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Efficacy of Plant Growth Regulators on Growth and Flowering of Cucumber (*Cucumis sativus* L.) cv. Malini under Shade Net Conditions

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A B S T R A C T

An investigation was conducted to study the effect of different plant growth regulators on growth and flowering of cucumber cv. Malini under shade net conditions. The experiment was carried out with 10 treatments GA_3 at 75, 150 and 250 ppm, Ethrel at 100, 200 and 300 ppm, Salicylic acid at 75, 150 and 250 ppm and control (water spray) in three replications. Among all, GA_3 at 75 ppm recorded with maximum vine length (271.76 cm), number of number of leaves (90.32), number of nodes on main stem (30.22), length of primary branches (153.25 cm) and leaf area (458.14 cm^2), whereas, maximum number of primary branches(18.49) was recorded in ethrel 300 ppm. Further, maximum internodal distance (8.24 cm) was recorded with GA_3 at 250 ppm. With respect to phenological parameters, ethrel at 300 ppm exhibited the best results for the minimum number of days taken for first female flower appearance (38.88 days), least node number of first female flower appearance (6.77) and lowest male to female sex ratio (1.40) as compared to other treatments, whereas treatment GA_3 at 150 ppm recorded minimum number of days taken to initiation of flowering (33.74 days), minimum days taken for 50 per cent flowering (44.91 days) and time taken for first harvesting (51.80 days) over other treatments and finally yield (165.17 t/ha) was recorded highest in GA_3 75 ppm compared to other treatments.

K e y w o r d s

Plant growth, Regulators, GA_3, Salicylic acid, Cucumber, Shade net

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Introduction

Cucumber (*Cucumis sativus* L.) is one of the most important cross pollinated and popular vegetable crop belonging to the family Cucurbitaceae having chromosome number 2n=14. Basically, it is an annual plant species and found to be day neutral; however, under protected conditions three crops in a year can be grown. It is a monoecious, trailing or climbing vine (Baily, 1969) having hirsute or scabrous stems with triangular ovate leaves with acute curves, leaf axils with unbranched lateral tendrils. As the lateral branches develop, flower clusters appear at each leaf axils and the fruits are warty and cylindrical. However, enhancement in growth and flowering are important factors for getting higher yields and 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. The practical use of plant growth regulators can be exploited in monoecious crop like cucumber grown under protected conditions for increasing femaleness and effective pollination there by improving yield and quality. Whereas, the knowledge and use of plant growth regulators at appropriate time and dosages among the farmers is meager for desired results. In view of this the present investigation has been taken up with an objective of to find out the effect of different plant growth regulators on growth and flowering of cucumber cv. Malini under shade net conditions.

Materials and Methods

The present investigation was carried out during the late *rabi* season of the year 2018-19 in completely randomized design (CRD) by application of different concentrations of plant growth regulators at College of Horticulture, Mojerla.

The experiment was laid out in Completely Randomized Design (CRD) with three replications. The experiment comprised of 10 treatments of different concentrations of GA_3 (75, 150 and 250 ppm), Ethrel (100, 200 and 300 ppm) and salicylic acid (75, 150 and 250 ppm) along with water spray (control). Seeds were sown on the well prepared beds two seeds per hill during first week of December with dimensions of 100 x 40 x 50 cm (width, height and distance between two beds) and spacing adopted was 180 ×30 cm. Plant growth regulators were sprayed at 20 and 35 days after sowing.

The data on various growth and phenological parameters *viz*., vine length (cm), number of primary branches per vine, length of primary branches per vine (cm), number of leaves per vine, number of nodes on vine, intermodal distance (cm), leaf area (cm^2), days taken to first female flower appearance (days), node number of first female flower, days taken to initiation of flowering, days taken to 50 per cent of flowering (days), sex ratio, days taken to first harvesting (days) was recorded from the five randomly selected plants and the means were calculated and mean values were subjected to statistical analysis as per Panse and Sukhatme (1985). The data on phenological parameters was collected at 30, 60 and 90 days after sowing (DAS).

Results and Discussion

Growth parameters

The results related to growth parameters revealed that GA_3 at 75 ppm recorded with maximum for vine length (271.76 cm), length of primary branches per vine (153.25 cm), number of leaves per vine (90.32), number of nodes on vine (30.22) and leaf area (458.14 cm^2), at different growth stages as compared to the other treatments, main reason for the positive effect of GA_3 on these growth parameters was due to cell division by mitosis and cell elongation which further increased the length and size of cell which further increases the vine length, number of leaves per plant, number of nodes on main stem, length of primary branch and leaf area. Similar findings also reported by Shafeek *et al.,* (2016) in squash, Chaurasiya *et al.,* (2016) in musk melon, Murthy *et al.,* (2007) in gherkins, and Ansari and Chowdhary (2018) in bottle gourd.

Further ethrel at 300 ppm recorded more number of primary branches per vine (18.49) at different growth stages of the cucumber by retarding the stem elongation, promoted lateral branching. These results were in line with Mir (2007) in cucumber.

Among all treatments, maximum internodal distance (8.24 cm) was recorded in plants treated with GA_3 at 250 ppm over other

treatments. Increased internodal distance mainly due to increase in the number of cells, and the length of cells are the two immediate factors contributing to internode elongation. Similar results were also reported by Ansari and Chowdhary (2018) in bottle gourd (Table 1–3).

Table.1 Efficacy of plant growth regulators on different growth parameters at different growth stages of cucumber (*Cucumis sativus* L.) cv. Malini

Treatment No.	Treatment details	Vine length (cm)			Number of leaves per vine			Number of primary branches per vine		
		30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
T_1	GA_3 75 ppm	87.15^{a}	237.12^{a}	271.76^{a}	18.67^{a}	58.35^{a}	90.32^{a}	5.32^{cd}	10.15^{bcd}	16.62^{bcd}
T_2	GA_3 150 ppm	84.07^{b}	234.45^{ab}	267.61^{ab}	18.47^{a}	57.07^{a}	88.01^{ab}	5.21^{de}	9.96^{cde}	16.58^{cd}
T_3	GA_3 250 ppm	83.44^{b}	232.88^{abc}	265.81^{bc}	17.87^{a}	55.03^{ab}	86.56^{abc}	5.07d^{ef}	9.82^{cde}	15.94^{de}
T_4	Ethrel 100 ppm	79.46d^{e}	229.17^{bcd}	258.80^{d}	14.60^{bcd}	46.16^{de}	82.40^{cd}	5.83^{bc}	10.49^{bc}	17.41^{bc}
T_5	Ethrel 200 ppm	78.09^{ef}	228.25^{bcd}	261.68^{cd}	14.30^{cd}	45.49^{de}	84.28^{bcd}	6.12^{ab}	10.79^{b}	17.52^{b}
T_6	Ethrel 300 ppm	75.67^{fg}	225.52^{d}	256.84^{d}	13.72^{d}	43.44^{ef}	80.07^{d}	6.43^{a}	11.56^{a}	18.49^{a}
T_7	Salicylic acid 75 ppm	81.43^{bcd}	231.35^{abcd}	260.25^{d}	17.13^{ab}	51.46^{bc}	85.06^{bc}	4.93d^{ef}	9.78cd^{e}	15.94^{de}
T_8	Salicylic acid 150 ppm	82.39^{bc}	229.62^{bcd}	259.24^{d}	16.60^{abc}	49.66^{cd}	84.65^{bcd}	4.53^{fg}	9.54^{de}	15.43^{ef}
T_9	Salicylic acid 250 ppm	80.32^{cde}	227.39^{cd}	257.29^{d}	17.13^{ab}	53.95^{abc}	83.42^{bcd}	4.69^{ef}	9.27^{e}	14.93^{f}
T_{10}	Water spray (control)	72.89^{g}	218.59^{e}	239.14^{e}	12.74^{d}	39.55^{f}	74.39^{e}	3.98^{g}	7.48^{f}	11.26^{g}
	SEm±	0.94	2.25	1.76	0.94	1.67	1.66	0.19	0.24	0.30
	CD at 5%	2.79	6.66	5.20	2.77	4.95	4.91	0.58	0.71	0.90

Table.2 Efficacy of plant growth regulators on different growth parameters of cucumber cv. Malini under shade net conditions

Treatment No.	Treatment details	Length of primary branches per vine (cm)			Number of nodes on total length of vine			Leaf area (cm^2)			Internodal distance (cm)
		30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	
T_1	GA_3 75 ppm	45.18^{a}	96.07^{a}	153.25^{a}	8.99^{a}	16.04^{a}	30.22^{a}	138.53^{a}	290.41^{a}	458.14^{a}	7.45^{a}
T_2	GA_3 150 ppm	41.82^{b}	92.10^{b}	148.54^{b}	8.09^{b}	13.65^{b}	28.30^{ab}	136.31^{b}	287.28^{a}	446.20^{b}	6.83^{bc}
T_3	GA_3 250 ppm	41.54^{b}	92.34^{b}	147.85^{b}	7.90b^{c}	13.26^{b}	26.23^{bc}	137.64^{a}	286.63^{a}	441.22^{cd}	8.24^{a}
T_4	Ethrel 100 ppm	39.31^{bc}	88.37^{cde}	140.55^{cd}	7.67^{bcd}	11.56^{b}	24.85^{bcd}	133.29^{cd}	271.15^{cd}	431.60^{fg}	5.26^{de}
T_5	Ethrel 200 ppm	40.94^{b}	91.13^{bc}	143.31^{c}	7.36^{cde}	12.60^{b}	23.92^{cd}	133.47^{cd}	270.33^{d}	435.62^{ef}	5.46^{de}
T_6	Ethrel 300 ppm	38.80^{bc}	85.75^{e}	137.71^{d}	7.57^{bcd}	11.32^{bc}	22.70^{cd}	132.28^{d}	269.60^{d}	438.58^{de}	4.96^{e}
T_7	Salicylic acid 75 ppm	40.72^{b}	90.68^{bcd}	143.28^{c}	7.17^{de}	12.04^{b}	23.65^{cd}	134.74^{c}	276.46^{bc}	430.58^{g}	6.54^{bcd}
T_8	Salicylic acid 150 ppm	39.61^{bc}	87.58^{de}	141.03^{cd}	7.02^{de}	11.35^{bc}	21.75^{de}	134.68^{c}	275.11^{bcd}	434.95^{ef}	5.93^{cde}
T_9	Salicylic acid 250 ppm	37.27^{c}	85.64^{e}	139.37^{cd}	6.87^{e}	12.90^{b}	23.10^{cd}	133.82^{cd}	278.29^{b}	443.41^{bc}	6.48^{bcd}
T_{10}	Water spray (control)	31.15^{d}	78.85^{f}	124.99^{e}	5.91^{f}	9.01^{c}	18.74^{e}	127.49^{e}	252.18^{e}	423.80^{h}	4.97^{e}
	SEm±	1.11	1.05	1.37	0.23	0.80	1.25	0.52	2.01	1.36	0.44
	CD at 5%	3.27	3.10	4.04	0.69	2.37	3.69	1.56	5.93	4.02	1.32

Table.3 Efficacy of plant growth regulators on different phenological parameters of cucumber cv. Malini under shade net conditions

Treatment No.	Treatment details	Days taken to initiation of flowering	Node number of first female flower appearance	Days taken to first female flower appearance	Days taken to 50% of flowering	Sex ratio (Male: Female)	Time taken to first harvesting (days)
T_1	GA_3 75 ppm	34.13[a]	8.03[b]	41.34[b]	46.10[b]	1.92[c]	53.63[bc]
T_2	GA_3 150 ppm	33.74[a]	8.76[bc]	41.31[b]	44.91[a]	1.75[bc]	51.80[a]
T_3	GA_3 250 ppm	35.04[ab]	8.47[b]	40.72[ab]	45.13[a]	1.71[b]	54.49[cd]
T_4	Ethrel 100 ppm	36.75[bc]	8.15[b]	40.07[a]	47.15[cd]	1.67[b]	55.22[d]
T_5	Ethrel 200 ppm	36.62[b]	7.72[ab]	39.73[a]	48.15[e]	1.65[ab]	56.59[ef]
T_6	Ethrel 300 ppm	37.31[d]	6.77[a]	38.88[a]	47.92[de]	1.40[a]	57.89[f]
T_7	Salicylic acid 75 ppm	39.21[d]	9.23[c]	42.06[b]	48.16[e]	1.98[cd]	55.93[de]
T_8	Salicylic acid 150 ppm	38.81[d]	9.55[c]	42.46[b]	49.13[fg]	2.10[de]	56.36[e]
T_9	Salicylic acid 250 ppm	38.35[cd]	9.33[c]	42.42[b]	49.67[g]	2.01[d]	58.01[fg]
T_{10}	Water spray (control)	40.05[d]	10.08[d]	45.02[c]	51.74[h]	2.32 [e]	59.00[g]
	SEm±	0.69	0.35	0.72	0.11	0.08	0.49
	CD at 5%	2.03	1.03	2.13	0.81	0.25	1.45

Phenological parameters

With respect to phenological parameters, treatment with ethrel at 300 ppm exhibited the best results for the minimum number of days taken for first female flower appearance (38.88 days) by inducing the transformation of male flowers to female flowers at early nodes thus reduced the days taken for first female flower appearance. The least node number of first female flower appearance (6.77) and lowest male to female sex ratio (1.40:1) as compared to other treatments. This is mainly due effect of ethrel because at primordial stage all flowers carry both sets of sex organs and application of ethrel induce transformation of male flowers located at the starting and other nodes into female flowers. Similar results were also reported by Ansari and Chowdhary (2018) in bottle gourd, Mir (2007)in cucumber and Mehdi *et al.,* (2012) in cucumber.

Whereas treatment with GA_3 at 150 ppm recorded minimum number of days taken to initiation of flowering (33.74 days), minimum days taken for 50 per cent flowering (44.91 days) and time taken for first harvesting (51.80 days) over other treatments. Because, in plants, gibberellins are needed in the vascular tissue to increase production of systemic signal that is transported from the leaves to meristem during floral induction cause early flowering and this early flowering further leads to early harvesting. These results were in line with Ajay *et al.,* (2018) in cucumber.

Among all parameters highest yield (165.17 t/ha) was recorded in GA_3 at 75 ppm compared to other treatments, reason behind this increased yield might be due to the positive effect on different yield attributing growth characters like increased leaf area and increased number of leaves etc.

It could be concluded from the present investigation that plant growth regulators had significant influence on growth, phenological and yield parameters of cucumber cv. 'Malini' under shade net conditions. Among different plant growth regulator treatments, plants treated with GA_3 at 75 ppm showed positive effect on growth, phenological and yield parameters.

References

Ajay, K.S., Asati, K.P., Swathi, B., and Tulasigiri, R.G. 2018. Effect of different plant growth regulators on growth, yield and quality parameters in cucumber. *Int. Curr. Microbiol. App. Sci.*, **7**(4): 2319-7706.

Ansari, A,M. and Chowdhary, B.M. 2018. Effects of boron and plant growth regulators on bottle gourd (*Lagenaria siceraria* (Molina) Standle.). *Res. J. Pharmacognosy and Phytochem*.., SP1: 202-206.

Bailey, L.H. 1969. Manual of cultivated plants. Macmillan Company, New York., pp 1116.

Chaurasiya, J., Verma, R. B., Mukhtar, A., Adarsh, A., Rajesh, K., and Tej, P. 2016. Influence of plant growth regulators on growth, sex expression, yield and quality of muskmelon (*Cucumis melo* L.). *Ecology, Environment and Conservation*., 22(april 2016):s39–43.

Mehdi, M., Ahmed, N., Jabeen, N., and Baseerat, A. 2012. Effect of different concentration of ethrel on growth, fruiting behavior and yield of cucumber (*Cucumis sativus* L.) under greenhouse conditions. *Asian J. Horti*., 7 (2): 579-581.

Mir, A.A. 2007. Effect of pruning and plant growth regulators on growth, flowering, fruiting and yield of cucumber. Thesis submitted to Sher-e-Bangla Agricultural University, Dhaka.

Murthy, T.C.S., Negegowda, V. and Basavaiah. 2007. Influence of growth regulators on growth, flowering and fruit yield of gherkin (*Cucumis anguria* L.). *Asi. J. Hort.*, 2(1): 44–46.

Panse, V. G. and Sukhatma, P. V 1985. Staistical methods for agricultural workers. Indian Council of Agricultural Research, New Delhi.

Shafeek, M.R., Helmy, Y.I., Ahmed, A.A., and Ghoname, A.A. 2016. Effect of foliar application of growth regulators (GA_3 and Etherel) on growth, sex expression and yield of summer squash plants (*Cucurbita pepo* L.) under plastic house condition. *Int. J. Chem. Tech. Res*., 9(6): 70-76.

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