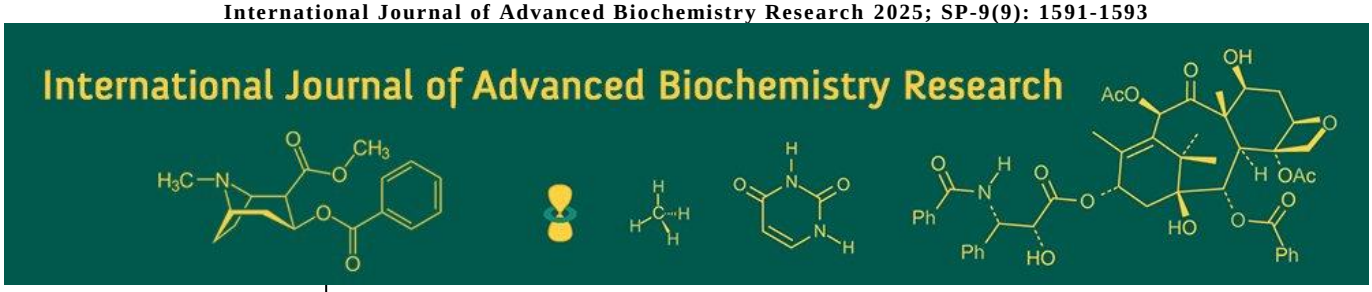

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Effect of organic and inorganic fertilizers on yield traits of bottle gourd [*Lagenaria siceraria* (Mol.) Standl.]

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Abstract
The present investigation, "Effect of organic and inorganic fertilizers on yield traits of Bottle Gourd [*Lagenaria siceraria* (Mol.) Standl.]," was conducted during summer 2024-25 at the College of Horticulture and Research Station, Sankara, Patan, MGUVV, Durg (C.G.). The experiment was laid out in a Randomized Block Design with three replications and eleven treatments comprising organic, inorganic, and integrated nutrient sources. Observations were recorded on yield, and economic traits. The study revealed that application of 50% NPK + 25% Vermicompost + 25% FYM (T_9) recorded significantly maximum number of fruits per plant (12.6), fruit weight (672.5 gm), fruit yield per plant (8.12 kg), fruit yield per plot (48.74 kg), fruit yield per ha (342.0 q/ha). Among all treatments, the bottle gourd cultivation seems to be a profitable by using treatment 50% NPK + 25% Vermicompost + 25% FYM was obtained higher net return and BCR (4.22). Thus, it can be concluded that application of 50% NPK + 25% Vermicompost + 25% FYM inorganic with vermicompost and FYM turned to be the best treatment for increasing yield and economic parameter of bottle gourd.

Keywords: Benefit-cost ratio, economic parameter, FYM, net return, vermicompost

Introduction
Bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] is an important cucurbitaceous vegetable in India, valued for its nutritional richness, medicinal properties, and economic potential. It is cultivated widely across major states, including Uttar Pradesh, Punjab, Gujarat, Rajasthan, and Chhattisgarh (Anonymous, 2021-24) [1]. The fruits are rich in minerals, carbohydrates, proteins, and vitamins, and are used in culinary preparations as well as traditional medicine for their cardioprotective, digestive, and anti-hyperlipidaemic properties.
Sustaining high yields requires balanced nutrient management. Excessive nitrogen promotes vine growth and reduces fruiting, whereas integrated use of organic manures and inorganic fertilizers improves soil fertility, nutrient availability, and productivity (Patel *et al*., 2014) [8]. FYM and vermicompost provide essential macro-and micronutrients while enhancing soil properties, and nitrogen, phosphorus, and potassium play critical roles in vegetative growth, root development, photosynthesis, and protein synthesis.
However, limited information is available on the combined use of organic and inorganic nutrient sources in bottle gourd under local conditions. Therefore, the present investigation was undertaken to study the effect of manure and fertilizer application on the growth, yield, and quality of bottle gourd.

Materials and Methods
The Experiment was carried out during summer season of the year 2024-25 at research farm village Khudmudi under College of Horticulture and research station, Sankara-Patan, Durg (C.G.). The experimental material consisted of eleven treatments including control. Different inputs used include organic (FYM, Vermicompost, Neem Cake) and inorganic fertilizers. The experiment was laid out in a Randomized Block Design (RBD) with three replications.

Treatment Details

T_0 Control
T_1 100% NPK
T_2 100% FYM
T_3 100% Neem Cake
T_4 100% Vermicompost
T_5 75% NPK + 12.5% FYM + 12.5% Neem Cake
T_6 75% NPK + 12.5% VC + 12.5 FYM
T_7 75% NPK + 9% FYM + 8% Neem Cake + 8% VC
T_8 50% NPK + 25% FYM + 25% Neem Cake
T_9 50% NPK + 25% VC + 25% FYM
T_{10} 50% NPK + 18% FYM + 16% Neem Cake + 16% VC

Climatic condition

Durg lies within the tropical climatic zone and receives the majority of its annual rainfall, ranging from about 1100 to 1276 mm, during the southwest monsoon season, primarily from June to October. Summers in the region are hot, with temperatures varying between 30 °C and 47 °C, whereas winters are mild, with temperatures ranging from 5 °C to 25 °C.

Results and Discussion

Yield Parameters

The results revealed that the significant differences were observed among treatments for number of fruits per plant, maximum fruit weight, fruit yield per plant, plot, and hectare levels (Table 1). The results showed that the maximum number of fruits per plant (12.6), maximum fruit weight (6725 gm), fruit yield per plant (8.12 kg), per plot (48.74 kg), and per hectare (342.0 q/ha) was recorded under T_9 (50% NPK + 25% vermicompost + 25% FYM), followed by T_{10} (11.8, 665.5 gm, 7.46 kg, 44.77 kg, and 314.1 q/ha, respectively). While the minimum number of fruits per plant (11.8), fruit weight (665.5 gm) and yield was obtained in the control (T_0), which produced only 3.49 kg per plant, 20.92 kg per plot, and 146.8 q/ha respectively.

The superior performance of T_9 may be attributed to the synergistic effects of integrated nutrient management, where inorganic fertilizers supplied readily available nutrients while organic manures improved soil structure, microbial activity, and sustained nutrient release. This balance promoted vigorous vine growth, enhanced photosynthetic efficiency, better flower retention, and fruit development. Similar positive effects of integrated nutrient management on cucurbits have been reported by Anjanappa *et al*. (2012) [2] and Thriveni *et al*. (2015) [11].

Economic parameter

The result showed that Significant variation in cost of cultivation, gross return, net return, and benefit-cost ratio (B:C) was observed under different nutrient management practices (Table 2). The highest cost of cultivation (₹ 73,480), was incurred with T_4 (100% vermicompost), while the lowest (₹ 38,480) was in the T_0 (control). Gross return was maximum (₹ 2,73,625.3) in T_9 (50% NPK + 25% vermicompost + 25% FYM), compared to the minimum (₹ 1,17,452.8) in T_0 (control).

Table 1: Effect of organic and inorganic fertilizers on fruit yield per plant (kg), per plot (kg) and per ha (q) of Bottle Gourd

Treatment Notation	Treatments	Number of fruits per plant	Average fruit weight (g)	Fruit yield per plant (kg)	Fruit yield per plot (kg)	Fruit yield per ha (q)
T_0	Control	8.0	393.6	3.49	20.92	146.8
T_1	100% NPK	9.4	553.1	5.61	33.65	236.2
T_2	100% FYM	8.8	457.7	4.13	24.81	174.1
T_3	100% Neem Cake	8.6	400.8	3.86	23.18	162.7
T_4	100% Vermicompost	9.1	487.4	4.51	27.04	189.8
T_5	75% NPK + 12.5% FYM + 12.5% Neem Cake	10.8	600.1	6.63	39.75	279.0
T_6	75% NPK + 12.5% VC + 12.5 FYM	11.2	625.4	6.98	41.90	294.0
T_7	75% NPK + 9% FYM + 8% Neem Cake + 8% VC	10.3	585.3	6.41	38.47	270.0
T_8	50% NPK + 25% FYM + 25% Neem Cake	10.1	578.2	6.34	38.03	266.9
T_9	50% NPK + 25% VC + 25% FYM	12.6	672.5	8.12	48.74	342.0
T_{10}	50% NPK + 18% FYM + 16% Neem Cake + 16% VC	11.8	665.6	7.46	44.77	314.1
S.E.(m)±		0.41	7.51	0.22	1.34	9.40
CD at 5%		1.23	22.16	0.65	3.91	27.45

Economic parameter

The result showed that Significant variation in cost of cultivation, gross return, net return, and benefit–cost ratio (B:C) was observed under different nutrient management practices (Table 2). The highest cost of cultivation (73,480 ₹), was incurred with T_4 (100% vermicompost), while the lowest (38,480.0₹) was in the T_0 (control). Gross return was maximum (2,73,625.3 ₹) in T_9 (50% NPK + 25% vermicompost + 25% FYM), compared to the minimum (1,17,452.8 ₹) in T_0 (control). Net return also maximum (₹2,21,245.3) in T_9 (50% NPK + 25% vermicompost + 25% FYM), while the minimum (78,327.5₹) was recorded in T_4 (100% vermicompost). Similarly, the highest B:C ratio (4.22) was obtained with T_9 (50% NPK + 25% vermicompost + 25% FYM), whereas T_4 (100% vermicompost) recorded the lowest (1.07). The superior economic performance of T_9 can be attributed to enhanced yield and efficient nutrient use through integrated organic and inorganic fertilization. Comparable results were reported by Kumar *et al*. (2012) [2], Baghel *et al*. (2017) [3], and Prasad *et al*. (2016) [9] in bottle gourd.

Table 2: Effect of organic and inorganic fertilizers on economics of different treatment.

Treatment Notation	Treatments	Total cost of cultivation (Rs.)	Gross Return (Rs.)	Net Return (Rs.)	B: C Ratio
T_0	Control	38,480.0	1,17,452.8	78,972.8	2.05
T_1	100% NPK	43,780.0	1,88,936.2	1,45,156.2	3.32
T_2	100% FYM	48,480.0	1,39,278.1	90,798.1	1.87
T_3	100% Neem Cake	60,480.0	1,30,143.8	69,663.8	1.15
T_4	100% Vermicompost	73,480.0	1,51,807.5	78,327.5	1.07
T_5	75% NPK + 12.5% FYM + 12.5% Neem Cake	46,455.0	2,23,184.5	1,76,729.5	3.80
T_6	75% NPK + 12.5% VC + 12.5 FYM	48,080.0	2,35,228.9	1,87,148.9	3.89
T_7	75% NPK + 9% FYM + 8% Neem Cake + 8% VC	47,915.0	2,15,990.2	1,68,075.2	3.51
T_8	50% NPK + 25% FYM + 25% Neem Cake	49,130.0	2,13,484.4	1,64,354.4	3.35
T_9	50% NPK + 25% VC + 25% FYM	52,380.0	2,73,625.3	2,21,245.3	4.22
T_{10}	50% NPK + 18% FYM + 16% Neem Cake + 16% VC	52,050.0	2,51,315.0	1,99,265.0	3.83

Conclusion

On the basis of above findings, it is concluded that the treatment T_9 (50% NPK + 25% vermicompost + 25% FYM) was recorded the best among all the treatment combination with maximum number of fruits per plants (12.6), maximum fruit weight (672.5 gm) and yield (8.12 kg/plant, 48.74 kg/plot, 342.0 q/ha), maximum net return (₹2,21,245.3), and the highest B:C ratio (4.22). The advantage of T_9 was due to the combined benefits of inorganic fertilizers providing immediate nutrient availability and organic manures improving soil health and sustained nutrient release.

Hence, the integrated application of 50% NPK with 25% vermicompost and 25% FYM may be recommended as the most effective practice for improving productivity, profitability, and sustainability in bottle gourd cultivation.

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