

Response of hybrid cotton to chloro mepiquat chloride and detopping under high density planting

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ABSTRACT : The results revealed that among plant densities, population at 37,037 plants/ha (90 x 30 cm) recorded significantly lower sympodial branches/plant (19.81) and bolls/plant (20.76) over that of 24,691 plants/ha (90 x 45 cm) and 18,518 plants/ha (90 x 60 cm). However the seed cotton yield (1668 kg/ha) was significantly highest in this treatment when compared to other. Among the canopy management practices, sympodial branches/plant (20.76), bolls/plant (35.89) and seed cotton yield (1635 kg/ha) were significantly higher with two sprays of chloro mepiquat chloride when compared to single spray, detopping and control, respectively. At higher population nitrogen, phosphorus and potassium uptake was significantly higher than lower populations. Application of growth regulator chloro mepiquat chloride resulted in higher uptake of nitrogen and lower uptake of phosphorus and potassium as compared to detopping and control.

Key words: Chloro mepiquat chloride, detopping, plant density

Cotton is a subtropical, perennial plant with an indeterminate growth habit grown as important cash crop in India. Maximum yield potential of cotton can be obtained by adopting optimum plant density, fertilizer and better agronomic practices. Vegetative and reproductive development occurs simultaneously. Under the excessive vegetative growth situations, fruit abortion may be increased, crop maturity may be delayed and all these may lead to low yield. Chemical growth regulators have been used to reduce stem elongation and leaf size and increase in yield. An attempt has, therefore, been made to evaluate the impact of chemical growth regulators on cotton yield at high density planting.

The field experiment was conducted during *khari*, 2010 under rainfed condition at College of Agriculture Farm, Hyderabad which is geographically situated at 17° 19' N latitude 78°-28' E longitude and at an altitude of 542.3 m above the mean sea level. The experiment was conducted in sandy clay loam soil having 277 kg/ha available nitrogen (medium), 32.4 kg/ha available phosphorus (medium), 225 kg/ha available potassium, (high) and 8.1 pH. An intra *hirsutum* cotton hybrid Brahma (Boll gard II) having semi determinant plant type was used

as a test cultivar. The experiment was laid out in randomized block design (factorial concept) with 3 replications. The treatments consisted of 3 different plant densities *viz.*, 18,518 plants/ha (90 x 60 cm), 24,691 plants/ha (90 x 45 cm) and 37,037 plants/ha (90 x 30 cm) and 4 canopy management practices such as control (no spray), detopping at 50-60 DAS, single spray of growth regulator chloro mepiquat chloride @ 0.2 ml/l at 50-60 DAS and two sprays of chloro mepiquat chloride @ 0.2 ml/l at 50-60 DAS and at 80-90 DAS. The seeds were sown on 13th July, 2010 by dibbling seeds in opened holes with a hand hoe. Nitrogen, phosphorus and potassium were applied in the form of urea, single super phosphate and muriate of potash, respectively at the rate of 150-75-75 kg/ha. Nitrogen and potash were applied in 4 splits at 20, 40, 60 and 80 DAS while phosphorus was applied as basal at the time of sowing. Cotton was picked 3 times when the bolls were fully bursted at 135 (24th November, 2010), 155 (14th December, 2010) and 168 (27th December, 2010) DAS.

The data on growth, yield parameters and nutrient uptake (kg/ha) by stalk as influenced by different treatments is presented in Table 1.

Effect of high density planting on

growth, yield and nutrient uptake : The growth measured in terms of plant height (130.4 cm) was higher at high density planting with a spacing of 90 x 30 cm followed by lower densities at 90 x 45 cm (127.6 cm) and at 90 x 60 cm (123.3 cm) spacing (Table 1). The taller plants which were observed at high density were due to higher inter plant competition. Similar research findings were reported by Manjunatha (2009). The yield parameters such as sympodial branches/plant and boll number/plant were lower at high density (37,037 plants/ha) compared to lower densities (24,691 plants/ha, 18,518 plants/ha) but the loss in bolls/plant at closer spacing was compensated by higher plant population/ha there by resulting in higher seed cotton yield. The seed cotton yield (1668 kg/ha) with nitrogen (26.82 kg/ha), phosphorus (8.12 kg/ha) and potassium (36.64 kg/ha) uptake were significantly higher with higher density followed by lower densities at 90 x 45 cm and 90 x 60 cm spacing. Similar results were in conformity with

Table 1. Effect of high density planting and chloro mepiquat chloride on growth, yield parameters and nutrient uptake (kg/ha) by stalk of *Bt* cotton

Treatment	Plant height (cm)	Monopodia/ plant	Sympodia/ plant	Bolls/ plant	Seed cotton yield (kg/ha)	Nitrogen uptake (kg/ha)	Phosphorus uptake (kg/ha)	Potassium uptake (kg/ha)
Plant density (Spacing)								
D₁ : 18,518 plants/ha (90 x 60 cm)	123.3	2.02	20.36	35.1	1247	18.27	4.58	20.48
D₂ : 24,691 plants/ha (90 x 45 cm)	127.6	2.04	20.16	29.24	1423	19.11	5.56	25.2
D₃ : 37,037 plants/ha (90 x 30 cm)	130.4	1.83	19.81	20.76	1668	26.82	8.12	36.64
S. Em ±	0.9	0.08	0.12	1.95	16	0.03	0.04	0.04
C.D. (p=0.05)	2.7	NS	0.42	5.57	46	0.11	0.12	0.13
Canopy management practices								
C₁ : Control	134.9	2	19.61	22.33	1282	21.31	6.19	27.54
C₂ : Detopping	133.9	2.02	19.64	22.89	1310	21.38	6.18	27.53
C₃ : Single spray	121.1	1.97	20.43	32.38	1556	21.43	5.99	27.37
C₄ : Two sprays	118.6	1.87	20.76	35.89	1635	21.48	5.97	27.32
S. Em ±	1.1	0.09	0.15	2.22	18	0.04	0.04	0.05
C.D. (p=0.05)	3.2	NS	0.6	6.39	53	0.1	0.15	0.15
D×C (Interaction)								
S. Em ±	1.9	0.17	0.31	3.6	31	0.07	0.08	0.08
C.D. (p=0.05)	NS	NS	0.92	10.8	91	NS	NS	NS

Detopping at 50-60 DAS, **Singe Spray:** Spraying of chloro mepiquat chloride (0.2ml/l) at 50-60 DAS

Table 2. Interaction effect of high density planting and chloro mepiquat chloride on seed cotton yield (kg/ha) and bolls/plant

Particulars	Seed cotton yield (kg/ha)					Total number of bolls/plant				
	C ₁	C ₂	C ₃	C ₄	Mean	C ₁	C ₂	C ₃	C ₄	Mean
	Control	De-topping	Single spray	Two sprays		Control	De-topping	Single spray	Two sprays	
D₁ : 18,518 plants/ha (90 x 60 cm)	1111	1146	1342	1389	1247	28.28	27.7	39.79	44.65	35.1
D₂ : 24,691 plants/ha (90 x 45 cm)	1275	1292	1515	1610	1423	22	23.02	34.69	37.27	29.24
D₃ : 37,037 plants ha (90 x 30 cm)	1460	1494	1813	1905	1668	16.7	17.94	22.66	25.75	20.76
Mean	1282	1310	1556	1635	1446	22.33	22.89	32.38	35.89	28.37
S.Em ±							S.Em ±			
Interaction (D x C)	31						3.6			
			CD (p=0.05)					CD (p=0.05)		
				91					10.8	

several research workers (Sisodia and Khamparia, 2007; Manjunatha, 2009).

Effect of chloro mepiquat chloride and detopping on growth, yield and nutrient uptake

: The growth parameter like plant height was significantly lower with 2 sprays of chloro mepiquat chloride followed by single spray as compared to control plot and detopping treatment. The yield parameters like sympodial branches/plant (20.76) and bolls/plant (35.89) were greater with spraying of chloro mepiquat chloride twice followed by single spray compared to control and detopping treatment. The present result corroborate with the findings of Joseph and Johnson (2006). The seed cotton yield and nitrogen uptake by stalk were significantly higher (1635 kg/ha, 21.48 kg/ha) with two sprays of chloro mepiquat chloride compared to single spray (1556 kg/ha, 21.43 kg/ha), detopping (1310 kg/ha, 21.38 kg/ha) treatment and control (1282 kg/ha, 21.31 kg/ha) plot. Higher seed cotton yield could be due to relatively higher biomass, better partitioning of photo assimilates into reproductive structures, higher values of yield components upon application of growth regulator. Similar results were reported by Norton *et al.*, 2005.

But in contrary to the nitrogen uptake spraying of chloro mepiquat chloride twice resulted in lower uptake of phosphorus and potassium which was followed by single spray to control plot and detopping treatment. The monopodial branches/plant did not vary due to

different plant densities and growth regulator application (Table 1).

Interaction effects : Data presented in Tables 2 revealed that there was a significant interaction between plant density and chloro mepiquat chloride application. Higher bolls/plant and seed cotton yield was obtained with the application of chloro mepiquat chloride twice at 50-60 DAS and 80-90 DAS with a plant density of 37,037 plants/ha (90 x 30 cm) over all other treatment combinations.

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