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Effect of plant growth regulators on growth of chilli type Keshori local

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Abstract

The present investigation entitled “Effect of plant growth regulators on growth of chilli type Keshori local” was conducted during the late *kharif* season of 2025-2026 at the Farm of Horticulture Section, College of Agriculture, Nagpur. The experiment was laid out in a Randomized Block Design (RBD) with three replications comprising seven treatments, viz., NAA at 30, 40 and 50 ppm and GA₃ at 20, 40 and 60 ppm. The observations recorded on growth parameters of chilli.

Among the different treatments, GA₃ at 60 ppm (T₆) recorded the maximum plant height. However, NAA at 50 ppm (T₃) recorded the maximum plant spread, number of primary branches plant⁻¹, while the early flower initiation and 50% flowering were also recorded under NAA at 50 ppm (T₃). Overall, NAA at 50 ppm (T₃) was found to be the most effective treatment for improving growth of chilli and was comparable with NAA at 40 ppm (T₂) and GA₃ at 60 ppm (T₆).

Keywords: Chilli, plant growth regulators, NAA, GA₃, growth, height, flowering, growth attributes

Introduction

Chilli (*Capsicum annum* L.), belonging to the family Solanaceae, has 2n = 24 chromosomes and is an important spice and vegetable crop cultivated in tropical, subtropical and warm temperate regions. It performs well under warm, humid conditions in well-drained, fertile soils rich in organic matter (Kondapa *et al.*, 2009). Chilli was introduced into India by the Portuguese from Brazil in 1584, with its subsequent spread involving different routes and locally adapted types (Poornima *et al.*, 2025; Genetic Diversity, Phylogenetic Tree and Principal Component Analysis Based on Morpho-Metric Traits of Assam Chilli, 2018).

Plant growth regulators (PGRs) play an important role in regulating various physiological processes associated with plant growth, flowering, fruit set and fruit development. Their application at appropriate concentrations and growth stages can improve vegetative growth and yield attributes in chilli. Among the commonly used PGRs, naphthalene acetic acid (NAA) and gibberellic acid (GA₃) are important in promoting cell division, cell elongation, flowering, fruit set and fruit development (Chaudhary *et al.*, 2006) [2].

‘Keshori’ is a locally cultivated chilli variety of Maharashtra, particularly prominent in eastern Vidarbha. It is valued for its pungency and is utilized both as a green chilli and after processing into powder. Improving its productivity requires appropriate crop and nutrient management.

The response of chilli to PGR application varies with the type and concentration of the regulator, cultivar, method and time of application and prevailing environmental conditions. An appropriate concentration may enhance growth and yield, whereas excessive application may adversely affect crop performance. Therefore, identification of suitable PGRs and their optimum concentrations is essential for improving productivity. Hence, the present investigation was undertaken to study the effect of different concentrations of NAA and GA₃ on growth and yield of chilli and to identify the most effective treatment for enhancing crop productivity.

Materials and Methods

The present investigation entitled “Effect of plant growth regulators on growth and yield of chilli” was conducted during the late *khari* season of 2025-26 at the Farm of Horticulture Section, College of Agriculture, Nagpur. The experiment was laid out in a Randomized Block Design (RBD) with three replications and seven treatments comprising NAA at 30, 40 and 50 ppm and GA₃ at 20, 40 and 60 ppm.

Healthy and uniform 30-day-old chilli seedlings were transplanted on raised beds at a spacing of 60 cm × 30 cm. The recommended dose of fertilizers and other standard cultural practices were uniformly followed in all treatments. The respective plant growth regulator treatments were applied through foliar spraying as per the treatment schedule. Observations were recorded on growth and flowering attributes, including plant height, plant spread, number of primary branches plant⁻¹, days to flower initiation and days to 50% flowering.

Results and Discussion

Growth parameters

Data on plant height, plant spread, number of primary branches plant⁻¹, days to flower initiation, days to 50% flowering influenced by plant growth regulators were recorded and presented in Table 1.

Plant height was not significantly influenced by the treatments at 30 DAT. However, significant differences were observed at 60 and 90 DAT. At 60 DAT, the maximum plant height was recorded with GA₃ at 60 ppm (T₆) (50.07 cm), followed by NAA at 50 ppm (T₃) (48.38 cm), while the minimum height was recorded in the control (T₇) (42.21 cm). While 90 DAT the maximum plant height recorded (70.39 cm) in T₆ (GA₃ at 60 ppm), which was at par with T₃ (NAA at 50 ppm) (68.30 cm), whereas the control recorded the minimum plant height (60.51 cm). The enhanced plant height under GA₃ may be attributed to its role in promoting cell division, cell elongation and internodal elongation, resulting in vigorous vegetative growth.

Similar beneficial effects of GA₃ on plant height have been reported by Balraj *et al.* (2002) ^[1], Chaudhary *et al.* (2006) ^[2], Anolisa *et al.* (2020) ^[3]. Also supporting observations of Kannan *et al.* (2002) ^[6], and Baghel and Singh (2024) ^[4] regarding the positive influence of NAA on vegetative growth in chilli.

Plant spread was not significantly influenced by the treatments at 30 DAT. However, significant differences were observed at 60 and 90 DAT. At 60 DAT, the maximum plant spread was recorded with NAA at 50 ppm (T₃) (29.96 cm), followed by NAA at 40 ppm (T₂) (27.63 cm), whereas the control recorded the minimum spread (21.32 cm). At 90 DAT, T₃ recorded the maximum plant spread (43.05 cm), followed by T₂ (40.85 cm) and GA₃ at 60 ppm (T₆) (39.24 cm), while the minimum value was observed in T₇ (34.32 cm). The greater plant spread under NAA at 50 ppm may be associated with enhanced cell division and elongation, improved nutrient uptake and efficient translocation of assimilates, which promoted lateral vegetative growth.

Similar responses to NAA and GA₃ application have been reported by Chaudhary *et al.* (2006) ^[2], Anolisa *et al.* (2020) ^[3], Baghel and Singh (2024) ^[4].

The number of primary branches plant⁻¹ was not significantly affected at 30 DAT, whereas significant differences were observed at 60 and 90 DAT. At 60 DAT, the maximum number of primary branches was recorded with NAA at 50 ppm (T₃) (7.50), which was at par with NAA at 40 ppm (T₂) (7.29) and GA₃ at 60 ppm (T₆) (6.96). At 90 DAT, T₃ recorded the highest number of primary branches (10.44), followed by T₂ (9.38), while the minimum number was recorded in the control (7.01). The increased branching under NAA at 50 ppm may be attributed to enhanced cell division, cell elongation and assimilate translocation, which favoured lateral growth and branch initiation.

Similar improvement in branching due to NAA and GA₃ application has been reported by Balraj *et al.* (2002) ^[1], Kannan *et al.* (2002) ^[6], Anolisa *et al.* (2020) ^[3].

Flower initiation and 50% flowering significantly influenced flowering behaviour. The earliest flower initiation was recorded with NAA at 50 ppm (T₃) at 42.58 days, followed by NAA at 40 ppm (T₂) at 43.63 days and GA₃ at 60 ppm (T₆) at 44.09 days. Similarly, T₃ recorded the earliest 50% flowering (61.21 days), followed by T₂ (62.59 days) and T₆ (63.40 days). In contrast, the control (T₇) required the longest period (49.95 days) for flower initiation and 50% flowering (70.56). The earlier flowering under NAA may be attributed to its role in regulating physiological processes associated with floral induction and development.

These findings are in agreement with earlier reports of Kannan *et al.* (2002) ^[6], Chaudhary *et al.* (2006) ^[2], Anolisa *et al.* (2020) ^[3], Baghel and Singh (2024) ^[4].

Table 1: Effect of plant growth regulators on growth attributing characters of chilli

Treatments	Plant height (cm) 90 DAT	Plant spread (cm) 90 DAT	Primary branches plant ⁻¹ 90 DAT	Days to flower initiation	Days to 50% flowering
T ₁ (NAA 30 ppm)	61.16	37.05	8.02	46.76	65.11
T ₂ (NAA 40 ppm)	63.52	40.85	9.38	43.63	62.59
T ₃ (NAA 50 ppm)	68.30	43.05	10.44	42.58	61.21
T ₄ (GA ₃ 20 ppm)	62.69	35.22	7.10	48.44	68.27
T ₅ (GA ₃ 40 ppm)	66.01	36.35	7.68	47.11	67.20
T ₆ (GA ₃ 60 ppm)	70.39	39.24	8.67	44.09	63.40
T ₇ (Control)	60.51	34.32	7.01	49.95	70.56
'F' test	Sig.	Sig.	Sig.	Sig.	Sig.
SE±	2.00	1.90	0.36	1.58	2.02
CD at 5%	6.05	5.75	1.08	4.78	6.12

Conclusion

The present investigation revealed that foliar application of plant growth regulators significantly influenced the growth

and flowering attributes of chilli cv. Keshori local. Among the treatments, NAA @ 50 ppm (T₃) was found to be the most effective, recording maximum plant spread, primary

branches plant⁻¹, early flower initiation and minimum days to 50% flowering. However, GA₃ @ 60 ppm (T₆) recorded the maximum plant height. Overall, NAA @ 50 ppm was identified as the most suitable treatment for improving growth and promoting early flowering in chilli under the conditions of the present investigation.

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