Available online at http://www.journalijdr.com

International Journal of DEVELOPMENT RESEARCH

ISSN: 2230-9926

International Journal of Development Research
Vol. 6, Issue, 04, pp. 7310-7312, April, 2016

Full Length Research Article

EFFECT OF PLANT GROWTH REGULATERS ON GROWTH AND SEX EXPRESSION OF BITTER GOURD

[1,*]Mangave, B.D., [1]Dekhane, S. S. and [2]Patel, D.J.

[1]ASPEE Agricultural Research and Development Foundation, Tansa Farm, Palghar- 421312
[2]Ex. Principle BA college of Agriculture, Anand Agricultural University, Anand

ARTICLE INFO

Article History:
Received 21st January, 2016
Received in revised form
16th February, 2016
Accepted 11th March, 2016
Published online 27th April, 2016

Key Words:
Bitter Gourd,
PGR,
Sex Expression,
NAA,
Putrescine,
Yield.

ABSTRACT

Investigation was conducted to study the effect of different chemicals as a foliar spray on bitter gourd. The treatments were comprised of plant growth regulators *viz.,* NAA @ 50 mg/l and 75 mg/l, ethereal @ 50 mg/l and 100 mg/l, spermine @ 5 mg/l and 10 mg/l, putrescine @ 20 mg/l and 40 mg/l and Control (water spray) applied at 2 and 4 leaf stage. All the treatments improved the flowering and yield characters over control. However, among different treatments, foliar spray of NAA 75 mg/l followed by, putrescine @ 40 mg/l were found most significant in influencing parameters like no. of branches per vine, no. of days taken for first male and female flower, no. of male flowers, no. of female flowers with highest yield. Whereas, significantly highest vine length was recorded in putrescine @ 20 mg/l.

INTRODUCTION

Bitter gourd (*Momordica charantia* L.) a medicinal plant, belonging to family cucurbitaceae generally used in the treatment of diabetes and stomach diseases. Bitter gourd induces greater no. of male flowers, than female flowers which is not advantageous and economical and significantly reduces the yield. Sex expression is a complex characteristic in plants is influenced by genetic, environmental and hormonal factors. Growth regulators play an important role in both morphology and physiology of the plants. Several investigation were done to study effect of growth regulators on plant growth and yield, concentration of chemical, time and method of application. The principle of sex modification in cucurbits lies in altering the sequence of flowering and sex ratio. Besides the environmental factors, endogenous levels of auxins, gibberellins, ethylene and ascorbic acid, at the time and the set of ontogeny determine the sex ratio and sequence of flowering (Leopold and Kriedemann, 1975).

Corresponding author: Mangave, B.D.,
ASPEE Agricultural research and Development Foundation, Tansa Farm, Palghar- 421312.

Exogenous application of plant growth regulators can alter the sex ratio and sequence, if applied at 2 or 4 leaf stage which is the critical stage for suppression or promotion of either sex (Shinde *et al*., 1994). Hence, modification of sex to desired direction has to be manipulated by exogenous application of plant growth regulators (Rudich, 1983).

MATERIALS AND METHODS

The present investigation was carried out at ASPEE Agricultural Research and Development Foundation, Tansa Farm, Tal- Wada, Dist- Palghar (MS), India, during *kharif* 2015. The experiment was comprised of nine treatments involving four growth regulators *viz.,* NAA @ 50 mg/l and 75 mg/l, ethereal @ 50 mg/l and 100 mg/l, spermine @ 5 mg/l and 10 mg/l, putrescine @ 20 mg/l and 40 mg/l and control (water spray) applied at 2 and 4 leaf stage. The experiment was laid out in randomized block design with three replications. Seeds were sown on ridges at spacing of 150 x 100 cm. The recommended packages of practices were adopted to raise the crop. Five plants in each net plot were randomly selected for recording the growth, flower and yield observations. The data were statistically analyzed by using 'waps statistical program' developed by ICAR research complex Goa and critical differences were worked out at five percent level to draw statistical conclusions.

RESULTS

All treatments significantly affect growth and flowering of bitter gourd. Maximum no. of branches per vine (22.71) and minimum no. of days taken for first male (33.80) and female flower (40.84) appearance were recorded (Table-1) in treatment NAA @ 75 mg/l followed by putrescine @ 40 mg/l whereas control recorded minimum no. of branches per vine (12.42), maximum no. of days taken for male (43.08) and female (53.31) flower. Maximum vine length (3.15 m) was recorded in putrescine @ 20 mg/l (Table-1) followed by NAA @ 50 mg/l. Minimum no. of male flowers (149.65) and maximum no. of female flowers (37.16) were recorded in NAA @ 75 mg/l (Table-2) followed by NAA @ 50 mg/l and putrescine @ 40 mg/l respectively. Minimum sex ration is recorded in NAA @ 75 mg/l were as maximum sex ration was recorded in control. Highest yield (1.99 kg/vine) was recorded in treatment NAA @ 75 mg/l followed by NAA @ 50 mg/l, whereas control recorded minimum yield (1.26 kg/vine).

ratio and sequence, if applied at 2 or 4 leaf stage, the critical stage at which the suppression or promotion of either sex is possible. Hence, modification of sex to desired direction has to be manipulated by exogenous application of plant growth regulators once, twice or even thrice, at different intervals (Devies, 1987). Maximum no. of branches per vine, minimum no. of days taken for first male and female flower, minimum no. of male flowers, maximum no. of female flowers with highest yield were recorded in NAA @ 75 mg/l. Choudhury and Singh (1970) reported that NAA 100 ppm was effective in suppressing the male flowers and increasing the number of female flowers in cucumber. The effects subsequently increased the percentage of fruit set and ultimately the yield. Bisaria (1974) found that foliar spray of NAA at 100 ppm increased the number of female flower per plant and the sex ratio was reduced in cucurbits. The increase in the fruit yield with NAA may be due to the effect of auxins to cause physiological modifications in the plants mainly on sex ratio, increased fruit set, fruit weight and higher photosynthetic activity, synthesis and translocation of metabolites from source to sink points (Hilli *et al*., 2010). Putrescineis a common polyamine and used to plant growth regulator.

Table 1. Effect of growth regulators on No. of branches/vine, vine length (m), days to first male flower and days to first female flower

	No of branches/vine	Vine length (m)	Days to first male flower	Days to first female flower
T_1- NAA 50 mg/l	17.09	3.09	35.86	47.91
T_2- NAA 75 mg/l	22.71	2.45	33.80	40.84
T_3- Ethereal 50 mg/l	16.36	3.03	38.14	47.18
T_4- Ethereal 100 mg/l	17.55	2.44	40.17	46.07
T_5- Spermine 5 mg/l	17.62	2.73	37.02	46.22
T_6- Spermine 10 mg/l	15.94	2.38	38.35	46.95
T_7- Putrescine 20 mg/l	14.38	3.15	35.38	44.30
T_8- Putrescine 40 mg/l	20.70	2.92	35.34	45.07
T_9- Control	12.42	1.88	43.08	53.31
CD at 5%	2.63	0.40	5.40	6.42

Table 2. Effect of growth regulators on No. of male flowers/vine, No. of female flowers/vine, sex ratio, yield kg/vine

	No of male flowers/vine	No of female flowers/vine	Sex ratio	Yield kg/vine
T_1- NAA 50 mg/l	183.74	26.59	6.91	1.82
T_2- NAA 75 mg/l	149.65	37.16	4.03	1.99
T_3- Ethereal 50 mg/l	195.52	32.02	6.11	1.45
T_4- Ethereal 100 mg/l	226.15	33.08	6.84	1.31
T_5- Spermine 5 mg/l	261.73	32.63	8.02	1.52
T_6- Spermine 10 mg/l	241.00	28.21	8.54	1.55
T_7- Putrescine 20 mg/l	269.97	32.46	8.32	1.30
T_8- Putrescine 40 mg/l	224.41	35.20	6.38	1.69
T_9- Control	273.69	23.83	11.49	1.26
CD at 5%	28.89	4.72		0.27

DISCUSSION

Plant growth regulators control various physiological and biochemical processes in plant. Exogenous application of growth regulators affect Root and flower buds initiation, development of flowers and fruits and also sex expression by increasing production of female flowers and suppressing male flower production especially in cucurbitaceous plants. This shift in sex expression increases the number of fruits per plant with increase in fruit weight as well as total yield. The principle in sex modification in cucurbits lies in altering the sequence of flowering and sex ratio (Mia *et al.,* 2014). Exogenous application of plant regulators can alter the sex

Polyamine knows to increase length of internode, the number of internode and increased the growth of seedlings (Amri*et al*., 2011) this increase plant height which is clearly seen in result.

REFERENCES

Amri, E., Mirzaei, M., Moradi, M. and Zare, K. 2011. The effects of spermidine and putrescine polyamines on growth of pomegranate (*Punica granatum* L. cv 'Rabbab') in salinity circumstance. *Int. J. Plant Physiology and Biochemistry*. 3(3) pp 43-49.

Bisaria, A. L. 1974. Sex expression and fruit development in cucumber as effect by gibberellins. *Indian J. Hort*., 16 pp 233-235.

Choudhury, B. and Singh, N. 1970. Chemical sex modification and its effect on fruiting of cucumber (*Cucumis sativus* L.) at three locations. *Indian J. Hort*. 27(3/4) pp180-183.

Devies, P. J. 1987. Plant hormones and their role in plant growth and development. Kluwer Academic Publishers, London pp. 232-239.

Hilli, J. S., Vyakarnahal, B. S., Biradar, D. P. and Hunje, Ravi. 2010. Effect of growth regulators and stages of spray on growth, fruit set and seed yield of ridgegourd (*Luffaacutangula* L. Roxb). *Karnataka J. Agric. Sci*., 23(2) pp 239-242.

Leopold, A. C. and Kriedemann, P. E. 1975. Plant growth and development. 2nd Ed. Tata McGraw-Hill Publishing Company Ltd. New Delhi pp. 138-326.

Mia Baset, M. A., Islam, M. S. and Shamsuddin, Z. H. 2014. Altered sex expression by plant growth regulators: An overview in medicinal vegetable bitter gourd (I L.). *J. Medicinal Plant Research.* 8(8) pp 361-367.

Rudich, J. 1983. Conference on the Biology and Chemistry of Cucurbitaceae. Cornell University, Ithaca. New York August.

Shinde, H. J., Desai, U. T., Masalkar, S. D. and Choudhari, S. M. 1994. Effect of plant growth regulators to control vine length in watermelon. *J. Maharashtra Agric. Univ*., 19(1) pp 150-151.

****