2019

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Effect of integrated nutrient management on growth, yield and economics of brinjal (*Solanum melongena* L.) cv. GABH-3

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Abstract

An experiment was conducted on “Effect of integrated nutrient management on growth, yield and economics of brinjal (*Solanum melongena* L.) cv. GABH-3” at Horticultural Research Farm, Department of Horticulture, B. A. College of Agriculture, Anand Agricultural University, Anand during *Kharif-Rabi* season of the year 2018. The experiment was laid out in Randomized Block Design with 3 replications and 7 treatments *viz.*, T₁ – Control (RDF = 200:50:50 NPK kg/ha), T₂ - 75% RDF through inorganic fertilizers + 25% through FYM, T₃ - 75% RDF through inorganic fertilizers + 25% through vermicompost, T₄ - 50% RDF through inorganic fertilizers + 50% through FYM, T₅ - 50% RDF through inorganic fertilizers + 50% through vermicompost, T₆ - 75% RDF through inorganic fertilizers + 25% through FYM + NPK consortium and T₇ - 75% RDF through inorganic fertilizers + 25% through vermicompost + NPK consortium. Growth parameters *viz.*, plant height and number of branches per plant at 120 days after transplanting were recorded maximum (87.78 cm and 24.94) in treatment T₇ which, was at par with T₆ for plant height and treatments T₅ and T₆ for number of branches per plant however, integrated nutrient management did not manifest its effect on days to flower initiation. The maximum fruit length (23.01 cm), fruit diameter (4.33 cm) and fruit weight (149.21 g) was recorded with treatment T₅ which remained at par with treatment T₆ and T₇ for fruit length and with treatment T₆ for fruit diameter and fruit weight. Treatment T₇ recorded significantly, maximum number of fruits per plant (39.86), fruit yield per plant (5.47 kg) and fruit yield per hectare (40.76 t) which remained at par with treatment T₆ (35.21, 5.43 kg and 39.92 t, respectively). Economic assessment of different treatments revealed that maximum net realization of ₹ 338863/ha with benefit cost ratio (5.62) was observed in treatment T₆ (75% RDF through inorganic fertilizers + 25% through FYM + NPK consortium).

Keywords: Brinjal, GABH-3, NPK consortium, vermicompost, growth and yield

1. Introduction

Brinjal (*Solanum melongena* L.) is one of the most common and popular vegetable crop grown in India and occupying a pride of place in every food of all people. It is also known as eggplant and baingan. India is the second largest producer of brinjal in the world after China. Average productivity of brinjal is very low in our country and there exist a good scope to improve its average productivity to fulfil both domestic and national needs (Thingujam *et al.*, 2016)^[8].

Brinjal crop demand good nutrition and respond well to fertilization. It is necessary to apply the optimum doses of fertilizers to obtain better growth and higher yield. Excessive use of chemical fertilizers has badly affected the soil health and productivity and is also adding high economic load. Only one source of nutrients like chemical fertilizers, organic manures and biofertilizers cannot improve the production, productivity and soil health so in order to get high returns and to maintain production sustainability integrated nutrient management is advisable for profitable production. In the present experiment new brinjal hybrid cv. GABH-3 was selected for investigation which was released by Main Vegetable Research Station, AAU, Anand, Gujarat in 2014. There is no any research work on requirement of nutrient for this variety. Hence, the present study was undertaken with the objective to know the effect of integrated nutrient management on growth, yield and economics of brinjal.

2. Materials and Methods

An experiment was conducted at Horticultural Research Farm, Department of Horticulture, B.A. College of Agriculture, Anand Agricultural University, Anand, Gujarat, during *Kharif*

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–Rabi season of the year 2018 on brinjal cv. GABH-3 with the objective to study the effect of integrated nutrient management on growth, yield and economics of brinjal. The soil of the experimental site was sandy loam, low in organic carbon (0.25%), available nitrogen (220 kg/ha) and high in available P₂O₅ (68.02 kg/ha) and K₂O (280.85 kg/ha). The experiment was laid out in Randomized Block Design with 3 replications and 7 treatments viz., T₁ – Control (RDF = 200:50:50 NPK kg/ha), T₂ - 75% RDF through inorganic fertilizers + 25% through FYM, T₃ - 75% RDF through inorganic fertilizers + 25% through vermicompost, T₄ - 50% RDF through inorganic fertilizers + 50% through FYM, T₅ - 50% RDF through inorganic fertilizers + 50% through vermicompost, T₆ - 75% RDF through inorganic fertilizers + 25% through FYM + NPK consortium and T₇ - 75% RDF through inorganic fertilizers + 25% through vermicompost + NPK consortium.

Blanket application of FYM @ 10 t/ha was applied 1 month before transplanting. Organic manures (FYM and vermicompost) according to treatment combination were applied at the time of field preparation. Recommended full dose of phosphorous, potassium and half dose of nitrogen was applied as a basal dose and remaining half dose of nitrogen was applied in two splits, 1st at 30 days after transplanting and next at 60 days after transplanting and bio NPK was provided as seedling dip treatment (@ 5 ml/l for 15-20 minutes) at the time of transplanting. Healthy and uniform 4 weeks old seedlings were transplanted at a spacing of 90 x 75 cm in the field on 10th August 2018.

Observations of plant height and number of branches per plant were recorded at 120 days after transplanting. Yield parameters viz., fruit length, fruit weight, fruit diameter, number of fruits per plant and fruit yield/plant were recorded from five tagged plants. Days to flower initiation were recorded when first flower noticed on any plant in the net plot and fruit yield per hectare was calculated by recording total fruit yield by weight in all the pickings from the all the plants in net plots and then calibrated to tonnes per hectare. The benefit cost ratio of different treatments were calculated on basis of cost of cultivation, gross and net return. Selling price of brinjal was ₹ 10/kg.

3. Results and Discussion

Integrated nutrient management practices exerted significant effect on growth parameters like plant height (cm) and number of branches/plant at 120 days after transplanting (Table 1). Significantly, maximum plant height (87.78 cm)

and number of branches per plant (24.94) were recorded in treatment T₇ (75% RDF through inorganic fertilizers + 25% through vermicompost + NPK consortium) which, remained at par with treatment T₆ (86.23 cm) for plant height and with treatments T₅ and T₆ (24.24 and 24.15) for number of branches per plant at 120 days after transplanting. The increase in growth parameters such as plant height, and number of branches may be due to the combined application of organic, inorganic and biofertilizers which provided continuous supply of nutrients along with production of phytohormones which enhanced higher carbohydrates production. These results are in accordance with the findings of Chatterjee *et al.*, (2014)^[2] in tomato and Vasuniya (2012)^[9] in chilly and Kumar (2018)^[5] in brinjal.

Integrated nutrient management showed significant effect on all the yield parameters except for days to flower initiation. Significantly, maximum fruit length (23.01 cm), fruit diameter (4.33 cm) and fruit weight (149.21 g) was recorded in treatment T₅ (50% RDF through inorganic fertilizers + 50% through vermicompost) which remained at par with T₆ (22.32 cm) and T₇ (21.57 cm) for fruit length and with treatment T₆ for fruit diameter and fruit weight (4.25 cm and 148.48 g). Increase in yield attributes such as fruit length, fruit weight and fruit diameter might be due to accelerated mobility of photosynthates from the source to the sink as influenced by the growth hormone released or synthesized due to the organic sources of fertilizers and balanced nutrient availability. Similar results were reported by Suvarna (2007)^[7] and Patidar (2017)^[6] in brinjal, Dnyaneshwar (2015)^[4], Chauhan *et al.* (2017)^[3] and Vasuniya (2012)^[9] in chilly and Chanda (2011)^[1] in tomato.

Maximum number of fruits per plant (39.86), fruit yield per plant (5.47 kg) and fruit yield per hectare (40.76 t) was observed in treatment T₇ (75% RDF through inorganic fertilizers + 25% through vermicompost + NPK consortium) which, remained statistically at par with treatment T₆ (35.21, 5.43 kg and 39.92 t, respectively). This might be due to positive effects of inorganic fertilizers with organic manures and biofertilizers which could have induced higher vegetative growth ultimately helped in the synthesis of greater amount of food material which were later translocated into the developing fruits, resulting in an increase in number of fruits and ultimately yield. The results of the present investigation are in conformity with the findings of Kumar (2018)^[5] in brinjal, Chatterjee *et al.*, (2014)^[2] in tomato, fruit yield per plant and fruit yield per hectare and Vasuniya (2012)^[9] in chilly.

Table 1: Effect of integrated nutrient management on growth and yield of brinjal

S. No	Plant height (cm) 120 DAT	No. of branches per plant 120 DAT	Days to flower initiation	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	No. of fruits per plant	Fruit yield per plant (kg)	Fruit yield per hectare (t)
T ₁	78.72	22.06	36.33	20.98	3.82	137.67	29.78	4.04	33.64
T ₂	75.84	21.11	35.67	19.75	3.88	136.41	33.69	4.74	32.68
T ₃	81.03	22.28	36.00	20.63	4.02	139.03	30.99	4.68	33.27
T ₄	80.75	22.30	36.00	21.08	3.97	140.51	33.98	4.80	36.79
T ₅	79.97	24.24	35.00	23.01	4.33	149.21	32.70	4.84	37.13
T ₆	86.23	24.15	35.33	22.32	4.25	148.48	35.21	5.43	39.92
T ₇	87.78	24.94	35.00	21.57	4.03	142.84	39.86	5.47	40.76
S.Em	2.15	0.82	0.71	0.62	0.09	1.68	1.54	0.20	1.04
C.D. at 5%	6.64	2.51	NS	1.92	0.29	5.18	4.73	0.62	3.21
C.V. (%)	4.58	6.13	3.43	5.05	4.00	2.05	7.88	7.15	4.98

4. Economics

The expenditure and return from different treatments for brinjal cultivation presented in table 2. Maximum net

realization of ₹ 3,38,863 per hectare with BCR of 5.62 was observed in treatment T₆ (75% RDF through inorganic fertilizers + 25% through FYM + NPK consortium).

Table 2: Effect of integrated nutrient management on economics

Treatment	Fruit yield (t/ha)	Gross realization (₹/ha)	Total cost of production (₹/ha)	Net realization (₹/ha)	BCR
T ₁	33.64	336400	54906	281494	5.13
T ₂	32.68	326800	60229	266571	4.43
T ₃	33.27	332700	75705	256995	3.40
T ₄	36.79	367900	65556	302344	4.61
T ₅	37.13	371300	96508	274792	2.85
T ₆	39.92	399200	60337	338863	5.62
T ₇	40.76	407600	75813	331787	4.38

5. Conclusion

On the basis of results obtained from research experiment, it can be concluded that in brinjal cv. GABH-3 application of 75% RDF (150: 37.5: 37.5 NPK kg/ha) through inorganic fertilizers + 25% through FYM (50: 12.5: 12.5 NPK kg/ha) + NPK consortium was found most effective in increasing plant height, number of branches per plant, fruit length, fruit diameter, fruit weight, number of fruits per plant and fruit yield with maximum net realization and Benefit cost ratio.

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