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Effect of Different Dose of Chlormequat on Growth and Yield of Okra (*Abelmoschus esculentus* L.)

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ABSTRACT: A field trial was conducted during Kharif season 2022-23 at the sharadhey Bhagwati singh research farm of Chandra Bhanu Gupta Agriculture P. G. College, B. K. T. Lucknow to find out the "Effect of different dose of chlormequat on growth and yield of okra (*Abelmoschus esculentus* L.)" .The experiment consisted of 6 treatments concentration of chlormequat (water spray, 250, 500, 750, 1000 and 1250 ppm) replicated three times. Results revealed that growth parameter like days to reproductive phase, number of leaf per plant, number of branches per plant and yield attributes i.e. fruit length, fruit girth, number of fruit per plant, and yield per plant was significantly highest with chlormequat spray T_6 (@1250ppm) as compared to rest of the treatment. However, the plant height and days to first floral initiation was significantly reduced with increasing dose of chlormequat and being highest with control. The highest fruit yield (110.22q/ha) was recorded in T_6 treatment, which was at par with T_5 (102.22 q/ha). whereas the lowest fruit yield hectare was recorded in T_1 i.e. control (53.76 q /ha) . The percent increase in yield due to chlormequat @ 1250 ppm was recorded to the tune of 7.78, 27.02, 47.90, 74.37 and 105.02 over dose of 1000 ppm, 750 ppm, 500 ppm, 250 ppm and no chloremequet spray treatments, respectively.

KEYWORD: Chlormequat, Foliar spray, Growth and yield, Okra.

INTRODUCTION

Okra (Abelmoschus esculentus (L.) Moench, 2n=130) is an important herbaceous annual plant belongs to family Malvaceae growing in tropical and subtropical parts of the world but it is injured when exposed to no freezing temperatures, i.e. below 12°C. In India, okra is cultivated on an area of 5.31 lakh hectare with production of 64.66 lakh metric tonnes and productivity was 12.17 tonnes per hectare. In Uttar Pradesh okra is cultivated on 1000 hectares, producing 1.3 lakh tonnes with average productivity of 13.0 tonne per hectare. The productivity of okra is comparatively low in Uttar Pradesh. There are many factors responsible for low productivity. These green fruits are rich sources of vitamins, calcium, potassium and other minerals like calcium, potassium and magnesium (Matloob et. al., 1989).

Growth and yield potential of okra can be improved with the adoption of scientific cultivation including use of growth regulators. Plant growth regulators (PGR's) are considered as a new generation of agrochemicals which affect the physiology of plant growth and influence the natural rhythm of a plant when added in small amounts. In crop production, plant growth regulators promote growth along with the longitudinal area, increase number of branches, early flower initiation, fruit set, fruit quality and subsequently contribute towards higher production when applied at various concentrations. As stated earlier growth regulators help in efficient utilization of metabolites (Antony *et al.*, 2003).

Chlormequat plays a vital role in the regulation of plant growth, formation of pods, seeds etc. in the plants. Among several growth substances, 2-chloroethyl trimethylammonium chloride commonly known as in the name of chlormequat is very promising, and it is being used on a large scale in a number of fruits, vegetables, and flowering crops in developed countries. Chlormequat brings about retardation in plant height by reducing internodal length. Simultaneously, it also induces the formation of lateral shoots. Chlormequat has been reported to be very effective in improving yield and quality of certain vegetable crops, which causes retardation of vegetative growth and diversion of assimilates towards reproductive growth (Nerson et al., 1989). However, a limited research conducted on the effect of chlormequat on okra under the central plain zone of U. P. Hence, the present experiment was planned.

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MATERIALS AND METHODS

A field experiment was conducted during kharif season 2022-23 at shardhay Bhagwati singh Research farm of Chandra Bhanu Gupta Agriculture P.G. College, B.K.T. Lucknow. The field experiment comprising of six concentrations of Chlormequat i.e. (water spray, 250 ,500, 750, 1000 and 1250 ppm) tested in RBD with three replication. Two spray of chlormequat was done at 20 and 40 days after sowing. A recommended dose of Nitrogen, Phosphorus and Potassium @ 100, 50 and 60 kg/ha was supplied by using Urea, Di-ammonium phosphate (DAP) and Murate of potash (MOP). In each replication seeds were dibbled at hill spacing of 60 x 30 cm. All improved package of practices were used to raise the crop . The fruits attained the length 8 to 10 cm and were hand picked at three days' intervals. The data on plant height ,number of branches per plant, number of leaves per plant, fresh fruit weight, yield per plant were recorded at 60, 75, 90 DAS. The data on time taken to first floral initiation and days to reproductive phase were also recorded. The okra yield per hectare was recorded by sum up of yield obtained at different picking.

RESULTS AND DISCUSSION

The data presented in Table - 1 revealed that foliar spray application of chlormequat reduced the number of days taken to first floral initiation but increased the days to reproductive phase. Significantly, the minimum days taken to first floral initiation and maximized the days to floral period was recorded in T_6 i.e. cholormequat @1250 ppm (36.00 and 61.00 days) followed by T_5 (37.66 and 58.66 days). However, the number of days for first floral initiation (51.33 days) and minimum days for reproductive phase (49.66 days) was recorded in control treatment (water spray) . Higher concentration of chlormequat induced early flowering which might be due to suppression of vegetative growth and induction of early reproductive phase (Acharya 2004).

The data presented in table - 2 revealed that the yield attributes of okra such as fruit length (cm), fruit girth (cm) and average weight of fruit (g) were also influenced statistically due to chlormequat. The highest fruit length (15.71 cm) and fruit girth (6.61 cm) was recorded in the T_6 (@1250 ppm)followed by T_5. while the lowest fruit length (10.91 cm) and fruit girth (3.03 cm) was recorded under control (water spray). Increased in fruit length might due to reduced cell division and cell elongation or nutritional factor and fertility of soil as well as weather condition. Similar findings were also recorded by Paletiya et al ., (2008) in okra.The highest fruit weight (13.33 g) was significantly recorded with foliar application of chlormequat (1250 ppm) followed T_5 (13.03 g), where as the lowest fruit weight (10.79 g) was recorded in T_1(control treatment) .Increase in fruit weight might be due to higher diameter of fruit .It may also due to the accumulation of carbohydrate ,leaf area and chlorophyll content of leaves that produced more photosynthates which translocated from source and sink. These findings are in agreement with findings of Sanganagoud et.al (2014) in Okra and Mohsen kazemi(2013) in cucumber.

The highest number of fruits per plant (20.33) was recorded in T_6 (@1250 ppm) followed by T_5 (19.21) ,whereas the lowest number of fruits per plant (12.33) was recorded in T_1 i.e. control treatment.

It may be due higher concentration treated plants had higher number of internodes i.e. short internodes length, which resulted to produce more number of fruit. Significant improvement in growth parameters due to chlormequat was mainly because of their higher cell division and cell elongation Kokare et.al., (2013) and Sajjan et.al. (2003). Higher branches due to suppressing apical dominance, thereby promoted the growth of axillary buds into new shoots. These results are in agreement with the results Bhagure et ai., (2013). Results revealed that application of chlormequat increased the values of all growth as well as yield attributes significantly over the rest of the treatments except plant height and days to floral initiation, which was reduced with the application of chlormequat .The significantly highest green fruit yield per plant (274.46 g) was recorded with the application of @1250 ppm followed by T_5 (255.94 g),however lowest being with under control treatment (water spray).

YIELD

The highest fruit yield (110.22 q) per hectare was recorded in T_6 treatments, which was at par with T_5 (102.22q). whereas, the lowest fruit yield per hectare was recorded in T_1 i.e. control (53.76 g). The percent increase in yield due to chlormequat @1250 ppm was recorded to the tune of 7.28, 27.02, 47.90, 74.37 and 105.02 over dose of 1000 ppm, 750 ppm, 500 ppm, 250 ppm and no chloremequet spray treatments respectively.The high yield of chloremequat @1250 ppm was mainly because of significant improvement in growth as well as yield attributes.

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Table-1 Effect of chlormequat on growth parameter of lady finger

Treatments	Plant height (cm.)	Number of leaves per plant	Number of branches per plant	Days to floral initiation	Days to Reproductive phase
T_1 (Control)	120.06	15.33	3.33	51.33	49.66
T_2 (250 ppm)	115.87	16.77	3.99	46.66	52.33
T_3 (500 ppm)	111.70	18.33	4.99	41.33	55.00
T_4 (750 ppm)	106.33	19.66	5.66	39.33	56.33
T_5 (1000 ppm)	101.26	21.33	6.99	37.66	58.66
T6 (1250 ppm)	98.21	22.99	7.66	36.00	61.00
SE m ±	0.20	0.22	0.20	0.25	0.43
CD $_{(P=0.05\%)}$	0.64	0.72	0.66	0.80	1.38

Table-2 Effect of chlormequat on yield parameter of lady finger

Treatment	Fruit length (cm)	Fruit girth (cm)	Average weight of green fruit (g)	Number of green fruit per plant	Yield per plant (g)	Yield per hectare (Q/ha)
T_1 (Control)	10.91	3.30	10.79	12.33	131.75	53.76
T_2 (250 ppm)	12.33	3.64	11.50	13.66	156.29	63.21

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T_3 (500 ppm)	13.38	4.01	12.35	15.33	188.38	74.52
T_4 (750 ppm)	14.42	4.63	12.59	17.33	216.67	86.77
T_5 (1000 ppm)	15.24	5.54	13.03	19.21	255.94	102.74
T6 (1250 ppm)	15.71	6.10	13.33	20.33	274.46	110.22
SE m±	0.04	0.07	0.09	0.10	0.58	0.48
CD $_{(P=0.05\%)}$	0.14	0.23	.28	0.34	1.87	1.54

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