EFFECT OF PLANT GROWTH REGULATORS ON PLANT GROWTH, YIELD AND FRUIT QUALITY OF BRINJAL

ABSTRACT

The present investigation was carried out with title "**Effect of Plant Growth Regulators on Plant growth, Yield and Fruit quality of Brinjal (*Solanum melongena* L.)**" at the Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj, Uttar Pradesh during the *Kharif*-2021-22 with a view to determine the effect of plant growth regulators application on brinjal hybrid variety Indam Supriya for its growth, quality and yield and to work out the economics of various treatments. Under this experiment, overall 9 treatments was taken T_1 Control (water spray), T_2 (GA_3 @ 5 ppm), T_3 (GA_3 @ 10 ppm), T_4 (Salicylic acid @ 50 ppm), T_5 (Salicylic acid @ 75 ppm), T_6 (GA_3 @ 5 ppm and Salicylic acid @ 50 ppm), T_7 (GA_3 @ 10 ppm and Salicylic acid @ 50 ppm), T_8 (GA_3 @ 5 ppm and Salicylic acid @ 75 ppm) and T_9 (GA_3 @ 10 ppm and Salicylic acid @ 75 ppm). From the above experimental finding it was concluded that the treatment T_5 (Salicylic acid @ 75 ppm) was found to be best in the terms of growth yield and quality of brinjal. While, the highest net return was found in the T_5 with Rs. 1,18,290 and the highest B:C ratio was found in the same with 2.3

Keywords: Plant growth regulators, GA_3, Salicylic acid, Benefit cost ratio.

INTRODUCTION

Brinjal are horticulture crop belongs to the family *Solanaceae* bearing chromosome number 2n=2X=24 (**Karpechenko, 1925**). It originated from India (**Vavilov, 1935**). The brinjal plants typically grow to 1–3 meters (3–10 ft) in height and have a weak stem that often sprawls over the ground and vines over other plants. Although small fruited varieties might have 30 to 50 flowers per cluster, flowers are typically produced in clusters of 4 to 8. Brinjal plants are dicots, day neutral and grow as a series of branching stems, with a terminal bud at the tip that does the actual growing. Brinjal plays a major role in human nutrition, fruit contain high nutritive value constituting high amount of carbohydrates (6.4%), protein (1.3%), fat (0.3%), calcium (0.02%),

phosphorus (0.02%), iron (0.0013%) and other mineral matters. Apart from this, it also contains B-carotene (34 mg), riboflavin (0.05 mg), thiamine (0.05 mg), niacine (0.5 mg) and ascorbic acid (0.9 mg) per 100 g fruit (Choudhury, 1976). Brinjal has valuable vitamins and de-cholesterolizing agent due to presence of poly-unsaturated fatty acids (Linoleic and Lenolenic acid) present in 65.1% of pulp and its seeds. Glycoalkaloids of brinjal range from 0.37 mg/100 gm of fruits. Brinjal is a warm season crop. The best fruit colour and quality is obtained at a temperature range of 13-21°C. Brinjal contribute to a healthy, well balanced diet. They are rich in minerals, vitamins, essential amino acids, sugars, dietary fibres and it has many other uses tomato seed contain 24% of oil is used as salad oil and in the manufacture of margarine.

MATERIAL AND METHODS

The present investigation entitled **"Effect of Plant Growth Regulators on Plant growth, Yield and Fruit quality of Brinjal (*Solanum melongena* L.)"** was done to understand the effect of Plant Growth Regulators applications of GA_3 and Salicylic acid at different doses combination on fruit growth, yield and quality of brinjal hybrid variety Indam Supriya. The details of the materials used and the procedures adopted in the investigation, which was carried out at Horticultural Research Farm (HRF), Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj during the *Kharif* season of 2021. All types of facilities necessary for cultivation of successful crop including field preparation, inputs, irrigation facilities and labours were provided from the Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, U.P. Prayagraj falls in central plain sub-zone of Agro-climatic zone V (***Source: Perspective and Strategic Plan (SPSP) for IWMP* of Uttar Pradesh**, **Department of Land Development and Water Resources, Government of U.P.**). Naini is situated between the parallels of 20° 33' 40'' to 21' .50' N latitude and 73° 27' 58'' and 73° 56' 36'' E longitude. This region has a tropical climate with a reasonably hot summer, a moderate cold winter, and a warm and humid monsoon. This area typically experiences heavy rains from June to September. The south-west moving monsoon brings the majority of the precipitation, which mainly falls in the months of July and August.

RESULT AND DISCUSSION

Plant height (cm)

The results pertaining to the effect of foliar application of micronutrients on plant height of tomato at 30, 60 DAT and at harvest are presented in Table 1

1.1 Plant height at 30 DAT

The height of plant significantly varied among different treatment combinations. The mean Plant height at 30 DAT was observed to be 23.78 cm. The C.V. for plant height at 30 DAT was observed to be 5.40, while S.E.(m) was 1.05. The maximum plant height (24.92 cm) at 30 DAT was observed with treatment T_7 (GA_3 @ 10 ppm and Salicylic acid @ 50 ppm) followed by T_9 (GA_3 @ 10 ppm and Salicylic acid @ 75 ppm) with 24.58 cm. Minimum plant height (21.78 cm) was observed in T_1 (control), while the remaining treatments were moderate in their growth habit.

4.1.2 Plant height at 60 DAT

The height of plant significantly varied among different treatment combinations. The mean Plant height at 60 DAT was observed to be 37.55 cm. The C.V. for plant height at 60 DAT was observed to be 4.12, while S.E.(m) was 1.26. The maximum plant height (39.50 cm) at 60 DAT was observed with treatment T_7 (GA_3 @ 10 ppm and Salicylic acid @ 50 ppm) followed by T_8 (GA_3 @ 5 ppm and Salicylic acid @ 75 ppm) with 39.33 cm. Minimum plant height (35.13 cm) was observed in T_4 (Salicylic acid @ 50 ppm), while the remaining treatments were moderate in their growth habit.

4.1.3 Plant height at harvest

The height of plant significantly varied among different treatment combinations. The mean Plant height at harvest was observed to be 62.29 cm. The C.V. for plant height at harvest was observed to be 2.29, while S.E.(m) was 1.17. The maximum plant height (66.83 cm) at harvest was observed in treatment T_7 (GA_3 @ 10 ppm and Salicylic acid @ 50 ppm) followed by T_9 (GA_3 @ 10 ppm and Salicylic acid @ 75 ppm) with 63.83 cm. Minimum plant height (59.48 cm) was observed in T_1 (control), while the remaining treatments were moderate in their growth habit.

Table 1 Effect of plant growth regulators on plant height (cm) of the brinjal.

Treatment Notation	Treatment details	30 DAT	60 DAT	At Harvest
T_1	Control (water)	21.78	35.17	59.48
T_2	GA_3 @ 5 ppm	24.31	39.29	62.25
T_3	GA_3 @ 10 ppm	23.00	35.67	60.67
T_4	Salicylic acid @ 50 ppm	23.75	35.13	60.33
T_5	Salicylic acid @ 75 ppm	23.75	36.79	60.58
T_6	GA_3 @ 5 ppm and Salicylic acid @ 50 ppm	23.54	38.25	62.92
T_7	GA_3 @ 10 ppm and Salicylic acid @ 50 ppm	24.92	39.50	66.83
T_8	GA_3 @ 5 ppm and Salicylic acid @ 75 ppm	24.36	39.33	63.75
T_9	GA_3 @ 10 ppm and Salicylic acid @ 75 ppm	24.58	38.83	63.83
Mean		**23.78**	**37.55**	**62.29**
'F' Test		**NS**	**S**	**S**
C.V.		**5.40**	**4.12**	**2.29**
S.E.(m)		**1.05**	**1.26**	**1.17**
C.D. at 5%		**2.22**	**2.68**	**2.48**

Days to first fruit picking

The results related to days to first fruit picking varied significantly among different treatments and is presented in table 2 and graphically represented in fig. 4.3.

The mean value for days to first fruit picking was observed to be 84.71 days, its C.V. was found to be 3.48, while S.E.(m) was observed to be 2.41. Among the foliar application of PGRs the minimum days to first fruit picking was seen in T_1 (GA_3 @ 5 ppm) with 79.58 days, followed by T_9 (GA_3 @ 10 ppm and Salicylic acid @ 75 ppm) with 82.25 days whereas maximum days to first fruit picking 92.00 days was recorded in T_7 (GA_3 @ 10 ppm and Salicylic acid @ 50 ppm).

Table 2 Effect of plant growth regulators on days to first fruit picking of brinjal.

Treatment Notation	Treatment details	In days
T_1	Control (water)	88.50
T_2	GA_3 @ 5 ppm	79.58
T_3	GA_3 @ 10 ppm	85.58
T_4	Salicylic acid @ 50 ppm	84.50
T_5	Salicylic acid @ 75 ppm	82.42
T_6	GA_3 @ 5 ppm and Salicylic acid @ 50 ppm	84.50
T_7	GA_3 @ 10 ppm and Salicylic acid @ 50 ppm	92.00
T_8	GA_3 @ 5 ppm and Salicylic acid @ 75 ppm	83.08
T_9	GA_3 @ 10 ppm and Salicylic acid @ 75 ppm	82.25
Mean		**84.71**
'F' Test		**S**
C.V.		**3.48**
S.E.(m)		**2.41**
C.D. at 5%		**5.11**

4.10 Average Yield per plant (kg/plant)

Yield of brinjal fruit per plant under different treatment combination is presented in Table 3 and graphically illustrated in Fig. 4.8. The data contained in the table reveals that the average yield per plant was significantly influenced by foliar application of micronutrients and their interaction.

The mean value for fruit yield per plant is observed to be 1.01 kg/plant, C.V. was found to be 13.90 and its S.E.(m) was found to be 0.12. The maximum average yield per plant (1.27 kg/plant) were recorded in treatment T_9 (GA_3 @ 10 ppm and Salicylic acid @ 75 ppm) followed

by T_7 (GA_3 @ 10 ppm and Salicylic acid @ 50 ppm) i.e., 1.17 kg/plant and the lowest average yield per plant (0.42 kg/plant) were observed in T_1 (Control).

Table 3 Effect of plant growth regulators on Average Yield per plant of brinjal.

Treatment Notation	Treatment details	In Kg/plant
T_1	Control (water)	0.42
T_2	GA_3 @ 5 ppm	1.12
T_3	GA_3 @ 10 ppm	1.01
T_4	Salicylic acid @ 50 ppm	1.11
T_5	Salicylic acid @ 75 ppm	1.18
T_6	GA_3 @ 5 ppm and Salicylic acid @ 50 ppm	0.89
T_7	GA_3 @ 10 ppm and Salicylic acid @ 50 ppm	1.17
T_8	GA_3 @ 5 ppm and Salicylic acid @ 75 ppm	0.98
T_9	GA_3 @ 10 ppm and Salicylic acid @ 75 ppm	1.27
Mean		**1.01**
'F' Test		**S**
C.V.		**13.90**
S.E.(m)		**0.12**
C.D. at 5%		**0.24**

4.11 Total soluble solid (^{0}Brix)

From the data presented in table 4 and graphically represented fig.4.11 it is clear that the T.S.S. (^{0}Brix) content among different treatments varied significantly. The mean value of T.S.S. was observed to be ……. C.V. was recorded to be 1.54, while S.E.(m) was 0.06. The maximum T.S.S. (4.73 ^{0}Brix) was observed in treatment T_7 (GA_3 @ 10 ppm and Salicylic acid 50 ppm) followed by T_8 (GA_3 @ 5 ppm and Salicylic acid 75 ppm) with 4.72 ^{0}Brix. The minimum T.S.S. (4.34 ^{0}Brix) was noticed in treatment T_1 (Control).

Table 4 Effect of plant growth regualtors on Total soluble solid of brinjal.

Treatment Notation	Treatment details	In °Brix
T_1	Control (water)	4.34
T_2	GA_3 @ 5 ppm	4.40
T_3	GA_3 @ 10 ppm	4.46
T_4	Salicylic acid @ 50 ppm	4.42
T_5	Salicylic acid @ 75 ppm	4.63
T_6	GA_3 @ 5 ppm and Salicylic acid @ 50 ppm	4.68
T_7	GA_3 @ 10 ppm and Salicylic acid @ 50 ppm	4.73
T_8	GA_3 @ 5 ppm and Salicylic acid @ 75 ppm	4.72
T_9	GA_3 @ 10 ppm and Salicylic acid @ 75 ppm	4.46
Mean		**4.53**
'F' Test		**S**
C.V.		**1.54**
S.E.(m)		**0.06**
C.D. at 5%		**0.12**

CONCLUSION

The present investigation was carried out to identify the effects of different combinations of plant growth regulators and its role in growth, yield and quality of brinjal variety Indam Supriya. The experiment was laid in Randomized block design with 8 treatments and 3 replications with different combination in RDF and foliar application of plant growth regulators.

From the aforementioned experimental results, it can be said that the treatment T_5 (Salicylic acid @ 75 ppm) was found to be best in the terms of growth yield and quality of brinjal. While, the highest net return was found in the T_5 with Rs. 1,18,290 and the highest B:C ratio was found in the same with 2.3.

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