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Research Article

EFFECT OF PLANT GROWTH REGULATOR ON GROWTH AND FRUIT YIELD OF BRINJAL

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Abstract: The experiment was carried out in the Instructional cum Research Farm, Department of Horticulture, Biswanath College of Agriculture (AAU) Biswanath Chariali, Sonitpur district of Assam during 2014-15 in order to study the effect of plant growth regulators on growth and fruit yield of brinjal (*Solanum melongena* L.) cv. JC -1. The experiment was laid out in a Randomized Block Design with three replications accommodating ten treatments in each replication. The details of treatment comprised of GA_3 (25, 50 and 100 ppm), IAA (25, 50 and 100 ppm), NAA (25, 50 and 100 ppm) and control (distilled water). During the period of investigation the growth regulators showed significant response on morphological, Physiological and yield attributing characters of brinjal. The result revealed that morphological characters with respect to plant height (93.70 cm), number of leaves per plant (53.10) and number of branches per plant (6.90) were significantly improved by GA_3 treatment at 100 ppm (T_3). The maximum leaf area index (2.82) was recorded under GA_3 at100 ppm (T_3) while GA_3 at 50 ppm (T_2) recorded the highest (802.40 g) total dry weight per plant at harvest. However, the highest leaf chlorophyll content index (44.50) was recorded under treatment with NAA at 50 ppm (T_8). The treatment with GA_3 at 50 ppm (T_2) exhibited significantly higher total number of flower per plant (38.49), number of fruit per plant (18.56) and fruit yield (1.58 kg/plant and 377 q/ha). It may be concluded from the experiments that GA_3 proved to be the best in improving the morphological, physiological and yield attributing parameters in brinjal.

Keywords: Brinjal, Plant Growth Regulator, Growth, Fruit yield

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Introduction

Brinjal (*Solanum melongena L.*) is a widely adaptive and highly productive vegetable crop of tropical and subtropical regions world, which suffers from various abiotic and biotic stresses [1]. 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 region and can be grown throughout the year. It is a perennial but grown commercially as an annual crop. The maximum potential yield of brinjal is not achieved due to its poor physiological efficiency, poor plant architecture, poor fruit setting and none synchronize maturity [2]. Application of plant growth regulators (PGRs) may play an important role in proper flowering, fruit setting, synchronize maturity, ripening and thereby increase in the physiochemical efficiency and yield of the crops. One of the major problem associated with brinjal are flower and fruit drop resulting in poor fruit yield. The market demand and consumer preference of brinjal depends upon fruit colour, size, shape and stage of maturity [3]. Use of PGRs may increase the productivity of brinjal in terms of quality and quantity and thereby increase the market price and profitability. Since brinjal is a popular vegetable in India, therefore yield and quality improvement of the crop is of considerable importance. The PGRs play an important role in improvement of quality besides improving the productivity. Therefore, the present investigation was designed to find out the suitable plant growth regulators for increasing the yield potential in brinjal.

Material and Methods

An experiment was conducted at the Instructional cum Research Farm, Department of Horticulture, Biswanath College of Agriculture (Assam Agricultural University) Biswanath Chariali, Sonitpur district of Assam during 2014-15. The experimental site was situated at 26°43'32'' N latitude and 93°08'01'' E longitude having an elevation of 86.70 m above mean sea level. The soil of the experimental site is derived from the alluvial deposits of the river Brahmaputra. The experiment was laid out in a Randomized Block Design with three replications accommodating ten treatments in each replication given in [Table-1]. Three plant growth regulators namely GA_3 (25, 50 and 100 ppm), IAA (25, 50 and 100 ppm) and NAA (25, 50 and 100 ppm) were selected for the experiment. Each growth regulators was used in three concentrations at 40 days after transplanting when one or two flower buds appear in each plots. The variety JC-1 was selected. The fruit are elongated, medium sized, purple with pointed apex, maturity 130 days, no incidence of phomopsis blight and little leaf virus, wilt and borer infestation are moderate. The healthy seedling were transplanting one month after sowing at the spacing of 75 cm x 60 cm. During the course of experimentation the observation were recorded from five representative plants in each replication for each treatment. The height of the plant, number of physiologically mature leaves per plant and number of branches per plant was measured and counted at 40, 60 days after transplanting and at harvest. Observation recorded during field experimentation was subjected to the statistical analysis of variance by Randomized Block Design (RBD). Significance and non-significance of the variance due to different treatments were determined by calculating the respective 'F' value as the method described by Panse and Sukhatme (1985) [4].

Results and Discussion

Morphological characters

Plant growth regulators had significant effect on the morphological parameters. Results revealed that GA_3 exhibited an increase in plant height, number of leaves, number of branches per plant and the maximum number of flower per plant while the lowest were recorded in control [Table-1].

Table-1 Effect of plant growth regulators on growth parameters at different stages in Brinjal

Treatment	Plant Height (cm)			Number of green leaves/plant			Number of branches/plant			Total number of flower per plant
	40 DAT	60 DAT	At harvest	40 DAT	60 DAT	At harvest	40 DAT	60 DAT	At harvest	
T_0- Control	36.13	59.33	70.57	14.27	39.24	33.70	4.27	4.70	5.19	25.20
T_1- GA_3 25 ppm	51.00	75.95	91.42	28.61	55.70	50.24	4.73	5.50	5.90	30.63
T_2- GA_3 50 ppm	53.93	79.53	92.90	27.64	58.10	52.62	5.30	6.30	6.40	31.49
T_3- GA_3 100 ppm	53.00	80.40	93.70	28.96	58.62	53.10	5.33	6.47	6.90	28.90
T_4- IAA 25 ppm	49.07	74.40	87.80	24.90	50.59	45.09	5.10	5.87	6.30	28.71
T_5- IAA 50 ppm	42.87	67.00	80.36	20.90	42.63	37.10	5.20	6.00	6.44	25.80
T_6- IAA 100 ppm	38.53	61.47	74.91	19.90	40.43	34.90	4.60	4.93	5.50	23.30
T_7-NAA 25 ppm	45.07	71.93	74.40	21.20	43.20	37.71	4.93	5.47	5.93	26.56
T_8- NAA 50 ppm	40.13	63.57	76.80	24.53	49.73	38.20	5.10	5.67	6.15	25.91
T_9- NAA 100 ppm	40.07	61.13	85.36	21.40	43.70	44.20	5.00	5.60	6.05	23.82
SEm (±)	6.94	0.45	1.13	0.32	0.71	0.73	0.32	0.12	0.23	0.64
CD (P ≤ 0.05)	NS	0.95	2.42	0.67	1.47	1.48	NS	0.25	0.48	1.52

Table 2. Effect of plant growth regulators on physiological and yield parameters at different stage in Brinjal

Treatments	Leaf area index		Chlorophyll Content Index		Total dry weight at harvest (g/plant)	No. of fruit per plant	Fruit yield (kg/plant)	Fruit yield (q/ha)
	40 DAT	60 DAT	40 DAT	60 DAT				
T_0- Control	1.10	2.21	20.10	24.00	702.90	11.34	1.38	324.01
T_1-GA_3 25 ppm	1.60	2.50	22.57	26.63	760.05	18.23	1.50	355.00
T_2- GA_3 50 ppm	1.70	2.70	24.73	31.10	802.40	18.56	1.58	377.00
T_3- GA_3 100 ppm	1.90	2.82	28.90	33.17	768.93	18.11	1.54	365.33
T_4- IAA 25 ppm	1.30	2.50	35.53	37.53	743.72	15.89	1.47	346.33
T_5- IAA 50 ppm	1.40	2.60	37.00	38.90	742.70	13.00	1.46	348.33
T_6- IAA 100 ppm	1.40	2.30	38.00	39.89	724.72	12.67	1.44	338.00
T_7-NAA 25 ppm	1.40	2.64	33.80	35.70	728.90	14.56	1.42	333.03
T_8- NAA 50 ppm	1.50	2.70	42.60	44.50	717.54	14.11	1.41	332.01
T_9- NAA 100 ppm	1.50	2.50	40.37	42.27	713.34	11.56	1.40	329.03
SEm (±)	0.13	0.14	1.46	1.36	6.38	0.84	0.01	1.54
CD (P ≤ 0.05)	0.32	0.34	3.08	2.86	13.43	1.82	0.02	3.26

Netesh *et al*., 2005 [5] reported similar results in chilli. This might be due to promoting effect of GA_3 in protein synthesis which consequently enhanced biomass production of vegetative part [6]. GA_3 promoted flower primodia in tomato [7] and increase the number of flowers per plant by increasing the number of flower cluster and number of branches [8]. Similar results were also obtained by several workers in various vegetables like snap bean [9]; okra [10] and tomato [11]. The maximum number of flowers per plant was recorded under GA_3 at 50 ppm at 50 ppm while the minimum was recorded in control [Table-1]. GA_3 promoted flower primodia in tomato [7] and increased the number of flowers per plant by increasing the number of flower cluster and number of branches [8].

Physiological characters

Leaf area index (LAI) and total dry matter at harvest were found maximum with application of GA_3 while the minimum was recorded in control [Table-2]. Rahman *et al*. (2004) [12] observed increase in LAI and total dry matter production with GA_3 treatment. GA_3 induced acceleration of vegetative growth resulting in an extensive photosynthetic apparatus and relative increase in LAI. Similar result was reported by Hoque and Haque (2002) [13] in mung bean and Chatterjee and Choudhuri (2012) [14] in cowpea. The Chlorophyll content index increased with advancement of plant growth till 60 DAT. The maximum chlorophyll content was recorded at NAA at 50 ppm while the minimum chlorophyll content was found in control (Table-2). The highest chlorophyll content with the application of NAA was observed by Ramesh and Ramprasad (2013) [15] in soybean. This might be due to decline in chlorophyll degradation because of the protection of chlorophyll molecule from photo oxidation and increased chlorophyll synthesis. Similar resultswere reported by Prakash *et al*. (2003) [16] in black gram and Rajesh *et al*. (2014) [17] in green gram.

Yield parameters

Significant differences in respect to number of fruit per plant and fruit yield were observed due to different growth regulator treatments. Maximum number of fruits per plant and fruit yield was observed with GA_3 at 50 ppm while the minimum was found under control [Table-2]. The results are also corroborated to that of Hidayatullah *et al*. (2012) [18]. This might be due to enhanced fruit setting. The increase in the number of fruits were associated with increased production of flower, coupled with the reduction in flower and fruit drop that ultimately increased the percentage of fruit set [16]. Similar results were reported by Choudhury *et al*. (2013) [8] and Akand *et al*. (2015) [19] in tomato.

Conclusion

It may be concluded from the experiments that GA_3 proved to be the best in improving the morphological, physiological and yield attributing parameters in brinjal.

Application of research: The study showed that the application of GA_3 improved the morphological, physiological and yield attributing parameters in brinjal.

Research Category: Crop and Vegetable Sciences.

Abbreviations: GA_3- Gibberellic acid; NAA- Naphthaleneacetic acid; IAA- Indole-3-acetic acid; ppm- Parts per million

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