Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 7 [4] March 2018 : 30-36

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD
Global Impact Factor 0.876
Universal Impact Factor 0.9804
NAAS Rating 4.95

ORIGINAL ARTICLE **OPEN ACCESS**

Influence of Organic Manure With Inorganic and Bio-Fertilizer on Growth, Flowering, Yield and Yield Attributes of Bottle Gourd [*Lagenaria siceraria* L.]

***Satish Singh BagheL[1], U.S.Bose[1], Rajesh Singh[1] and S.S.Singh[2]**
[1] JNKVV, College of Agriculture, Rewa- 486001 (M.P.)
[2] MGCGVV, Chitrakoot,Satna- 485334 (M.P.)
*Email : rewahortic@gmail.com

ABSTRACT
Bottle gourd is an important vegetable crop grown for its green tender fruits, which are used as a vegetable in a variety of ways. It is rich in vitamins, calcium, potassium and other minerals. The present investigation was conducted during spring- summer seasons of 2013 and 2014 to find out the Influence of organic manure with inorganic and bio-fertilizer on growth, flowering, yield and yield attributes of bottle gourd [Lagenaria siceraria L.]. The experimental material for the present investigation was comprised of sixteen treatments with three replications with spacing of 2.0 m × 0.5 m and of 4.0 m × 3.0 m of plot size. The results revealed that the plants received 100% RDF of NPK + FYM @ 10 t ha^{-1} + Vermicompost @ 5 t ha^{-1} + Poultry manure @ 2.5 t ha^{-1} had a beneficial effect on bottle gourd viz., maximum vine length (282.47 cm), Number of nodes branch^{-1} (22.48), Length of internodes (12.60 cm), Number of branches plant^{-1} (9.60), Leaf length (22.40 cm) of plant, Leaf width (20.86 cm), Leaf weight (48.41 g), minimum days taken for first male (43.39) as well as female flower initiation (49.87) that appeared at earliest node for first male and female flower (17.72 and 19.96, respectively). INM packages on maximum fruit length (22.71 cm), fruit girth (8.68 cm), minimum pedicle length (7.58 cm), maximum fruit weight (568.43 g), fruit weight plot^{-1} (34.75 kg) and fruit yield ha^{-1} (463.31 q).
***Keywords**: Bottle gourd, Vremicompost, Azospirillum, FYM, Vine length*

Received 12.08.2017 Revised 12.12.2017 Accepted 10.02.2018

INTRODUCTION

The importance of vegetables in human nutrition is well known. Vegetables are rich and comparatively cheaper source of vitamins and minerals. Cucurbit vegetables are fair source of thiamine and riboflavin. Bottle gourd is the leading vegetable crop of India, the higher yield and maximum returns make it the most preferred vegetable crop of Indian farmers. Bottle gourd (*Legenaria siceraria* L.) belongs to the family cucurbitaceae and locally known as 'Lauki' is an important gourd having wide range of uses and is largely cultivated in the tropics and subtropics for as vegetable, sweets, raita and pickles. It has cooling effect and prevents constipation and has diuretic and cardio-tonic properties. From nutritional point of view, bottle gourd can be considered as nutrition rich fruit vegetable. No doubt modern agriculture is based on the use of inorganic manures, which play a major role for producing higher yield in per unit area. These are commonly used by most of the farmers because of quick availability of nutrient to the plant and easy available in market. Organic manures increase the organic matter in the soil. They provide organic acids that help dissolve soil nutrients and make them available for the plants. Application of organic manures improves the soil fertility, soil structure and moisture holding capacity. Integrated plant nutrient management is one of the recent methods of supplying nutrients to the plants by organic as well as inorganic means together to fulfill the nutrient requirements. At the same time the main aim of integrated plant nutrient management is to minimize the use of chemical fertilizers without sacrificing the yield. Composts, vermicomposts, poultry manures, Farmyard manure (FYM) etc. are
bulky organic manures, although supply low quality of major nutrients, but have potential to supply all essential nutrients for longer periods [1]. Integrated plant nutrient management (IPNM) is the best approach for obtaining potential crop yield with less expenditure. The optimum dose of nitrogen, phosphorus, and potassium vary greatly cultivar, geographical location and the environmental factors.

These factors will have marked effect on the growth and yield parameters of bottle gourd. A judicious use of organic manures, chemical fertilizers and bio-fertilizers may be effective not only in sustaining crop productivity and soil health, but also in supplementing chemical fertilizers, requirements of the crops [2-3].

MATERIAS AND METHODS

The present experiment was conducted at progressive farmer's field located at Village- Khajua, Post-Mahsanw, Distt. - Rewa (M.P.) during spring- summer seasons of 2013 and 2014. The experiment was comprised of sixteen treatments with various combinations of nutrient management, applied to bottle gourd variety Pusa Naveen, included different level of applications of inorganic fertilizers, Organic manure (FYM, vermicompost and poultry manure) and bio-fertilizers (*Azospirillum*) as mentioned in Tables. The experiment was laid out in randomized block design (R.B.D.) with 3 replications of each treatment. Bottle gourd seeds were sown in the field at a spacing of 2.0 m × 0.5 m in plots of 4.0 m × 3.0 m size. Normal cultural practices and plant protection measures were followed during the cultivation process. Five plants were selected at random from each plot of each treatment as representative sample for recording the data. The pooled mean values of each treatment in each replication for individual observation were calculated.

RESULTS AND DISCUSSION

The results of the mean data in respect of growth (vine length and number of branch vine^{-1}), flowering (number of nodes to first male flower appears, as well as female flower and days taken to male and female flower initiation), yield and yield attributes as influenced by various treatment combinations are presented in Table 1 to 5.

Effect of different nutrient management on growth characters of bottle gourd

Integrated nutrient management treatments rendered their significant effect on all the vegetative growth characters (Table 1). Significantly highest vine length (282.47 cm), number of nodes branch^{-1} (22.48), length of internodes (12.60 cm) and higher number of branches plant^{-1} (9.60) were recorded in 100% RDF of NPK + FYM @ 10 t ha^{-1} + Vermicompost @ 5 t ha^{-1} + Poultry manure @ 2.5 t ha^{-1} (Treatment T_{11}) as against lowest vine length (148.20 cm), number of nodes branch^{-1} (14.25), length of internodes (6.34 cm) and number of branches plant^{-1} (4.35) recorded with Treatment T_{16}, *Azospirillum* @ 2 kg ha^{-1} (Table 1). NPK, FYM, vermicompost and poultry manure mixture portably stimulates the root growth through efficient translocation of growth promoting substances synthesized in plant followed by enhanced nutrients absorption. Rate of various physiological and biochemical processes enhanced due to development of large photosynthetic areas comprising of wider leaf area and higher weight of branch was observed. The phenomena of increase in growth parameter might be due to better photosynthetic activities in wide photosynthetic area. Higher fertilizer dose involved in improving the vegetative characteristics of the soil and increasing soil ventilation by increasing the porosity. The increase in number and size of cells leading to marked improvement in vegetative characteristics. Similar work on summer squash plants was also reported by Sarhan *et al*. [4]. On the other hand, all growth characteristics under study were reduced under lower fertility levels. Increasing levels of nitrogen and phosphorus increased the plant height. The combined application of inorganic and organic manures significantly influenced the growth parameters in bottle gourd. This has been the consequence because of higher nutrient availability and increased nitrogen from organic manures along with inorganic fertilizer, which had profound influence in mobilizing the nutrients from the unavailable form of nutrients mainly due to improved physical, chemical and biological properties of the soil. The increase in growth parameters such as plant height and number of branches may be due to the application of organic manure, which facilitates quick and greater availability of plant nutrients and thus provides a better environment for root growth and proliferation. It also creates more adsorptive surface for uptake of nutrients. The results are supported by the findings of Bahadur *et al.* [2], Sureshkumar and Karuppaiah [5], Prasad *et al*. [6], Bahadur *et al.* [7] and Anjanappa *et al*. [8].

Effect of different nutrient management on leaf area characteristics of bottle gourd

The leaf area parameters like leaf length, leaf width and leaf weight have been presented in Table 2. Maximum leaf length (22.40 cm), leaf width (20.86 cm) and leaf weight (48.41 g) was recorded in plants fertilized with 100% RDF of NPK + FYM @ 10 t ha^{-1} + Vermicompost @ 5 t ha^{-1} + Poultry manure @ 2.5 t ha^{-1} (Treatment T_{11}) while, lowest leaf length (12.99 cm), leaf width (13.19 cm) and lowest leaf weight (28.01 g) was observed in plants fertilized with *Azospirillum* @ 2 kg ha^{-1} (T_{16}) during both the years of 2013 and 2014, respectively. The maximum fresh weight of leaf in the present experiment might be due to the maximum leaf length and width under treatment T_{11}. The effect of organic manure on plant growth of bottle gourd could be attributed to presence of plant growth regulators and humic acid with organic

manure, which are produced by increased activity of microbes such as fungi, bacteria, yeasts, actinomycetes and algae. The microbes are also capable of producing auxins, cytokinins and gibberellins during vermicomposting [9]. These beneficial effects of various sources of nutrients were also reported by Oloyede *et al*. [10] in pumpkin, Bahadur *et al.* [7] in lettuce and Hilli *et al*. [11] in ridge gourd. Arancon *et al*. [9] reported positive effects of organic manure on increases in leaf area, shoot dry weight and fruit weight under field conditions.

Effect of different nutrient management on flowering characters of bottle gourd

The flowering characters like number of nodes to first male/female flower appears and days required to first male/female flower initiation have been presented in Table 3. The first male and female flower recorded at earliest node (17.72 and 19.96, respectively) while, significantly minimum days taken for first male and female flower (43.39 and 49.87 days, respectively) were recorded with 100% RDF of NPK + FYM @ 10 t ha^{-1} + Vermicompost @ 5 t ha^{-1} + Poultry manure @ 2.5 t ha^{-1} (Treatment T_{11}). The possible reason for above might be due to fact that balance dose of NPK and FYM + vermicompost + poultry manure [12]. The reduction in days to male and female flower initiation was due to stimulating effect of phosphorus on growth hormones which induce early flowering [13]. On the other hand plants of the plots with addition of manure and bio-fertilizers along with inorganic fertilizers took comparatively lesser days for initiation of male and female flowers and minimum number of nodes at which first male and female flower appeared. Similar kind of result has been revealed in a study on integrated nutrient management in cucumber by Bindyia *et al*. [14] where they observed that combined application of vermicompost (2 t ha^{-1}) + ½ RD of NPK (50:30:30 Kg ha^{-1}) + Azotobacter and PSB each at 5 Kg ha^{-1} showed earliness and took lesser number of days for 50% flowering. Early flowering may be due to integration effect as vermicompost have soil microbes, nitrogen-fixing bacteria, phosphate solubilizing bacteria and growth hormones like auxine, gibberlines and cytokinins which influence and enhance efficiency of nitrogen greater than that of chemical fertilizer which influence early flowering and earliest node to flowering. The present results are in accordance with the findings of Prasad *et al*. [6] and Suresh Kumar and Karuppaiah [5] in bitter gourd and Singh and Teena Rani [15] in bottle gourd. The delay in initiation of first male and female flower was noted at 23.68 and 27.43 nodes, as well as maximum days taken for first male and female flower appearance (56.69 and 58.20 days, respectively) were with application of *Azospirillum* @ 2 kg ha^{-1} (Treatment T_{16}) . From these reports, it is evident that the results of the present investigation are well supported by the findings of the earlier research workers.

Effect of different nutrient management on yield attributing characters of bottle gourd

The yield attributing characters like fruit length and girth, pedicle length, fruit weight and fruit yield have been presented in Table 4. A significant favorable change were recorded characteristic change in yield attributes towards higher fruit length (22.71 cm) and girth (8.68 cm) and lowest pedicel length (7.58 cm) in the application of T_{11} (100% RDF of NPK + FYM @ 10 t ha^{-1} + Vermicompost @ 5 t ha^{-1} + Poultry manure @ 2.5 t ha^{-1}). It is due to luxurious supply of nitrogen , phosphorus , potash , vermicompost, FYM and poultry manure and their effect absorption which the various physiological and metabolic processed especially protein metabolism . The translocation of these nutrients to the fruiting nodes results in higher fruiting and fruit development. Similar findings with respect to nitrogen and phosphors on yield attributes were also reported by Anjanappa *et al*. [8] and Thriveni *et al*. [16]. In application of inorganic sources of nutrients in combination with FYM, vermicompost and poultry manure lead the plant growth favorably with the production of more carbohydrates. In this situation, flow of assimilates to sink was high and might be the reason of higher fruit length. Besides, more length and girth of fruit under T_{11} exercised positively on fruit weight [8]. Minimum results of yield attributing characters were obtained in the plots those received *Azospirillum* @ 2 kg ha^{-1} (Treatment T_{16}). Thus, the results of the present experiment are in a good agreement with the above mentioned findings.

Effect of different nutrient management on yield of bottle gourd

Fertility levels had significant response on yield of fruits. The application of 100% RDF of NPK + FYM @ 10 tha^{-1} + Vermicompost @ 5 tha^{-1} + Poultry manure @ 2.5 tha^{-1} produced highest fruit weight (568.43 g), fruit weight $plot^{-1}$ (34.75 kg) and fruit yield ha^{-1} (463.31 q) (Table 5). The fruit yield depends mainly on the length of fruit, diameter of fruit, volume of fruit and average weight of fruit. The highly suitability of INM treatment imparts favorable yield attributes may because of favorable soil environment under this treatment [2]. Higher yield of bottle gourd in the present study is also related to the influence of combined effect of organic and inorganic fertilizers. Besides, quick availability of plant nutrient from inorganic sources, balanced C/N ratio, enhanced the synthesis of photosynthates and production of hormone like substances IAA, GA, amino acids and vitamins resulted in quantitative yield might be due to its additive effect on vegetative growth of the crop ultimately affecting the yield. . The present results are in accordance with the findings of Bahadur *et al.* [2] in chinese cabbage, Pulak Bhunia *et al*. [17] and Thriveni *et al*. [16] in bitter gourd, Kameswari and Narayanamma [18] in ridge gourd.

Table 1. Influence of organic manure with inorganic and bio- fertilizer on growth characters at 75 days after sowing (DAS) of bottle gourd

Sr.No.	Treatments	Vine Length (cm)	Number of nodes branch^{-1}	Length of internodes	No. of branches plant^{-1}
T_1:	Normal dose of NPK 120: 60: 60 kg ha^{-1}	185.49	14.54	8.68	6.48
T_2:	FYM @ 20 t ha^{-1}	191.55	14.90	8.75	6.57
T_3:	Vermicompost @ 10 t ha^{-1}	216.33	16.07	9.03	7.22
T_4:	Poultry manure @ 5 t ha^{-1}	202.80	15.27	8.84	6.78
T_5:	50% RDF of NPK + FYM @ 20 t ha^{-1}	197.47	15.19	8.78	6.63
T_6:	100% RDF of NPK + FYM @10 t ha^{-1} + vermicompost @ 5 t ha^{-1}	270.14	20.53	10.25	8.41
T_7:	50% RDF of NPK + vermicompost @ 2.5 t ha^{-1} + poultry manure @ 1.25 t ha^{-1}	208.98	15.60	8.92	6.97
T_8:	100% RDF of NPK + FYM @ 5 t ha^{-1} + Azospirillum @ 1 kg ha^{-1}	221.07	17.20	9.17	7.21
T_9:	100% RDF of NPK + FYM @ 5 t ha^{-1} + vermicompost @ 10 t ha^{-1}	276.98	21.38	11.31	8.72
T_{10}:	100% RDF of NPK + FYM @ 5 t ha^{-1} + vermicompost @ 2.5 t ha^{-1} + Azospirillum @ 1 kg ha^{-1}	253.88	17.77	9.92	7.83
T_{11}:	100% RDF of NPK + FYM @10 t ha^{-1} + vermicompost @ 5 t ha^{-1} + poultry manure @ 2.5 t ha^{-1}	282.47	22.48	12.60	9.60
T_{12}:	100% RDF of NPK + FYM @ 5 t ha^{-1} + vermicompost @ 2.5t ha^{-1} + poultry manure @ 1.25 t ha^{-1}	258.25	18.86	9.98	8.13
T_{13}:	50% RDF of NPK + vermicompost @ 10 t ha^{-1}	234.26	17.50	9.62	7.67
T_{14}:	100% RDF of NPK + vermicompost @ 5 t ha^{-1}	241.98	17.48	9.76	7.83
T_{15}:	100% RDF of NPK + vermicompost @ 2.5 t ha^{-1}	232.56	16.43	9.41	7.53
T_{16}:	Azospirillum @ 2 kg ha^{-1}	148.20	14.25	6.34	4.35
	SEm	3.31	0.35	0.22	0.25
	CD (P=0.05)	9.64	1.01	0.65	0.73

Table 2. Influence of organic manure with inorganic and bio- fertilizer on leaf area characteristics at 75 Days after sowing (DAS) of bottle gourd

Sr.No.	Treatments	Leaf length (cm)	Leaf width (cm)	Leaf weight (g)
T_1:	Normal dose of NPK 120: 60: 60 kg ha^{-1}	15.16	14.86	37.87
T_2:	FYM @ 20 t ha^{-1}	15.12	15.06	38.87
T_3:	Vermicompost @ 10 t ha^{-1}	16.04	15.77	40.07
T_4:	Poultry manure @ 5 t ha^{-1}	15.61	15.33	39.97
T_5:	50% RDF of NPK + FYM @ 20 t ha^{-1}	15.50	15.22	39.60
T_6:	100% RDF of NPK + FYM @10 t ha^{-1} + vermicompost @ 5 t ha^{-1}	19.12	17.97	44.98
T_7:	50% RDF of NPK + vermicompost @ 2.5 t ha^{-1} + poultry manure @ 1.25 t ha^{-1}	15.88	15.41	39.97
T_8:	100% RDF of NPK + FYM @ 5 t ha^{-1} + Azospirillum @ 1 kg ha^{-1}	16.30	16.19	40.66
T_9:	100% RDF of NPK + FYM @ 5 t ha^{-1} + vermicompost @ 10 t ha^{-1}	20.50	19.22	45.96
T_{10}:	100% RDF of NPK + FYM @ 5 t ha^{-1} + vermicompost @ 2.5 t ha^{-1} + Azospirillum @ 1 kg ha^{-1}	17.19	17.48	43.76
T_{11}:	100% RDF of NPK + FYM @10 t ha^{-1} + vermicompost @ 5 t ha^{-1} + poultry manure @ 2.5 t ha^{-1}	22.40	20.86	48.41
T_{12}:	100% RDF of NPK + FYM @ 5 t ha^{-1} + vermicompost @ 2.5t ha^{-1} + poultry manure @ 1.25 t ha^{-1}	17.90	18.51	43.09
T_{13}:	50% RDF of NPK + vermicompost @ 10 t ha^{-1}	16.97	16.78	41.79
T_{14}:	100% RDF of NPK + vermicompost @ 5 t ha^{-1}	17.42	17.13	42.48
T_{15}:	100% RDF of NPK + vermicompost @ 2.5 t ha^{-1}	16.81	16.64	43.31
T_{16}:	Azospirillum @ 2 kg ha^{-1}	12.99	13.19	28.01
	SEm	0.53	0.48	1.44
	CD (P=0.05)	1.53	1.41	4.18

Table 3. Influence of organic manure with inorganic and bio- fertilizer on flowering characters of bottle gourd

Sr.No.	Treatments	No. of nodes to first male flower appears	No. of nodes to first female flower appears	Days to first male flower initiation	Days to first female flower initiation
T_1:	Normal dose of NPK 120: 60: 60 kg ha^{-1}	22.42	24.92	53.93	54.72
T_2:	FYM @ 20 t ha^{-1}	22.34	24.54	53.38	53.97
T_3:	Vermicompost @ 10 t ha^{-1}	21.68	23.59	52.23	52.95
T_4:	Poultry manure @ 5 t ha^{-1}	22.35	24.22	53.03	53.44
T_5:	50% RDF of NPK + FYM @ 20 t ha^{-1}	23.01	24.29	51.32	53.66
T_6:	100% RDF of NPK + FYM @10 t ha^{-1} + vermicompost @ 5 t ha^{-1}	20.85	21.99	46.95	51.27
T_7:	50% RDF of NPK + vermicompost @ 2.5 t ha^{-1} + poultry manure @ 1.25 t ha^{-1}	22.24	24.00	54.43	53.25
T_8:	100% RDF of NPK + FYM @ 5 t ha^{-1} + Azospirillum @ 1 kg ha^{-1}	22.40	23.42	51.04	52.55
T_9:	100% RDF of NPK + FYM @ 5 t ha^{-1} + vermicompost @ 10 t ha^{-1}	19.23	21.39	44.14	50.95
T_{10}:	100% RDF of NPK + FYM @ 5 t ha^{-1} + vermicompost @ 2.5 t ha^{-1} + Azospirillum @ 1 kg ha^{-1}	21.24	22.62	44.23	51.69
T_{11}:	100% RDF of NPK + FYM @10 t ha^{-1} + vermicompost @ 5 t ha^{-1} + poultry manure @ 2.5 t ha^{-1}	17.72	19.96	43.39	49.87
T_{12}:	100% RDF of NPK + FYM @ 5 t ha^{-1} + vermicompost @ 2.5t ha^{-1} + poultry manure @ 1.25 t ha^{-1}	20.72	22.19	49.52	51.54
T_{13}:	50% RDF of NPK + vermicompost @ 10 t ha^{-1}	21.54	23.14	51.63	52.09
T_{14}:	100% RDF of NPK + vermicompost @ 5 t ha^{-1}	21.40	22.86	50.62	51.84
T_{15}:	100% RDF of NPK + vermicompost @ 2.5 t ha^{-1}	21.71	23.17	51.46	52.38
T_{16}:	Azospirillum @ 2 kg ha^{-1}	23.68	27.43	56.69	58.20
	SEm	0.64	0.42	1.02	0.73
	CD (P=0.05)	1.87	1.21	2.96	2.13

Table 4. Influence of organic manure with inorganic and bio- fertilizer on yield attributing characters of bottle gourd

Sr.No.	Treatments	Fruit length (cm)	Fruit girth (cm)	Pedicle length (cm)
T_1:	Normal dose of NPK 120: 60: 60 kg ha^{-1}	16.66	6.58	12.19
T_2:	FYM @ 20 t ha^{-1}	16.95	7.66	11.93
T_3:	Vermicompost @ 10 t ha^{-1}	18.16	8.07	11.42
T_4:	Poultry manure @ 5 t ha^{-1}	17.44	7.98	11.92
T_5:	50% RDF of NPK + FYM @ 20 t ha^{-1}	17.26	7.79	11.99
T_6:	100% RDF of NPK + FYM @10 t ha^{-1} + vermicompost @ 5 t ha^{-1}	20.08	8.29	8.89
T_7:	50% RDF of NPK + vermicompost @ 2.5 t ha^{-1} + poultry manure @ 1.25 t ha^{-1}	17.70	8.00	11.58
T_8:	100% RDF of NPK + FYM @ 5 t ha^{-1} + Azospirillum @ 1 kg ha^{-1}	18.49	8.12	11.26
T_9:	100% RDF of NPK + FYM @ 5 t ha^{-1} + vermicompost @ 10 t ha^{-1}	22.39	8.51	8.10
T_{10}:	100% RDF of NPK + FYM @ 5 t ha^{-1} + vermicompost @ 2.5 t ha^{-1} + Azospirillum @ 1 kg ha^{-1}	21.24	8.48	9.80
T_{11}:	100% RDF of NPK + FYM @10 t ha^{-1} + vermicompost @ 5 t ha^{-1} + poultry manure @ 2.5 t ha^{-1}	22.71	8.68	7.58
T_{12}:	100% RDF of NPK + FYM @ 5 t ha^{-1} + vermicompost @ 2.5t ha^{-1} + poultry manure @ 1.25 t ha^{-1}	20.77	8.35	9.12
T_{13}:	50% RDF of NPK + vermicompost @ 10 t ha^{-1}	19.31	8.00	10.60
T_{14}:	100% RDF of NPK + vermicompost @ 5 t ha^{-1}	19.33	8.27	10.48
T_{15}:	100% RDF of NPK + vermicompost @ 2.5 t ha^{-1}	18.48	8.14	9.99
T_{16}:	Azospirillum @ 2 kg ha^{-1}	13.86	5.59	12.57
	SEm	0.41	0.22	0.11
	CD (P=0.05)	1.18	0.64	0.33

Table 5. Influence of organic manure with inorganic and bio- fertilizer on yield of bottle gourd

Sr.No.	Treatments	Fruit weight (g)	Fruit yield plot^{-1} (kg)	Fruit yield (q ha^{-1})
T_1:	Normal dose of NPK 120: 60: 60 kg ha^{-1}	429.24	10.11	134.80
T_2:	FYM @ 20 t ha^{-1}	442.39	11.02	146.99
T_3:	Vermicompost @ 10 t ha^{-1}	474.46	15.61	208.11
T_4:	Poultry manure @ 5 t ha^{-1}	460.28	12.28	163.69
T_5:	50% RDF of NPK + FYM @ 20 t ha^{-1}	457.10	11.84	157.85
T_6:	100% RDF of NPK + FYM @10 t ha^{-1} + vermicompost @ 5 t ha^{-1}	518.56	25.31	337.49
T_7:	50% RDF of NPK + vermicompost @ 2.5 t ha^{-1} + poultry manure @ 1.25 t ha^{-1}	466.33	12.59	167.82
T_8:	100% RDF of NPK + FYM @ 5 t ha^{-1} + Azospirillum @ 1 kg ha^{-1}	478.29	15.81	210.81
T_9:	100% RDF of NPK + FYM @ 5 t ha^{-1} + vermicompost @ 10 t ha^{-1}	543.47	28.33	377.72
T_{10}:	100% RDF of NPK + FYM @ 5 t ha^{-1} + vermicompost @ 2.5 t ha^{-1} + Azospirillum @ 1 kg ha^{-1}	504.54	18.37	245.00
T_{11}:	100% RDF of NPK + FYM @10 t ha^{-1} + vermicompost @ 5 t ha^{-1} + poultry manure @ 2.5 t ha^{-1}	568.43	34.75	463.31
T_{12}:	100% RDF of NPK + FYM @ 5 t ha^{-1} + vermicompost @ 2.5t ha^{-1} + poultry manure @ 1.25 t ha^{-1}	502.47	19.51	260.18
T_{13}:	50% RDF of NPK + vermicompost @ 10 t ha^{-1}	491.19	17.48	233.08
T_{14}:	100% RDF of NPK + vermicompost @ 5 t ha^{-1}	499.94	17.80	237.28
T_{15}:	100% RDF of NPK + vermicompost @ 2.5 t ha^{-1}	485.83	16.44	219.23
T_{16}:	Azospirillum @ 2 kg ha^{-1}	326.42	8.56	114.11
	SEm	7.24	0.64	8.51
	CD (P=0.05)	21.04	1.84	24.74

CONCLUSION

Integrated nutrient management treatments rendered their significant effect on almost all the growth, flowering characters and yield attributing characters as well as fruit yield of bottle gourd cv. Pusa Naveen. Treatment consisted of 100% RDF of NPK + FYM @ 10 t ha^{-1} + Vermicompost @ 5 t ha^{-1} + Poultry manure @ 2.5 t ha^{-1} (T_{11}) recorded maximum performances with respect to almost all the characters. Treatment T_{16} (*Azospirillum* @ 2 kg ha^{-1}) was the lowest performer for the results of the said characters. So, keeping view on yield sustainability, balance in ecosystem, soil health improvement and good health of human beings it may be suggested that vegetable growers may supplement through the judicious and efficient use of inorganic fertilizers or FYM, vermicompost and poultry manure, alone or in combinations.

REFERENCES

1. Rajput RL and Pandey RN (2004). Effect of method of application of bio-fertilizers on yield of pea. *Legume Research;* 27 (1):75-76.
2. Arancon NQ, Edwards CA, Babenko A, Cannon J, Galvis P and Metzger JD (2008). Influence of vermicomposts, produced by earthworms and microorganisms from cattle manure, food waste and paper waste, on the germination, growth and flowering of petunias in the greenhouse. *Applied Soil Ecology;* 39: 91-99.
3. Bindiya Y, Reddy IP, Srihari D, Reddy RS and Narayanamma M (2006). Effect of different sources of nutrition on soil health, bacterial population and yield of cucumber. *Journal of Research, ANGRAU;* 34: 12-17.
4. Thriveni V, Mishra HN, Pattanayak SK, Sahoo GS and Thomson T (2015). Effect of inorganic, organic fertilizers and biofertilizers on growth, flowering, yield and quality attributes of bitter gourd (*Momordica charantia* L.). *International Journal of Farm Science;* 5(1): 24-29.
5. Hilli JS, Vyakarnahal BS, Biradar DP and Ravi Hunje (2009). Influence of method of trailing and fertilizer levels on seed yield of ridge-gourd (*Luffa acutangula* L. Roxb). *Karnataka Journal of Agricultural Science;* 22(1): (47-52).
6. Prasad PH, Mandal AR, Sarkar A, Thapa U and Mality TK (2009). Effect of biofertilizer and nitrogen on growth and yield attributes of bitter gourd (*Momordica charantia* L.).Proceedings, International Conference on Horticulture-2009, pp. 738-740.
7. Kale LV, Bhandarkar M and Brunner R (1998). Load Balancing in Parallel Molecular Dynamics. In Fifth International Symposium on Solving Irregularly Structured Problems in Parallel.
8. Bahadur A, Singh J, Singh K.P, Upadhyay AK and Rai M (2006). Effect of organic amendments and biofertilizers on growth, yield and quality attributes of Chinese cabbage (*Brassica perkinensis*). *Indian Journal of Agricultural Sciences;* 76: 596-98.

9. Pandey SK, Singh AB, Singh R and Singh MC (2009). Effect of organic manures and bio- fertilizers on biomass distribution, growth and yield of okra. *Vegetable Science;* 36(3): 415-17.
10. Sureshkumar R and Karuppaiah P (2008). Effect of integrated nutrient management on growth and yield of bitter gourd (*Momordica charantia* L.) type Mithipagal. *Plant Archives;* 8(2).867-868.
11. Sarhan Taha Z, Ghurbat H Mohammed and Jiyan A Teli (2011). Effect of bio and organic fertilizers on growth, yield and fruit quality of summer squash. *Sarhad Journal of Agriculture;* 27(3): 2011.
12. Bahadur A, Singh J, Singh KP, Upadhyay AK and Rai M (2009). Morphophysiological yield traits in lettuce (*Lactuca sativa*) as influenced by use of organic manures and biofertilizers. *Indian Journal of Agricultural Sciences;* 79: 282-85.
13. Singh R and Asrey R (2005). Integrated nutrient management in tomato (*Solanum lycopersicum* L.) under semiarid region of Punjab. *Vegetable Science;* 32(2):194-195.
14. Anjanappa M, Venkatesha J and Suresh Kumara B (2012). Growth, yield and quality attributes of cucumber (Cv. Hassan local) as influenced by integrated nutrient management grown under protected condition. *Vegetable Science;* 39(1): 47-50.
15. Oloyede FM, Agbaje GO and Obisesan IO (2013). Analysis of pumpkin (*Cucurbita pepo* Linn.) biomass yield and its components as affected by nitrogen, phosphorus and potassium (NPK) fertilizer rates. *African Journal of Agricultural Research;* 8(37): 4686-4692.
16. Pulak Bhunia Mandai AR (2009). Influence of irrigation levels and nutrient management on growth and yield of bitter gourd (*Momordica charantia* L.) under West Bengal condition*. Indian agriculturist;* 53(3/4):91-96.
17. Singh Vijay Kumar and Teena Rani VK (2012). Effect of integrated nutrient management on economics in bottle-gourd (*Lagenaria siceraria* L.). *Environment and Ecology;* 30(4A):1410-1412.
18. Kameswari PL and Narayanamma M (2011). Influence of integrated nutrient management in ridge gourd (*Luffa acutangula* L*.). Journal of Research, ANGRAU;* 39(3):16-20.

CITATION OF THE ARTICLE

S S BagheL, U.S.Bose, R Singh and S.S.Singh.Influence of Organic Manure With Inorganic and Bio-Fertilizer on Growth, Flowering, Yield and Yield Attributes of Bottle Gourd [*Lagenaria siceraria* L.]. Bull. Env. Pharmacol. Life Sci., Vol 7 [4] March 2018 : 30-36