



Effect of different levels of NPK on growth and yield of brinjal (*Solanum melongena* L.)

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Summary

A field trial was conducted to evaluate the effect of different levels of NPK on the growth and yield of brinjal (*Solanum melongena* L.). The experiment comprised five treatments with different NPK levels i.e. control, 50:25:25 kg ha⁻¹, 75:37.5:37.5 kg ha⁻¹, 100:50:50 kg ha⁻¹ and 125:62.5:62.5 kg ha⁻¹ and replicated three times. Results indicated that growth parameters such as plant height, number of leaves per plant, number of branches per plant, and branch length, as well as yield parameters like the number of fruits per plant, fruit length, fruit diameter, fruit weight, and yield per plant, were significantly highest with T₅ (125:62.5:62.5 kg NPK ha⁻¹), followed by T₄. The lowest values were observed in the control treatment.

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Introduction

Brinjal (*Solanum melongena* L.) belongs to the non-tuberous species of the nightshade family. It is a widely cultivated vegetable in tropical and subtropical regions and is often grown as a tender or half-hardy annual in temperate climates. India is considered its center of origin (Zeven & Zhukovsky 1975). Brinjal is valued not only for its culinary uses but also for its high nutritional content and medicinal properties. Brinjal is rich in essential minerals such as potassium, calcium, sodium, and iron (Mohamed et al. 2003), as well as dietary fiber, which makes it beneficial for human health. Additionally, the plant contains an alkaloid called solanine, found in its roots and leaves, which possesses medicinal properties. It is particularly useful for diabetes management and is an effective remedy for liver disorders. Several studies have also highlighted the therapeutic potential of brinjal in reducing blood cholesterol levels. Its extracts and tissues have been traditionally used in the treatment of ailments such as asthma, cholera, bronchitis, and diarrhea.

Proper nutrient management is essential for maximizing brinjal growth and yield. Nitrogen plays a crucial role in plant development as it is a fundamental component of proteins, nucleic acids, and chlorophyll. It promotes vegetative growth by enhancing cell division and elongation. However, excessive nitrogen application can negatively impact flower and fruit production, leading to reduced yield (Parida & Das 2005; Vishnu Priya et al. 2019). Phosphorus, another essential macronutrient, supports energy transfer, root development, flowering, and fruit set. It is an integral part of nucleic acids, coenzymes, phosphoproteins, and phospholipids. Adequate phosphorus availability enhances early root establishment and helps plants absorb moisture and

nutrients more efficiently (Grant et al. 2001; Akshay et al. 2018). Potassium plays a significant role in photosynthesis, enzyme activation, and the transportation of assimilates from leaves to other plant parts. It improves fruit quality, enhances shelf life, and increases flower and fruit yield. Additionally, potassium regulates water uptake, improves stress tolerance, and strengthens plant immunity.

However, improper and imbalanced fertilizer application often leads to suboptimal growth and yield. Farmers frequently face challenges related to the high cost of inorganic fertilizers and low nutrient use efficiency, which hinder optimal nutrient management. One of the key factors contributing to lower brinjal productivity in central Uttar Pradesh is the suboptimal and unbalanced use of fertilizers. Thus, the present study was undertaken to evaluate the effects of different levels of NPK on the growth and yield of brinjal, aiming to determine the most effective fertilization strategy for enhancing productivity.

Materials and Methods

A field experiment was conducted at the Shardhey Bhagwati Singh Research Farm, Chandra Bhanu Gupta Agriculture P.G. College, B.K.T., Lucknow, during the *Kharif* season of 2022-2023. The study involved five levels of NPK (Control, 50:25:25 kg ha⁻¹, 75:37.5:37.5 kg ha⁻¹, 100:50:50 kg ha⁻¹ and 125:62.5:62.5 kg ha⁻¹) in a Randomized Block Design (RBD) with three replications. The Pusa Purple Long variety of brinjal was selected due to its superior performance under central Uttar Pradesh conditions. Seeds were sown in nursery beds in the last week of June. Standard cultural practices, including irrigation, weeding, intercultural operations, and plant protection measures, were implemented. Twenty-five days old seedlings (3-4 leaf stage) were transplanted at a spacing of 60 × 45 cm. The first harvest was conducted when the fruits attained a length of 15-20 cm, followed by subsequent harvesting at 3-4-day intervals.

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Vegetative parameters such as plant height, the number of leaves per plant, the number of branches per plant, and branch length were recorded at 30, 45, and 60 days after transplanting. Yield parameters, including fruit length, fruit diameter, fruit weight, the number of fruits per plant, and yield per plant, were assessed at harvest. The total brinjal yield per hectare was determined by summing the yields from different harvests.

Results and Discussion

The NPK poses a significant effect on various growth parameters of brinjal, which is clearly evident from the experimental findings and is shown in Table 1 & Table 2. It has been observed that significantly high value of plant height (73.70 cm), no. of leaves per plant (12.44), no. of branches per plant (18.35) and branch length (22.48 cm) was obtained with the application of T₅

Table 1. Effect of different on NPK on growth parameter of brinjal

Treatments	Plant height (cm)	No. of leaves per plant	No. of branches per plant	Branch length (cm)
T ₁ (Control)	55.75	9.88	11.31	12.75
T ₂ (50:25:25 kg NPK ha ⁻¹)	62.97	10.88	13.66	15.77
T ₃ (75:37.5:37.5 kg NPK ha ⁻¹)	65.38	10.89	15.21	18.22
T ₄ (100:50:50 kg NPK ha ⁻¹)	71.10	11.62	16.33	18.44
T ₅ (125:62.5:62.5 kg NPK ha ⁻¹)	73.70	12.44	18.35	22.48
SE±	0.62	0.17	0.21	1.43
CD(P=0.05)	2.06	0.17	0.71	4.81

Among the different NPK levels, applying doses of T₅ (125:62.5:62.5 kg NPK ha⁻¹) recorded significantly highest no. of fruit plant⁻¹ (29.69), fruit length (21.49 cm), fruit diameter (5.87 cm), fruit weight (43.32 g), yield plant⁻¹ (2.91 kg) and yield ha⁻¹ (29.69 t). The significantly lowest no. of fruit plant⁻¹ (23.50), fruit length (15.37 cm), fruit diameter (4.68 cm), fruit weight (36.47 g), yield plant⁻¹ (2.17 kg) and yield ha⁻¹ (21.38 t) was observed with control (Table 2).

The increase in number of fruit in T₅ (125:62.5:62.5 kg NPK ha⁻¹) treatment might be due to the beneficial effect

(125:62.5:62.5 kg NPK ha⁻¹). While the lowest value of the plant height (55.75 cm), no. of leaves per plant (9.88), no. of branches per plant (11.31), and branch length (12.75 cm) was noticed with T₁ treatment (Table 1). The growth of plants during the vegetative stage is mostly controlled by their NPK nutrition because "photosynthates transported to sites of growth are used primarily in the synthesis of nucleic acid and protein" (Mengel and Kirkby, 1982). As a consequence, a higher NPK dosage of 125:62.5:62.5 kg NPK ha⁻¹ promoted cell division, which increased plant height, no. of leaves per plant, no. of branch per plant, and branch length. The results support the reports of Prabhu et al. (2003), Agarwal et al. (2007), Jilani et al. (2009) and Nafiu et al. (2011).

of NPK on stimulation of growth, development of plant and formation of fruits and showed improved fruit attributes. It also might have helped in higher nutrient availability likely facilitated better photosynthate translocation and favourable microclimatic conditions during the crop growth period had favoured to reproductive plant part which led to improved fruit yield and its component. Similar results were recorded by Arshad et al. (2002) Sollapur & Hiremath (2017) and Hariyadi et al. (2021) in brinjal.

Table 2. Effect of different level on NPK on yield parameter of brinjal

Treatments	No. of fruits plant ⁻¹	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	Yield plant ⁻¹ (kg)	Yield hectare ⁻¹ (t/ha)
T ₁ (Control)	23.50	15.37	4.68	36.47	2.17	21.38
T ₂ (50:25:25 kg NPK ha ⁻¹)	24.88	16.12	5.09	38.24	2.32	23.93
T ₃ (75:37.5:37.5 kg NPK ha ⁻¹)	25.60	17.24	5.19	39.31	2.45	24.77

T ₄ (100:50:50 kg NPK ha ⁻¹)	27.29	18.97	5.35	40.81	2.62	26.69
T ₅ (125:62.5:62.5 kg NPK ha ⁻¹)	29.69	21.49	5.87	43.52	2.91	29.69
SE±	0.27	0.07	0.04	0.08	0.13	0.13
CD(P=0.05)	0.88	0.25	0.36	0.27	0.44	0.43

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