Int.J.Curr.Microbiol.App.Sci (2017) *6*(10): 3551-3556

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 6 Number 10 (2017) pp. 3551-3556**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2017.610.418

Effect of Growth Regulator on Growth, Yield and Seed Quality Parameters of Okra (*Abelmoschus esculentus* L.): cv. Utkal Gaurav

Kanhaiyalal Sanodiya[1*], Geeta Pandey[2], Prafull Kacholli[1] and Ashish Kumar Dubey[3]

[1]Department of Vegetable Science, Collage of Agriculture, Orissa University of Agriculture and Technology, Bhubaneswar-751003, Odisha, India
[2]Department of Floriculture and Landscaping, Collage of Agriculture, Orissa University of Agriculture and Technology, Bhubaneswar-751003, Odisha, India
[3]Indira Gandhi National Tribal University, Amarakantak-484224, Madhya Pradesh, India
**Corresponding author*

Keywords

Effect, Growth regulator growth yield seed quality parameter of okra.

Article Info

Accepted:
28 September 2017
Available Online:
10 October 2017

A B S T R A C T

The present investigation entitled, "Effect of growth regulator on growth, yield and seed quality parameters of okra (*Abelmoschus esculentus* L.):cv. Utkal Gaurav." Was carried at Central Farm, Breeder Seed Production Unit, College of Agriculture, OUAT during *Kharif* season of 2015-2016. Foliar spray two growth regulator like GA_3, NAA were spray at different concentration and 20th, 40th, 60th day after sowing. Result revealed foliar spray is significantly positive impact on growth regulator in growth parameters i.e. T_4 (NAA 50 @ ppm at 20days spray) was first flowering (31.47 days), 50 per cent flowering (40.40 days), first harvesting (37.02 days), minimum days to fruit maturity (66.02 days), yield parameter T_5 (NAA 50 ppm at 40 days spray) maximum fruit weight (16.47 gm.), dry fruit weight (5.61 gm.), fruit length (16.58 cm), fruit girth (6.46 cm), fruit yield per plot (4.83 kg), yield per hectare (96.63 q/ha.), and seed quality parameter T_6 (NAA @ 50 ppm spray at 60 DAS) recorded maximum root length (9.40cm), fresh seedling weight (6.43 g), dry seedling weight (26.77mg) and Vigour index type-I & II (2210.29 and 22.58) and as compare to other treatment and T9 (control).

Introduction

Okra, lady's finger (*Abelmoschus esculentus* L.), 2n = 2x = 130 Okra is an important vegetable crop having good demand throughout the year for its tender fruits and consider as one of the major vegetable crops of the tropical and subtropical parts of the world.

Plant growth regulators are the organic substances which are produced naturally in plants, synthesized in one part and usually translocated to other part where every small quantity influence the growth and other physiological function of the plants (Taiz *et al.*, 2010).

Okra is a heavy yielder and high remunerative crop but sometimes grower suffer with recurring economic loss due to poor plant vigour, low pod setting and small pod size. Therefore, besides varieties evaluation, standardization of location specific approach

is essential to improve productivity of okra. Growth regulator is considered to be a key factor in vegetative growth, flowering, pod setting and high yield in okra (Singh *et. al. 2012*).

The growth regulators and their uses are considered to be the most technical and scientific in crop production. The selection of right hormones, their appropriate concentration and their time and method of application are most essential. Even the same growth regulator in different concentrations brings about the different results. Due to high rise in the prices of chemical fertilizers and also to maintain the eco-system of soil, it has become necessary to use eco-friendly chemicals like GA_3, NAA and IBA. Hence the present investigation has been undertaken to find out the effect of certain growth regulators *viz*., GA_3 50 ppm, NAA 50 ppm were spray at different day after sowing 20^{th}, 40^{th}, 60^{th} day after sowing.

Materials and Methods

The experiment was conducted during kharif season 2015-16 was carried at Central Farm, Breeder Seed Production Unit, College of Agriculture, OUAT. The experiment was laid out in Randomized Block Design with three replications and nine treatments including growth regulators as GA_3 50 ppm, NAA 50 ppm were spray at 20^{th}, 40^{th}, 60^{th} day after sowing and one control. The seeds of okra were sown in the main field with recommended package of practices. Observations are collected on the growth of crop in ten randomly selected plants in an each plot.

Treatment details given are below.

T_1 = Foliar spray of 50 PPM GA_3 at 20 DAS

T_2 = Foliar spray of 50 PPM GA_3 at 40 DAS

T_3 = Foliar spray of 50 PPM GA_3 at 60 DAS

T_4 = Foliar spray of 50 PPM NAA at 20 DAS

T_5 = Foliar spray of 50 PPM NAA at 40 DAS

T_6 = Foliar spray of 50 PPM NAA at 60 DAS

T_7 = Foliar spray of GA_3 20 PPM at 20 DAS + NAA 50 PPM at 40 DAS

T_8 = Foliar spray of NAA 40 PPM at 20 DAS + GA_3 50 PPM at 40 DAS

T_9 = Control

The vigour index values were calculated as per the method prescribed by Abdul-Baki and Anderson (1973) and expressed in whole number.

Vigour index Type-I = Germination (%) x mean seedling length (cm)

Vigour index Type-II = Germination (%) x mean seedling dry weight (g)

Results and Discussion

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads

Effect of foliar spray of growth regulators on different growth parameters in Okra cv. Utkal Gaurav

The data presented in (Table 1) revealed the significant effect of growth regulators on growth parameters at T_2 (GA_3 @ 50 ppm at 40 DAS) where maximum plant height (107.97cm) was recorded, followed by T_5 (NAA @ 50 ppm at 40 DAS) plant height (104.31cm). Minimum plant height was recorded on T_9 (control treatment). Similar result was reported by Rani *et al.*, (2013),

Patil and Patel 2010 and The application of growth promoters increased the plant height due to enhancement in the cell division and cell elongation at shoot apex and such effect was due to increase in photosynthetic efficiency (Taiz *et al.,* 2010). The maximum stem girth (5.68 cm) was recorded in T_4 (NAA @ 50 ppm spray at 20 DAS) while lowest (5.22 cm), was recorded T_9 (control). It may be due to decreased apical growth and increase in translocation of food reserves to stem. Similar result was observed with promoters in onion by Shakhada and Gajipara (1998). Among all the treatment minimum days to first flowering (31.47 days), 50 percent (40.40 days) and first harvesting (37.02 days), days to require to fruit maturity T_4 (NAA @ 50 ppm sprays at 20 DAS) was recorded and followed by T_7 (GA_3 @ 20 ppm at 20 DAS + NAA @ 50 ppm at 40 DAS).

Similar result was reported by Chandiniraj *et al.,* (2016) where spray of NAA @ 75 ppm had earliest flowering in chilli. Similar results have been confirmed by Natesh *et al.,* (2005). The increased synthesis of auxin in the root tissue by their enhanced activity due to the application of NAA and their simultaneous transport to the axillary buds would have resulted in a better sink for the mobilization of photo- assimilates at a faster rate. This would have helped in the early transformation from the vegetative phase to reproductive phase. The induction of early flower bud initiation might be influenced by narrowing of the significant accumulation of carbohydrates. The result on earliness in flowering in this experiment goes with the reports by Singh and Mukherjee (2000) in chilli.

Effect of growth regulators on yield parameters of okra cv. Utkal Gaurav

Significant maximum (Table 2) fruit length (16.58 cm), fruit girth (6.46 cm), fresh fruit weight (16.47gm) and dry fruit weight (5.61) were recorded in the T_5 (NAA @ 50 ppm at 40 DAS) followed by T_7 (GA_3 @ 20 ppm at 20 DAS and NAA @ 50 ppm at 40 DAS). Similar results were reported by Chattopadhyay and Sen (1974). The increased fruit length, girth may be due to the increase in number of leaves resulting in increased photosynthesis and maximum distribution of assimilates. These results have been reported by Kore *et al.,* (2003).

Table.1 Effect of foliar spray of growth regulators on different growth parameters in Okra cv. Utkal Gaurav

Treatment	Final height (cm)	Stem girth (cm)	Days to first flowering	Days to 50 per cent flowering	First harvesting	Days require to fruit maturity
T_1- GA_3 @ 50 ppm at 20 DAS	101.32	5.54	33.11	43.91	40.27	68.51
T_2- GA_3 @ 50 ppm at 40 DAS	107.97	5.47	35.87	45.15	42.24	71.30
T_3- GA_3 @ 50 ppm at 60 DAS	98.23	5.26	38.58	47.94	44.16	72.47
T_4-NAA @ 50 ppm at 20 DAS	100.75	5.68	31.47	40.40	37.02	66.02
T_5-NAA @ 50 ppm at 40 DAS	104.31	5.46	36.04	45.36	43.08	71.13
T_6-NAA @ 50 ppm at 60 DAS	97.97	5.37	38.17	47.87	44.23	70.90
T_7-GA_3 @ 20 ppm at 20 DAS + NAA @ 50 ppm at 40 DAS	103.31	5.63	33.08	42.05	39.72	68.14
T_8-NAA @ 40 ppm at 20 DAS + GA_3 @ 50 ppm at 40 DAS	100.24	5.51	33.96	44.24	40.87	70.23
T_9-Control	95.07	5.22	39.04	49.33	45.14	76.34
Mean	101.02	5.46	34.59	45.14	41.86	70.56
SEm (±)	1.75	0.13	0.92	1.12	0.86	0.72
CD 5%	5.24	0.39	2.77	3.35	2.57	2.15

Table.2 Effect of foliar spray of growth regulators on different yield parameters in okra cv. Utkal Gaurav

Treatment	Fruit fresh weight (g)	Dry fruit weight (g)	Fruit length (cm)	Fruit girth (cm)	Fruit yield/ plot (kg)	Yield (q/ha)
T_1- GA_3 @ 50 ppm at 20 DAS	14.47	4.47	14.72	5.75	4.43	88.62
T_2- GA_3 @ 50 ppm at 40 DAS	14.33	4.53	13.91	6.25	4.58	91.52
T_3- GA_3 @ 50 ppm at 60 DAS	12.87	4.41	12.72	5.51	4.33	86.56
T_4-NAA @ 50 ppm at 20 DAS	15.01	4.73	14.38	5.36	4.32	86.44
T_5-NAA @ 50 ppm at 40 DAS	16.47	5.61	16.58	6.46	4.83	96.63
T_6-NAA @ 50 ppm at 60 DAS	12.22	4.39	13.07	5.62	4.35	87.12
T_7-GA_3 @ 20 ppm at 20 DAS + NAA @ 50 ppm at 40 DAS	1 5.14	4.97	14.98	5.97	4.63	92.60
T_8-NAA @ 40 ppm at 20 DAS + GA_3 @ 50 ppm at 40 DAS	12.67	4.35	13.51	5.68	4.42	88.40
T_9-Control	11.67	4.03	10.89	4.97	3.97	79.37
Mean	13.87	4.61	13.86	5.73	4.42	88.58
SEm±	0.31	0.17	0.34	0.18	0.13	2.01
CD %	0.94	0.50	1.02	0.55	0.40	6.02

Table.3 Effect of foliar spray of growth regulators on different seed quality parameters in Okra cv. Utkal Gaurav

Treatment	Test weight (g)	Shoot length (cm)	Root length (cm)	Fresh seedling weight (g.)	Dry seedling weight (mg.)	Vigour index type - I	Vigour index type – II
T_1- GA_3 @ 50 ppm at 20 DAS	7.00	15.40	8.43	5.89	24.33	2184.50	22.30
T_2- GA_3 @ 50 ppm at 40 DAS	7.17	15.58	8.56	5.81	24.50	2092.21	21.23
T_3- GA_3 @ 50 ppm at 60 DAS	6.67	16.95	8.83	6.15	26.03	2122.47	21.43
T_4-NAA @ 50 ppm at 20 DAS	6.33	14.83	8.67	5.69	24.57	1950.50	20.39
T_5-NAA @ 50 ppm at 40 DAS	8.03	16.33	8.90	6.09	25.70	2161.71	22.02
T_6-NAA @ 50 ppm at 60 DAS	6.93	16.81	9.40	6.43	26.77	2210.29	22.58
T_7-GA_3 @ 20 ppm at 20 DAS + NAA 50 @ ppm at 40 DAS	7.67	15.97	7.93	6.03	24.57	2079.30	21.38
T_8-NAA @ 40 ppm at 20 DAS + GA_3 @ 50 ppm at 40 DAS	6.33	16.52	7.17	5.12	23.27	2029.52	19.94
T_9-Control	5.33	13.68	5.21	4.75	19.93	1561.64	16.48
Mean	6.83	15.79	8.12	5.77	24.41	2043.57	20.86
SEm±	0.11	0.14	0.10	0.07	0.19	50.87	0.44
CD 5%	0.32	0.22	0.56	0.43	0.29	152.50	211.99
CD 1%	-	0.30	0.77	0.60	0.40	211.99	1.85

Fruit yield of 4.83 kg/plot and 96.63 (q/ha) fruit yield per hectare was recorded in T_5 (NAA @ 50 ppm at 40 DAS) followed by T_7 (GA_3 @ 20 ppm at 20 DAS and NAA @ 50 ppm at 40 DAS) were superior to control. It is a well-established fact by several workers that increased yield is product of increased yield parameters like fruit length, width and number of seeds. The increased yield with NAA is due to greater mobilization of reserved food materials to fruit and seed, which ultimately increase the fruit length, width and number of seeds. Similar results were reported by Kishan *et al.*, (2001).

Effect of growth regulators on seed quality parameters of okra cv. Utkal Gaurav

Among the growth regulator (Table 3) maximum test weight was maximum (8.03gm) in T_5 (NAA @ 50 ppm at 40 DAS). Similar results were reported by Godara *et al.*, (2013). This may be due to better diversion of photosynthesis to the fruit and better accumulation of food reserves in the seeds. Similar results have been confirmed by Bhat and Singh (1997).

Growth regulator improved the seed quality parameters over control i.e. T_6 (NAA @ 50 ppm spray at 60 DAS) recorded maximum root length (9.40cm), fresh seedling weight (6.43 g), dry seedling weight (26.77 mg) and Vigour index type-I & II (2210.29 and 22.58). Similar result was reported by Premchand *et al.*, (2013). Seeds become more viable and vigorous due to proper development of embryo and endosperm by proportionate use of growth regulators. Similar result was recorded in Khan *et al.*, (2013).These results are in conformity with that of Baruah & Paul (1997) and Velumani and Ramaswamy (1977)

On the basis of results obtained during the present investigation reveals that use of growth regulators (foliage spray) enhanced the growth, yield and seed quality parameters of okra So, it can be concluded that foliar spray of T_5 (NAA @ 50 ppm 40 days after sowing) is most effective in enhancing the yield of okra and improved the seed quality parameters T_6 NAA @ 50 ppm spray at 60 DAS.

References

Abdul-Baki, A.A., and Anderson, V.D., 1973. Vigour determination in soybean seedmultiple criteria. *Crop science*, 13:630-633.

Baruah, G.K.S., and Paul, S.R. 1997. Seed development and maturation studies in okra. *Annual Agriculture Research.* 18(1): 367-368.

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). *Vegetation Science.* 24(1): 4-6.

Chandiniraj, A., Holebasappa, K., Hore, J.K. and Chattopadyay, N. 2016. Growth and yield of chilli (*Capsicum annuum* L.) as influenced by different growth regulators. *The BIOSCAN the Journal an International Quarterly Journal of life sciences.* 11(1): 385-388.

Chattopadhyay, J.K., and Sen, S.K. 1974. Studies on the effect of different growth regulators on reproductive physiology and morphology of chilli. *Vegetable Science.* 1: 41-46.

Godara, A.S., Gupta, U.S., Singh, R. and Lal, G. 2013. Effect of bio-regulators on productivity and profitability of fenugreek (*Trigonella foenum-graecum* L.). *International Journal Seed Spices.* 3(2):42-45.

Khan, S.H., Chattoo, M.A. and Mufti, S. 2013. Effect of plant bio-regulators on seed yield, germination and vigour in okra [*Abelmoschusesculentus* (L.)Moench]. *Progressive Horticulture.* 45(2): 345-346.

Kishan, S.T.V., Sharma, R.S. and Attri, B.L. 2001. Effect of Alpha napthalene acetic acid and 2-4-D on growth quality and yield of tomato cultivars. *Madras Agriculture Journal.* 30(10-12): 723-726.

Kore, V.N., A. R. Salunke, S. Gargi, A.V. Mane, R. Patil and Bendale V.W. 2003. Flowering and yield attributes of okra as influenced by different plant growth regulators. *Journal of Soils and Crops*. 13(2): 238-241.

Natesh, N., Vyakaranahal, B.S., Gouda, M.S.

and Deshpande, V.K. 2005. Influence of growth regulators on growth, seed yield and quality of chill cv. Byadgikaddi. *Karnataka Journal of Agricultural Sciences*. 18(1):36-38.

Patil, D.R., and Patel, M.N. 2010. Effect of seed treatment with GA_3 and NAA on growth and yield of okra [*Abmelmoschus esculentus* (L.) Moench] cv. GO-2. *The Asian Journal of Horticulture*. 5(2): 269-272.

Premchand, K., Channakeshava, B.C. and Narayanareddy, A.B. 2013. Effect of Interaction due to Plant Growth Regulators and Fruit Retention on Crop Growth, Seed Yield and Quality in Okra cv. Arka Anamika. *Indian Horticulture Journal*. 3(2): 10-18.

Rani, M.U., U.K. Jyothi, and Kumar, M.K. 2013.Study on the effect of growth regulators and micronutrients on yield components and nutrient uptake of okra (*Abelmoschus esculentus* L. Moench cv. Arka Anamika. *International Journal of Agriculture Environment & Biotechnology*. 6(1): 117-119.

Shakhada, V.P., and Gajipara, N.N. 1998. A note on influence of NAA, IBA and GA_3 on growth and yield of onion (*Allium cepa* L.). *Vegetable Science*. 25:123-125

Singh, J., B.K. Singh, A.K. Singh, M. Panwar, and Singh B. 2012. Effect of foliar spray of GA_3 and IBA on plant characters and yield of okra [*Abelmoschus esculentus* (L.) Moench]. *Environment & Ecology*. 30(4): 1351-1353.

Singh, L., and Mukherjee, S. 2000. Effect of foliar application urea and NAA on yield and yield attributes of chilli (*Capsicum annuum var: longum*). Agriculture Science Digest. 20(2):116-117.

Taiz, L., Zeiger, E., Moller, I.M. and Murphy. A. 2010. Gibberellins Regulators of Plant Height. Plant Physiology. 5:461-492.

Velumani, N.P., and Ramaswamy, R.R. 1977. Studies on fruit development and maturation in okra. (*Abelmoschus esculentus* (L.) Moench). *Indian Journal Horticulture.283-285.*

How to cite this article:

Kanhaiyalal Sanodiya, Geeta Pandey, Prafull Kacholli and Ashish Kumar Dubey. 2017. Effect of Growth Regulator on Growth, Yield and Seed Quality Parameters of Okra (*Abelmoschus esculentus* L.): cv. Utkal Gaurav. *Int.J.Curr.Microbiol.App.Sci.* 6(10): 3551-3556.
doi: https://doi.org/10.20546/ijcmas.2017.610.418