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Effect of plant growth regulators on certain growth and yield of ridge gourd (*Luffa acutangula* L.) COH 1.

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ABSTRACT
The plant growth regulators, other than nutrients, usually are organic compounds. They are either natural or synthetic compounds and are applied directly to a plant to alter its processes or structure in some beneficial ways so as to enhance yield and improve quality. The growth regulators such as gibberellic acid stimulates the cell elongation of main shoot and roots, while ethrel induce more growth and ultimately yield in ridge gourd. An experiment was conducted during the year 2022 to find out the best combination in plant growth regulators (PGR) on growth and yield of ridge gourd (Luffa acutangula L.). COH 1 at Chidambaram, Tamil Nadu, India. The data collected from the growth and yield parameters were put through to analysis of variance for randomized block design (RBD). The treatments are scheduled as follow as T_1 - GA_3 @25 ppm, T_2 - GA_3 @50 ppm, T_3 – Ethrel @150 ppm, T_4 – Ethrel @200 ppm, T_5 -MH @100ppm, T_6 – MH @150 ppm, T_7 – NAA @50 ppm, T_8 – NAA @100 ppm, T_9 – Control. The result generated from the experiment was statistically significant (P≥0.05) for all the growth and yield characters recorded. The GA_3@ 50 ppm was observed to be significantly superior over the other treatments. It has recorded profuse growth and yield in respect of maximum vine length (8.67m), number of primary branches vine^{-1} (8.26), number of leaves vine^{-1} (264.23), fruit length (54.97cm), fruit weight fruit $^{-1}$(356.63g) and fruit yield vine^{-1} (9.48kg) are found significantly superior over all the other treatments. In this study it has identified that the GA_3@50ppm have the significant influence on certain growth and yield characters on ridge gourd.
Key words- *Ridge gourd, Growth, Yield, GA_3, Ethrel, MH, NAA.*

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INTRODUCTION

The role of plant growth regulators has been well known to modify various physiological processes in cucurbitaceous crops [11]. Plant growth regulator is an organic substance produced naturally in controlling growth and other functions at a site remote from its place of production in minute quantities, in some outstanding achievements, in several fruit crops with respect to growth, yield and quality. [6]. They are known to have great potential to increase the productivity of vegetables. The potentialities of growth promoters and growth retardants can be used to maximize the yield of several vegetable crops. The response of plant or plant parts to growth regulators varies due to fluctuations in endogenous hormonal levels of the plant and the manner in which the natural growth regulators interact with the applied growth regulators. Ethrel plays an important role in numerous effects on the cellular, development, storage and stress related process. [1]. Plant growth regulators have potential ability to increase the productivity of yield. Both auxin and antiauxins at proper concentrations modify sex. The application of plant growth regulators has been found to be effective in initiating higher percentage of female flowers thereby modifying sex ratio i.e., lower down male female ratio and ultimately resulting in more fruiting and yield in bitter gourd.

Material and methods

This experiment was undertaken during the year 2022 in the area of Varagoorpettai, a village located near Annamalai Nagar, Chidambaram, Tamil Nadu, India. The experimental location contains sandy clay loam soil with clay loam texture. The climate is tropical, warm and humid, with average rainfall and high humidity as distinguishing features. The experimental site received approximately 968 mm of rainfall per year, with a mean minimum temperature of 26^{0}C, Maximum temperature of 35^{0}C, and relative humidity of 78%. The experiment was conducted in the area of 392.04 m^2 divided into 14.52m^2 sized plots of each one. The experiment was set up in a Randomized Block Design (RBD) and three replications consisting of nine treatments. Total nine treatments combinations involving four growth regulators plots *viz*., T_1 - GA_3 @25

ppm, T_2 - GA_3@ 50 ppm, T_3 – Ethrel@150 ppm, T_4 – Ethrel@ 200 ppm, T_5 -MH @100ppm, T_6 – MH@ 150 ppm, T_7 – NAA@ 50 ppm, T_8 – NAA@ 100 ppm, T_9 – Control and three stages of spray *viz*., four leaf, flower and fruit initiation stages. The seeds are sown in rabi season and follow the treatments schedule as mentioned above. All suggested cultural practices and plant protection measures were followed throughout the growing season. The seeds were sown at the rate of two seeds per hole on ridges and furrow. The recommended plant spacings (2.5×1 m) to achieve the necessary population densities. The crop was supplied of well rotten farm yard manure @ 25 tones ha^{-1} along with 125 kg nitrogen, 100 kg phosphorous and 100 kg potash as per the recommended dose of fertilizers. All P, K and 1 /4^{th} N were applied as basal does to all the treatments at the time of land preparation and another 3 /4^{th} of N in three equal parts as top dressing. All the plants were irrigated frequently. Observations were recorded for six different growth and yield parameters related to vine length (m), number of primary branches $vine^{-1}$ and number of leaves $vine^{-1}$, fruit length (cm), fruit weight $fruit^{-1}$(g) and fruit yield $vine^{-1}$ (kg). The data were taken from certain growth and yield characters in all treatments and replication.

Data collection and analysis

Data was taken from five plants randomly selected from each plot and tagged for the purpose of collecting data.

Vine length (m)

The length of vine from the crown or collar to the tip was measured after the final harvest and expressed in meter.

Number of primary branches $vine^{-1}$

The total number of branches were recorded for each sample plant at the time of final harvesting and expressed in number.

Number of leaves $vine^{-1}$

The total number of leaves per plant was counted on 120 days after sowing and expressed in numbers.

Fruit length (cm)

The length of fruits at marketable stage was measured from head end up to blossom scar in each treatment and then the average fruit length was calculated and expressed in centimetres.

Fruit weight $fruit^{-1}$ (g)

The fruits were collected random from each treatment. Average fruit weight was calculated from ten fruits per replication and expressed as grams $fruit^{-1}$.

Fruit yield $vine^{-1}$ (kg)

The total quantity of fruits per plant from each treatment in each replication were recorded per plant yield was expressed in kilogram (kg).

RESULTS AND DISCUSSION

Vine length (m)

The data on the effect of plant growth regulators on growth and yield of ridge gourd is presented in table 1. Among the treatments, maximum vine length was observed in T_2 (8.67 m) and it was followed by T_1 (8.15 m). The minimum vine length was found in control T_9 (4.43 m), which was significantly differed from all other treatments. Vine length was increased significantly by the application of plant growth regulators and it may be due to the result of stimulatory action of GA_3. The results are supported with the findings of Dalai *et al*. [3] in cucumber.

Number of primary branches $vine^{-1}$

Ridge gourd showed significant variation in number of primary branches $vine^{-1}$ and ranged from 2.69 to 8.26. Among the treatments the maximum number of primary branches $vine^{-1}$ were observed in T_2 (8.26) followed by (7.61). The minimum number of primary branches $vine^{1}$ were resulted in control T_9 (2.69). The increased number of primary branches by GA_3 might be due to the mechanism of GA in the apex, protein synthesis, cell division, auxins production, cell expansion and elongation in the bottle gourd. The results are inline with the findings of Sahil *et al.* [9] and Thappa *et al*. [10] in cucumber.

Number of leaves $vine^{-1}$

Significant differences were found in number of leaves $vine^{-1}$ with the application of GA_3 @50 ppm mentioned in table 1. The maximum number of leaves $vine^{-1}$ T_2 (264.23) was observed with the application of GA_3@50 ppm, which was followed by T_1 (249.10). The minimum number of leaves $vine^{-1}$ was recorded in T_9 (148.23). The maximum values in number of leaves could be due to energetic effect of chemical to the cell elongation and rapid cell division in apical portion of the plants. The present finding is in accordance with the findings obtained by Rahman [7] in tomato.

Fruit length (cm)

The data depicted in table 1 showed significant differences in fruit length (cm). The maximum fruit length (54.97cm) was observed by the application of GA_3@50 ppm (T_2), which was followed by T_4 (53.26cm). The

minimum fruit length was recorded in T_9 (24.41cm). The results showed the increase in fruit length was due to the increase cell division and cell elongation as well as enhanced metabolic activity under the influence of chemical stimulates. The results are supported by the findings of Hidayatullah *et al.* [4] in bottle gourd.

Fruit weight fruit $^{-1}$ (g)

The data on the effect of plant growth regulators on growth and yield of ridge gourd had significant differences on fruit weight fruit $^{-1}$ (g) presented in table 1. Among the treatments, maximum fruit weight was observed in T_2 (356.63g) and it was followed by T_4 (340.71g). The minimum fruit weight was found in control T_9 (274.57g), which was significantly differed from all other treatments. The reason for increased fruit weight might be due to more carbohydrate accumulation which is due to increased photosynthesis. The results are supported by the findings of Dalai *et al*. [2] in cucumber.

Fruit yield vine^{-1} (kg)

Significant differences were found in fruit yield vine^{-1} (kg) with the application of GA_3 @ 50 ppm mentioned in table 1. The maximum fruit yield vine^{-1} (9.48kg) was observed in the treatment T_2 -GA_3@50 ppm, which was followed by T_4 (9.42kg). The minimum fruit yield was recorded in T_9 (4.61 kg). The yield increased is due to the effect of auxins to cause physiological modifications in the plants, higher photosynthetic activity, synthesis and translocation of metabolites. The results are in line with the findings of Wamiq *et al*. [12] in bottle gourd. The findings of also current trial is supported by the results of Kadi *et al*. [5] in cucumber.

Table 1. Effect of plant growth regulators on certain growth and yield of ridge gourd (*Luffa acutangula* L.), (COH 1)

Treatments	Vine length (m)	Number of primary branches vine^{-1}	Number of leaves vine^{-1}	Fruit length (cm)	Fruit weight fruit^{-1} (g)	Fruit yield vine^{-1} (kg)
T_1- GA_3 @25 ppm	8.15	7.61	249.10	49.35	340.08	8.79
T_2- GA_3 @50 ppm	8.67	8.26	264.23	54.97	356.63	9.48
T_3- Ethrel @150 ppm	6.71	5.07	207.79	48.48	313.50	8.76
T_4- Ethrel @200 ppm	6.92	5.39	213.86	53.26	340.71	9.42
T_5- MH @100ppm	5.94	4.09	186.16	37.81	308.38	7.43
T_6- MH @150 ppm	6.19	4.82	203.38	39.34	322.05	7.46
T_7- NAA @50 ppm	7.43	6.04	228.42	43.52	323.50	8.10
T_8- NAA @100 ppm	7.94	6.69	243.65	44.13	328.35	8.14
T_9- Control	4.43	2.69	148.23	24.41	274.57	4.61
Sed	**0.23**	**0.17**	**6.60**	**1.35**	**7.21**	**0.21**
C.D (p=0.05)	**0.47**	**0.36**	**13.99**	**2.87**	**15.02**	**0.43**

CONCLUSION

The experiment has brought out some vital research that the application of GA_3@50 ppm was found to be the best in producing more vine length, number of branches, number of leaves, fruit length, fruit weight and fruit yield. Among the various plant growth regulators (PGR) with different concentration, the application of GA_3@50 ppm was found to be superior certain growth and yield parameters in ridge gourd COH 1.

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