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Influence of Foliar Ethrel on Growth, Flowering, Fruit Set and Yield of different Varieties on Cucumber (*Cucumis sativus* L.) under Net House condition

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ABSTRACT: The present investigation was carried out in the net house of the Department of Plant Physiology, Bhubaneswar, Odisha, India to screen twenty popular cucumber genotypes by foliar application of ethrel @300mg/L and to recommend and to grow under field condition suitable to Coastal Odisha Agro-climate. Primarily, the screening methods focus on one or more customary growth sites (bud, leaves, stem, flower and fruits) and on the basis of their growth, flowering (male: female), fruit set and yield a conclusion was derived The pot experiment was carried out from October 2019 to January 2020 in net house condition with factorial completely randomized design (CRD) and was replicated twice. The first ethrel (2-chloro- ethane phosphonic acid) @300ppm treatments were applied when the second true-leaf was fully expanded and a second application was made seven days later including a control spray application of distilled water. The foliage application of ethrel increased vine length (133.50 cm), maximum number of leaves per plant (24.53), maximum leaves area (166.43 cm^2), more number of primary node per plant (18), percentage of fruit set per plant (88.56), number of female flowers per plant (17.50), number of fruit per vine (15.50) and highest yield per vine (2.98 kg) and was found highest in cultivar Rohan than control (water spray) and other cultivars.

Keywords: Cucumber, growth, vine length, foliar spray, flowering, sex ratio, yields, ethrel.

INTRODUCTION

Cucumber (*Cucumis sativus* L.) is a member among *cucurbitaceae* families. It is grown for its edible tender fruits in almost all parts of the world. In India, it is grown in 0.41 lakh hectares with an annual production of 6.41 lakh tonnes (NHB 2013). Cucumber flower buds that are different in leaf axils of main shoots are bisexual in their early developmental stages. After that they will develop into either male (staminate) or female (pistillate) flowers. Iwahori, *et al.*, (1969); Wang *et al.*, (2010) reported that in cucumber varieties male flowers differentiate at the lower nodes, followed by female flowers at the higher nodes. The number of nodes of cucumber to the first female flower and total number of female flowers are both reliable indices of sex expression. It is modified by several environmental factors. Reverse conditions tend to cause maleness (Atsmon and Tabbak, 1979). It is reported at times that ethrel which releases ethylene in the presence of plant tissues, is remarkably effective in increasing femaleness in cucumber (Iwahori *et al.*, 1970; Yamasaki *et al.*, 2003). The application of ethrel at 200 to 400ppm for inducing female flowers in cucurbits is very common but the action varies with environment and the genotype (Vadigeri *et al.*, 2001). Therefore, an investigation involving ethrel at the rate of 300ppm was carried out on protected conditions with the objective to study effect of ethrel on growth and yield of different genotypes.

MATERIALS AND METHODS

Plant Materials. Twenty popular cucumber cultivars (Vishwas 20, Priya, Rajkanya, Gangotri, Maha Prasad, Kheera Hara, Lamba, Seven Star, Basumati, Rohan, Dash, Barsha Nandan, Machara Sosa, Green Long, Padmini, Manish, Green Sona, Barsha Rani, Mohine,

Adimata, Chaitali) available in Odisha were collected from Department of Vegetable science, Odisha University of Agriculture and Technology, Bhubaneswar.

Pot Experiment. This experiment was conducted using cemented pots of five kilogram soil filled capacity at the net house of the Department of Plant Physiology, Bhubaneswar (20°15′N, 85°52′E, 26msl), Odisha, containing normal N, K and medium P soil (<16kg/ha; 0-15cm layer, pH5.4) collected from Central Farm, OUAT, Bhubaneswar, Odisha. The experiment was conducted in January 2019 for 75days (day/night temperature of 23°/16°C, RH~70%, bright sunlight).The pots were arranged as per factorial completely randomized design (FCRD) in two replications with two treatments as two factors, one being the 20 cucumber cultivars and the other as two chemical sprayings i.e., ethrel@300ppm and water. Soil mixed with recommended dose of fertilizer and FYM were filled in pots and were sown with seeds which were watered regularly during the entire period of experiment. Two seedlings were maintained in each pot and when the plant attained two fully grown leaves the ethrel@300ppm and water was sprayed once and the second spraying was done 7 days after 1st spray. The following observations were recorded in the plant such as: vine length (cm), number of leaves per plant, leaf area (cm^2), number of female flower per plant, number of male flower per plant, sex ration, no of fruit per plant, weight of fruit, and fruit yields per plant.

RESULTS AND DISCUSSION

Growth characters. The various growth parameters like vine length, number of leaves, primary nodes, leaf area of cucumber were found significant among varieties and the effect of foliar application of ethrel as compared to water was prominent during the course of investigation. The results presented in Table 1 showed that the maximum vine length (133.50cm), maximum number of leaves per plant (24.5), maximum leaves area (166.43 cm^2), more number of primary node per plant (18), was recorded in cultivar Rohan followed by Barsha Rani and Manish varieties. While the minimum vine length, minimum number of leaves per plant, less number of primary nodes per plant were observed in Maha Prasad variety. Ethrel treatment might have increased the photosynthetic activity, synthesis and translocation of more metabolites in a way of enhanced cell division, cell elongation and increased the plant growth. These results are in line with Rafeekher *et al*., (2002); Sure *et al*., (2013); Das *et al*., (2015). Shafeek *et al*., (2016) was also reported that increased flexibility of the cell wall pursued by hydrolysis of starch to sugars which lowers the water of the cell, fulfils the permit of water to the cell causing protraction. These osmotic paying rejoinder under the effectiveness of ethrel might have impute to increase in photosynthetic vigour, quickened translocation and performance of employ photosynthetic production, consequently perform in increased cell protraction and quick cell segmentation in the resurgent portion.

Table 1: Effect of foliar ethrel on growth characters of cucumber.

Varieties name	Wine Length 45 DAS		Number of leaves per plant		Node per plant		Leaf area (cm^2)	
	Ethrel	Control	Ethrel	Control	Ethrel	Control	Ethrel	Control
Vishwas 20	80.05	70.10	17.50	16.50	11.5	8.5	88.43	63.37
Priya	80.95	72.05	16.50	15.50	17.0	11.0	148.08	124.21
Rajkanya	78.85	71.30	19.00	17.50	17.5	10.5	133.39	101.02
Gangotri	76.75	70.50	17.50	15.50	15.0	8.0	148.43	146.32
Maha Prasad	75.65	68.33	17.50	17.50	16.0	16.0	126.52	102.65
Kheera Hara Lamba	98.75	91.83	20.00	19.50	15.5	13.5	158.41	114.38
Seven Star	77.00	76.65	16.50	15.50	13.5	8.5	116.54	108.95
Basumati	78.75	78.75	17.00	15.50	17.0	17.0	96.71	91.91
Rohan	133.50	117.20	24.50	19.50	18.0	11.0	166.43	98.18
Dash	90.85	88.25	21.00	14.50	12.5	10.5	112.08	98.51
BarshaNandan	101.95	91.55	18.50	17.00	15.0	13.0	139.82	128.38
Machara Sosa	73.85	70.63	18.50	17.00	16.0	15.0	127.98	110.08
Green Long	112.75	99.90	20.50	19.50	15.5	13.5	150.43	112.68
Padmini	93.85	80.90	18.00	16.50	16.0	13.0	151.06	114.78
Manish	120.95	109.00	20.00	19.50	16.0	15.0	156.32	150.67
Green Sona	120.35	109.50	23.50	24.00	14.5	14.5	159.75	118.87
Barsha Rani	128.65	117.90	22.50	21.50	13.5	11.5	162.86	159.01
Mohine	93.70	89.30	21.50	20.00	16.0	13.0	163.00	116.56
Adimata	101.55	93.15	22.00	21.50	14.5	13.5	138.38	121.09
Chaitali	95.60	89.85	22.00	18.50	12.5	10.5	143.51	135.08
	Sem±	CD at 5%	Sem±	CD at 5%	Sem±	CD at 5%	Sem±	CD at 5%
Varities	4.22	12.05	0.725	2.071	0.844	2.412	7.687	21.968
Treat	1.33	3.81	0.229	0.655	0.267	0.763	2.431	6.947
Interaction	NS	NS	NS	NS	1.194	3.411	NS	NS

Flowering characteristics of cucumber. The Table 2 showed the male, female flower formation, their sex ratio and fruits percentage per plant and were influenced by ethrel during the experimentation. These parameters were found statistically significant among the different varieties during the cropping season. Foliar application ethrel produced minimum number of male flowers per plant in Vishwas 20 followed by Chaitali (5.0) whereas maximum number of male flowers per plant Rohan (17.5) was noted under control (water spray). The decreased number of male flowers might be due to higher uptake of ethrel favoring growth activity in plant organs resulting in more male flowers on vine. The similar results were also reported by Sureshkumar *et al*., (2016); Shafeek *et al*., (2016). On the other hand, the maximum number of female flowers per plant was found in Rohan (17.50) followed by Padmini (16.0), while the lowest number of female flowers per plant in Vishwas 20 (6.5) were produced in plants sprayed with water (control). Iwahori *et al.*, (1969); Yamasaki *et al.*, (2003); Shafeek *et al*., (2016) suggested that the positive effect of cucumber spraying the seedlings with ethrel in early stage might due to promoting root growth through germination and early growing stage, which reflected on intensity shoot growth consequently increasing male to female flowers. Moreover Pankaj *et al*., (2005); Chen *et al*., (2010) reported that spraying of ethrel at 1-2 proper leaf stage catalysed plant growth, improved female flowers ratio and then increased fruit offspring and its quality. Spraying of ethrel@ 300 mgl/1, significantly promoted total yield by increasing female flowers and decreased male flowers. A minimum number of sex ratio per plant in Padmini variety (0.31) were noted under ethrel and maximum number of sex ratio per plant found in Dash variety (1.94) under control. The above findings were similar to the results of Moniruzzaman *et al.*, (2019); Sharma *et al.*, (1988). Growth regulator, ethylene, when foliar sprayed through ethrel advanced the female flower initiation in the present study, which might be due to increase the metabolization in plants and also reduce sugar thereby bringing a change in the membrane permeability. Beside that data showed that flowering characteristics of cucumber vine under net house different in its restraint to ethrel foliar sprays and significantly increased fruit set than control. Rohan showed a maximum number of fruit sets per plant (88.56) and a minimum number of fruit sets per plant were found in Seven Star variety (60.0). The results of fruit set indicated that when sex ratio was high then fruit set up will be less and it will be affect the yields (Gill *et al.*, 2012; Akter *et al.*, 2010). The results are the report of Moniruzzaman *et al*., (2019); Megharaj *et al*., (2017) who reported that ethrel has a role for increasing female flowers than any other hormone.

Table 2: Effect of foliar ethrel on flowering characteristics of cucumber.

Varieties name	No. of male flowers		No. of female flowers		Sex ratio		Fruit set percentage	
	Ethrel	Control	Ethrel	Control	Ethrel	Control	Ethrel	Control
Vishwas 20	5.0	7.0	7.5	6.5	0.67	1.08	80.36	77.38
Priya	7.5	8.0	11.5	10.0	0.66	0.80	82.58	85.00
Rajkanya	9.0	12.5	12.0	11.0	0.76	1.14	71.68	68.18
Gangotri	7.5	11.0	15.0	13.0	0.50	0.85	70.00	61.90
Maha Prasad	10.0	11.5	13.5	11.5	0.74	1.00	70.60	65.15
Kheera Hara Lamba	9.5	11.0	11.0	10.0	0.88	1.10	77.50	75.00
Seven Star	9.5	11.5	12.5	11.0	0.76	1.06	67.95	60.00
Basumati	8.5	10.5	10.0	8.5	0.86	1.24	75.25	70.83
Rohan	10.0	17.5	17.5	12.0	0.57	1.46	88.56	79.17
Dash	11.5	15.5	9.5	8.0	1.21	1.94	84.44	81.25
BarshaNandan	6.0	8.0	11.0	8.5	0.55	0.94	87.50	82.64
Machara Sosa	7.0	9.0	11.0	9.0	0.64	1.00	86.36	83.33
Green Long	8.5	10.5	14.5	12.5	0.59	0.84	72.38	68.27
Padmini	5.0	8.5	16.0	12.5	0.31	0.68	62.50	60.26
Manish	6.0	7.5	10.0	9.0	0.60	0.83	80.00	77.78
Green Sona	6.5	9.5	10.0	9.5	0.66	1.01	86.36	84.44
Barsha Rani	8.0	10.5	10.0	8.5	0.80	1.24	82.50	76.39
Mohine	5.5	7.5	11.0	9.5	0.50	0.79	77.27	78.89
Adimata	6.5	11.5	9.0	8.5	0.72	1.36	83.33	82.64
Chaitali	5.0	10.0	13.0	11.5	0.39	0.87	73.81	74.24
	Sem±	CD at 5%	Sem±	CD at 5%	Sem±	CD at 5%	Sem±	CD at 5%
Varities	0.395	1.130	0.367	1.048	0.058	0.165	4.187	11.966
Treatment	0.125	0.357	0.116	0.331	0.018	0.052	NS	NS
Interaction	0.559	1.598	0.518	1.482	0.081	0.233	NS	NS

Yield characteristics. Results of present study revealed that ethrel application differs significantly with respect to fruit yield per vine and highest yield was recorded in Rohan variety (2.98 kg) followed by Green Long variety (1.99 kg) while it was lowest in Basumati variety (0.76) in control. Sure *et al.*, (2013); Shafeek, (1995); Mishra *et al*., (1972) reported that the increase in fruit yield by foliar spray by ethephon@ 300 mg/1 increased the qualities of the cucumber fruits because of increasing carbohydrate metabolism. The data in Table 3 showed that the number of fruits per plant was significantly higher when foliar spray with

ethrel@300ppmin Rohan (15.50) and the lowest fruit per plant was recorded in Vishwas 20 varities (5.0) in control. The number of fruits per vine, fruit yield per vine, and maximum fruit weight was found in Rohan when treated with ethrel at two true leaf stages of cucumber rather than water spray. Similar results was found by Shafeek *et al*., (2016). The earlier report of Thomas, (2008); Alonso *et al*., (2003); Chae *et al*., (2003); Yongan *et al*., (2002); Vadigeri *et al*., (2001); Kshirasagar *et al*., (1995); Hua *et al*., (1998); Shanmugavelu *et al*., (1973) that to foliar spray ethephon or ethrel had effects on female flower and increased fruits per plant and quality of cucumber (Vadigeri *et al*., 2001). Taiz and Zeiger (2002) also reported that ethrel might be foliar sprayed for more female flowers due to its property of better development of gynoecium, fruit ripening, stress induction, lateral cell expansion.

Table 3: Effect of foliar ethrel on yield characteristics.

Varieties name	No. of fruits per plant		Average fruit weight (g)		Fruits yields per plant (kg)	
	Ethrel	Control	Ethrel	Control	Ethrel	Control
Vishwas 20	6.0	5.0	192.2	180.2	1.15	0.90
Priya	9.5	8.5	175.1	172.1	1.66	1.46
Rajkanya	8.5	7.5	183.2	146.5	1.56	1.10
Gangotri	10.5	8.0	159.4	127.5	1.67	1.02
Maha Prasad	9.5	7.5	182.8	146.2	1.74	1.10
Kheera Hara Lamba	8.5	7.5	143.4	138.3	1.22	1.04
Seven Star	8.5	6.5	161.7	197.4	1.37	1.28
Basumati	7.5	6.0	157.6	126.8	1.18	0.76
Rohan	15.5	9.5	192.1	185.5	2.98	1.76
Dash	8.0	6.5	180.5	144.4	1.44	0.94
BarshaNandan	9.5	7.0	121.1	136.8	1.15	0.96
Machara Sosa	9.5	7.5	180.4	162.3	1.71	1.22
Green Long	10.5	8.5	189.4	170.4	1.99	1.45
Padmini	10.0	7.5	174.5	157.5	1.75	1.18
Manish	8.0	7.0	143.4	129.6	1.15	0.91
Green Sona	8.5	8.0	162.9	145.8	1.38	1.17
Barsha Rani	8.3	6.5	179.8	161.7	1.48	1.05
Mohine	8.5	7.5	200.4	180.3	1.70	1.35
Adimata	7.5	7.0	193.4	154.7	1.45	1.08
Chaitali	9.5	8.5	178.8	155.7	1.69	1.32
	Sem±	CD at 5%	Sem±	CD at 5%	Sem±	CD at 5%
Varities	0.317	0.907	1.064	3.042	0.051	0.146
Treatment	0.100	0.287	0.337	0.962	0.016	0.046
Interaction	0.449	1.283	1.505	4.302	0.072	0.207

CONCLUSION

The performance of Rohan was found amazing which improvement the female flower and sex ratio. When foliar spray with ethrel with 300ppm at 2 leaf stage.

FUTURE SCOPE

Genotype of Rohan may be next experiment step with ethephon and gibberellin to accept the fruiting in coastal land of odisha

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Conflict of interest. None.

REFERENCES

Akter, K., & Rehman, A. (2010). Effect of foliar application of IAA and GA3 on sex expression, yield attributes and yield of bitter gourd (*Momordica charantia* L.). *The Chittagong University Journal of Biological Sciences*, *5*: 55-62.

Alonso, J. M., Stepanova, A. N., & Leisse, T. J. (2003). Genome-wide insertional mutagenesis of Arabidopsis thaliana. *Science, 301*, 653–657.

Atsmon, D., & Tabbak, C. (1979). Comparative effects of gibberellin, silver nitrate and aminoethoxyvinyl glycine on sexual tendency and ethylene evolution in the cucumber plant (*Cucumis sativus* L.). *Plant and cell physiology*, *20*(8), 1547-1555.

Chae, H. S., Faure, F., & Kieber, J. J. (2003). The eto1, eto2, and eto3 mutations and cyokinin treatment increase Ethrel biosynthesis in Arabidopsis by increasing the stability of ACS protein. *Plant Cell*, *15*: 545–559.

Chen, H. J., Tsai, Y. J., Chen, W. S., Huang, G. J., Huang, S. S., & Lin, Y. H. (2010). Ethephon-mediated effects on leaf senescence are affected by reduced glutathione and EGTA in sweet potato detached leaves. *Botanical Studies*, *51*: 171-181.

Das, R., Mandal A. R., Priya, A., Das, S. P., & Kabiraj, J. (2015). Evaluation of intergrated nutrient management on the performance of bottle gourd. *Journal of Applied and Natural Science*, *7*(1): 18-22.

Gill, J., Dhillon, W. S., Gill, P. S. S., & Singh, N. (2012). Fruit set and quality improvement studies on bitter gourd. *Indian J. Hort.*, *69*(1): 39-44.

Hua, J., & Meyerowitz, E. M. (1998). Ethrel responses are negatively regulated by a receptor gene family in Arabidopsis thaliana. *Cell*, *94*: 261–271.

Iwahori, S., Lyons, J., & Smith, O. E. (1970). Sex Expression in Cucumber Plants as Affected by 2-Chloroethylphosphonic Acid, Ethylene, and Growth Regulators. *Plant Physiol.*, *46*, 412-415.

Iwahori, S., Lyons, J. M., & Sims, W. L. (1969). Induced femaleness in cucumber by 2-chloroethanephosphonic acid. *Nature*, *222*: 171-172.

Kshirasagar, D. B., Desai, U. T., Patll, B. T., & Pawer, B. U. (1995). Effect of plant growth regulators on sex expression and fruiting in cucumber cv. Hemangi. *Journal of Maharashtra Agricultural Universities*, *20*: 473-474.

Megharaj, K. C., Ajjappalavara, P. S., Revanappa, Manjunathagowda, D. C., & Bommesh, J. C. (2017). Sex Manipulation in Cucurbitaceous Vegetables. *Int. J. Curr. Microbiol. App. Sci.*, *6*(9): 1839-1851.

Mishra, G.M., Prasad, B., & Sinha, S. C. (1972). Effect of plant growth substances on growth, sex expression and yield of bottle gourd. *Proceedings of Third International Symposium on Subtropical and Tropical Horticulture*, pp. 199-207.

Moniruzzaman, M., Khatoon, R., Moniruzzama, M., & Qamruzzaman, A. K. M. (2019). Influence of plant growth regulators on vegetative growth, sex expression and yield of summer bottle gourd. *Bangladesh J. Agril. Res.*, *44*(4): 577-590.

NHB (2013). Natonal Horticulture Bosrd, Department of Agriculture and Co-operation Govt India.

Pankaj, G, Dhaka, R. S., & Fageria, M. S. (2005). Effect of plant growth regulators and water round melon. *Haryana Agricultural University Journal of Research*, *11*: 485-489.

Rafeekher, M., Nair, S. A., Sorte, P. N., Hatwar, G. P., & Chandan, P. M. (2002). Effect of growth regulators on growth and yield of summer cucumber. *J. Soils and Crops*, *12*: 108-110.

Shafeek, M. R. (1995). Response of pepper growth and yield to some cultural treatments under plastic house.phD. *Faculty of Agriculture Al-Azhar University*, Pp 12.

Shafeek, M. R., Helmy, Y. I., Ahmed, A. A., & Ghoname, A. A. (2016). Effect of foliar application of growth regulators (GA3 and Ethrel) on growth, sex expression and yield of summer squash plants (*Cucurbita peop* L.) under plastic house condition. *International Journal of Chem. Tech. Research*, *9*(6): 70-76.

Shanmugavelu, K. G., Thamburaj, S., & Srinivasan, C. (1973). Effect of ethrel (Ethephon) on pumpkin (*Cucurbita moschata* Poir.). *South Indian Horticulture*, *21*: 94-99

Sharma, N. K., Arora, S. K., & Dhankhar, B. S. (1988). Effect of plant growth substances on growth, flowering, sex expression and fruit yield in bottle gourd [*Lagenaria siceraria* (Mollina) Stand]. *Haryana Agric. Univ. J. Res*. *18*(4): 291-297.

Sure, S., Arooie, H., & Azizi, M. (2013). Effect of GA3 and ethephon on sex expression and oil yield in medicinal pumpkin (*Cucurbita peop* var. styriaca). *International J. Farming and Allied Sciences*, *2*(9): 196-201.

Sureshkumar, R., Karuppaiah, P., Rajkumar, M., & Sendhilnathan, R. (2016). Influence of Plant growth regulators on certain yield and quality attributes of bitter gourd (*Momordica charantia* L.) Ecotypes 'Mithipagal' in the rice fallow of cauvery delta region. *International Journal of Current Research*, *8*(5): 30293-30295.

Taiz, L., & Zeiger, E. (2002). Developmental and physiological effects of ethylene in plants physiology sinayer. *Associates Inc., Publishers, Sunderland, Massachusetts*, 657-661.

Thomas, T. D. (2008). The effect of in vivo and in vitro applications of ethrel and GA3 on sex expression in bitter melon (*Momordica charantia* L.). *Euphytica*, *164*: 317323.

Vadigeri, B. G., Madalageri, B. B., & Sheelavantar, M. N. (2001). Effect of ethrel and gibberellic acid on yield and quality of two cucumber varieties. *Karnataka Journal of Agricultural Sciences*, *14*: 727-730.

Wang, D. H., Li, F., Duan, Q. H., Han, T., Xu, Z. H., & Bai, S. N. (2010). Ethylene perception is involved in female cucumber flower development. *The Plant Journal*, *61*(5): 862-872.

Yamasaki, S., Fujii, N., & Takahashi, H. (2003). Characterization of ethylene effects on sex determination in cucumber plants. *Sexual Plant Reproduction*, *16*: 103-111.

Yongan, C., Bingkui, Z., Enhui, Z., & Zunlian, Z. (2002). Control of sex expression in summer squash (*Cucurbita pepo* L.). *Cucurbit Genetics Cooperative Report*, *25*: 51-53.

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