Original Research Article

Efficacy of plant growth regulators on different yield parameters of cucumber cv. Malini under shade net conditions

ABSTRACT

The experiment was conducted to study the effect of different plant growth regulators on yield of cucumber cv. Malini under shade net conditions. The experiment was carried out with 10 treatments GA3 at 75 ppm, 150 ppm and 250 ppm, Ethrel at 100 ppm, 200 ppm and 300 ppm, Salicylic acid at 75 ppm, 150 ppm and 250 ppm and control (water spray) in 3 replications. The yield parameters like number of fruits per plant, fruit weight, fruit length etc. were significantly influenced by plant growth regulators. Among all yield parameters superior values for maximum days taken for final harvest (86.49 days), maximum fruit weight (248.00 g) were recorded in treatment GA3 at 250 ppm, treatment GA_3 at 75 ppm was recorded with the highest values for number of fruits per vine (9.46) and fruit diameter (4.56cm) and GA_3 at 150 ppm recorded with highest values for fruit length (21.33 cm) as compared to other treatments. Among all treatments, treatment with GA3@ 75 ppm showed positive effect in terms of gross returns and over all net returns.

Key words: Efficacy of plant, planteffect, plant growth, yield parameters

INTRODUCTION

"Cucumber (*Cucumis sativus* L.) is a vine crop belonging to the family Cucurbitaceae having chromosome number 2n=14. cultivation of cucumber is possible in field conditions as well as under shade net conditions, but crop grown under shade net conditions provide more yields compared to field grown crops and under protected conditions three crops in a year can be grown, cultivation under shade net conditions provide more favorable conditions for better

growth and development. Mostly cucumber is preferred as a summer vegetable, immature fruits are consumed raw or along with salt in salads. Consumption of cucumber helps people suffering from indigestion, constipation and jaundice" (Baily, 1969)."Cucumber is an annual plant species which is found to be day neutral in nature, Cucumber is a monoecious, trailing vine having hirsute or scabrous stems with triangular ovate shape leaves with acute curves, leaf axils with unbranched lateral tendrils. As the lateral branches develop, flower clusters appear at each leaf axils whereas fruits are warty and cylindrical.However, enhancement in yield and quality are important factors for getting higher returns in any crop, which will be improved by different horticultural techniques. Among these, use of different plant growth regulators at appropriate concentration increases the quality and yields of any crop" (Baily, 1969). Plant growth regulators play a significant role in the growth and development of plants by affecting a variety of plant functions. Plant growth regulators can be a useful tool for boosting production and quality in monoecious crops like cucumbers that are cultivated under protected settings. These regulators can increase the femaleness of the crop and facilitate effective pollination. On the other hand, farmers lack the necessary knowledge and skills to apply plant growth regulators at the right times and dosages to achieve the intended effects.

MATERIALS AND METHODS:

To determine the impact of various plant growth regulators on the yield of cucumber cv. Malini at the College of Horticulture, Mojerla, the current study was conducted in the late rabi season of 2018–19 using the application of various concentrations of plant growth regulators.

The experiment was laid out in Completely Randomized Design (CRD) along with three replications. The experiment comprised of 10 treatments of different concentrations of GA3(75 ppm, 150 ppm, 250 ppm), Ethrel (100 ppm, 200 ppm, 300 ppm) and salicylic acid (75 ppm, 150 ppm, 250 ppm) along with water spray (control). Seeds were sown on the well prepared beds two seeds per hill during early days of December month on beds with dimensions of 100 x 40 x 50 cm (width, height & distance between two beds) and size of the plot was 21m. Plant growth regulators were sprayed with 15 days interval at 20 and 35 days after sowing.The data to various yield parameters*viz* ., Number of fruits per vine, Days taken for final harvest, Fruit diameter (cm), Length of fruits (cm), Fruit weight (cm) was recorded during the course of investigation for the experiments conducted. Uniformly growing five plants were randomly selected and

tagged in each treatment and replication for the purpose of recording observations and the data was subjected to statistical analysis .

RESULTS AND DISCUSSION

Yield parameters:

From the results it was observed that Treatment GA_3 at 75 ppm was recorded with the highest values for number of fruits per vine (9.46) and fruit diameter (4.56 cm), the increased number of fruits per plant due to increased flowering with application of gibberellins and increased fruit set due to increased availability of nutrients from leaves by GA3. These findings are in agreement with the results reported by Ghani *et al*. (2013) in bitter gourd and Increased fruit diameter with gibberellins is mainly due to their general function cell division and cell elongation and increased translocation of metabolites from source to sink. The findings were in agreement with Jyoti *et al*.(2016) in cucumber and Rahman *et al* (2020) in cucumber reported the similar findings where applicationof GA3 increased the number of fruits per vine. Whereas GA3 at 250 ppm was recorded for maximum days taken for final harvest (86.49 days) and maximum fruit weight (248.00 g). This is mainly due to gibberellins' increased metabolic activity of plants which resulted in the enhancement of reproductive phase which resulted in prolonged the days of harvesting and this prolonged harvesting remains as crux in reaping out higher yields. The main reason associated with increased fruit weight is that treated plants with gibberellins remain more active physiologically and build up sufficient food for developing fruits which results in the increased fruit weight. Increase in size of individual fruits with application of GA_3 also reported by Vadigeri*et al*. (2001) in cucumber, Chowdary *et al.* (2023) in cucumber where GA3 200 ppm significantly increased fruit weight and Nagamani *et al.* (2015) who reported that application of GA_3 significantly enhanced fruit weight in bitter gourd..Sapkota*et al* (2020) also observed similar findings in cucumber. Finally, the highest fruit length was recorded in treatment with GA3 at 150 ppm. GA3promotes cell division and cell elongation which would have favored uptake of water and nutrients. Results were in line with Prabhu *et al* (2006) in ivy gourd, similar effect with Gibberellic Acid application was reported by Jyoti *et al*.(2016).Pandey *et al* (2021) also published similar findings in cucumber.

Economic analysis

Among all treatments GA_3 at 75 ppm (T_1) recorded the highest gross return (Rs.16, 51,700), highest net return (Rs.11, 27,783.22) and best benefit cost ratio (2.15) followed by GA_3 at 250 (T_3) with benefit cost ratio (2.13), whereas the lowest benefit cost ratio (1.62) was recorded in water spray (control) (T_{10}). This might be due to the positive effect towards other yield attributing characters and lower cost of chemicals due to lower concentration compared to T_2 and T_3.

Table 1**: Effect of plant growth regulators on number of fruits per vine, days taken to final harvest, fruit diameter (cm) fruit length (cm) and fruit weight (g) of cucumber (Cucumis *sativus* L.) cv. Malini**

Treatment No.	Treatment details	Number of fruits per vine	SD	Days taken to final harvest	SD	Fruit diameter (cm)	SD	Fruit length(cm)	SD	Fruit weight(g)	SD
T_1	GA_3 75 ppm	9.46^{a}	0.12	82.26^{b}	0.93	4.56^{a}	0.02	17.83^{bcd}	0.63	239.39^{b}	2.12
T_2	GA_3 150ppm	9.08^{b}	0.20	83.68^{b}	1.31	3.71^{b}	0.17	21.33^{a}	0.53	238.67^{b}	3.51
T_3	GA_3 250 ppm	9.06^{b}	0.18	86.49^{a}	0.65	3.62^{bc}	0.01	18.33^{bcd}	0.11	248.00^{a}	5.14
T_4	Ethrel 100 ppm	8.65^{c}	0.29	79.06^{cd}	1.48	3.14^{cd}	0.34	16.68^{d}	0.01	234.67^{b}	4.04
T_5	Ethrel 200 ppm	8.46^{c}	0.06	80.14^{c}	1.03	3.37^{bcd}	0.25	17.90^{bcd}	0.01	239.33^{b}	1.53
T_6	Ethrel 300 ppm	8.12^{d}	0.03	77.20^{de}	0.93	2.94^{de}	0.19	17.00^{cd}	0.01	236.96^{b}	2.66
T_7	Salicylicacid 75ppm	8.40^{cd}	0.17	85.89^{a}	1.04	3.07^{d}	0.49	18.75^{bc}	0.01	233.00^{b}	7.97
T_8	Salicylicacid 150ppm	8.60^{c}	0.31	83.15^{b}	1.02	3.04^{d}	0.28	19.00^{b}	0.49	237.36^{b}	5.00
T_9	Salicylicacid 250ppm	8.64^{c}	0.29	83.05^{b}	1.52	3.06^{d}	0.17	17.00^{cd}	0.43	235.67^{b}	6.51
T_{10}	Water spray (control)	7.27^{e}	0.15	75.60^{e}	1.15	2.48^{e}	0.35	16.60^{d}	0.02	216.00^{c}	6.56
	SEm±	0.11		0.65		0.18		0.63		2.84	
	CD at 5%	0.34		1.93		0.54		1.88		8.39	

CONCLUSION

The current study suggests that, in shade net conditions, plant growth regulators significantly impacted the production characteristics of the cucumber variety "Malini." Out of all the treatments for plant growth regulators, plants treated with 75 ppm of GA3 had the best B:C ratio, maximum gross returns, net returns, and positive effects on growth, phenological, yield, and quality indicators.

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