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TO STUDY THE EFFECTS OF GA_3 AND MH ON BUD INITIATION AND FLOWERING IN CHILLI (Capsium annuum L.)

Dr. Manoj Kumar
Lecturer in Biology
Govt.I.College,Kalron
Almora ,Uttarakhand

Dr. V.K.Vatsa
Associate Professor & HOD
Department of Botany
Hindu College Moradabad
M.J.P.Rohilkhand University,Bareilly

ABSTRACT:

The flowering behaviour of a plant is of great importance in most of the economic plants. Foliar application of GA_3 induced early flowering and reduced the number of days taken to bud initiation and opening of flower. Single foliar spray of GA_3 at 55 DAT (S_2 stage) and triple foliar spray showed more pronounced effects. 50ppm GA_3 treatment is found to be most effective and it induced 6 days early flowering as compared to control. GA_3 treatments increased the number of flowers significantly at all the concentrations used except 100 ppm over the control. Foliar application of MH delayed the flowering at all the concentrations used. 100 ppm MH treatment of triple spray delayed flower bud initiation by 10 days and opening of flower by 12 days over control. Foliar application of MH showed that number of flowers per plant in chilli was gradually increased with increasing concentrations from 5 to 50 ppm and then decreased at 100 ppm at all the stages of single spray as well as triple spray. Triple sprayed plants with 50 ppm MH produced maximum number of flowers (325.4 flowers/plant) in comparison to control (238.5 flowers /per plant).

KEYWORDS: *GA_3 (Gibbrellic acid), MH (Malic hydrazide), DAT(Days after treatment)*

INTRODUCTION:-

Flowering behaviour of plant is of great importance in most of the economic plants. Some naturally occurring growth hormones reach a low level in the young active regions of many plants at the time when they switch over from vegetative phase to reproductive phase. If the growth regulators are maintained at a high concentration by foliar applications at different stages of vegetative growth, an early flowering or a delayed flowering might be resulted. In pineapple, the flowering was induced first by ethylene and then by α naphthalene acetic acid. The effects of photoperiod, temperature and different growth substances on flowering have been studied in various plants.

The effects of foliar application of gibberellins on flower bud initiation, number of flowers and pollen sterility have been studied by a large number of workers in different crops viz. Trichosanthes dioica (Basu et al.,1999), Cucurbita moschata (Rahman & Sharmeen, 1999), cucumber (Rafeekher et al., 2002), tuberose (Padaganur et al., 2005) and okra (Surendra et al., 2006). Hopkins (1995) has observed that the gibberellins promoted uniform flowering, early flowering and increased number of flowers. Umrao et al. (2007) have reported that preplanting soaking of corms in 50, 100 and 150 ppm of GA_3 increased the number of flowering spikes per mother corm in gladiolus.

The foliar application of maleic hydrazide has also been found to alter the flowering behaviour. Effect of foliar application of MH on flowering, number of flowers, sex expression, flower drop and pollen sterility has also been studied by a large number of workers in various plants viz. bottle gourd (Arora et al., 1982), egg plant (Raman and Natrajan 1999), tuberose (Sagar et al., 2005 and onion (Sabale and Mane, 2006). Akiko Ito et al. (2001) have observed that application of MH increased the number of laterally born flower buds on shoot in pear.

MATERIALS AND METHODS:-

The experiments for foliar spray were carried out at agricultural farm, Behta Jai Singh (Bahjoi) Distt. Moradabad during summer season of year 2003-05. The seedlings of chilli cultivar 'Suryamukhi' were prepared on raised beds and all the recommended practices of seedlings raising were followed. Experiments were carried out to determine the effects of NAA and MH on flowering in chilli (*Capsicum annuum L.*). The plants were sprayed with aqueous solutions of each of NAA and MH at 5, 10, 25, 50 and 100 ppm at three stages. Single foliar spray was made at the age of 40 DAT (S_1stage), 55 DAT (S_2stage) or 70 DAT (S_3 stage). Double foliar spray was made at S_1+S_2 stages and triple foliar spray was made at S_1+S_2+S_3 stages. The control plants were sprayed with distilled water.

Following observations were recorded

1. Flower bud initiation
2. Opening of flower bud.
3. Number of flowers per plant

OBSERVATIONS:-

Flower bud initiation & opening of flower: -

The experimental findings on flower bud initiation & opening of flower are presented in tables 1-2 and figures 1-4 Foliar application of GA_3 showed variable effects on flower bud initiation. Foliar spray of GA_3 at S_1 stage (40 DAT) has no visible effect on flower initiation while single spray at S_3 stage (70 DAT)

showed little effect and 10 to 50 ppm treatments induced early flowering. Single foliar spray at S_2 stage (55 DAT) and as triple foliar spray (S_1+S_2+S_3) showed pronounced effects on flower initiation. Single spray of 5 to 50 ppm GA_3 induced early flowering and reduced the number of days taken to flower bud initiation (table 1 & fig. 1-2). 50 ppm GA_3 treatment showed earliest flowering and flower initiation took place in 68.4 days as compared to 72.3 days in control. Triple spray of GA_3 is found comparatively more effective than single spray at S_2 stage in inducing early flower bud initiation. Triple spray of GA_3 at 50 ppm treatment induced earliest flower bud initiation and it took 67.2 days as compared to 72.3 days in control but triple sprays of GA_3 at 100 ppm treatment delayed by 2 days. Triple spray reduced the number of days taken for opening of flower. In all the three stages of spray, 50 ppm GA_3 treatment is found to be most effective and it took 69.6 days only for opening of flower as compared to 76.00 days in control.

Perusal of data from table 2 and figs. 3-4 shows that maleic hydrazide (MH) delayed the flowering at all the concentrations used, however, single spray at S_1 and S_3 stages showed little effect. Single foliar application at S_2 stage and triple foliar application at S_1+S_2+S_3 stages showed marked effect on flower bud initiation as well as opening of flower. In both these cases, number of days taken for flower bud initiation as well as for opening of flower was gradually increased with the increasing concentrations of MH from 5 to 100 ppm. Triple spray of 100 ppm MH is found to be most effective in delaying the flowering in chilli and flower bud initiation took place in 82.2 days as compared to 72.3 days in control while opening of flower took place in 88.00 days as compared to 76.00 days in control. It means 100 ppm MH treatment (triple spray) delayed flower bud initiation by 10 days and opening of flower by 12 days.

Table - 1

Effect of gibberellic acid (GA_3) on flower bud initiation and flower opening in chilli (*Capsicum annuum L.*)

Treatment	*Days after transplantation*							
	Single spray						Triple Spray	
	S_1		S_2		S_3		$S_1+ S_2+ S_3$	
	A	B	A	B	A	B	A	B
Control	72.30	76.00	72.30	76.00	72.30	76.00	72.30	76.00
GA3 5 ppm	72.70	76.50	72.10	75.40	72.00	75.00	71.60	74.70
10ppm	72.50	76.20	70.40	73.60	71.20	74.60	69.40	72.30
25 ppm	72.50	75.90	69.60	72.30	70.80	73.80	68.20	70.80
50 ppm	73.00	76.60	68.40	71.00	70.30	72.20	67.20	69.60
100 ppm	72.10	75.40	71.50	74.60	72.80	76.30	73.60	75.50

S_1 = Single spray at 40 days after transplantation
S_2 = Single spray of 55 days after transplantation
S_3 = Single spray of 70 days after transplantation

A = No. of days taken for flower bud initiation
B = No. of days taken for opening of flower

Table -2

Effect of maleic hydrazide acid (MH) on flower bud initiation and flower opening in chilli (*Capsicum annuum L.*)

Treatment	Days after transplantation							
	Single spray						Triple Spray	
	S_1		S_2		S_3		S_1+ S_2+ S_3	
	A	B	A	B	A	B	A	B
Control	72.30	76.00	72.30	76.00	72.30	76.00	72.30	76.00
MH 5ppm	72.30	76.10	74.10	78.00	72.80	77.10	74.40	78.70
10 ppm	73.60	74.40	75.30	79.50	73.20	77.80	75.70	80.50
25 ppm	72.60	76.20	77.90	82.90	73.90	79.00	78.90	83.90
50 ppm	73.80	77.00	77.90	84.20	74.20	79.40	79.50	85.00
100 ppm	74.50	78.40	80.30	85.80	74.50	80.00	82.20	87.90

S_1 = Single spray at 40 days after transplantation
S_2 = Single spray of 55 days after transplantation
S_3 = Single spray of 70 days after transplantation

A = No. of days taken for flower bud initiation
B = No. of days taken for opening of flower

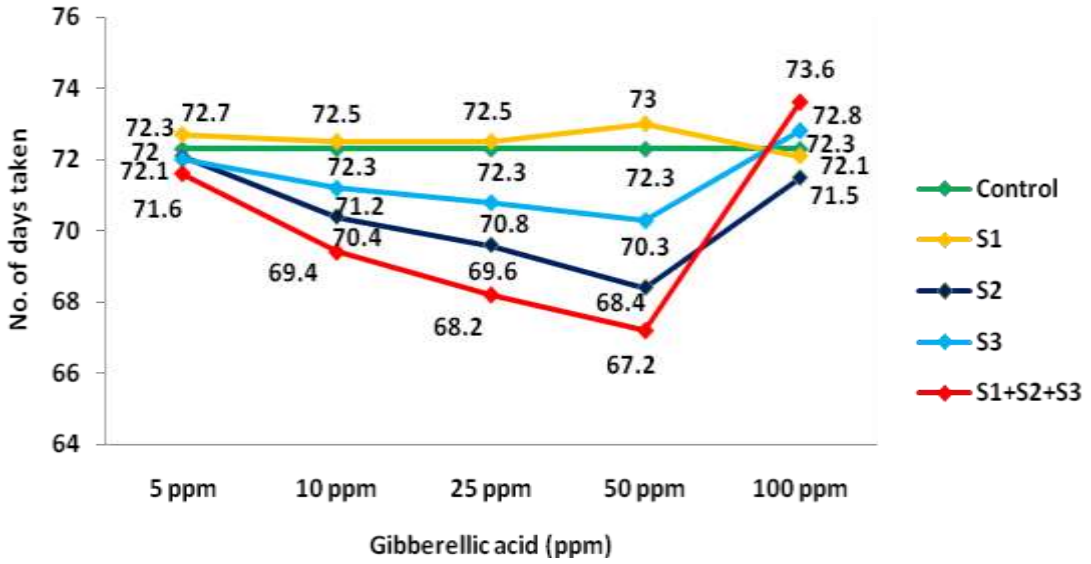

Fig – 1: Effect of single (S_1, S_2 & S_3 stages) and triple spray of GA_3 on time taken for flower bud initiation

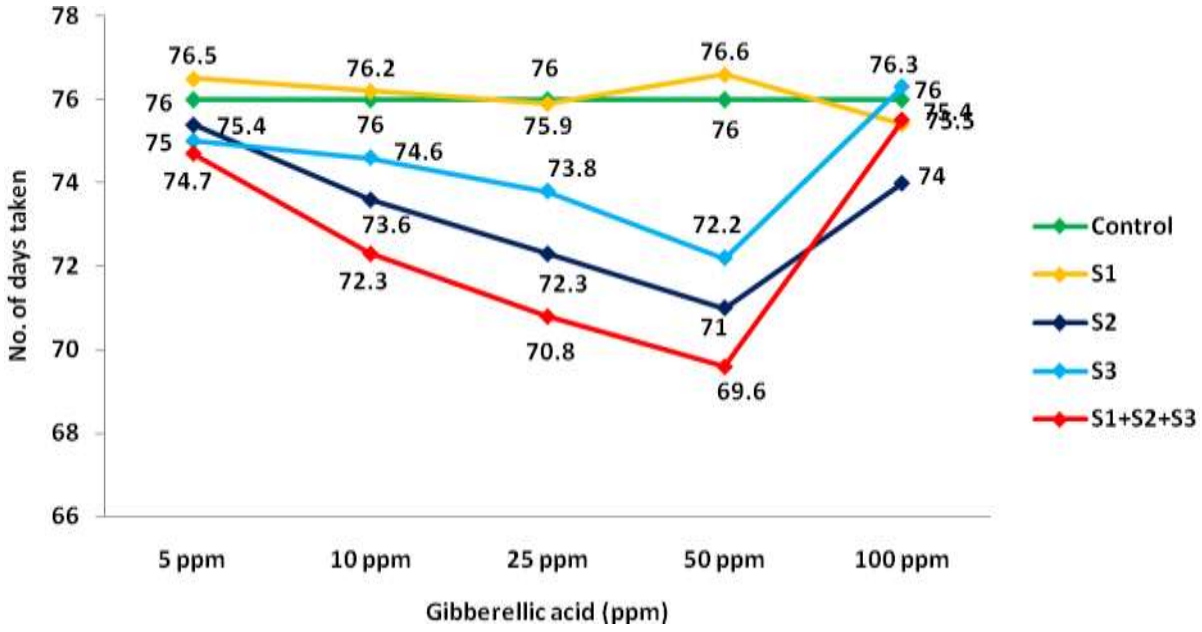

Fig – 2: Effect of single (S_1, S_2 & S_3 stages) and triple spray of gibberellic acid on time taken for opening of flower

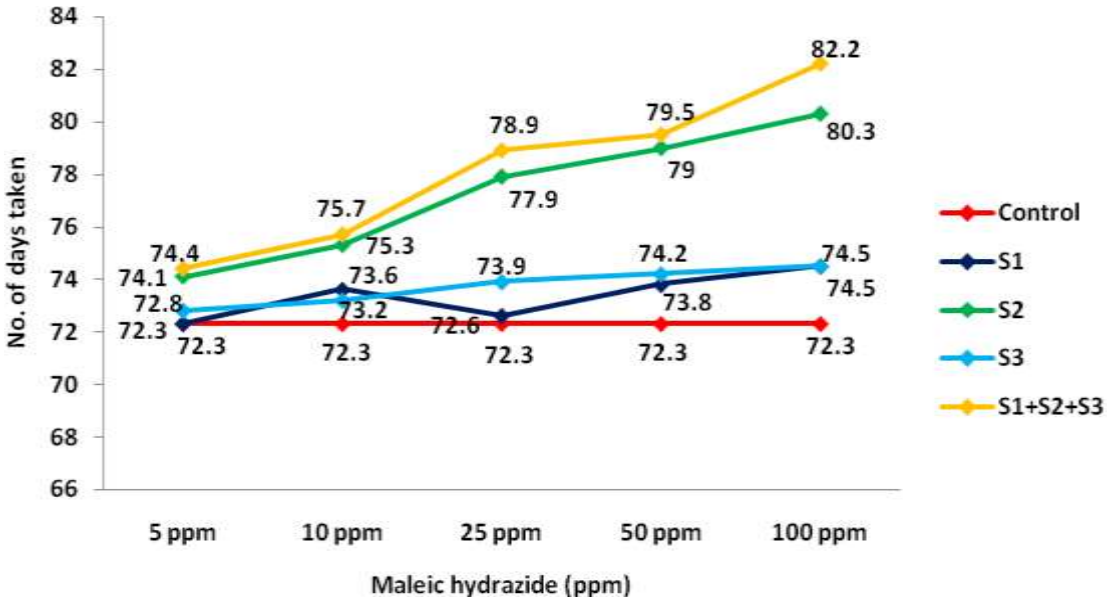

Fig –3: Effect of single (S_1, S_2 & S_3 stages) and triple spray of maleic hydrazide on time taken for flower bud initiation

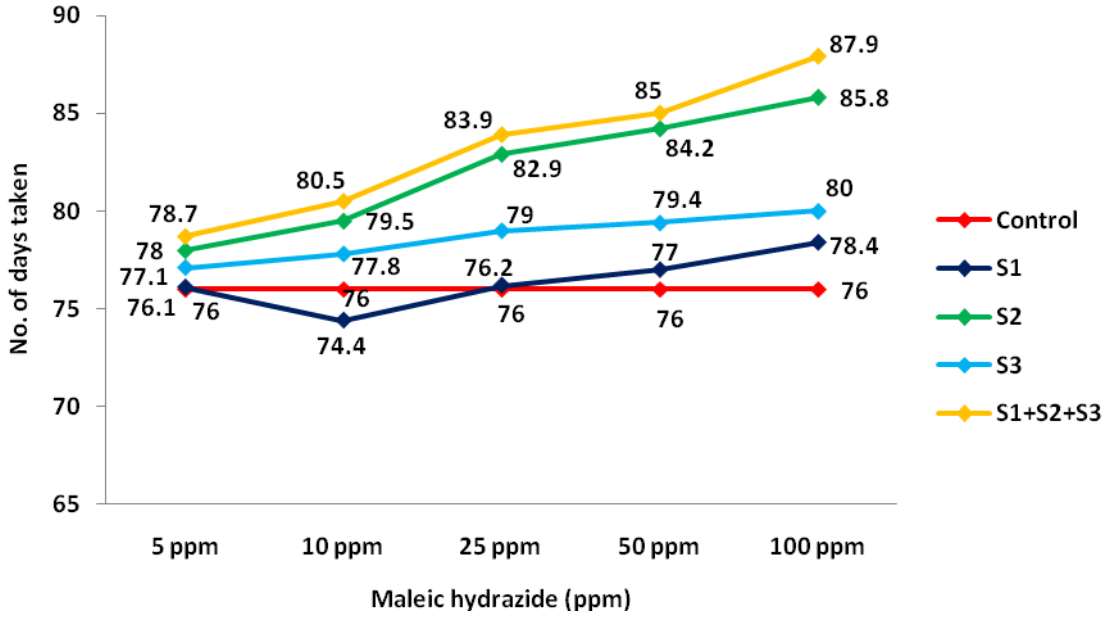

Fig. –4: Effect of single (S_1, S_2 & S_3 stages) and triple spray of maleic hydrazide on time taken for opening of flower

Number of flowers:-

The experimental findings on number of flowers per plant are presented in tables 3 & figs. 5 . Single spray of GA_3 at S_1, S_2 and S_3 stages and triple foliar spray (S_1+S_2+S_3) increased the number of flowers significantly at all the concentrations used except 100 ppm over the control. The lower concentrations (5 to 25 ppm) were more promotery in comparison to higher concentrations (50 and 100 ppm). Number of flowers per plant was gradually increased with the increasing concentrations upto 25 ppm and then it was gradually decreased upto 100 ppm. Maximum numbers of flowers were found in 25 ppm treatment. Single foliar application at S_2 stage and triple foliar application of 25 ppm GA_3 produced 254.3 and 261.5 flowers respectively as compared to 238.5 flowers in control. GA_3 reduced the number of flowers at single spray (S_3 stage) and triple spray significantly. Triple foliar spray of GA_3 showed more pronounced effect on number of flowers as compared to single spray.

Data for the effect of MH on number of flowers in chilli is presented in table 4 & fig. 6. Number of flowers per plant was gradually increased significantly with the increasing concentrations of MH from 5 to 50 ppm and decreased at 100 ppm at all the three stages of single spray as well as triple spray. Single foliar spray at S_2 stage and triple foliar sprays are found to be more effective in increasing the number of flowers per plant. Triple spray MH treated plants produced more number of flowers as compared to single spray at different concentrations of MH used. Among single spray MH treated plants, maximum number of flowers (316.0) was found at 50 ppm treatment. Triple sprayed plants with 50 ppm MH produced maximum number of flowers (325.4) in comparison to only 238.5 flowers per plant of control.

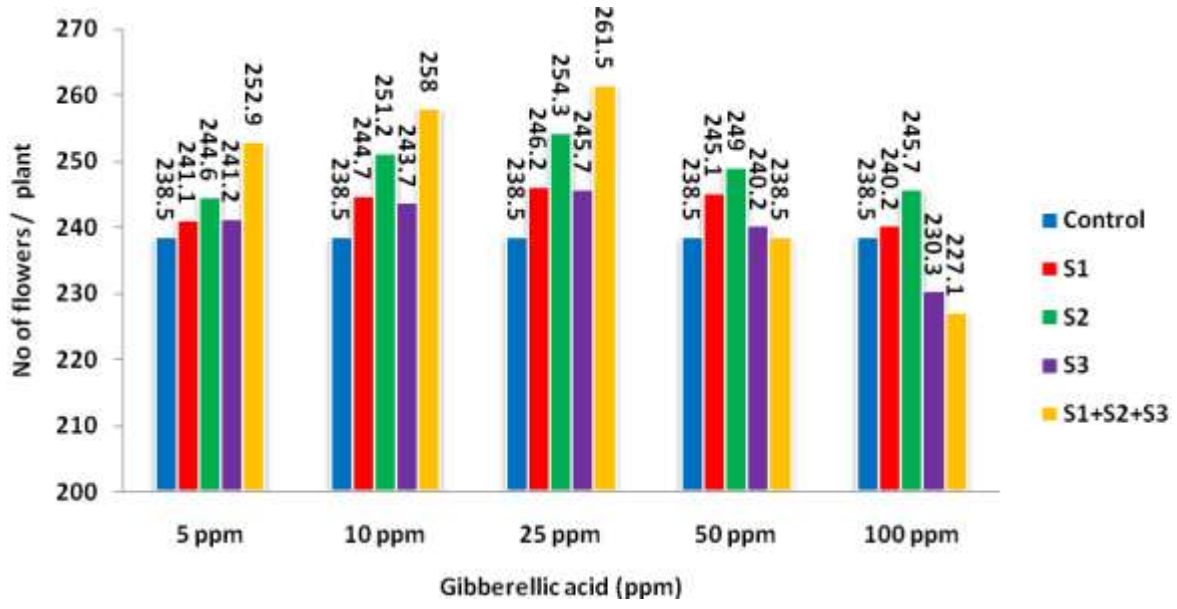

Fig – 5: Effect of gibberellic acid on number of flowers per plant in chilli

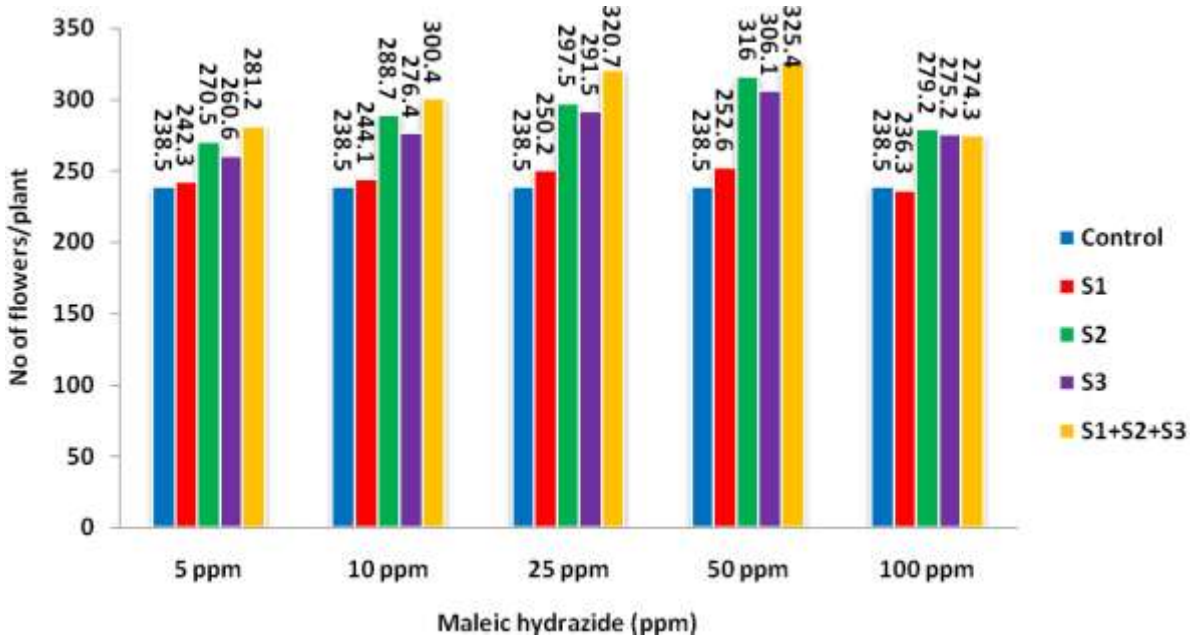

Fig –6: Effect of maleic hydrazide on number of flowers per plant in chill

Table -3

Effect of gibberellic acid (GA_3) on number of flowers per plant in chilli *(Capsicum annuum L)*

Treatments	Number of flowers			
	Single spray			Triple spray
	S_1	S_2	S_3	$S_1+S_2+S_3$
	Mean ± SE CV%	Mean ± SE CV%	Mean ± SE CV%	Mean ± SE CV%
Control	238.5 ± 1.08 2.04	238.5 ± 1.08 2.04	238.5 ± 1.08 2.04	238.5 ± 1.08 2.04
GA_3 5 ppm	241.1 ± 1.00* 1.85	244.6 ± 0.94** 1.72	241.2 ± 0.81** 1.49	252.9 ± 0.87** 1.42
10 ppm	244.7 ± 0.93** 1.70	25.12 ± 0.98** 1.60	243.7 ± 0.92** 1.69	258.0 ± 1.12** 2.02
25 ppm	246.2 ± 0.82** 1.49	254.3 ± 0.99** 1.74	245.7 ± 0.84** 1.53	261.5 ± 0.81** 1.38
50 ppm	245.1 ± 0.89** 1.59	249.0 ± 1.01** 1.82	240.2 ± 0.88* 1.62	238.5 ± 1.08** 2.04
100 ppm	240.2 ± 0.88 1.62	245.7 ± 0.96** 1.74	230.3 ± 0.83** 1.62	227.1 ± 0.67** 1.33

* Significant at P = 0.05

** Significant at P = 0.01

Table -4

Effect of maleic hydrazide (MH) on number of flowers per plant in chilli *(Capsicum annuum L)*

Treatments	Number of flowers			
	Single spray			Triple spray
	S_1	S_2	S_3	$S_1+S_2+S_3$
	Mean ± SE CV%	Mean ± SE CV%	Mean ± SE CV%	Mean ± SE CV%
Control	238.5 ± 1.08 2.04	238.5 ± 1.08 2.04	238.5 ± 1.08 2.04	238.5 ± 1.08 2.04
MH 5 ppm	242.4 ± 0.81** 1.48	270.5 ± 1.19** 1.97	260.6 ± 0.84** 1.44	281.2 ± 1.12** 1.78
10 ppm	244.1 ± 0.88** 1.61	288.7 ± 1.04** 1.61	276.4 ± 1.15** 1.85	300.4 ± 1.03** 1.54
25 ppm	250.2 ± 0.91** 1.63	297.5 ± 1.37** 2.06	291.5 ± 0.95** 1.46	320.7 ± 0.77** 1.07
50 ppm	252.6 ± 0.84** 1.49	316.0 ± 0.81** 1.33	306.1 ± 1.02** 1.49	325.4 ± 1.06** 1.46
100 ppm	236.3 ± 0.84** 1.59	279.2 ± 1.03** 1.60	275.2 ± 1.07** 1.73	274.3 ± 0.92** 1.50

*Significant at P = 0.05

**Significant at P = 0.01

CONCLUSION:

It can be concluded that out of the two hormones used in present study 50ppm GA_3 treatment is found to be most effective and it induced 6 days early flowering as compared to control. GA_3 treatments increased the number of flowers significantly at all the concentrations used except 100 ppm over the control. Foliar application of MH delayed the flowering at all the concentrations used. 100 ppm MH treatment of triple spray delayed flower bud initiation by 10 days and opening of flower by 12 days over control. MH is found to be the most effective in increasing the number of flowers per plant 325.4 over the control (238.5) per plant. It probably appears to be due to the profused branching in MH treated plants, which provided more sites for bud formation. Among three different stages of single foliar sprays, S_2 stage (55 DAT) is most appropriate for hormonal treatment. Triple foliar spray showed more pronounced effect in increasing the number of flowers per plant as compared to single spray.

BIBILIOGRAPHY:

1. Akiko, Ito, Hayama, H., Kashimura, Y. and Yoshioka, H.. 2001 : Effect of maleic hydrazide on endogenous cytokinin contents in lateral buds, and its possible role in flower bud formation on the Japanese pear shoot. Scientica Horticulturae. **87**: 199-205.

2. Arora, S.K., Pandita, M.L. and Sidhu, A.S. 1982 : Effect of MH on vegetative growth, flowering, fruiting and yield of bottle gourd. Scientia Horticulturae. **17** :211-215.

3. Basu, P.S., Banerjee, S., Das, Susmita and Das, S. 1999 : Effect of gibberellic acid on flowering, fruit setting and fruit development of *Trichosanthes dioica* Roxb. Indian Journal of Plant Physiology. **4**(4): 331-333.

4. Hopkins, W.G. 1995 : Introduction to plant physiology. Ist edi. John wiley and sons Inc. New york NY.

5. Padaganur, V.G., Mokashi, A.N. and Patil, V.S., 2005: Effect of growth regulators on growth and yield of tuberose cv. Single. Karnataka J. Agric. Sci. **18** (2): (469-473).

6. Rafeekher, M., Nair, S.A., Sorte, P.N., Hatwar, G.P., and Chandan, P.M. 2002 : Effect of growth regulators on growth and yield of summer cucumber. Journal of soils and crops. **12** (1) : 108-110.

7. Rahman, M.A., Sharmeen, S. 1999 : Effect of IAA, GA_3, TIBA, B & Mo. on sex expression and yield of *Cucurbita moschata* (Duch. & Lam., Duch ex Poir). Bangladesh Journal of Botany. **28** (1):79-83.

8. Raman, J.M. and Natarajan, S. 1999 b : Studies on effect of chemical hybridizing agents on male sterility in egg plant (*Solanum melongena* L.). South Indian Horticulture. **47** (1-6): 54-56.

9. Sabale, A.B. and Mane, A.A. 2006 : Biochemical parameters in *Allium cepa* L. varieties influenced by maleic hydrazide. Agric. Sci.Digest. **26**(2): 123-125.

10. Sagar, N.N., Kawarkhe, V.J., Deshmukh, Manisha and Lokhande, B.S.(2005): Effect of Preplanting growth regulator treatment of Bulbs on growth and flowering of tuberose (*Palianthes tuberosa* L.). The Orissa Journal of Horticulture. 33(1): 39-42.

11. Surendra, P., Nawalagatti, C.M., Chetti, M.B. and Hiremath S.M. 2006: Effect of plant growth regulators and micronutirents on yield and yield components in okra. Karnataka J. Agric. Sci. **19**(2): 264-267.

12. Umrao, Vijay, K., Singh, R.P. and Singh, A.R. 2007 : Effect gibberellic acid and growing media on vegetative and floral attributes of gladiolus . Indian J. Hort. **64**(1): 73-76.