The Pharma Innovation Journal 2021; 10(6): 844-846

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(6): 844-846

www.thepharmajournal.com
Received: 18-03-2021
Accepted: 29-04-2021

SB Gadade
Department of Crop Physiology D P College of Agriculture, Dahegaon, Affiliated to VNMKV, Parbhani, Maharashtra, India

NS Kahate
Department of Genetics and Plant Breeding, D P College of Agriculture, Dahegaon, Affiliated to VNMKV, Parbhani, Maharashtra, India

AS Magar
Department of Crop Physiology PhD Scholar in IGKV, Raipur, Chhattisgarh, India

Corresponding Author:
SB Gadade
Department of Crop Physiology D P College of Agriculture, Dahegaon, Affiliated to VNMKV, Parbhani, Maharashtra, India

Effect of plant growth regulators on biochemical and quality aspects of ladys finger (*Abelmoschus esculentus* L. Moench)

SB Gadade, NS Kahate and AS Magar

Abstract
The field experiment was conducted on field of Department of Agril. Botany, College of Agriculture, Parbhani, during *kharif*, 2015 for studying effects of plant growth regulators on biochemical and quality aspects of Okra (*Abelmoschus esculentus* L.). The experiment was laid out in randomized block design with nine treatments and three replications. The treatments consisted of two growth regulators *viz*., Gibberrellic acid (50,100,150 and 200 ppm) and naphthalene acetic acid (50,100,150 and 200 ppm) and experimental results revealed that the biochemical parameters *viz*., chlorophyll content (total chlorophyll) increased significantly due to the application of plant growth regulators. Application of growth regulators increased the yield contributing characters *viz*., Pod length, Pod width, number of pod per plant.

Keywords: PGR, chlorophyll content, pod length, pod width, lady's finger

Introduction
Okra is a tall growing, annual, semi woody and warm season crop. It is self- pollinated, but occasionally up to 20% cross pollination happens by insects. The okra flowers blossoms only one day. Okra pods are harvested when they reach the maximum size but still tender (may be 60-180 days from sowing) around 5-10 days after opening of flower depending on the cultivar grown [1].

Okra pods are considered nutritious, providing some human supplementary vitamins such as vitamin C, A, B- complex, calcium, potassium, iron and other minerals [2].

The application of plant growth regulators is known as one of the most important treatments used nowadays in agriculture. Some horticulture crop productions were increased by application of different growth regulators. Growth regulators mainly regulate the plant physiological and biochemical processes. There are some reports, which indicate that application of growth regulators improved the growth and yield of vegetables [3].

Plant growth regulators could manage vegetative and reproductive growth balance. PGRs are known as chemical messengers because they are produced in one part of plant and affect on another part. Exogenous of plant growth regulators improved the yield production and fruit quality of horticulture crops [4].

The overall objective of the experiments was to improve the productivity and quality of okra (*Abelmoschus esculentus*) which will benefit our local farms. Vegetables are high yielding and provide nutritional security, more employment, more cash and more foreign exchange.

West Bengal is the leading state of okra production cultivation in 75.5 thousand ha. area, 882.4 thousand MT production and 15 MT per ha productivity and sharing 18 percent of total production, Followed by Gujarat 73.08. thousand ha. area, 857.05 thousand MT production and 11 MT per ha productivity and sharing 14 percent of total okra production. In Maharashtra okra cultivation with 11.3 thousands ha area with annual production of 84.06 thousand MT and its productivity is of 14.9 MT per ha and sharing 5 percent of the total okra production.

The Area and Production of Maharashtra is low as compare to other leading Okra Producing States. About 60 per cent of okra is grown for the fresh fruit for market and the remaining is used for processing. (Indiastat.com 2015-16) With this background, the present investigation was aimed to find out the effect of plant growth regulators on biochemical and quality aspects in Ladies Finger (*Abelmoschus esculentus* L. Moench).

Materials and Methods
The experiment entitled "to study the effect of plant growth regulators on biochemical &

quality aspects in Ladies Finger (Abelmoschus esculentus L. Moench)" were conducted at Department of Agricultural Botany, VNMKV, Parbhani, Maharashtra, India during *kharif* season 2015-2016. The Okra variety 'Parbhani ok' was sown at 45cm × 30cm spacing in a net plot size of 2.6 m^2. The experiment was laid out in randomized block design with three replications and eight treatments including plant growth regulators as GA3 (50, 100, 150, 200 ppm), NAA (50, 100, 150, 200 ppm) and one control (foliar spray).

Preparation and application of growth regulators

Gibberellic acid: The Solution was prepared by dissolving 50mg,100mg,150mg and 200mg of gibberellic acid in small quantity of ethyl alcohol. For dissolving all particle of GA and stirred. When complete GA granules dissolved in ethyl alcohol the volume was made to one liter by adding double distilled water to obtain 50,100,150,200ppm concentration solution respectively.

Napthalene acetic acid: The 50,100,150,200 ppm solution of NAA was prepared by dissolving 50mg, 100mg, 150mg and 200mg of NAA is small quantity of ethyl alcohol and the volume was made to one liter by adding double distilled water to obtained 50,100,150 and 200 ppm concentration respectively. All the growth regulators were sprayed on the entire plant. While spraying proper care was taken regarding spraying according to layout.

Biochemical analysis

Total chlorophyll: Shoaf and Lium (1976) [15] devised an improved method of extraction of chlorophyll by dimethyl sulphoxide (DMSO). The fresh leaves were gently washed in water to remove dirt and were blotted gently with tissue paper to remove water. The fresh leaf tissue was cut into small pieces avoiding midrib and thick veins, 100 mg was weighed and incubated in 7.0 ml of DMSO at 65ºC for 30 minutes. At the end of the incubation period, supernatant was decanted and leaf tissue was discarded. The volume was made up to 10.0 ml with DMSO. The absorbance of the extract was measured at 645 nm, 652 nm and 663 nm in spectrophotometer (Spectro UV-VIS dual beam UVS-2700, Labomed Inc., USA) using DMSO as a blank. The chlorophyll 'a', chlorophyll 'b' and total chlorophyll contents were calculated by using formulae as given below and expressed as mg/g fresh weight.

$$\text{Chlorophyll 'a'} = 12.7\,(A663) - 2.69\,(A645) \times \frac{V}{1000 \times W \times a}$$

$$\text{Chlorophyll 'b'} = 22.9\,(A645) - 4.68\,(A663) \times \frac{V}{1000 \times W \times a}$$

$$\text{Total Chlorophyll} = 22.9\,(A645) - 4.68\,(A663) \times \frac{V}{1000 \times W \times a}$$

Where
A = Absorbance at specific wave length (645 and 663 nm)
V = Final volume of the chlorophyll extract (ml)
W= Fresh weight of the sample (g)
a = Path length of light (1 cm)

Statistical analysis: Fisher's method of analysis of variance was applied & analysis conducted as suggested by Panse and Sukhatme (1967) [14].

Result and Discussion

Total chlorophyll content in leaf (mg/g): Chlorophyll content in leaf as influenced by GA and NAA concentrations. Total chlorophyll content of leaf was recorded at, 60, 75 and 90 DAS as given in table 1 & figure 1. The treatment differences were significant in total chlorophyll content in functional leaves except 90 DAS. At 60 DAS treatment T_2 (GA 100ppm) and treatment T_7 (NAA 150 ppm) recorded significantly higher content of chlorophyll than T_9 (Control) and statistically at par with T_1 (GA 50ppm) and T_6 (NAA 100ppm) respectively.

Table 1: Mean Total chlorophyll content of leaves (mgs/g)

Sr. No.	Treatments	60 DAS	75 DAS	90 DAS
T_1	GA 50 ppm	1.330	1.275	1.280
T_2	GA 100 ppm	1.340	1.319	1.289
T_3	GA 150 ppm	1.285	1.280	1.229
T_4	GA 200 ppm	1.261	1.273	1.218
T_5	NAA 50 ppm	1.238	1.240	1.208
T_6	NAA 100 ppm	1.290	1.230	1.234
T_7	NAA 150 ppm	1.308	1.257	1.273
T_8	NAA 200 ppm	1.250	1.207	1.176
T_9	Control	1.189	1.131	1.117
	S.E.±	0.014	0.021	0.010
	C.D.at 5%	0.044	0.063	NS

At 75 days T_2 (GA 100 ppm) and T_7 (NAA 150 ppm) recorded satisfactory chlorophyll content in leaves and it was statistically at par with T_3 (GA 150 ppm), T_1 (GA 50ppm) T_4 (GA 200 ppm) and treatment T_6 (NAA 100ppm) respectively. The foliar application of GA_3 (100 ppm) resulted in higher chlorophyll content. It has been suggested that the application of PGR's increased the availability of assimilates, which in turn might have caused maximum chlorophyll synthesis. These character were reported by Akhtar *et al.* (1998) [5], Jasmine Mary S. *et al.* (2012) [6], and Bhagure & Tambe (2015) [7] in okra.

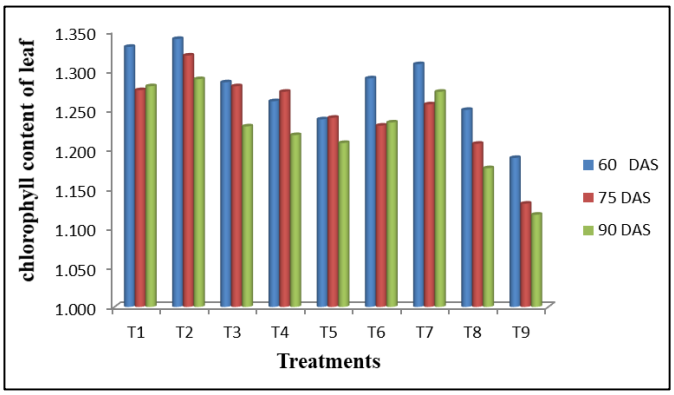

Fig 1: Chlorophyll content of leaf

Mean pod length (cm)

The table 2 data indicate that length of pod was highest at 60 DAS and thereafter it was decreasing slowly. At 60 and 90 days pod length was significantly highest in the treatment T2 (GA 100 ppm) and T7 (NAA 150 ppm) superior over T9 (control) and statistically at par with T1 (GA 50 ppm) and T6 (NAA 50 ppm) respectively. The treatment differences were significant in length of pod. Same result were reported by P. surendra *et al.*, (2006 [8], Patil.*et al.*(2010) [9], Usha Rani *et al.*

(2012) [10], Chand *et al.* (2013) [11], Muhammad *et al.* (2013) [13] & Mehraj *et al.* (2015) [12]

Table 2: Mean pod length (cm)

Sr. No.	Treatments	60 DAS	75 DAS	90 DAS
T_1	GA 50 ppm	13.73	13.10	11.97
T_2	GA 100 ppm	13.83	13.27	12.47
T_3	GA 150 ppm	11.73	11.97	10.93
T_4	GA 200 ppm	12.83	12.17	11.67
T_5	NAA 50 ppm	12.16	12.63	12.33
T_6	NAA 100 ppm	12.88	11.97	10.57
T_7	NAA 150 ppm	13.40	13.23	12.23
T_8	NAA 200 ppm	11.60	12.23	11.07
T_9	Control	11.53	11.57	10.47
	S.E.±	0.17	0.21	0.21
	C.D.at 5%	0.53	0.63	0.64

Mean pod width (cm)

The table 3 data indicate that maximum width of pod observed at 60 DAS. At 60 days pod width was significantly highest in the treatment T2 (GA 100 ppm) and treatment T7 (NAA 150 ppm) superior over T9 (control) and statistically at par with T1 (GA 50 ppm), T3 (GA 150 ppm) and T6 (NAA 100 ppm), T5 (NAA 50 ppm) respectively. Same result were reported by Chand *et al.* (2013) [11], Mehraj, *et al.* (2015) [12].

Table 3: Mean pod width (cm)

Sr. No.	Treatments	60 DAS	75 DAS	90 DAS
T_1	GA 50 ppm	2.03	2.00	1.94
T_2	GA 100 ppm	2.07	2.03	1.97
T_3	GA 150 ppm	1.97	1.92	1.91
T_4	GA 200 ppm	2.03	1.94	1.90
T_5	NAA 50 ppm	1.97	1.91	1.89
T_6	NAA 100 ppm	2.05	1.95	1.86
T_7	NAA 150 ppm	2.20	2.07	1.87
T_8	NAA 200 ppm	1.83	1.97	1.85
T_9	Control	1.65	1.83	1.79
	S.E.±	0.09	0.04	0.013
	C.D.at 5%	0.28	0.12	0.03

Conclusion

In conclusion, the foliar spray of PGRs enhanced the chlorophyll content in leaf and the effect was more with GA (100 ppm) and NAA 150 ppm. Chlorophyll content increased up to 75 DAS and declined thereafter in all the treatments. The fruit characters *viz*., fruit length and fruit diameter was maximum in GA (100 ppm) and the lowest was recorded in control. Thus the total chlorophyll content was improved with application of gibberilic acid (100 ppm) and napthalene acetic acid (150 ppm).

Conflict of Interest

The authors declare that there is no conflict of interest regarding publication of this paper**.**

Ethical standard

The experiment conducted complies with laws.

References

1. Adetuyi, FO, Osagie AU, Adekunle AT. Effect of post-harvest storage techniques on the nutritional properties of benin indigenous Okra (*Abelmoschus esculentus* L Moench). Pak J of Nutri. 2008;7(5):652-657.
2. Lee KH, Cho CY, Yoon ST, Park SK. The effect of nitrogen fertilizer plant density and sowing date on the yield of okra. Korean J of Crop Sci 1990;35(8):179-183
3. Jafarullahet MD, Abdul Fattah Q, Feroza H. Response of growth, yield attributes and yield to the application of KNP and NAA in Cowpea (*Vigna aunguiculata* L). Bang J of Bot 2007;36(2):127-132.
4. Nickell LG. Plant growth regulators. Chemical Engineering News 1978;56:18-34.
5. Akhtar N, Bhuiyan AH, Quadir A, Mondal F. Effect of NAA on the yield and quality of summer tomato. Ann. of Bangladesh Agric 1998;6(1):67-70.
6. Jasmine Mary, John Merina. Effect of gibberellic acid on seedling growth, chlorophyll content and carbohydrate metabolism in okra (*Abelmoschus esculentus* L. Moench). Res J of chem sci 2012;2(7):72-74.
7. Bhagure YL, Tambe TB. Effect of seed soaking and foliar sprays of plant growth regulators on physiological and yield attributes of okra (*Abelmoschus esculentus* L Moench.) Asian J Hort 2015;10(1):31-35.
8. Surendra P, Nawalagatti CM, Chettiand MB, Hiremath SM. Effect of plant growth regulators and micronutrients on yield and yield components in Okra. Karnataka J Agric Sci 2006;19(2):264 -267.
9. Patil DR, Patil MN. Effect of seed treatment with GA3 and NAA on growth and yield of okra (*Abelmoschus esculentus* L. Monech), Asian J. Hort 2010;5(2):269-272.
10. Usharani MK, Uma Jyothi, Kishor Kumar M. Study on the effect of growth regulators and micronutrients on yield components and nutrient uptake of okra (*Abelmoschus esculentus* L. Moench). Intl J Agric Env Biotech 2012;6(1):117-119.
11. Chand KP, Channakeshva BC, Narayanreddy AB. Effect of interaction due plant growth regulators and fruit retention on crop growth, seed and quality in okra. Ind Hort J 2013;3(1-2)
12. Mehraj HT, Taufique MR, Ali RK, Sikder, Jamal Uddin, AFM. Impact of GA3 and NAA on horticultural traits of *Abelmoschus esculentus* World App Sci J 2015;33(11):1712-1717.
13. Muhammad Rizwan Shahid, Muhammad Amjad, Khurram Ziafi, Muhammad Mu zammil Jahangir, Saeed Ahmad, Qumer Iqbal *et al.* Growth, yield and seed production of okra as influenced by different growth regulators. Pak J Agri Sci 2013;50(3):387-392.
14. Panse and Sukhatme, Statistical Methods for Agril. Workers 1954;XVI;361.
15. Shoaf WT, Lium BW. Improved extraction of chlorophyll a and b from algae using DMSO, J Limnology & oceanography 1976;21(6):926-928.