

Original Research Article

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Influence of Growth Regulators for Growth and Yield Attributes in Brinjal (*Solanum melongena* L)

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ABSTRACT

The present investigation entitled “Effect of growth regulators for growth, yield and quality in brinjal (*Solanum melongena* L) cv. CO 2” was carried out during 2017 at Vanavarayar Institute of Agriculture, Manakkadavu, Pollachi. The studies were carried out with 8 different treatments involving the growth regulators (NAA@ 20 ppm, NAA@ 40 ppm, GA₃@ 20 ppm, GA₃@ 40 ppm, 2,4-D@ 2ppm, 2,4-D@ 4ppm, Water spray and Control), sprayed at 20 and 40 DAT. The experiment was laid out in a randomized block design (RBD) with three replications and data on effect of different growth regulators on growth, yield and quality attributes was recorded and statistically analyzed. Among the treatments, the data recorded on plant height at 30 DAT revealed that there was significant difference among the treatments. Among the growth regulator, T₄ – GA₃ @ 40ppm concentration significantly increased the plant height (40.10 cm), Data on plant height at 60 DAT. Maximum plant height was recorded with T₄ – GA₃ @ 40ppm (54.30 cm), At 90 DAT, maximum plant height was recorded with T₄ – GA₃ @ 40ppm (76.50 cm). The data recorded on number of leaves at 30 DAT. T₄ – GA₃ @ 40ppm concentration significantly increased the number of leaves (22.50). Data on number of leaves at 60 DAT. Maximum numbers of leaves was recorded with T₄ – GA₃ @ 40ppm (49.20). At 90 DAT, maximum number of leaves was recorded with T₄ – GA₃ @ 40ppm (87.20), the highest number of primary branches was recorded in T₄ – GA₃ @ 40ppm (7.30), number of secondary branches was observed in T₄ – GA₃ @ 40ppm (18.70). Earliest days to first flowering was recorded in T₄ – GA₃ @ 40ppm (37.50days). The number of flower per plant T₄ – GA₃ @ 40ppm (24.60), the highest number of fruit set (%) was observed in T₄ – GA₃ @ 40ppm (57.80), number of fruits per plant, the highest number of fruits per plant was observed in T₄ – GA₃ @ 40ppm (17.80).

Keywords

Brinjal, Growth regulators, Growth, Flower, Yield

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Introduction

Brinjal (*Solanum melongena* L., 2n = 24) is a widely adaptive and highly productive vegetable crop of tropical and subtropical regions world, which suffers from various abiotic and biotic stresses (Kaur *et al.*, 2004). It is one of the most popular vegetable crops in many parts of the world including India. The crop is cultivated on small family farms and considered to be important source of nutrition and cash income for many resource poor farmers (Bose *et al.*, 1993). The brinjal is

of much importance in the warm areas of Far East, being grown extensively in India, Bangladesh, Pakistan, China and the Philippines. In India, it is one of the most common, popular and principal vegetable crops grown throughout the country except higher altitudes. It is a versatile crop adapted to different agro-climatic regions and can be grown throughout the year. It is a perennial but grown commercially as an annual crop. A number of cultivars are grown in India, consumer preference being dependent upon fruit color, size and shape (Gopalan *et al.*,

2007). The fruits are known for being low in calories and having a mineral composition beneficial for human health. They are also rich source of Potassium, Magnesium, Calcium and Iron (Zenia *et al.*, 2008). Plant growth regulators like promoters, inhibitors or retardants play a key role in controlling internal mechanisms of plant by interacting with key metabolic processes such as, nucleic acid metabolism and protein synthesis. Use of the growth regulators (PGRs) might be a useful alternative to increase crop production. Recently, there has been global realization of the important role of PGRs in increasing crop yield. Gibberellic acid is an important growth regulator that may have many uses to modify the growth, yield and yield contributing characters of plant (Rafeekher *et al.*, 2002). Plant growth regulators are used widely to improve plant performance. Maximum fruit set occurs from long styled and medium styled flowers. No fruit set occurs from pseudo short-styled and true short styled flowers. Pseudo short styled and true short styled flowers are converted into long-styled, and medium styled flowers when they were treated with different growth regulators and it is possible to get fruits from those flowers (Ravestijn, 1983). This study was therefore initiated to investigate the best dose of the PGRs under consideration in single or combined application that improve brinjal fruit yield and quality.

Materials and Methods

The experimental field is situated at the south farm of Vanavarayar Institute of Agriculture Manakkadavu, Pollachi. Which is located at 10.7° N and 76° E with an altitude of 195 m above MSL. The experiment was laid out in randomized block design with replicated three times. Spaced at 60 x 60 cm were selected for the experiment. Two plots were selected for each replication for the study. Treatments details are T₁-NAA@20ppm, T₂-

NAA@40ppm, T₃-GA₃@20ppm, T₄-GA₃@40ppm, T₅-2,4-D@2ppm, T₆2,4-D@4ppm, T₇-water spray and T₈-Control

Results and Discussion

Influence of growth regulators on growth attributes

The growth regulators significantly increased growth parameters such as plant height, number of leaves per plant, number of primary branches and number of secondary branches. Growth promoters have been defined as the chemicals that enhance the cell division and cell elongation in the shoot apex and increase the plant height physiologically without formative effects (Scurfield and Moore, 1958).

In the present investigation, data on effect of plant growth regulators on growth parameters in brinjal are furnished in (Table 1). The T₄ – GA₃@ 40ppm concentration significantly increased the plant height (40.10 cm) and Followed by T₂– NAA @ 40ppm were recorded plant height (36.20 cm) at 30 DAT. T₄ - GA₃@ 40ppm (54.30 cm) followed by T₂- NAA @ 40ppm (47.62 cm) at 60 DAT. T₄ – GA₃@ 40ppm (76.50 cm) followed by T₂– NAA @ 40ppm (70.71 cm) at 90 DAT. In case of number of leaves per plant was observed in for all the 30, 60 and 90 DAT, T₄ – GA₃@ 40ppm concentration significantly increased the number of leaves (22.50) and Followed by T₂– NAA @ 40ppm were recorded number of leaves (18.20). With respect to the number of primary branches, and number of secondary branches was significantly influenced by the growth regulators for foliar application. T₄ – GA₃@ 40ppm (7.30) followed by T₂– NAA @ 40ppm (6.90) and the lowest number of primary branches was registered in the T₈-Control (4.20). In case of number of secondary branches was observed in T₄ – GA₃@ 40ppm (18.70) followed by T₂– NAA

@ 40ppm (17.40). True to the definition, the growth regulators used in the present investigation significantly increased the plant height and number of leaves per plant at all stages. The application of growth promotive substances increased the plant height and such effect was due to increased photosynthetic activity, enhancement in the mobilization of photosynthates, rapid increase in sugars, there by changing in the membrane permeability (Shukla *et al.*, 1997). The increased plant height with GA₃ might be due to intermodal

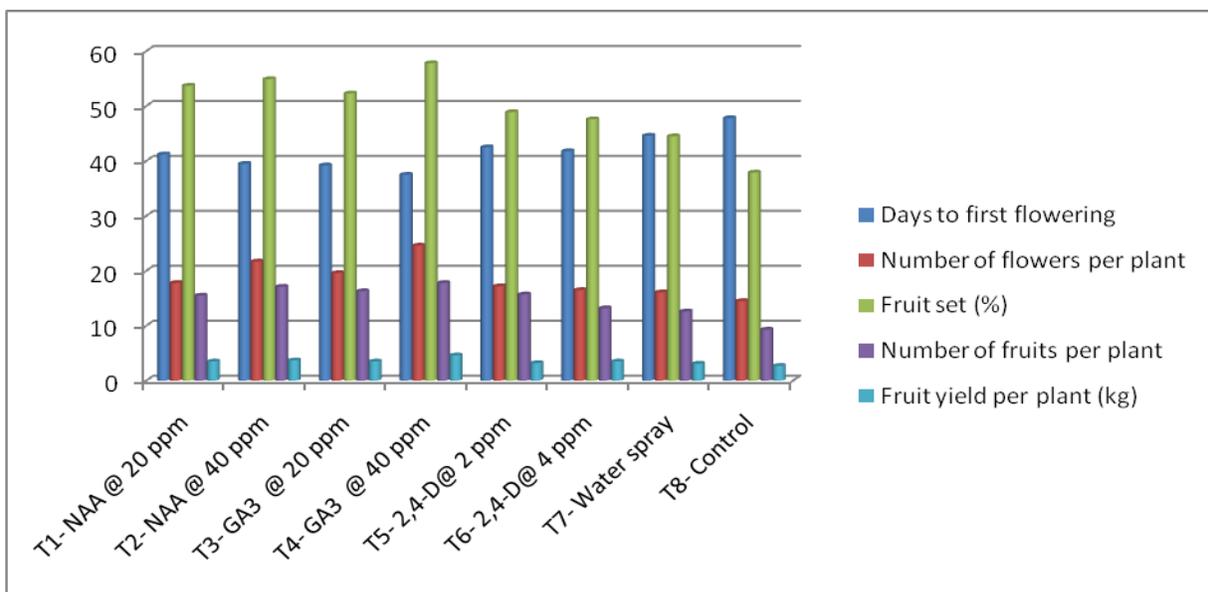
elongation which was also reported by Sen and Subhodh (1968) in bhendi. Similar findings of increase in plant height by GA₃ were also reported by Abdul *et al.*, (1985).

The increase in the growth parameters by GA₃ treatment may be probably due to cell elongation and quicker multiplication of cell in the growth points as soon as the germination starts. Similar results were also reported by Singh and Kumar (1998) and Kumar *et al.*, (1997) in okra (Fig. 1).

Table.1 Effect of growth regulators on morphological parameters in brinjal cv. CO 2

Treatment details	Plant height (cm)			Number of leaves /plant			Number of primary branches	Number of secondary branches
	30 DAT	60 DAT	90 DAT	30 DAT	60 DAT	90 DAT		
T ₁ - NAA @ 20 ppm	34.80	42.60	54.50	17.31	42.50	81.15	4.60	13.30
T ₂ - NAA @ 40 ppm	36.20	47.62	70.71	18.20	46.50	85.50	6.90	17.40
T ₃ - GA ₃ @ 20 ppm	28.90	44.42	66.25	17.70	43.15	82.60	5.30	16.50
T ₄ - GA ₃ @ 40 ppm	40.10	54.30	76.50	22.50	49.20	87.20	7.30	18.70
T ₅ - 2,4-D@ 2 ppm	25.80	40.30	64.50	17.40	40.90	81.30	5.74	15.20
T ₆ - 2,4-D@ 4 ppm	28.18	42.10	69.20	17.50	42.70	83.80	6.60	16.80
T ₇ - Water spray	29.02	43.14	60.30	15.20	39.30	82.00	4.60	13.30
T ₈ - Control	20.10	34.24	48.50	13.10	38.20	68.90	4.20	9.30
SEd	1.83	2.58	3.77	1.01	2.50	4.76	0.34	0.89
CD (0.5%)	3.93	5.54	8.08	2.17	5.36	10.26	0.72	1.92

Fig.1 Effect of growth regulators on flowering and yield attributes in brinjal cv. CO 2



Influence of growth regulators on flowers and yield attributes

The aim of any applied research is to maximize the yield. Yield in any crop is a multiplicative factor of fruit size and number of fruits, harvested from the plant. Flowering and fruit set are the most critical events occurring after establishment of a crop (Davenport and Nunez-Elisea, 1990). Other possible inductive factors in flowering can be proper nutrition (carbohydrate and nitrogen status of the plant), photoperiod and plant hormones, and other yet undetermined factors (Bernier *et al.*, 1981).

In the present investigation, Application of different levels of growth regulators through foliar application has caused a significant effect on the days to first flowering and number of flower per plant. The earliest days to first flowering was recorded in T₄ – GA₃@ 40ppm (37.50days) followed by T₂– NAA @ 40ppm (39.50days). With respect to the number of flower per plant T₄ – GA₃@ 40ppm (24.60) followed by T₂– NAA @ 40ppm (21.70), the highest number of fruit set (%) was observed in T₄ – GA₃@ 40ppm (57.80) followed by T₂– NAA @ 40ppm (54.90), the highest number of fruits per plant was observed in T₄ – GA₃@ 40ppm (17.80) followed by T₂– NAA @ 40ppm (17.10). The highest number of fruits per plant was noticed in T₄ – GA₃@ 40ppm (4.60 kg) followed by T₂– NAA @ 40ppm (3.70 kg). According to Marschner (1995), a balanced supply of nitrogen promoted the translocation of phytohormones to the shoot, probably inducing the flower and fruit initiation. In the present investigation, the important economic traits namely, fruit weight and number of fruits were dramatically influenced by different levels of growth regulators and botanicals. This is might be due to the higher levels of IAA in the leaves of the branches that produced more flowers in late February

suggested the involvement of IAA in flower-bud development. The growth regulators are capable of redistribution of dry matter in the plant thereby bringing about an improvement in yield which depends not only on the accumulation of photosynthates during crop growth and development but also on its partitioning in the desired storage organs. These in turn, are influenced by the efficiency of metabolic processes within the plant system. The maximum number of fruits per plant was recorded in GA₃ 40 ppm over all other treatments, followed by NAA40 ppm. This is in agreement with the findings of earlier researchers who have explained that the application of GA₃ increased the number of fruits per plant (Mahesh kumar and Sen, 2005). The yield depends on the accumulation of photo assimilates and partitioning in different plant parts. The yield in okra was found to be strongly influenced by the application of different growth regulators and thus indicating the importance of these compounds in increasing the yield potential through their effect on various growth and yield parameters. The application of GA₃ had a significant influence on fruit yield per plot and fruit yield per hectare. The increase in fruit yield could be attributed to betterment in the morphological traits, growth parameters and yield attributes. The positive influence of GA₃ on yield of okra was also reported by Kumar *et al.*, (1997) and Vijayraghavan (1999). Increase in yield was observed in plants sprayed with NAA might be due to stimulating effect of auxins on various vegetative growth characters including dry weight, which might have helped in having highest yield. Similar increase in fruit yield due to application of growth substances was reported by Gasti *et al.*, (1997).

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