



International Journal of Horticulture and Food Science

E-ISSN: 2663-1067
P-ISSN: 2663-1075
NAAS Rating: 4.74
www.hortijournal.com
IJHFS 2025; 7(7): 47-50
Received: 22-04-2025
Accepted: 27-05-2025

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Studies on nutrient management on growth and yield of bottle gourd *Lagenaria siceraria* (L.) var. Pusa Naveen

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DOI: <https://www.doi.org/10.33545/26631067.2025.v7.i7a.336>

Abstract

A field experiment was conducted at Research Farm of Mewar University, Chittorgarh (Rajasthan) during *Summer* season (March to June), 2025 on medium black soil, which consisted nine treatments viz., control T₀: Control, T₁: FYM @ 20 ton/ha, T₂: FYM @ 10 ton + NPK 25:15:25kg/ha (50% RDF), T₃: Vermicompost @ 5 ton/ha, T₄: Vermicompost @ 2.5 ton +NPK 25:15:25 kg/ha (50% RDF), T₅: Poultry manure @ 5 ton/ha, T₆: Poultry manure @ 2.5 ton+ NPK 25:15:25 kg/ha (50% RDF), T₇: Neem cake 0.5 ton/ha and T₈: Neem cake 0.25 ton + NPK 25:15:25 kg/ha (50% RDF) Randomized Block Design (RBD). The bottle gourd variety “Pusa Naveen” was used for experiment.

Results clearly showed that growth parameters viz., vine length (cm), appearance of 1st female flowers, maximum yield parameters viz. fruit length, fruit weight, number of fruits/plant and total yield significantly higher recorded under T₆: Poultry manure @ 2.5 ton + NPK 25:15:25 kg/ha (50% RDF) over control and remained at par with T₄: Vermicompost @ 2.5 ton +NPK 25:15:25 kg/ha (50% RDF).

Keywords: FYM, RDF, Bottle gourd, vine length and yields

Introduction

Cucurbitaceae family is a largest group of vegetables crops which provide the major contribution for economically important domesticated species and are cultivated form medicinal and nutritional value. Among all plants of the Cucurbitaceae family, *Lagenaria* species is one of the most popular cucurbits. Bottle gourd belongs to the genus *Lagenaria* that is derived from the word *lagena*, meaning ‘the bottle’. It seems that bottle gourd was originated from India because its wild races are found in Dehradun (high humid area and Malabar coastal area). Bottlegourd [*Lagenaria siceraria* (Mol.) Standl.)] is one of the most popular cucurbitaceous crops grown in India and entire world.

The bottle gourd is monoecious and there is highly variable range in the male to female sex ratio. The production of staminate flower is normally much more than pistillate flowers. However, ultimately only pistillate flowers contribute to the yield in the crop. So, it is highly important to achieve a shift in favour of pistillate flowers in bottle gourd crop. Consumption of bottle gourd has been associated with a number of functional properties and health benefits: Anti-hyper-lipidemic activity, analgesic and anti-inflammatory activity, diuretic activity, anti-oxidant activity, immuno-modulatory activity, hepato-protective activity, cardio-protective activity, anti-diabetic activity, central nervous system activity, hypertensive activity, anticancer activity, CNS depressant activity.

Nutrient management plays an important role in boosting up the yield of vegetable crops. Integrated use of organic manure, inorganic fertilizers and biofertilizers, as a source of plant nutrients helps in building up soil health and productivity of crops. It helps in improving soil physical and biological properties. It supplies the various nutrients required by the plant in a balanced form and avoids ill effects on soil health, those associated with the use of inorganic fertilizers. Thus, this system supplies all the nutrients judiciously to increase yield in a sustainable way. Hence, the integrated approach of plant nutrient supply is indispensable for sustaining the production potential of vegetable crops.

Farmyard Manure (FYM) is the traditional organic manure and is most readily available to the farmers. The value of FYM in soil improvement is also due to its content of micro nutrients and its ability to improve soil health and aeration, as well as water holding capacity of soil and to stimulate the activity of microorganisms, which in turn will greatly help the availability of nutrient elements to crop plants.

Fertilizers have played a major role in increasing crop productivity. Over use of these chemical fertilizer causes the problem of environmental pollution and deterioration of soil structure and also there is problem of loss of applied fertilizers through leaching, volatilization and DE nitrification of nitrogen and fixation of phosphorous. Besides their prices increases day by day. The continuous and indiscriminate use of inorganic fertilizers lead to decrease the nutrient uptake and adversely affect the quality of vegetables.

Materials and Methods

The field experiments were carried out during *summer* season (March-June) of 2025 to study the “Studies on Nutrient Management in Bottle Gourd [*Lagenaria siceraria* (L.) Var. Pusa Naveen]” in Randomized Block Design (RBD) with consisted nine treatments viz., control T₀: Control, T₁: FYM @ 20 ton/ha, T₂: FYM @ 10 ton + NPK 25:15:25kg/ha (50% RDF), T₃: Vermicompost @ 5 ton/ha, T₄: Vermicompost @ 2.5 ton +NPK 25:15:25 kg/ha (50% RDF), T₅: Poultry manure @ 5 ton/ha, T₆: Poultry manure @ 2.5 ton+ NPK 25:15:25 kg/ha (50% RDF), T₇: Neem cake 0.5 ton/ha and T₈: Neem cake 0.25 ton + NPK 25:15:25 kg/ha (50% RDF) at Research Farm, Mewar University, Chittorgarh (Rajasthan). The experimental farm is geographically located at 074°63'59" E longitude and 25°0'33" N latitude and this region falls under agro-climatic zone IV A of Rajasthan. The experimental fields were medium black soil and the soil fertility status contained available nitrogen (137.8 kg ha⁻¹) by Subia and Asija 1996, available phosphorus (16.3 kg ha⁻¹) by Olsen *et al.* 1954 and available potassium (250.12 kg ha⁻¹). The organic carbon content was from 0.34-0.38 per cent. The weekly mean maximum and minimum temperatures were of temperature during both summers (40.6 °C) and winters (2.7 °C). The mean relative humidity fluctuated from 63.50 to 91 per cent during the crop season. The average rainfall is 557 mm per annum, which is mostly received during July to September. The sporadic showers during winters are also common, which are probably observed during this period. The observation were recorded at harvest was analysed by statistical methods.

Results and Discussion

It is clear from the result of present study that, nutrient management had significantly affected the growth and yield parameters of bottle gourd at harvest. Application of T₆: Poultry manure @ 2.5 ton + NPK 25:15:25 kg/ha (50% RDF) recorded the highest growth parameters viz. vine length (284.66 cm) at harvest and 1st appearance of female flowers (35.25) which was remained statistically at par with T₄: Vermicompost @ 2.5 ton +NPK 25:15:25 kg/ha (50% RDF) (Table-1). Vine length and 1st appearance of female flowers increased with the application of organic and inorganic sources of nutrients due to increased cell division and cell elongation at higher level of nutrients. Probably the increase in auxin supply with higher levels of nitrogen

brought about increase in the dry matter and branches per plant.

The observed improvement might be due to an early and plentiful availability of nutrients leading to better nutritional environment in the root zone for growth and development. As nitrogen is one of the major essential plant nutrients required for growth (Budige *et al.*, 2021 and Somvanshi *et al.*, 2024) ^[1, 2]. It is obvious that phosphorus and potassium has long been considered as an essential constituent of all living organism, which plays an important role in conservation and transfer of energy in metabolic reactions of living cells including biological energy transformations. Phosphorus not only plays an important role in root development and proliferation but also improves water uptake by supplying assimilates to the roots. It is the main constituent of co-enzymes, ATP and ADP which act as "energy currency" within plants. Almost every metabolic reaction of any significance proceeds viz., phosphate derivatives. Thus, phosphorus influenced photosynthesis, biosynthesis of protein and phospholipids, nucleic acid synthesis, membrane transport and cytoplasmic streaming. Similar results were reported by Sharma *et al.*, 2014 and Sebastian *et al.*, 2024) ^[8, 7].

Table 1: Studies on nutrient management on vine length and appearance of 1st female flower (days) of bottle gourd

Treatment	Vine length (cm)	Appearance of 1 st female flower (days)
T ₀	138.75	61.29
T ₁	175.78	54.41
T ₂	203.48	54.07
T ₃	209.58	50.21
T ₄	280.51	41.13
T ₅	239.31	49.95
T ₆	284.66	37.25
T ₇	150.24	59.48
T ₈	248.15	46.17
SEm±	8.01	1.06
CD (P=0.05)	23.9	3.20
CV (%)	7.25	6.78

Table 2: Studies on nutrient management on yield parameters of bottle gourd

Treatment	Fruit length (cm)	Fruit weight (g)	Number of fruits/plant	Yield (t/ha)
T ₀	20.05	671.33	10.59	9.99
T ₁	23.94	753.43	13.38	18.79
T ₂	25.43	794.51	14.75	21.8
T ₃	25.51	803.89	15.03	20.65
T ₄	30.65	898.11	18.66	23.88
T ₅	27.02	847.39	16.57	23.12
T ₆	30.72	903.32	19.08	26.32
T ₇	22.38	710.77	12.03	23.28
T ₈	29.43	854.32	16.96	24.30
SEm±	0.48	11.76	0.42	0.78
CD (P=0.05)	1.45	35.32	1.28	2.35
CV (%)	6.98	8.78	4.88	6.38

Further yield parameters and yields like fruit length (30.72 cm), fruit weight (903.32 g), number of fruits/plant (19.08) and yield (26.32 t/ha) presented in Table 2, recorded with the application of T₆: Poultry manure @ 2.5 ton + NPK 25:15:25 kg/ha (50% RDF) over control but it was remained statistically at par with T₄: Vermicompost @ 2.5 ton +NPK 25:15:25 kg/ha (50% RDF). Yield components by

enhancing cell division, cell elongation process and photosynthetic activity leading to production and accumulation of more carbohydrates and auxins which

favours retention of more flowers ultimately leading to more number of reproductive parts plant⁻¹ (Sinha *et al.*, 2023 and Thakur *et al.* 2024) [5, 4].

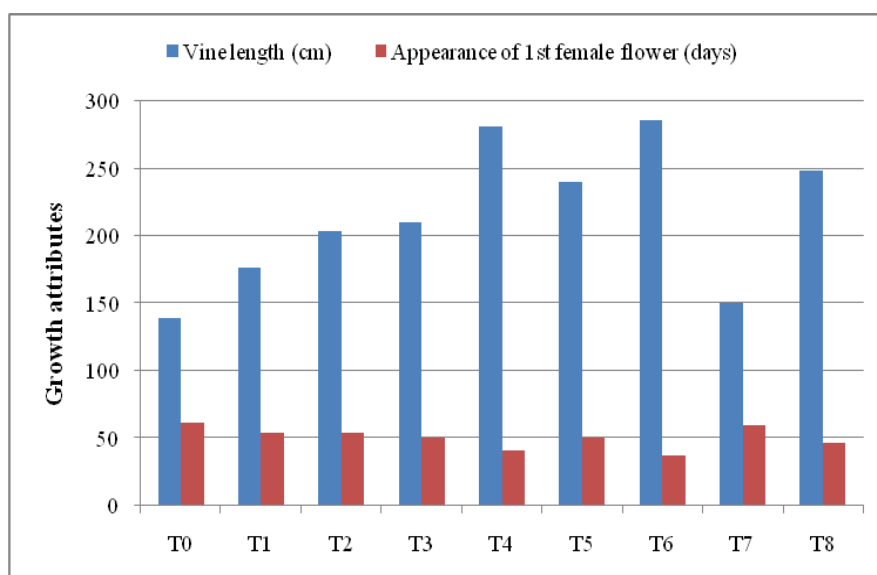


Fig 1: Studies on nutrient management on growth parameters of bottle gourd

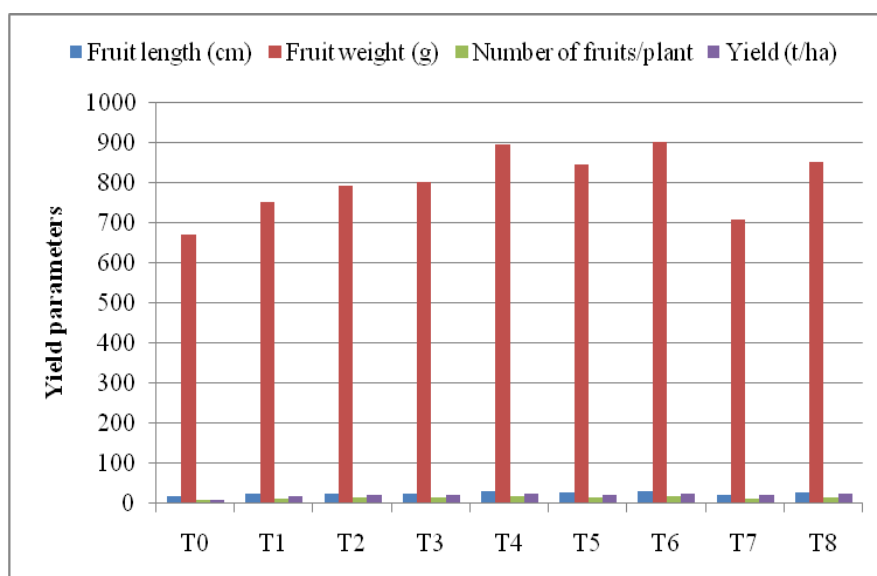


Fig 2: Studies on nutrient management on yield parameters and yields of bottle gourd

Conclusion

Based on the results of one-year experimentation, it may be concluded that the Application of T₆: Poultry manure @ 2.5 ton + NPK 25:15:25 kg/ha (50% RDF) found suitable to produce good yield of bottle gourd.

Acknowledgments

A feeling of sincere and heartfelt gratitude envelops me as I draft this acknowledgement. I acknowledge my esteemed Major Advisor, advisory committee, Head, Department of Agriculture (Horticulture), faculty members and non-teaching staff of Department of Agriculture (Horticulture), Mewar University, Chittorgarh for providing me the necessary help and suggestions during the course of the study.

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