



Effect of organic manures and inorganic fertilizers on growth, yield and quality of brinjal (*Solanum melongena* L.) cv. PANT RITURAJ

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Abstract : An experiment was conducted at Horticultural Research Farm of the of Department of Applied Plant Science (Horticulture), Babasaheb Bhimrao Ambedkar University, Lucknow from autumn - winter to spring season 2012 - 2013 with the objective to study the effect of different doses of organic manures and inorganic fertilizers on growth, yield and quality of brinjal and to ascertain the best treatment of organic manures and inorganic fertilizers for growth, yield and quality of brinjal cv. Pant Rituraj. The experiment consisted of different doses of FYM (100, 75, 50 and 25 %), Vermicompost (100, 75, 50 and 25 %) and Neem cake (100, 75, 50 and 25 %) along with recommended dose of fertilizer. The experiment was arranged in Randomized Block Design and the treatments were replicated thrice. The result showed that maximum plant height (47.33 cm), number of branches (9.22), number of leaves (103.8 per plant) was recorded under 25% RDF+ 75%Neemcake and the maximum number of flowers (16.77) was noted under 75% RDF+ 25% vermicompost while, all the growth parameters were found minimum under control. The yield attributing parameters were recorded maximum in terms of fruit length (32.333 cm), fruit diameter (8.88 cm), fruit weight (123.111g), number of fruits per plant (16.66), fruit yield per plant (2.05 kg), fruit yield per plot (32.80 kg) and fruit yield per hectare (75.93 tonnes) under 25% RDF+ 75% Neem cake while, all the yield and yield attributing parameters were found minimum under control. The quality parameters were recorded maximum viz. total soluble solids (T.S.S) (7.000 °Brix), total sugars (2.627 g), reducing sugar (0.470 g) and Vitamin- C (22.77 mg/ 100g) under 25% RDF+ 75% Neem cake and all the quality attributing parameters were found inferior under control.

Key Words : Farm yard manure, Vermicompost, Neem cake, Brinjal, Fruit yield, Quality

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INTRODUCTION

Among the vegetable crops, brinjal (*Solanum melongena* L.) is an important herb with erect or semi-spreading habit belongs to family solanaceae and having chromosome number ($2n=2x=24$). It is an important solanaceous crop of sub-tropics and tropics. It is the versatile crop adapted to different agro- climatic regions. In our country, brinjal cultivation shares the total production of about 8% with an annual productivity of 17.2 million tonnes per hectare. The global area has been estimated at 612 million hectares with total production of 10565 million tonnes

(Anonymous, 2010). In India major brinjal producing states are West Bengal (with leading production of 26.5%), Orissa, Bihar, Gujarat, Maharashtra, Karnataka, Uttar Pradesh and Andhra Pradesh.

Brinjal crop is an important indispensable item in every kitchen as vegetable, hence commands on extensive internal market. Nandkarni (1927) has reported the medicinal uses of eggplant; the fruit is employed as cure for "toothache". It has also been recommended as an excellent remedy for those suffering from liver complaints (Shukla and Naik, 1993). The green leaves of plant are the main source of the supply of anti-ascorbic vitamin- C. It is used in Ayurveda as appetizer,

aphrodisiac and “cardiotonic” and fruit exhibits laxative property and provides relief from inflammation. The unripe fruit is primarily used as a cooked vegetable. It has got much potential as raw material in pickle making and dehydration industries (Singh *et al.*, 1963). White brinjal is good for diabetic patients. It is a well documented fact that increased dependence on agro-chemicals including fertilizer has led to several ill effects on the human health, so one should aware for eco-friendly organic products. Sustainable and eco-friendly agriculture which minimizes the use of harmful energy intensive inputs is available through the use of organic and biofertilizers. The organic nutrition for vegetables is especially important as they provide quality foods, which are very important for providing health security to people. Since the vegetables are mostly consumed as fresh or partially cooked, they should be devoid of residual effect of chemical fertilizers. Increase in the yield of chilli, okra, tomato and brinjal by application of organic manure was reported by Gaur *et al.*(1984).

Organic farming is a production system which avoids or largely excludes the use of synthetically produced fertilizer, pesticides, growth regulators and livestock feed additives to the maximum extent possible organic farming system rely upon crop rotation, crop residues, animal manures, legumes, green manures, off farming organic waste, mineral bearing rocks and biofertilizers to maintain soil productivity, tillth and to supply plant nutrients and biological means to control insects, weeds and diseases.

Generally, solanaceous vegetables require large quantity of major nutrients like nitrogen, phosphorus and potassium. In addition to secondary nutrients such as calcium and sulphur for better growth of fruit and seed yield. The cost of chemical fertilizer has been enormously increasing to an extent that they are out of reach of the small farmers. The use of organic manure and biofertilizer in such situation is a practically paying proposal. P-solublizers are biofertilizers which solublize phosphorus in soil and make it available to plant while *Azospirillum*, a heterotrophic nitrogen fixing organism has been reported to be beneficial and economical on several crops. They improve growth, yield as well as quality of fruits. In view of these beneficial effects present study was conducted to assess the efficiency of organic materials with inorganic fertilizers on growth, yield and quality of brinjal cv. Pant Rituraj.

MATERIAL AND METHODS

The experiment was laid out during the autumn - winter to spring season of 2012-13 at the Horticulture Research Farm, Department of Applied Plant Science (Horticulture), Babasaheb Bhimrao Ambedkar University, Lucknow (Uttar Pradesh), which is subjected to the extreme of weather conditions. Geographically this area falls under humid subtropical climate and located between 18.6 and 20.2 North

latitude and 76 and 78⁰ East longitude on an elevation of about 111 meters from sea level in the gangetic alluvial plains of eastern Uttar Pradesh.

One variety of brinjal *viz.*, Pant Rituraj was selected for the present study. Seeds were collected from the Govind Ballabh Pant University of Agriculture and Technology (G.B.P.U.A. & T.), Pantnagar, Uttarakhand. The parentage of Pant Rituraj is T₃ X PPC bearing medium maturity, having oval round fruit shape, violet-purple fruit colour and 35 (tonnes / ha) average yield. The experiment was laid out in Randomized Block Design (RBD) with three replications. The experiment comprised 14 treatments with various doses of Inorganic fertilizers, FYM, Vermicompost, Neemcake applied alone and in combinations.

The land of the experimental site was irrigated prior to sowing for optimum moisture level. Seedlings were transplanted at a spacing of 60 x 45 cm and thus in a plot, 16 seedlings of specific cultivar were accommodated. Immediately after transplanting a light watering with watering can was given to avoid transplanting shock. First light irrigation was given one day after transplanting and subsequent irrigations were given as per need of the crop. First hand weeding was done at 10 days after transplanting to keep away the weeds. The second weeding was done 30 days after the first weeding followed by hoeing. The required weight of the organic manures and inorganic fertilizers was taken using electronic sensitive balance and applied manually at the time of field preparation. Data were collected from randomly selected plants. The collected data were collected for average height of plant (cm), number of branches per plant, number of leaves per plant, number of flowers per plant, fruit length (cm), fruit diameter (cm), fruit weight (g), number of fruits per plant, fruit yield per plant (kg), fruit yield per plot (kg), fruit yield per hectare (tone), Total Soluble Solids (T.S.S.), total sugars (%), reducing sugar (%) and vitamin C (mg/100g). The data was analyzed using analysis of variance (ANOVA) under RBD following the procedure as stated by Panse and Sukhatme (1967).

RESULTS AND DISCUSSION

A close review of the data presented in Table 1 revealed that the treatments of RDF + Neem cake, RDF + Vermicompost and RDF + FYM were found to be statistically significant in increasing plant height. Maximum plant height of 37.33 cm was recorded at 25% of RDF + Neem Cake 75% and RDF + Vermicompost (100% each). Minimum plant height (10.89 cm) was recorded under control without any manuring. Similarly maximum number of branches per plant (9.22) was observed under RDF + Neem cake at (25% + 75%) which was significantly superior over all other treatments and as well as control that showed minimum number of branches per plant (1.33). The number of leaves per plant was significantly affected by various treatments of

organic manure alone and in combination with inorganic fertilizers showed in Table 1. At the time of maturity of the plant under RDF + Neem cake (25% + 75%) showed the maximum number of leaves per plant (103.8) and were significantly superior over other treatment. Number of flowers per plant of brinjal showed statistically significant variation among different organic manures and inorganic fertilizers have been showed in Table 1. The maximum number of flowers per plant of (16.77) was recorded from RDF+ Vermicompost applied at 75% + 25% while the minimum number of flowers/plant (6.11) was recorded from control. This might be due to the fact that vermicompost provided better nutrition as it contains all the major nutrients

besides micro-nutrients, it also has some beneficial micro-organisms which results into improved chemical, physical and biological properties of soil. The effect of different treatments on the number of fruits per plant of brinjal was found and significant showed in Table 2. However, the maximum number of fruits (16.67) was observed under RDF+ Neem Cake at 25% + 75% which significant superior was over all other treatments. The Table 2 showed that maximum fruit length and diameter (32.333 and 8.889 cm, respectively) was recorded for the fruits obtained from the plants treated with RDF + Neem Cake (25%+75%). The effect of different treatments of organic manure alone and in combination with RDF (inorganic fertilizers) was found

Table 1 : Effect of different treatment combination of organic manures along with inorganic fertilizers on growth of brinjal

Sr. No.	Treatments	Plant height (cm)	Number of branches per plant	Number of leaves per plant	Number of flowers per plant
1.	Farm Yard Manure (FYM) (100%)	28.889	2.667	38.556	8.267
2.	Vermi-compost (100%)	30.889	3.000	34.222	9.267
3.	Neem Cake (100%)	32.667	3.667	32.444	9.667
4.	Recommended Dose of Fertilizers(RDF)(100%)	32.000	2.556	48.000	9.600
5.	RDF+ FYM (25%+75%)	27.556	3.333	31.222	12.222
6.	RDF + FYM (50%+50%)	41.333	5.000	71.667	11.667
7.	RDF + FYM (75%+25%)	32.556	2.889	43.222	11.111
8.	RDF+Vermi-compost (25%+75%)	29.111	3.667	52.333	14.556
9.	RDF +Vermicompost(50%+50%)	44.556	6.444	66.333	14.222
10.	RDF+ Vermicompost(75%+25%)	31.333	3.111	33.111	16.778
11.	RDF+ Neem Cake (25%+75%)	47.333	9.222	103.778	16.667
12.	RDF+ Neem Cake (50%+50%)	31.444	3.111	25.333	12.122
13.	RDF+Neem Cake (75%+25%)	26.556	3.444	40.667	10.533
14.	Control	20.889	1.333	10.222	6.111
	S.E. ±	1.765	0.430	6.527	0.927
	C.D. (P=0.05)	5.130	1.249	18.975	2.694

Table 2 : Effect of different treatment combinations of organic manures along with inorganic fertilizers on yield of brinjal

Sr. No.	Treatments	Number of fruits per plant	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	Fruit yield per plant(kg)	Fruit yield per plot(kg)	Fruit yield per ha (tonnes)
1.	Farm Yard Manure (FYM) (100%)	8.267	30.111	4.400	131.778	1.09	17.43	40.35
2.	Vermi-compost (100%)	9.267	21.667	5.356	122.611	1.14	18.18	42.08
3.	Neem cake (100%)	8.578	25.667	6.856	97.778	0.84	13.42	31.06
4.	Recommended dose of fertilizers (RDF) (100%)	9.600	28.889	6.267	81.889	0.79	12.58	29.12
5.	RDF+ FYM (25%+75%)	10.478	18.222	5.522	135.889	1.42	22.78	52.73
6.	RDF + FYM (50%+50%)	11.667	31.111	7.752	114.667	1.33	21.28	49.26
7.	RDF + FYM (75%+25%)	7.644	15.667	5.033	112.333	0.86	13.74	31.80
8.	RDF+Vermi-compost (25%+75%)	11.222	15.556	4.511	92.55	1.04	16.62	38.47
9.	RDF +Vermicompost (50%+50%)	14.222	31.667	7.889	117.444	1.67	26.72	61.86
10.	RDF+ Vermicompost (75%+25%)	7.233	15.778	4.978	84.333	0.61	9.76	22.59
11.	RDF+ Neem Cake (25%+75%)	16.667	32.333	8.889	123.111	2.05	32.80	75.93
12.	RDF+ Neem Cake (50%+50%)	12.122	23.778	5.468	82.222	1.00	15.95	36.91
13.	RDF+Neem Cake (75%+25%)	10.533	29.444	6.556	103.444	1.09	17.43	40.35
14.	Control	6.111	12.111	4.333	76.222	0.47	7.45	17.25
	S.E. ±	0.169	0.820	0.261	1.075	0.054	0.195	0.359
	C.D. (P=0.05)	0.491	2.383	0.760	3.125	0.156	0.566	1.044

Table 3 : Effect of different treatment combination of organic manures along with inorganic fertilizers on quality parameters of brinjal

Sr. No.	Treatments	Total soluble solid (T.S.S ⁰ Brix)	Total sugars (%)	Reducing sugars (%)	Vitamin C (mg/100g)
1.	Farm yard manure (FYM) (100%)	5.233	1.827	0.340	4.667
2.	Vermicompost (100%)	4.967	1.283	0.223	3.333
3.	Neem cake (100%)	5.700	1.550	0.253	5.444
4.	Recommended dose of fertilizers (RDF) (100%)	5.000	1.330	0.270	6.222
5.	RDF+ FYM (25%+75%)	5.100	1.823	0.260	4.333
6.	RDF + FYM (50%+50%)	6.200	2.387	0.413	17.111
7.	RDF + FYM (75%+25%)	5.100	1.760	0.243	6.778
8.	RDF+Vermicompost (25%+75%)	5.400	1.277	0.270	9.222
9.	RDF+Vermicompost (50%+50%)	6.667	2.447	0.430	12.889
10.	RDF+Vermicompost (75%+25%)	4.667	1.240	0.237	7.333
11.	RDF+Neem cake (25%+75%)	7.000	2.627	0.470	22.778
12.	RDF+Neem cake (50%+50%)	6.000	1.470	0.253	8.000
13.	RDF+Neem cake (75%+25%)	5.000	2.333	0.300	11.000
14.	Control	4.300	1.050	0.210	3.222
	S.E. ±	0.105	0.156	0.008	0.523
	C.D. (P=0.05)	0.305	0.455	0.023	1.522

significant on the fruit weight. However, the maximum fruit weight (123.111g) was found under RDF+ Neem Cake at 25% + 75% However, the minimum (76.222g) fruit weight was recorded in plants under control treatments. The data on fruit yield per plant have been presented in Table 2 which revealed the treatments significantly influenced the fruit yield per plant. Maximum fruit yield per plant (2.05 kg) was observed under RDF+ Neem Cake at 25% + 75% whereas; minimum fruit yield per plant (0.47 kg) was obtained in control treatment. The maximum fruit yield per plot (32.80 kg) and per hectare (75.93 t) was found under RDF+ Neem Cake at 25% + 75%. Table 3 indicated that the treatments of RDF+ Neem cake at 25% + 75% were found to be significantly superior in increasing T.S.S. A maximum T.S.S. of 7.00⁰Brix was recorded in the fruits when the plants were treated with RDF+ Neem cake (25%+75%) as compared to minimum 4.30⁰Brix recorded under control. Total sugars were estimated after harvesting the crop and the maximum sugar (2.627 %) was recorded under under RDF+ Neem Cake at 25% + 75% and minimum (1.05 %) total sugar was found under the control. Application of RDF + Neem Cake at 25% + 75% had the maximum reducing sugar (0.470 %). The minimum reducing sugar (0.21%) obtained from the plants under control. Application of RDF + Neem cake (25%+75%) had the maximum vitamin-C (12.778 mg/100g) and minimum vitamin C (6.222 mg/100g) was obtained from the plants under control. The study showed that neem cake and a constant NPK fertilizer dose accomplish of all the growth promoting substance as well as yield and quality attributes

of brinjal cv. PANT RITURAJ.

Conclusion:

Our study was concentrated to the effect of various organic manures and inorganic fertilizers on brinjal in the tropic region of Lucknow. Results showed that among the treatments under study, 25% RDF along with 75% Neem cake considerably increase the vegetative growth, yield and quality of fruit of brinjal cv. Pant Rituraj under Lucknow condition.

REFERENCES

- Aykroyd (1941)**. Health Bulletin No. 23 published by Nutrition Research Lab., Koonoor.
- Choudhary, M.R., Talukdar, N.C. and Saikia, A. (2005)**. Effect of Integrated Nutrient Management on growth and productivity of brinjal. *Res. Crops*, **6** (3) : 551-554.
- Gaur, A.C.(1984)**. Organic manures and biofertilizers. *Review of soil Research in India Part-1*. 12th Int. Cong. Soil Sci., New Delhi, India.
- Nandkarni, K.M. (1927)**. Vegetable crops. In *Advances in Horticulture* (Chadha K.Land Kalloo. G. eds.).Malhotra Publishing House, New Delhi, 5:105129.
- Panse, V.G. and Sukhatme, P.V. (1967)**. *Statistical methods for agricultural workers*. I.C.A.R., New Delhi. pp 68-75.
- Singh, S.R.(2004)**. Effect of organic farming system on yield and quality of brinjal (*Solanum melongena* L.) var. Pusa Purple Cluster under mid hill conditions of Himachal Pradesh. *Haryana J. Hort. Sci.*, **33** (3/4) : 265-266.

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