DOI:10.33451/florafauna.v24i1pp59-62

FLORA AND FAUNA ISSN 2456 - 9364 (Online)

2018 Vol. 24 No. 1 PP 59-62 ISSN 0971 - 6920 (Print)

EFFECT OF SOME PLANT GROWTH REGULATORS ON FRUIT YIELD AND SEED ATTRIBUTES OF OKRA (*ABELMOSCHUS ESCULENTUS*)

RAVI KUMAR*, A. K. PAL, SANDEEP K. MAURIYA, KULVEER SINGH YADAV AND ARUN KUMAR

Department of Horticulture,
Institute of Agricultural Sciences,
Banaras Hindu University,
VARANASI-221005, U.P., INDIA
*Corresponding Author
E-mail: ravibhuias@gmail.com

Received : 25.01.18; ***Accepted*** : 22.03.18

ABSTRACT

An investigation was carried out during rainy season at the HorticultureResearch Farm, Department of Horticulture, Institute of Agriculture Sciences, Banaras Hindu University, Varanasi. The investigation comprised ten treatments *viz.*,three levels each of gibberellic acid GA_3 (50, 75 and 100 ppm), cytokinin (50, 75 and 100 ppm) and NAA (50, 75 and 100 ppm) along with control (distilled water) were applied as foliar application at 30 and 40 days after transplanting. The experiment was laid out in a randomized block design with three replications. Results revealed that, the minimum number of days (49.97) to 1st edible fruits harvesting was recorded in 100 ppm GA_3 which was statistically at par with 75 ppm GA_3. The maximum fruit length (13.22 cm), fruit diameter (1.82 cm), number of seeds per fruit (50.13), number of fruits per plant (23.47), fruit yield per plant (354.30 g), highest fruit yield (141.72 q/ha), 100 seed weight (5.18 g), seed yield per plant (47.97 g) and highest seed yield (19.19 q/ha) were recorded with GA_3 at 100 ppm. The maximum fresh fruit weight (15.85 g) was recorded in 50 ppm.

Figure : 00 References : 22 Tables : 02

KEY WORDS : Cytokinin, Fruits, GA_3, Kashi Pragati, NAA, Okra, Seed

Introduction

Among the fruits and vegetables, okra is an important vegetable having good demand throughout the year for its tender fruits. The term 'vegetable' refers to the tender edible shoots, fruits, leaves and roots of plants that are eaten whole or cooked or part raw as a supplement to starchy foods[20].Vegetables supply considerable quantities of Vitamins *i.e.*, Vitamin 'A' maintains health of the respiratory and the eye tissue; Vitamin 'B' is good for development of the nervous system; Vitamin 'C' is an essential for health of blood cells and tissues, Vitamin 'D' maintains health of bones and teeth; Vitamin 'E' maintains health of the reproductive system and Vitamin 'K' is essential for blood clotting[1]. In recent years, scientists have given due attention to the idea of regulating plant growth as third most important factor in improving the growth, yield and quality with the application of plant growth regulators in various ways. The treatment of seed and foliar spray with plant growth regulator is one of the most popular methods and has been claimed as an effective tool by many workers for improving rate and amount of germination.

The effects of plant growth regulators vary with the stage of plant development, weather conditions (temperature and light intensity) and the time of the year[10,21]. Plant growth regulators (PGR's) can modify plant physiological process using in small amounts and plays an essential role in plant growth and development, elongation and flower development [13, 22]. The application of plant growth regulators for improving the yield and quality of many vegetable crops[14,12] in several ways and it has been found to greatly enhance stem elongation.

Materials and Methods

A field experiment was conducted on okra cv. Kashi Pragati at the HorticultureResearchFarm, Department of Horticulture, Institute of Agriculture Sciences, Banaras Hindu University, Varanasi-221 005 (U.P.) during rainy season 2016. Gcographically,the experirnental site falls under sub- tropical zone beetween $25^0$32, north latitude and $82^0$98' east longitude. The altitude of the location is 123.23 meter above the mean sea level. Three levels each of gibberellic acid (GA_3) (50, 75 and 100 ppm), cytokinin (50, 75 and 100 ppm) and NAA (50, 75 and 100 ppm) along with control (distilled water) were used in this investigation. The experiment was laid out in a randomized block design with three replications. The recommended doses of well rotten farmyard manure and fertilizers (N_2

TABLE-1 : Effect of some plant growth regulators on fruit yield of okra

Treatments	Days to 1st harvesting edible fruit	Fruit length (cm)	Fruit diameter (cm)	Fresh fruit weight (g)	Number of fruits per plant	Fruit yield per plant (g)	Fruit yield per ha (q)
T_0 (Control)	56.40	11.31	1.03	12.43	20.20	251.29	100.52
T_1 (Cytokinin 50 ppm)	55.40	12.09	1.10	14.93	21.73	330.27	132.11
T_2 (Cytokinin 75 ppm)	54.97	11.55	1.17	13.33	21.07	280.56	112.22
T_3 (Cytokinin 100 ppm)	53.07	11.60	1.20	13.22	20.80	275.02	110.01
T_4 (GA_3 50 ppm)	52.17	12.05	1.23	15.85	22.07	307.81	123.12
T_5 (GA_3 75 ppm)	51.83	12.67	1.35	15.52	22.80	348.95	139.58
T_6 (GA_3 100 ppm)	49.97	13.22	1.40	15.49	23.47	354.30	141.72
T_7 (NAA 50 ppm)	55.83	11.76	1.47	14.77	20.60	295.69	118.27
T_8 (NAA 75 ppm)	54.40	12.45	1.53	14.37	21.00	310.13	124.05
T_9 (NAA 100 ppm)	54.23	12.64	1.82	13.70	21.13	279.34	111.74
CD 5%	4.58	1.23	0.24	1.06	2.11	38.44	15.38
S.E. (d)	2.18	0.58	0.11	0.51	1.00	18.30	7.32

100 kg, P_2O_5kg and K_2O) were mixed in soil before sowing**.** The half amount of nitrogen and full dose of phosphorus and potash were applied as basal dose in field at the time of field preparation. Remaining half dose of nitrogen fertilizer was given in two split dose, half dose as top dressing at 30 days after sowing and other half at 45 days after sowing. Thus on this basis each and every plot of experimental field was supplied with the rate of 2.4 kgurea, 4.5 kg SSP and 0.9 kg MOP.Seed sowing was done on 31 August, 2016 at 50 cm row to row distance and 50 cm from plant to plant distance. Plot size was kept 2×2 m which accommodate 16 plants in each plot.The different concentrations of cytokinin, GA_3 and NAA were sprayed to the plants at 30 days after sowing. The control plots were sprayed with distilled water in same manner. Observations on various fruits and seed attributes were recorded. Results thus obtained, were subjected to statistical analysis.

Result and Discussion

Fruits parameters

The results obtained on fruit yield characters are presented (Table-1). The minimum number of days taken to 1st edible fruit harvesting (49.97) was recorded in 100 ppm GA_3 followed by 75 ppm GA_3 (51.82), 50 ppm GA_3 (52.17) and 100 ppm Cytokinin (53.07). It is due to the fact that the plant on account of its rapid and increased vegetative growth builds up suitable carbohydrate contained[17].The maximum fruit length (13.22 cm) was recorded in 100 ppm GA_3 followed by 75 ppm GA_3 (12.67 cm), 100 ppm NAA (12.64 cm) and 50 ppm Cytokinin (12.09 cm). The maximum fruit diameter (1.82 cm) was recorded in 100 ppm NAA followed by 75 ppm NAA (1.53 cm), 50 ppm NAA (1.47 cm) and 100 ppm GA_3 (1.40 cm) . This may be attributed to the efficient mobilization of photosynthetic materials in plants giving rise to increased stimulation of fruit growth ultimately resulting in fruit width in okra[6,15]. The maximum fresh fruit weight (15.85 g) was recorded in 100 ppm GA_3 followed by 75 ppm GA_3 (15.52 g), 50 ppm GA_3 (15.49 g) and 50 ppm Cytokinin (14.99 g). The increase in the yield was due to redistribution of dry matter in the plant there by bringing about an improvement in yield[11, 8, 7]. The maximum number of fruits per plant (23.47) was recorded in 100 ppm GA_3 followed

TABLE-2 : Effect of some plant growth regulators on seed attributes of okra

Treatments	Number of seeds/ fruit	weight of 100 seeds (g)	Seed yield / plant (g)	Seed yield/ ha (q)
T_0 (Control)	44.70	3.07	29.20	11.68
T_1 (Cytokinin 50 ppm)	45.10	3.23	34.43	13.77
T_2 (Cytokinin 75 ppm)	45.33	3.27	36.13	14.45
T_3 (Cytokinin 100 ppm)	46.17	4.43	36.29	14.52
T_4 (GA_3 50 ppm)	45.97	4.90	40.51	16.20
T_5 (GA_3 75 ppm)	49.40	4.99	43.47	17.39
T_6 (GA_3 100 ppm)	50.13	5.18	47.97	19.19
T_7 (NAA 50 ppm)	46.07	4.47	39.16	15.67
T_8 (NAA 75 ppm)	46.80	4.77	36.84	14.74
T_9 (NAA 100 ppm)	47.90	4.84	34.82	13.93
CD 5%	2.87	1.33	5.84	2.33
S.E. (d)	1.37	0.64	2.78	1.11

by 75 ppm GA_3 (22.80), 50 ppm GA_3 (22.07) and 50 ppm Cytokinin (21.73). The maximum fruit yield per plant (354.30 g) was recorded in 100 ppm GA_3 followed by 75 ppm GA_3 (348.95 g), 50 ppm Cytokinin (330.27 g) and 75 ppm NAA (310.13 g). The significantly highest fruit yield (141.72 q/ha) was recorded in 100 ppm GA_3 followed by 75 ppm GA_3 (139.58 q/ha), 50 ppm Cytokinin (132.11 q/ha) and 50 ppm NAA (124.05 q/ha). The possible reason for increasing in fruit yield per hectare is due to increase in number of fruits per plant, average fruit weight and fruit yield per plant[2,19].

Seed parameters

The results obtained on seed yield attributes are presented in Table -2. The maximum number of seeds per fruit (50.13) was recorded in 100 ppm GA_3 followed by 75 ppm GA_3 (49.40), 100 ppm NAA (47.90) and 75 ppm NAA (46.80). The increase in number of seed per fruit may be due to increased translocation and assimilation of photosynthates from source to the sink (seeds) in chilli [3. 18, 16 4] andin brinjal[14]. The maximum 100 seed weight (5.18 g) was recorded in 100 ppm GA_3 followed by 75 ppm GA_3 (4.99 g), 50 ppm GA_3 (4.90 g) and 100 ppm NAA (4.84 g). The minimum 100 seed weight (3.07 g) was recorded in control.This might have favoured increased supply of photosynthates and mobilization with the findings in okra[5], in tomato [9]and in brinjal[14]. The treatment 100 ppm GA_3 recorded significantly the highest seed yield per plant (47.97 g) followed by 75 ppm GA_3 (43.47), 50 ppm GA_3 (40.51 g) and 50 ppm NAA (39.16 g). The minimum seed yield per plant (29.20 g) was recorded in control. The treatment 100 ppm GA_3 recorded significantly the highest seed yield (19.19 q/ha) followed by 75 ppm GA_3 (17.39 q/ha), 50 ppm GA_3 (16.20 q/ha) and 50 ppm NAA (15.67 q/ha) whereas, minimum seed yield per hectare (11.68 q/ha) in control. This might be due to better translocation of photosynthates from source to sink [5].

References

1. AGUSIOBO, O.N. (1984) Vegetable Gardening Macmillan Publishers London and Basingstoke p. 16.

2. AKHTAR, N., BHUIAN, A.H., QUADIR, A. AND MONDAL, F. (1996) Effect of NAA on yield and quality of summer tomato *Annals Bangladesh Agriculture* **6**(1): 67-70.

3. BALAKUMAR, T. AND BALSUBRAMANIAN, N.A. (1988) Effect of hormonal treatments on biomass production in tomato *Tropical Agriculture* **65**: 373-375.

4. BALARAJ, R. (1999) Investigations of seed technological aspects in chilli (*Capsicum annuum* L.). Ph.D. Thesis University of Agricultural Sciences Dharwad, Karnataka (India).

5. BHATT, K.L. AND SINGH, A.K. (1997) Effect of different levels of phosphorus gibberellic acid and picking on seed production of okra [*Abelmoschus esculentus* (L.) Moench]. *Vegetable Science* **24**(1): 4-6.

6. BHOSLE, A.B., KHORBHADE, S.B., SANAP, P.B. AND GORAD, M.J. (2002) Effect of plant hormones on growth and yield of summer tomato (*Lycopersicon esculentum* Mill.) *Orissa Journal of Horticulture* **30**(2): 63-65.

7. CHANDRABABU, R., MANIAN, K., NAGRAJAN, M. AND RMACHANDRAY, T.K. (1995) Effect of mepiquat chloride on growth and yield of groundnut. *Madras Agriculture Journal* **82**(3): 229-230.

8. CHETTI, M.B. (1991) Evaluation of chamatkar on groundnut. Pestology: 1

9. GOUDAPPALAVAR, H.B. (2000) Effect of mother plant nutrition and chemical spray on seed yield and quality in tomato (*Lycopersicon esculentum* Mill.) M.Sc. (Ag.) Thesis University of Agricultural Sciences Dharwad, Karnataka (India).

10. HIROSE, K. (1981) Development of chemical thinners for commercial use for Satsuma mandarin in Japan. *Proceedings of the International Society of Citriculture* **1**: 256-260.

11. HUMPHRIES, E.C. (1979) Responses of crop plants to growth regulators. Rothamsted Experimental Station, England.

12. MEENA, R.S. (2008) Effect of GA3 and NAA on growth, yield and quality of tomato. (*Lycopersicon esculentum* Mill.) *Current Agriculture* **32**(1 & 2): 83-86.

13. MEERA, S. AND S. POONAM (2010) Response of growth regulators on some physiological traits and yield of wheat (*Triticum aestivum* L.) *Progressive Agriculture* **10**(2): 387-388.

14. PATIL, S.B. (2005) Standardisation of hybrid seed production techniques in brinjal (*Solanum melongena* L.) Ph.D. Thesis University of Agricultural Sciences Dharwad Karnataka (India).

15. PUNDIR, J.P.S. AND YADAV, P.K. (2001) Effect of GA3 and NAA on growth yield and quality of tomato *Current Agriculture* **32**(1 & 2): 137-138.

16. REVANAPPA (1993) Response of green chilli (*Capsicum annuum* L.) genotypes to nitrogen levels, plant density and growth regulators Ph.D. Thesis University of Agricultural Sciences Dharwad, Karnataka (India).

17. SAYED, A. AND KHAN, H. (2000) Effect of pre sowing seed treatment on yield of garden pea. *Allahabad Farmer* **45**(3): 27-30.

18. SINGH, D.K. AND LAL, G. (1995) Effect of plant growth regulators on the fruit set yield and quality of chilli (*Capsicum annuum* L.) cultivars. *Advance in Horticultural science and Forestry* **4** : 133-141.

19. SOHA, P., DAS, N., DEB, P. AND SURESH, C.P. (2009) Effect of NAA and GA_3 on yield and quality of tomato (*Lycopersicon esculentum* Mill). *Environment Ecology* **27**(3): 1048-1050.

20. WILLIAMS, D.A., RIOS, M., STEPHENS, C. AND PATEL, V.P. (1991) Fibronectin and VLA-4 in haematopoietic stem cell microenvironment interactions *Nature* **352** : 438-441.

21. WILSON, W.C., COPPOCK, G.E. AND ATTAWAY, J.A. (1981) Growth regulators facilitate harvesting of oranges *Proceedings of the International Society of Citriculture* **1**: 278-281.

22. YAMAGUCHI, S. AND KAMIYA, Y. (2000) Gibberellin biosynthesis: Its regulation by endogenous and environmental signals *Plant Cell Physiology* **4**: 251-257.