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Influence of nutrients on growth of ginger (*Zingiber officinale* Rosc.) cv. IISR Mahima

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Abstract
The present research entitled "Influence of nutrients on growth of ginger (*Zingiber officinale* Rosc.) cv. IISR Mahima" was undertaken at COH under DBSKKV, Dapoli. The experiment was conducted during the *kharif* season of 2025 – 2026. The experiment was laid out in RBD with 10 treatments and 3 replications. Among all the treatments T_9 (125:50:150 NPK kg/ha + FYM 25t/ha) was the most effective nutrient application for maximizing the growth of ginger as it recorded the highest values in growth parameters such as plant height (79.12 cm), number of leaves (139.65) and number of tillers (17.78). Economic analysis also showed that 125:50:150 NPK kg/ha + FYM 25t/ha recorded the highest B:C ratio (2.58) demonstrating superior profitability over the other treatment. The study concluded that application of 125:50:150 NPK kg/ha + FYM 25t/ha is recommended for achieving maximum growth and plant health of ginger in Konkan conditions

Keywords: Ginger, growth and nutrient doses

Introduction

Ginger (*Zingiber officinale* Rosc.) is a perennial herb belonging to the family same as that of cardamom that is zingiberaceae and is believed to have originated in tropical regions of Asia. Ginger is one of the most commonly consumed dietary condiment in the world. Its spicy aroma is mainly due to presence of ketones, especially the gingerols. The rhizome, which is the horizontal stem from which the roots grow, is the main portion of ginger that is consumed. The oleoresin from the rhizomes of ginger is an excellent source of several bioactive phenolics, including non-volatile pungent components such as gingerols, paradols, shagoals and zingerones (Bode *et al.*, 2011) [1]. In Maharashtra, ginger cultivation is predominantly concentrated in districts such as *Satara*, Sangli, Pune, Ahmednagar, Kolhapur and Solapur along with certain areas of Marathwada and Vidarbha. Within the Konkan region, especially in Ratnagiri, Sindhudurg and parts of Thane district, ginger is mainly cultivated in homestead gardens for household consumption, with only limited quantities entering local markets (Yadav, 2009) [2].

Nutritionally, ginger contains proteins (2-3%)%), fats (0.9%), minerals (1.2%), carbs (12.3%) and dietary fiber (5.19%) and calcium 16 mg. It is a good source of essential nutrients such as calcium, phosphorus, iron and several vitamins (Thakur, 2021).

Appropriate fertilizer application can enhance crop productivity, thereby increasing farmers income and overall suitable fertilizer doses helps maintain soil fertility, prevents nutrient depletion and supports sustainable agricultural practices. Growth characteristics including plants height, leaf area and biomass accumulation are strongly influenced by nutrient availability and serve as important indicators of crop performance. In addition to increasing yield, balanced fertilization improves rhizome quality, including attributes such as aroma, flavor and market acceptability.

Materials and Methods

The seed rhizomes of ginger cultivar IISR – Mahima were obtained from Nursery No. 4, COH, Dapoli – 415712, Dist – Ratnagiri (M.S). Rhizomes were raised in protrays, 30 days old seedling were transplanted in the field. Dapoli is located on the western coastal belt of Maharashtra along the Arabian Sea and experiences a typical humid climate. Geographically it lies at 17^0 45' latitude and 73^0 11' E longitude at an elevation of about 280m above mean sea level. The region is characterized by warm and humid weather conditions, with the mean temperature ranging between 18.5° C and 34.5°C throughout the year. Area falls under a high rainfall zone, receiving an annual precipitation of approximately 3500 mm, predominantly distributed from June to September due to the South West monsoon.

The soil of the experimental field was red lateritic soil having good water holding capacity with pH between 5.6 to 6.0. For providing the major nutrients to ginger, urea, single super phosphate and muriate of potash were used as source of the nutrients. Healthy seedling were transplanted at a spacing of 40 x 40 cm in eco

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nomic returns. Moreover, determining uniform cultural operations were carried out for all the treatments before and during transplanting. The influence of nutrients on growth of the crop was evaluated in terms of plant height, number of leaves/plant, and number of tillers at 30, 60, 90, 120, 150 and 180 DAT. Ten plants from each treatment bed were randomly selected for recording observations.

Treatment details

Sr. No.	Treatments	Treatment details
1.	T_1	75:50:100 NPK kg/ha + FYM 25t/ha
2.	T_2	75:50:125 NPK kg/ha + FYM 25t/ha
3.	T_3	75:50:150 NPK kg/ha + FYM 25t/ha
4.	T_4	100:50:100 NPK kg/ha + FYM 25t/ha
5.	T_5	100:50:125 NPK kg/ha + FYM 25t/ha
6.	T_6	100:50:150 NPK kg/ha + FYM 25t/ha
7.	T_7	125:50:100 NPK kg/ha + FYM 25t/ha
8.	T_8	125:50:125 NPK kg/ha + FYM 25t/ha
9.	T_9	125:50:150 NPK kg/ha + FYM 25t/ha
10.	T_{10}	Control (75:50:50 NPK kg/ha + FYM 25t/ha)

The data collected from the experiments were analyzed by adopting the procedure described by Panse and Sukhatme (1985).

Result and discussion

The growth of ginger is significantly influenced by the application of fertilizers, as nutrients supplied through fertilizers play an important role in various physiological and biochemical activities of the plant. Adequate nutrient availability supports essential plant processes, resulting in improved growth characteristics such as plant height, leaf production, and leaf development. Proper fertilization also enhances nutrient absorption, promotes healthy vegetative growth. An appropriate balance of nutrients is therefore important for achieving vigorous plant growth and maintaining sustainable crop health.

Plant height (cm)

The study revealed that different nutrient levels had significant effects on plant height of ginger. The highest plant height (79.12 cm) was recorded under T_9 (125:50:150 NPK kg/ha + 25t FYM/ha) which was at par with T_8 (78.86 cm) and T_6 (77.91 cm). The shortest height (64.41 cm). The results demonstrate that increasing fertilizer levels significantly enhanced plant morphological characteristics. Higher application of nitrogen and potassium promoted vigorous vegetative growth through improved nutrient uptake, cell division, chlorophyll synthesis and photosynthetic activity. These findings are supported by Verma *et al.* (2009) [3] and Seyie (2011) [4] in ginger.

Number of leaves/plant

The study showed that different nutrient levels significantly affected number of leaves/plant in ginger. Treatment T_9 recorded the highest number of leaves per plant (139.65). The lowest number of leaves per plant (68.91) were observed under the control treatment T_{10}. . Increased Nitrogen encouraged chlorophyll formation and vegetative growth, while higher Potassium enhanced photosynthetic activity and enzyme functions that promoted vigorous growth and continuous leaf initiation.

Leaf length (cm)

The study revealed that different nutrient levels had significant effects on leaf length of ginger with the maximum leaf length of (26.70 cm) in T_9 (125:50:150 NPK kg/ha) which was at par with treatments T_8 (25.81 cm) and T_6 (25.33 cm). The lowest leaf length (19.08 cm) was recorded in the control T_{10} treatment. The increase in leaf length with increasing fertilizer levels are likely to be attributed to the adequate supply of essential nutrients, particularly nitrogen and potassium, which promote cell division, cell elongation and chlorophyll synthesis, thereby enhancing vegetative growth. Nitrogen plays a fundamental role in protein synthesis and photosynthesis, while potassium regulates enzyme activities, water balance and translocation of photosynthates, resulting in greater leaf length.

Table 1. Influence of nutrients on growth of ginger

Treatments	Plant height	Number of leaves/plant	Leaf length (cm)
T_1	68.45	128.58	19.57
T_2	69.47	130.50	21.30
T_3	72.95	131.98	22.93
T4	73.78	132.13	23.70
T_5	75.35	135.44	24.83
T_6	77.91	136.98	25.33
T_7	74.20	134.33	24.16
T_8	78.86	137.10	25.81
T_9	79.12	139.65	26.70
T_{10}	64.41	68.91	19.08
Mean	73.45	127.57	23.34
S. Em. (±)	1.16	2.51	0.86
CD @ 5%	3.45	7.45	2.57

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Conclusion

The study concluded that the morphological characteristics of ginger cv. IISR Mahima were increased under the application of treatment T_9 (125:50:150 kg NPK/ha + FYM 25t/ha) which recorded the highest plant height, number of leaves and leaf length in terms of growth and nutrient uptake.

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