Effect of Organic Manures and Inorganic Fertilizers on Growth, Yield and Quality of Bottle gourd (*Lagenaria siceraria* Mol.) standl

ABSTRACT

The present experiment was carried out in Research field, Department of Horticulture, SHUATS, Prayagraj. The experiment was conducted in Randomized Block Design (RBD), with 12 treatments, replicated thrice with Organic manures and inorganic fertilizers. The treatments rendered their significant effect on growth, flowering and yield characters as well as fruit yield of bottle gourd. Treatment consisted of 25%NPK+75% Vermicompost was recorded maximum performances with respect to almost all the characters *viz.*, growth, flowering and yield. It is concluded from the investigation that the treatment 25%NPK+75%.Vermicompost was found suitable for application in *kharif* season bottle gourd cultivation for better yield (50.59 t ha^{-1}) and highest net return (291152.00) and Benefit cost ratio (3.56).

Keywords: *Bottle gourd, Organic (Vermicompost, FYM, Poultry manure) Inorganic(NPK)*

INTRODUCTION

Bottle gourd (*Lagenaria siceraria* Mol. Standl.) belongs to the family Cucurbitaceae with chromosome number of 2n=22. Its native is tropical Africa and Asia. It is commonly known as white-flowered gourd, *Lauki, Kaddu and Ghiya,* In Gujarat, it is known as Dudhi. In India it is cultivated in about 155 thousand ha area with production of 2573 thousand million tonnes. From nutritional point of view, bottle gourd can be considered as nutrition rich fruit vegetable. Among, cucurbits, bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] is extensively grown in India and fruits are available throughout the year. Fruits at tender stage are used as a cooked vegetable and for preparation of sweets (e.g. *kheer, petha, burfi, and halwa*), pickles and rayta. Hard shells of mature fruits are used as water jugs, domestic utensils, floats for fishing nets and making musical

instruments, etc. As a vegetable it is easily digestible. It has cooling effect and has diuretic and having cardio-tonic properties. Fruit pulp is used as an antidote against certain poisons and is good for controlling constipation, night blindness and cough. A decoction made out of leaf is taken for curing jaundice.

India is the second largest producer of vegetables in the world next to China with area and production of 162.90 million hectare and 268.285 million tonnes and Uttar Pradesh has an important place in area and production with 14.52 m ha and 427.81 thousand tonnes in bottle guard (year 2017-18) and also Meerut district occupy a crucial place in bottle guard area and production with. 49 m ha and 14.21 thousand tonnes (year 2016-17).

Vermicompost is homogenous with desirable aesthetics, plant growth hormones and high levels of soil enzymes, while enhancing microbial populations and tending to hold more nutrients over longer periods without adverse impacts on the environment. It can also be used as a bio remedial ~~The~~ higher yield and maximum returns ~~to~~ vegetable crops of Indian farmers.

Integrated plant nutrients management is one of the current methods of supplying nutrients to the plants through organic as well as inorganic fertilizers ~~means together~~ to fulfil the nutrient requirements. The main aim of integrated plant nutrient management is to minimize the

MATERIAL AND METHODS

A field experiment entitled "Effect of Organic Manures and Inorganic Fertilizers on Growth, Yield and Quality of Bottle gourd (*Lagenaria siceraria Mol.*)" was conducted at Departmental Research Field of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, during June to September 2020-2022. Following observation was recorded Vine length (cm), Number of branches per plant, Days to appearance of first male flower, Days to appearance of first female flower, Days to first picking Fruit length (cm) Fruit weight (g) ,Fruit diameter (cm), Number of fruit per plant, Fruit yield per plant (kg) , Yield tones ha^{-1}, Total soluble solids (^{0}Brix), Vitamin C (mg), Economics. Treatment details given under Table 1.

Table 1.Treatment details

Treatments symbols	Treatment combinations
T_1	100%RDF (200:100:100kgNPK)
T_2	25%NPK+75%FYM
T_3	25%NPK+75% Vermicompost
T_4	25%NPK+75% poultry manure
T_5	25% NPK+75% goat manure
T_6	50% NPK+50% FYM
T_7	50% NPK+50% vermicompost
T_8	50% NPK+50% poultry manures
T_9	50% NPK+50% goat manure
T_{10}	75% NPK+25% FYM
T_{11}	75% NPK+25% vermicompost
T_{12}	75% NPK+25% poultry manures

RESULT AND DISCUSSION

The morphologically, growth, yield and quality characteristics of the bottle gourd, namely Vine length (cm), Number of branches per plant, Days to appearance of first male flower, Days to appearance of first female flower, Days to first picking Fruit length (cm) Fruit weight (g) ,Fruit diameter (cm), Number of fruit per plant, Fruit yield per plant (kg) , Yield tones ha^{-1}, Total soluble solids (^{0}Brix), Vitamin C (mg), Economic Application of these individual fertilizers without combination did not have significant increase of yield and related traits but with the great combination of fertilizers and organic manure had significantly increased yield in bottle gourd.

Impact of different nutrient treatment on growth character of bottle gourd.

The maximum vine length was recorded 25%NPK+75% Vermicompost (7.72m).However, 50% NPK+50% vermicompost and 25%NPK+75%FYM are found statistically at par to 25%NPK+75% Vermicompost.While the minimum vine length recorded in100%RDF (200:100:100kgNPK) (4.29m). 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 .Similar findings of **Mujahid *et al.*, (2010)** in lettuce and **Bano and Kale (1987)** in brinjal and radish were also observed. The maximum No. of branches/ plant was recorded in 25%NPK+75% vermicompost(15.34). However, 25%NPK+75%FYM and 50% NPK+50% vermicompost are found statistically at par to 25%NPK+75% vermicompost. While the minimum No. of branches/ plant recorded in 100%RDF (200:100:100kgNPK) (8.76). Which is due to incorporation of organic manure. With nitrogen fertilizer or recommended dose of inorganic fertilizer the Similar findings has been reported by **Mujahid *et al.*, (2010)** and **Vadiraj *et al.*, (1993)** in brinjal,The results are supported by the findings of **Bahadur *et al.*, (2009), Sureshand Karuppaiah(2008).** The minimum days to first male flower appearance was recorded in 25%NPK+75% Vermicompost(66.71) followed by 50% NPK+50% vermicompost and 25%NPK+75%FYM. While the maximum days to first male flower appearance recorded in

100%RDF (200:100:100kgNPK) (84.90). The Similar result was also obtained by **Bano and Kale (1987).** The minimum days to first female flower appearance was recorded in 25%NPK+75% Vermicompost (70.89) followed by 50% NPK+50% vermicompost and 25%NPK+75%FYM. While the maximum days to first female flower appearance recorded in 100%RDF (200:100:100kgNPK) (89.34). The Similar result was also obtained by **Bano and Kale (1987)** in the cucurbits. The present results are in accordance with the findings of **Prasad *et al.*, (2009)** and **Kumar and Karuppaiah (2008)** in bitter gourd. The minimumdays to first picking was recorded in 25%NPK+75% Vermicompost (71.88) followed by 50% NPK+50% vermicompost, 25%NPK+75%FYM and 50% NPK+50% FYM. While the maximumdays to first picking recorded in 100%RDF (200:100:100kgNPK) (89.98). The Similar result was also obtained by **Bano and Kale (1987)** in the cucurbits. Represented under table number 2.

Impact of different nutrient treatment on yield and yield attributing characters of bottle gourd.

The maximum Avg. fruit length(cm) was recorded in 25%NPK+75% vermicompost(43.53). However, 50% NPK+50% vermicompost and 25%NPK+75%FYM are found statistically at par to 25%NPK+75% Vermicompost. While the minimum Avg. fruit length(cm) recorded in 100%RDF (200:100:100kgNPK) (43.53). The integrated use of N.P.K. along with organic manure significantly influenced the length – diameter ratio of fruit. The result are conformity with findings of **Abusaleh(1992)** in okra. The present results are in accordance with the findings of **Bahadur*et al.* (2009)** in Chinese cabbage **Thriveni *et al.*, (2015).** The maximum Avg. fruit weight(g) was recorded in 25%NPK+75% vermicompost(1.69). However, 50% NPK+50% vermicompost and 25%NPK+75%FYM are found statistically at par to 25%NPK+75% vermicompost.While the minimum Avg. fruit weight(g) recorded in 100%RDF (200:100:100kgNPK) (1.08). The fruit weight was significantly effect by vermicompost with 50% of NPK. The maximum fruit diameter (cm) was recorded in 25%NPK+75% vermicompost(22.29). However, 50% NPK+50% vermicompost, 50% NPK+50% FYM and 25%NPK+75%FYM are found statistically at par to 25%NPK+75% vermicompost.While the minimum Avg. fruit weight(g) recorded in 100%RDF (200:100:100kgNPK) (13.26).The maximum No. of fruits per plant was recorded in 25%NPK+75% vermicompost(23.62). However, 50% NPK+50% vermicompost, 50% NPK+50% FYM and 25%NPK+75%FYM are

found statistically at par to 25%NPK+75% vermicompost.While the minimum No. of fruits per plant recorded in 100%RDF (200:100:100kgNPK) (13.26). The Similar result has been founded in **Subbiah*et al.*, (1985).** The maximum fruit yield per plant (kg) was recorded in 25%NPK+75% vermicompost(39.84) followed by 50% NPK+50% vermicompost, 25%NPK+75%FYM and 50% NPK+50% FYM. While the minimum fruit yield per plant (kg) recorded in 100%RDF (200:100:100kgNPK) (14.33). The maximum fruit yield per t/ha was recorded in 25%NPK+75% vermicompost (50.59), followed by 50% NPK+50% vermicompost and 25%NPK+75%FYM. While the minimum fruit yield per t/ha recorded in 100%RDF (200:100:100kgNPK) (18.20)Represented under table number2.

Impact of different nutrient treatment on Quality characters of bottle gourd.

The analysis data of Total soluble solid showed the significant results.The maximum Total soluble solid was recorded in 25%NPK+75% vermicompost(4.60) However, 50% NPK+50% poultry manures, 50% NPK+50% FYM and25% NPK+75% goat manure are found statistically at par to 25%NPK+75% vermicompost.While the minimum Total soluble solid recorded in 100%RDF (200:100:100kgNPK) (3.25). The maximum Vitamin C was recorded in 25%NPK+75% vermicompost (7.34). However, 25%NPK+75% poultry manure, 25% NPK+75% goat manure, 50% NPK+50% FYM, 50% NPK+50% poultry manures and 75% NPK+25% poultry manures are found statistically at par to 25%NPK+75% Vermicompost.While the minimum Vitamin C recorded in 100%RDF (200:100:100kgNPK) (4.99).Vermicompost was found suitable for application in *kharif* season bottle gourd cultivation for better yield (50.59 t ha^{-1}) and highest net return (291152.00) and Benefit cost ratio (3.56)Represented under table number 2.

Treatments symbols	Treatment combinations	Vine length (m)	No. of branches/ plant	Days to first male flower appearance	Days to first female flower appearance	Days to first picking	Avg. fruit length(cm)	Avg. fruit weight(g)	Fruit diameter (cm)	No. of fruits per plant	Fruit yield per plant (kg)	Avg. Yield t/ha	TSS (°Brix)	Vitamin C
T_1	100%RDF (200 100 100kgNPK)	4.29	8.76	84.90	89.34	89.98	27.51	1.08	14.84	13.26	14.38	18.20	3.25	4.99
T_2	25%NPK+75%FYM	7.03	14.10	70.25	75.41	75.42	40.44	1.59	19.81	20.71	33.00	41.91	4.32	7.12
T_3	25%NPK+75% vermicompost	7.72	15.34	66.71	70.89	71.88	43.53	1.69	22.29	23.62	39.84	50.59	4.60	7.34
T_4	25%NPK+75% poultry manure	6.45	13.50	74.53	78.50	78.40	38.47	1.51	18.94	19.17	29.01	36.84	4.23	6.24
T_5	25% NPK+75% goat manure	6.03	12.65	77.68	82.18	81.45	36.46	1.44	18.29	17.17	24.67	31.33	4.09	6.34
T_6	50% NPK+50% FYM	6.83	13.89	73.64	78.14	76.30	39.32	1.54	19.71	19.99	30.79	39.10	4.15	6.72
T_7	50% NPK+50% vermicompost	7.22	14.26	67.15	71.79	72.37	41.49	1.63	20.97	21.28	34.68	44.04	4.56	7.18
T_8	50% NPK+50% poultry manures	6.30	12.29	76.43	82.74	80.06	37.66	1.47	18.50	18.73	27.61	35.06	4.16	6.49
T_9	50% NPK+50% goat manure	5.75	11.85	79.28	85.62	85.51	34.69	1.36	17.53	16.11	21.85	27.75	4.33	5.17
T_{10}	75% NPK+25% FYM	5.90	11.15	81.40	86.09	85.73	33.52	1.28	17.21	16.45	20.96	26.62	4.45	5.67
T_{11}	75% NPK+25% vermicompost	5.84	11.87	81.78	85.51	85.50	34.14	1.25	17.16	15.92	19.96	25.35	4.36	5.89
T_{12}	75% NPK+25% poultry manures	5.48	11.33	82.67	85.58	85.25	34.46	1.31	16.70	15.31	20.06	25.47	3.57	6.06
	F-Test	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
	S.Ed (±)	**0.219**	**0.424**	**1.078**	**0.966**	**0.700**	**0.872**	**0.038**	**0.464**	**0.660**	**0.994**	**1.262**	**0.212**	**0.342**
	C.D at 5%	**0.454**	**0.880**	**2.237**	**2.004**	**1.453**	**1.809**	**0.078**	**0.962**	**1.368**	**2.061**	**2.617**	**0.440**	**0.710**
	CV	**4.304**	**4.129**	**1.730**	**1.462**		**2.902**	**3.125**		**4.452**	**4.611**	**4.611**	**6.229**	**6.689**

Table 2: Impact of different nutrient treatment on growth character of bottle gourd

CONCLUSION

Organic manures and inorganic fertilizers treatments rendered their significant effect on almost all the growth, flowering and yield characters as well as fruit yield of bottle gourd. Treatment consisted of 25%NPK+75% Vermicompost was recorded maximum performances with respect to almost all the characters viz., growth, flowering and yield. It is concluded from the investigation that the treatment 25%NPK+75% Vermicompost was found suitable for application in kharif season bottle gourd cultivation for better yield (50.59 t ha^{-1}) and highest net return (291152.00) and Benefit cost ratio (3.56).

REFERENCES

Baghel, Satish Singh, Bose, U.S., Singh, Rajesh and Singh, S.S. (2017). Assessment of various sources of nutrients on growth, yield and yield components of bottle gourd [Lagenaria siceraria L.] *Agriculture Update*, **12**(7): 1940-1945.

Baghel, S.S., Bose, U.S. and Singh, S. S. (2017). Impact of Different Organic and Inorganic Fertilizers on Sustainable Production of Bottle Gourd [Lagenaria siceraria Ll, *International journal of pure and applied Bioscience*, **5**(2): 1089-1094.

Hamma, I. L., U. Ibrahim, and Ilaruna, Ni. (2012). Effect of poultry manure on the growth and yield of cucumber (*Cucumis sativus*) *Agriculture Food and Environment.* **8**(I):94-98.

Ikeh. A. O. Udoli, E. I., thluak, G. I. Udounan UE. 2012). Response of, cucumber (*cucumis sativus* L.) to different rates of goat and poultry' manure on an Ultisoi, *Journal of Agricultural and Social Research.*, **12**(2): 1132.

Kumar Sanjay and Singh Satendra Kumar. (2020). Effect of Different Organic Manure and Inorganic Fertilizers on Soil Characteristics and Growth Attributes and Yield of Bottle Gourd [*Lagenariasicenaria* (Mol.) Standl.] under Indo-Gangatic Belt.

Missing in text

Nagar Mukesh, A.K. Soni and D.K. Sarolia (2017). Effect of Organic Manures and Different Levels of NPK on Growth and Yield of Bottle Gourd [Lagenaria siceraria (Mol.) Standl.] *International journal of Microbiology and Applied Science* 6(5): 1776-1780.

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*, 738-740.

Sureshkumar 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.

Thriveni V., H.N. Mishra, S.K. Pattanayak, G.S. Sahoo and T. Thomson (2015). Effect of inorganic, organic fertilizers and biofertilizers on growth, flowering, yield and quality