Effect of organic manures and inorganic fertilizers on growth and yield of bottle gourd(*Lagenariasiceraria*)

ABSTRACT

The present study aimed to investigate the effect of organic manures and inorganic fertilizers on growth and yield of bottle gourd (*Lagenariasiceraria*). The present experiment was carried out during July to September 2023 in Departmental Research Field of Department of Horticulture, SHUATS, Prayagraj. The experiment was conducted in Factorial Randomized Block Design (RBD), with seven treatments, replicated thrice with three varieties of Bottle Gourd. the treatments were T0 (Control (100% RDF)), T1FYM (18 t/ha), T2Vermicompost (1.25 t/ha), T3Poultry manure (12.5 t/ha), T4NPK (100%) + FYM (18 t/ha), T5NPK (100%) + Vermicompost (1.25 t/ha), T6 NPK (100%) + Poultry manure (12.5 t/ha). From the present experimental findings it is found that the treatment T6 NPK (100%) + Poultry manure (12.5 t/ha) was found superior over other treatments in terms of growth, yield and quality of Bottle gourd. In thre varieties of Bottle gourd, variety WARAD CHECK VAREITY was found better with different treatments of organic and inorganic fertilizers, in terms of economics maximum gross and net return was recorded in treatment T6, but maximum cost benefit ratio was recorded in treatment T6and lowest readings was recorded in T0 (Control). Variety warad check vareityperformed better with various treatments of organic manure and inorganic fertilizers, and T0 (Control) had the lowest readings across the board.

Keywords: Bottle gourd, FYM, vermicompost and poultry manure

INTRODUCTION

The Bottle gourd, or (*Lagenariasiceraria Mol. Standl*)., is a member of the Cucurbitaceae family and has chromosome number 2n = 22. Originating in tropical Africa, bottle gourds were domesticated in Asia, Africa, and the New World. India is the world's second-largest producer of vegetables, behind China. The Indian Council of Medical Research (ICMR) has recommended that a male who is not vegetarian or a vegetarian should have 300 g of vegetables per day, comprising 125 mg of leafy vegetables, 100 g of root vegetables, and 75 g of other vegetables (Fagaria et al., 2010) [3]. According to Gupta et al. (2010) [7], the nation produced 97.5 million tons of vegetables overall in 2002 from 7.59 million hectares of

land.With a productivity of 13.6 t ha-1, vegetable crops account for only 2.8% of all cultivated land in the nation and 10% of global vegetable production—quite low when compared to other developed nations (Shanmugasundram, 2001) [10,14].

Agricultural yard Essentially, cow feces, urine, waste straw, and other dairy wastes are used to prepare manure.FYM has a lot of nutrients. While the plants may immediately use a tiny amount of N, a bigger amount becomes available as the FYM breaks down. Plants are provided with a balanced nutrition when urine and cow manure are combined. Potassium and phosphorus availability from FYM is comparable to that from inorganic sources. Soil fertility is increased with FYM application.

It has been demonstrated that vermicompost, as opposed to compost made using other ways of composting, is more nutrient-rich. It has also performed better than a commercial plant medium with added nutrients; nevertheless, pH and magnesium levels needed to be adjusted. increases in the soil's accessible nitrogen and phosphorus levels, as well as a rise in the vermicompost's overall nitrogen content. increases agricultural production, plant development, and germination enhances the structure and growth of roots, microorganisms that enrich the soil.

One of the most crucial elements in raising plant productivity is plant nutrition. One of the elements that has the biggest effects on a plant's growth, development, yield, and fruit quality is nitrogen (N). In contemporary agriculture, reducing reliance on chemical fertilizers and promoting sustainable output are essential goals that can be met with the use of an integrated plant nutrient supply system (IPNS).However, organic manures such as FYM, poultry, and pig manure are readily available in the area, are inexpensive, and can be effectively used for tomato cultivation. Integrated nutrition sources improve soil fertility and nutrient use, which in turn increases tomato yield.In addition to balancing the nutrition supply, organic manures enhance the chemical and physical characteristics of the soil. Vermicomposting recognized to boost plant protein synthesis, have a discernible impact on plant yield and growth. The use of biofertilizers, which are more affordable and environmentally friendlier than chemical fertilizers, can help lessen reliance on fertilizers.

Numerous scientists in India have conducted both organic and inorganic study on bottle gourds, and some recent ideas, such as the fruit's potential for food security, have placed more emphasis on the crop's production. Its cultivation has been pushed in recent decades by the use of chemical fertilizers, which are detrimental to the environment in terms of output. In order to determine the potential results of bottle gourd, two varieties of the plant

(Lagenariasiceraria Mol. Standl.) will be treated in this experiment with various combinations of inorganic and organic fertilizers under the agroclimatic conditions of Allahabad

MATERIALS AND METHODS

The Experimental was conducted in Factorial Randomized Block Design (FRBD) with 21 treatments of Organic and Inorganic fertilizers with three replications in the Research field of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during July to September, 2018. Total number of treatments were seven*viz.* T0 (Control (100% RDF), T1FYM (18 t/ha), T2Vermicompost (1.25 t/ha), T3Poultry manure (12.5 t/ha), T4NPK (100%) + FYM (18 t/ha), T5NPK (100%) + Vermicompost (1.25 t/ha), T6 NPK (100%) + Poultry manure (12.5 t/ha). and three varieties i.e. TMBG-1429, TMBG 3414 AND WARAD CHECK VAREITYwere used.

RESULTS AND DISCUSSION

The current study, was conducted in the Department of Horticulture's Departmental Research Field at the Naini Agricultural Institute of Sam Higginbottom University of Agriculture, Technology and Sciences in Prayagraj (U.P.), India, from July to September 2023. In light of earlier studies conducted both domestically and internationally, the findings of the current study on the impact of organic and inorganic fertilizers on the growth and production of bottle gourds have been examined and analyzed. Two types of bottle gourds, three replications, and seven treatments were used in the factorial randomized block design experiment.

The experiment's outcomes are summed up here.

In terms of vine length treatment T6 NPK (100%) + Poultry manure (12.5 t/ha) recorded maximum (9.23 cm) vine length, followed by T5NPK (100%) + Vermicompost (1.25 t/ha) with (8.77cm) where as minimum Vine length (7.04cm) was recorded in treatment T0 (Control). In three varieties of bottle gourd i.e.TMBG-1429, TMBG-3414 and WARAD CHECK VAREITY, maximum vine length (8.93cm) was observed in variety WARAD CHECK VAREITY closely followed by TMBG-1429, TMBG-3414 . Similar findings of Mujahid *et al*. (2010) [7] in lettuce and Bano and Kale (1987) [2] in brinjal and radish were also observed.

In terms of days to appearance of first male flower treatment T6 NPK (100%) + Poultry manure (12.5 t/ha) recorded minimum (43.63 days) for appearance of first male flower, followed by T3Poultry manure (12.5 t/ha), with (57.48 days) for appearance of first male

flower ,where as maximum Days for appearance of first male flower (59.07 days) was recorded in treatment T4NPK (100%) + FYM (18 t/ha). In three varieties of bottle gourd i.e.TMBG-1429, TMBG-3414 and WARAD CHECK VAREITY, minimum Days for appearance of first male flower (40.90 days) was observed in variety TMBG-1429. Similar results were also obtained by Bano and Kale (1987) [2] in the cucurbits.

In terms of days to appearance of first female flower treatment T0 (Control (100% RDF) recorded minimum (43.63 days) for appearance of first female flower, followed by T4NPK (100%) + FYM (18 t/ha) with (48.79 days) for appearance of first female flower, where as maximum Days for appearance of first female flower (47.35 days) was recorded in treatment T6 NPK (100%) + Poultry manure (12.5 t/ha). In three varieties of bottle gourd i.e.TMBG-1429, TMBG-3414 and WARAD CHECK VAREITY, minimum Days for appearance of first female flower (42.71 days) was observed in variety TMBG-1429. Similar result was also obtained by Bano and Kale (1987) [2] in the cucurbits.

In terms of days to first harvest treatment T0 (Control (100% RDF) recorded minimum (59.16 days) for days to first harvest, followed by T5NPK (100%) + Vermicompost (1.25 t/ha) with (67.85 days) for days to first harvest, where as maximum days to first harvest (69.80 days) was recorded in treatment T6 NPK (100%) + Poultry manure (12.5 t/ha). In three varieties of bottle gourd i.e.TMBG-1429, TMBG-3414 and WARAD CHECK VAREITY, minimum days to first harvest (61.62 days) was observed in variety TMBG-1429."Early number of days to first harvest might have increased metabolic activity leading to active translocation of nutrients to develop fruits which result in early maturity of fruits. Similar findings" were reported by Anjanappa et al. [2].

In terms of Number of fruits per plant treatment T4NPK (100%) + FYM (18 t/ha) recorded maximum (20.99) Number of fruits per plant, followed by T3Poultry manure (12.5 t/ha) with (20.25) Number of fruits per plant, where as minimum Number of fruits per plant (16.99) was recorded in treatment T0 (control). In three varieties of bottle gourd i.e.TMBG-1429, TMBG-3414 and WARAD CHECK VAREITY, maximum Number of fruits per plant (20.57) was observed in variety TMBG-3414 closely followed by variety TMBG-1429 ,WARAD CHECK VAREITY. The Similar result were reported by the Sekhar and Rajashree, (2009) [9] in tomato hybrid and Jose (1989) in Brinjal.

In terms of Fruit length treatment T4NPK (100%) + FYM (18 t/ha) recorded maximum (40.06 cm) Fruit length, followed by T6 NPK (100%) + Poultry manure (12.5 t/ha) with

(38.71 cm) Fruit length, where as minimum Fruit length (34.18 cm) was recorded in treatment T0 (Control). In three varieties of bottle gourd i.e.TMBG-1429, TMBG-3414 and WARAD CHECK VAREITY, maximum Fruit length (40.43 cm) was observed in variety WARAD CHECK VAREITYfollowed by variety TMBG-1429, TMBG-3414 . Similar findings previously also reported by Abusaleh (1992) [1] in okra.

In terms of Fruit diameter treatment T4NPK (100%) + FYM (18 t/ha) recorded maximum (17.51 cm) Fruit diameter, followed by T6 NPK (100%) + Poultry manure (12.5 t/ha) with (17.35 cm) Fruit diameter, where as minimum Fruit diameter (15.27 cm) was recorded in treatment T0 (Control). In three varieties of bottle gourd i.e.TMBG-1429, TMBG-3414 and WARAD CHECK VAREITY, maximum Fruit diameter (17.71 cm) was observed in variety WARAD CHECK VAREITYfollowed by variety TMBG-1429, TMBG-3414. The integrated use of NPK along with organic manures significantly influenced the length diameter ratio of fruit result are conformity with finding of Mausi (1960) [6] also reported that application of muskmelon resulted in bigger fruit.

In terms of Fruit weight treatment T4NPK (100%) + FYM (18 t/ha) recorded maximum (1.97 kg) Fruit weight, followed by T3Poultry manure (12.5 t/ha) with (1.91 kg) Fruit weight, where as minimum Fruit weight (1.63 kg) was recorded in treatment T0 (Control). In three varieties of bottle gourd i.e.TMBG-1429, TMBG-3414 and WARAD CHECK VAREITY, maximum Fruit weight (1.94 kg) was observed in variety WARAD CHECK VAREITY.followed by variety TMBG-1429, TMBG-3414 . Similar result has been obtained by Vadiraj*et al.* (1993) [12] in cardamom and Sekhar and rajashree (2009) [9] in tomato.

Table 1: Effects of Organic manure and Inorganic fertilizers on Vine length (cm), Days to appearance of first male flower, Days to appearance of first female flower, Days to first harvest ,No. of fruits per plant , Fruit length (cm), Fruit weight (kg) and Fruit diameter (cm) of Bottle Gourd [*LagenariaSiceraria*)

Symbols Treatment	Treatment combination	Vine length(cm)60 days	Days to appearance of first male flower	Days to appearance of first female flower	Days to first harvest	No. of fruits per plant	Length of fruits (cm)	Average weight of fruits(kg)	Fruit diameter (cm)
T_0	Control (RDF)	7.04	51.97	43.63	59.16	16.99	34.18	1.63	15.27
T_1	FYM (18 t/ha)	7.53	55.24	44.15	62.19	18.03	35.55	1.70	15.76
T_2	Vermicompost (1.25 t/ha)	8.08	55.90	45.77	61.41	19.09	37.30	1.79	16.15
T_3	Poultry manure (12.5 t/ha)	8.50	57.48	46.23	63.34	20.25	38.68	1.91	16.55
T_4	NPK (100%) + FYM (18 t/ha)	8.63	59.07	48.79	66.30	20.99	40.06	1.97	17.51
T_5	NPK (100%) + Vermicompost (1.25 t/ha)	8.77	56.35	45.56	67.85	18.92	36.80	1.74	16.16
T_6	NPK (100%) + Poultry manure (12.5 t/ha)	9.23	43.63	47.35	69.80	19.77	38.71	1.85	17.35
F-test		**S**	**S**	**S**	**S**	**S**	**S**	**S**	S
CD or LSD		0.17	1.04	0.79	0.52	0.33	0.65	0.06	0.41
SEm±		0.48	2.97	1.89	1.48	0.94	1.86	0.18	1.17
V1	TMBG1429	7.19	40.90	42.71	61.62	16.33	31.74	1.56	14.27
V2	TMBG 3414	8.64	46.85	47.44	64.09	20.57	39.80	1.90	17.19
V3	CHECK	8.93	44.71	47.63	62.44	20.54	40.43	1.94	17.71
F-test		**S**	**S**	**S**	**S**	**S**	**S**	**S**	S
CD or LSD		0.11	0.68	0.52	0.34	0.21	0.43	0.04	0.27
SEm±		0.31	1.95	1.70	0.97	0.61	1.22	0.12	0.76

Table 2: Effects of Organic manure and Inorganic fertilizers on Yield/acre (q/acre), Yield /hectare (q/ha), TSS(oBrix).

Symbols Treatment	Treatment combination	Yield/acre (q/acre)	Yield /hectare (q/ha)	TSS (oBrix)
T_0	Control (RDF)	27.96	69.91	4.01
T_1	FYM (18 t/ha)	29.97	74.92	4.19
T_2	Vermicompost (1.25 t/ha)	30.10	75.27	4.35
T_3	Poultry manure (12.5 t/ha)	31.61	79.03	4.80
T_4	NPK (100%) + FYM (18 t/ha)	32.64	81.60	4.89
T_5	NPK (100%) + Vermicompost (1.25 t/ha)	33.52	83.81	5.08
T_6	NPK (100%) + Poultry manure (12.5 t/ha)	36.54	91.35	5.20
F-test		**S**	**S**	**S**
CD or LSD		1.68	4.2	0.17
SEm±		4.8	12	0.48
V1	TMBG1429	28.40	71.00	4.06
V2	TMBG 3414	34.55	86.38	4.87
V3	CHECK	32.34	80.87	5.00
F-test		**S**	**S**	**S**
CD or LSD		1.1	2.75	0.11
SEm±		3.14	7.86	0.31

In terms of Fruit yield quintal per acre treatment T6 NPK (100%) + Poultry manure (12.5 t/ha) recorded maximum (36.54 q/ha) Fruit yield (q/ha), followed by T5 NPK (100%) + Vermicompost (1.25 t/ha) with (33.53 q/ha) Fruit yield (q/ha), where as minimum Fruit yield (27.96 q/ha) was recorded in treatment T0 (Control). In three varieties of bottle gourd i.e.TMBG-1429, TMBG-3414 and WARAD CHECK VAREITY, maximum Fruit yield (q/ha) (34.55 q/ha) was observed in variety TMBG-3414 .followed by variety TMBG-1429, WARAD CHECK VAREITY. "This is clearly indicated that integrated use of nutrient helpful in cell elongation of leaves use to development of cell and rapid cell division and cell elongation in meristematic region of plant due to production of plant growth substance and this may be due to abundant supply of plant nutrients and nitrogen which led in the growth of bottle gourd".[14] Similar findings of Mujahid *et al.* (2010) [7] in lettuce and Bano and Kale (1987) [2] in brinjal and radish were also observed.

In terms of Fruit yield tonns per hectare treatment T6 NPK (100%) + Poultry manure (12.5 t/ha) recorded maximum (91.35 q/ha) Fruit yield (q/ha), followed by T5 NPK (100%) + Vermicompost (1.25 t/ha) with (83.81 q/ha) Fruit yield (q/ha), where as minimum Fruit yield (69.91 q/ha) was recorded in treatment T0 (Control). In three varieties of bottle gourd i.e.TMBG-1429, TMBG-3414 and WARAD CHECK VAREITY, maximum Fruit yield (q/ha) (86.38 q/ha) was observed in variety TMBG-3414 .followed by variety TMBG-1429, WARAD CHECK VAREITY.

In terms of Total soluble solid treatment T6 NPK (100%) + Poultry manure (12.5 t/ha) recorded maximum (5.20oBrix) Total soluble solid of fruit, followed by T5 NPK (100%) + Vermicompost (1.25 t/ha) with (5.08oBrix) Total soluble solid of fruit, where as minimum Total soluble solids (oBrix) of fruit (4.01oBrix) was recorded in treatment T0 (control). In three varieties of bottle gourd i.e.TMBG-1429, TMBG-3414 and WARAD CHECK VAREITY, maximum Total soluble solids (oBrix) of fruit (4.30 oBrix) was observed in variety WARAD CHECK VAREITY, followed by variety TMBG-1429, TMBG-3414 . 1. "Increased in Total soluble solids content of fruits in treatments of organic manures, previously also reported by Sekhar and Rajashree" (2009) [9].

CONCLUSION

The treatment T6 NPK (100%) + Poultry manure (12.5 t/ha) was determined to be superior above other treatments in terms of bottle gourd development, yield, and quality, based on the current experimental findings. Three bottle gourd varieties were tested: TMBG-1429, TMBG-3414, and WARAD CHECK VAREITY. Variety WARAD CHECK VAREITY performed better with various treatments of organic manure and inorganic fertilizers, and T0 (Control) had the lowest readings across the board.

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REFERENCES

1. Abusaleha G. The effect of half poultry manures and half N through ammonium sulphate in flowering and yield of Bhindi. vegetable crops in India. 1992; 3(4):312-316.

2. AnjanappaM,VenkateshJ,SureshKumaraB.Influenceoforganic,inorganicandbiofertilizers on flowering, yield and yield attributes of cucumber (cv. Hassan Local) in openfieldcondition. KarnatakaJ. Agric. Sci. 2012; 25(4):493-497

3. Bano K, kale RP. Vermicompost: A rural technology. Agricultural Technology. 1987; 5:33-37.
4. Fagaria MS, Choudhary BR, Dhaka RS. Vegetable, crop production. Tech. kal. publ., New, 2010; 2:1

5. Jose D, Shanmugavelu KG, Thamburaj S. Studies on the efficacy of organic vs. inorganic form of nitrogen in brinjal. Indian J Hort., 1998; 445:100-103.

6. Jose S. Effect of poultry manure and urea on yield of bottle gourd, Vegetable Crops in India, T.K. Bose, ch: 1988, 8.
7. Mausi M. Studies on the absorption of nutrient element in muskmelon. On nitrogen and phosphorus level J. Hort. ass. Japan 1960; 29:12-20.

8. Mujahid AM, Gupta AJ. Effect of plant spacing organic manures and inorganic fertilizer and their combination on growth yield and quality of lettuce. Indian j Agri. Sci. 2010; 80(2):177-181.

9. Nath P. Cucurbits - everyone's crop. Acta Horticulturae. 2007; 731;485-491. 17 ref.

10. Sekhar MP, Rajashree V. Influence of organic on growth, yield and quality of tomato and the residual performance of cowpea. Green Farming. 2009; 2(5):272-274.

11. Shanmugasundadam S. Vegetable suremountale challenges. The hindu survey of Indian agriculture, M/S Kasturi and sons ltd., Chennai. 2001, 126-127

12. Subbiah K, Sundarrajan S, Muthuswamy S. Response of tomato and brinjal to varying levels of FYM and micronutrients under different fertility status of soil. South Indian Hort. 1985; 30(1):445-47.

13. Vadiraj BA, Krisna Kumar M, Naid R. studies on vermicompost and the on cardamom nursery seedling. Proceeding of national symposium on soil biology and ecology. 1993, 35-57.

14. Nitin Kishor and SS Saravanan Effect of organic and inorganic fertilizer on the growth and yield of bottle gourd [Lagenariasiceraria Mol. Standl. The Pharma Innovation Journal 2019; 8(7): 593-597