



## Research Article

# EFFECT OF PLANT GROWTH REGULATORS ON GROWTH AND YIELD OF CAPSICUM (*CAPSICUM ANNUUM* VAR. GROSSUM)

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**Abstract:** A field experiment was conducted at the Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat during November, 2016 to April, 2017 to assess the effect of plant growth regulators on growth and yield of Capsicum (*Capsicum annuum* var. *grossum*). The experiment was laid out with Randomized Block Design and replicated three times. There were seven treatments consisting of T<sub>1</sub> (PCPA @ 50 ppm), T<sub>2</sub> (PCPA @ 75 ppm), T<sub>3</sub> (NAA @ 25 ppm), T<sub>4</sub> (NAA @ 50 ppm), T<sub>5</sub> (2,4-D @ 1 ppm), T<sub>6</sub> (2,4-D @ 3 ppm) and T<sub>7</sub> (Control). The results revealed that growth characters were significantly influenced by the application of NAA treatments. The highest plant height (96.90 cm) and number of leaves per plant (49.64), were recorded in T<sub>4</sub> (NAA @ 50 ppm) followed by T<sub>3</sub> (NAA @ 25 ppm). The highest number of seeds per fruit, pericarp thickness and fruit yield per plant (1581.13 g) were found in treatment T<sub>4</sub>. All the growth and yield parameters were significantly poor in T<sub>7</sub> (Control).

**Keywords:** PCPA, NAA, 2,4-D, Growth, Yield, Capsicum

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## Introduction

Capsicum is a high value crop, which is usually grown all over the world and has excellent prospects both for domestic and export market. Capsicum is a rich source of Vitamin A, B, C, antioxidants and minerals like Ca, P, K and Fe [1]. It is the only variety of Capsicum species where capsaicin is absent, which gives hotness to the Capsicum species. Capsicum requires warm and humid climate with a temperature range of 20 to 27°C. Optimum soil temperature is 21 to 29°C. The soil should not be water logged. They are sensitive to an abundance of moisture and excessive temperatures [2]. Nehara *et al.* (2006) [3] observed that NAA increases ethylene formation in plants, which facilitates the efficient translocation of photosynthates from source to sink. Though the plant growth regulators have great potentiality to influence plant growth and morphogenesis, its application has to be judiciously planned in terms of optimal concentrations, stage of application, species specificity, season etc. So, there is a scope to apply plant growth regulators to minimize those production problems and generate good amount of income.

## Materials and Methods

The present investigation was carried out during Rabi season (November, 2016 to March, 2017) at Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat. It is situated between 26°47'N latitude and 94°12'E longitude at an elevation of 86.8 m above mean sea level. Three plant growth regulators with two concentrations of each (PCPA, 50 and 75 ppm; NAA, 25 and 50 ppm; 2,4-D, 1 and 3 ppm and control) were applied as foliar spray at 30 DAP and at initiation of crown flower bud. The trial was laid out in Randomized Block Design with three replications. The seedlings were transplanted at a distance of 60×45cm. Twenty plants were maintained in a plot of 5.06 m<sup>2</sup> area. The plant height and number of leaves per plant were recorded in 120 days and 60 days after planting respectively.

## Results and Discussion

The data presented in [Table-1] revealed that plant height was significantly increased by application of 50 ppm NAA. This might be due to increase in photosynthetic activity, efficient translocation and utilization of photosynthates causing rapid cell elongation and cell division at growing region of the plant leading to stimulation of growth, besides increasing the uptake of nutrients [4]. These results are in accordance with Raj *et al.*, (2016) [5] and Tomar *et al.*, (2017) [6]. Highest number of leaves per plant was recorded in treatment T<sub>4</sub> (NAA @ 50ppm) followed by T<sub>3</sub> (NAA @ 25 ppm) and T<sub>2</sub> (PCPA @ 75 ppm). The minimum was found in control. This might be due to the capacity of auxin to delay leaf senescence and abscission. Again, auxin coordinate the phyllotaxis of leaf initiation from the shoot apical meristem (SAM), and determined the location and initiation of leaflets from the margin of leaf primordia [7]. Similar findings were also reported by Kalshyam *et al.*, (2012) [8] and Sahu *et al.*, (2017) [9]. Number of seeds per fruit was found highest in 50 ppm NAA, and the lowest was obtained in 75 ppm PCPA. Application of PCPA induces formation of parthenocarpic fruit. This result is in accordance with the findings of Sridhar *et al.*, (2009) [10] and Patel *et al.*, (2015) [11]. Again, the plants sprayed with NAA remained more active to build up sufficient food reserve for developing seed, which increased the number of seeds. Such results were also obtained by Natesh, *et al.*, (2005) [12] and Shantappa *et al.*, (2009) [13]. In case of fruit pericarp thickness, the highest value was found in 50 ppm NAA. The probable reason might be due the positive correlation between seed number and pericarp thickness in capsicum. Similar finding was reported by Tiwari and Singh (2014) [14]. A significant influence of treatments on fruit yield per plant was observed with 1581.13 g plant<sup>-1</sup> in 50 ppm NAA. Application of NAA increased plant growth by enhancing the rate of cell enlargement, cell division and differentiation, which resulted in higher photosynthetic activity. Thus, increased cell size and photosynthetic activity together resulted into increase in fruit number and weight, which in turn increased the yield This result is in conformity with the findings of Sultana *et al.*, (2006) [15].

Table-1 Mean of growth and yield of Capsicum as influenced by plant growth regulators

| Treatments  | Plant height (cm) | Number of leaves per plant | Number of seeds per fruit | Pericarp thickness (cm) | Yield per plant (g) |
|-------------|-------------------|----------------------------|---------------------------|-------------------------|---------------------|
| PCPA 50 ppm | 93.95             | 44.84                      | 2.77                      | 0.46                    | 1186.28             |
| PCPA 75 ppm | 95.19             | 48.2                       | 1.75                      | 0.51                    | 1418.57             |
| NAA 25 ppm  | 95.86             | 48.83                      | 126.94                    | 0.62                    | 1470.28             |
| NAA 50 ppm  | 96.9              | 49.64                      | 146.06                    | 0.67                    | 1581.13             |
| 2,4-D 1 ppm | 92.2              | 43.37                      | 46.46                     | 0.61                    | 1000.56             |
| 2,4-D 3 ppm | 91.72             | 42.8                       | 35.45                     | 0.56                    | 1025.31             |
| Control     | 89.62             | 42.27                      | 113.64                    | 0.38                    | 802.75              |
| S.Ed±       | 0.19              | 0.33                       | 0.65                      | 0.02                    | 2.5                 |
| CD at 5%    | 0.41              | 0.72                       | 1.41                      | 0.04                    | 5.43                |

### Conclusion

On the basis of above findings, it may be concluded that NAA was better than the other plant growth regulators for growth and yield of capsicum. Again, among different concentrations of NAA, 50 ppm was more fruitful compared to other. So, NAA 50 ppm can be recommended to the growers for better production under Assam condition.

**Application of research:** It will help in increasing the production and yield of capsicum.

**Research Category:** Vegetable Science

### Abbreviations:

PCPA: 4-Chlorophenoxyacetic acid

NAA: Naphthaleneacetic acid

2,4-D: 2,4- Dichlorophenoxyacetic acid

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**Study area / Sample Collection:** Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat

**Cultivar / Variety name:** *Capsicum annuum* Var. Grossum

**Conflict of Interest:** None declared

**Ethical approval:** This article does not contain any studies with human participants or animals performed by any of the authors.  
Ethical Committee Approval Number: Nil

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