

# plant height, maturity and yield of transgenic BT cotton( *Gossypium hirsutum L.*) at varying Plant Growth Regulators



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## Results

### Introduction & Objectives

Plant Growth Regulators (PRGs) are widely used on cotton production in China. Mepiquat Chloride (MC) is a plant growth regulator that has been used in cotton production for several decades as a management tool in controlling vegetative growth. Mepiquat chloride is a gibberellic acid suppressant that is absorbed by the green portions of plant and serves to reduce cell elongation, thus offering the potential of decreasing leaf area and restricting additional plant height increases. Mepiquat chloride has also been associated with enhancing earliness with regards to fruiting development. Dichyl amino ethyl hexanoate (DA-6) is a kind of Tertiary Amine substance which has various influences on physiological process in plants. Researches showed that the mixture of MC and DA-6 could improve the root development of transgenic insect-resistant cotton at seedling stage. The experiment was conducted to study the effects of variety of plant growth regulators (MC, DA-6, MC+DA-6) on plant height, maturity and yield.

### Materials and methods

The experiment was conducted at Hejian experimental station of China Agricultural University in 2004 and 2005. the soil is a sandy loam. the climate is temperate. Cotton is planted at 20 April and harvested at the end of October in 2004, while 25 April in 2005. The cultivar in this experiment is Guokangmian12(GK12), a high-yielding commercial Bt transgenic (*Bacillus thuringiensis*) upland cotton (*Gossypium hirsutum L.*). The experiment was arranged in a randomized complete block design with four replicates. Each plot was eight rows with row length of 20m and row spacing of 90cm. Processing time were at 40, 60, 80, 100 days after planting, the dose of MC is 1.5, 20, 40, 80 g ha<sup>-1</sup>, the dose of DA-6 is 1.5, 3.75, 7.5, 15 g ha<sup>-1</sup>, the dose of MC+DA-6 is 1.5+1.5, 20+3.75, 40+7.5 and 80+15 g ha<sup>-1</sup>.

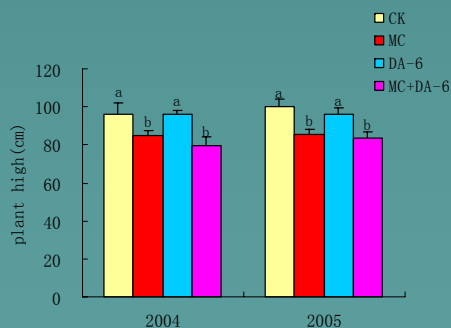


fig.1. Effects of PGRs on plant height (cm)

Both MC and MC+DA-6 treatments reduced the plant height significantly in 2004 and 2005. DA-6 treatment did not affect the plant height. Using of MC and MC+DA-6 could significantly reduced the length of fruiting branches. DA-6 elongated the length of 4-6 sympodiabranh. In 2004, Treatment with MC+DA-6 was remarkably increased the lint yield than the other three treatments. MC and DA-6 did not significantly affect lint yield (table 1). While in 2005, both MC and MC+DA-6 treatments significantly enhanced the lint yield. Lint yield of the treatment with DA-6 has no difference with CK. In 2005, treatment with MC and MC+DA-6 increased the number of bolls per plant (table 1), while three plant growth regulators did not remarkably affect the boll weight and lint percentage. Bolls number of fruiting branch 1-5 and 6-10 were enhanced by MC and MC+DA-6 treatments, while that of fruiting branch 11 and upper of 11 were suppressed. In 2005, both MC and MC+DA-6 treatments increased the second node's boll number, DA-6 has no significantly influence.

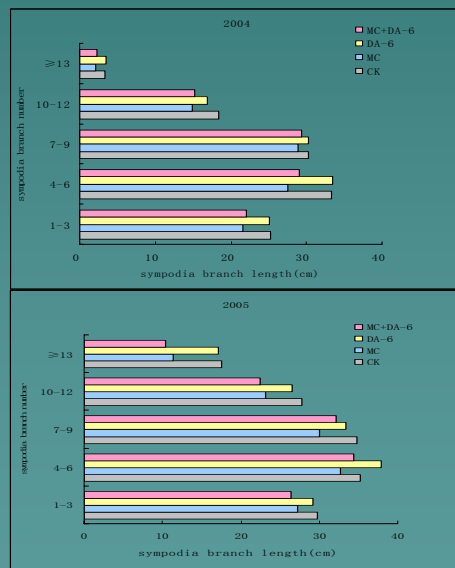


fig.2. Effects of PGRs on sympodia branch length in 2004 and 2005

Table 1. Lint yield, bolls number per plant, boll weight, and lint percentage as influenced by different plant growth regulator (PGR) treatment.

year	treatment	lint yield (kg/ha)	boll no. (per plant)	boll weight (g)	lint percentage (%)
2004	CK	1170.8b	7.6a	4.46b	39.3a
	MC	1221.3b	7.3a	4.51b	39.8a
	DA-6	1205.1b	7.4a	4.48b	39.5a
	MC+DA-6	1331.5a	7.7a	4.85a	39.5a
2005	CK	1199.3b	12.7b	4.43a	37.3a
	MC	1373.3a	13.8a	4.57a	37.3a
	DA-6	1230.5b	13.0b	4.45a	37.4a
	MC+DA-6	1375.7a	14.0a	4.56a	37.3a

Table 2. boll locules, boll weight, boll shell weight, and full seeds as influenced by different plant growth regulator (PGR) treatment.

year	treatment	boll locules	boll weight (g)	boll shell weight (g)	full seeds
2004	CK	4.20a	4.46b	1.76b	27.03a
	MC	4.28a	4.51b	1.95a	27.33a
	DA-6	4.25a	4.48b	1.78b	27.17a
	MC+DA-6	4.22a	4.85a	1.76b	27.95a
2005	CK	4.12a	4.43a	1.29a	26.21b
	MC	4.15a	4.57a	1.38a	26.55b
	DA-6	4.13a	4.45a	1.34a	26.30b
	MC+DA-6	4.10a	4.56a	1.29a	27.03a

Table 3. Boll weight of different sympodiabranh influenced by different plant growth regulator (PGR) treatment.

year	treatment	sympodiabranh		
		1-5	6-10	11-
2004	CK	2.50a	3.20b	1.85a
	MC	2.59a	3.57a	1.09b
	DA-6	2.52a	3.33b	1.90a
	MC+DA-6	2.60a	4.01a	1.06b
2005	CK	5.64b	4.81c	2.54a
	MC	6.00ab	5.88b	1.69b
	DA-6	5.65b	4.85c	2.57a
	MC+DA-6	6.33a	6.26a	1.36b

Table 2. boll weight of different nodes as influenced by different plant growth regulator (PGR) treatment.

year	treatment	nodes		
		1	2	≥3
2004	CK	3.75a	2.47a	1.33a
	MC	4.00a	2.53a	0.72b
	DA-6	3.79a	2.52a	1.21a
	MC+DA-6	3.67a	3.07a	0.93ab
2005	CK	6.31a	4.28b	2.83a
	MC	6.33a	5.38a	2.09b
	DA-6	6.28a	4.23b	2.85a
	MC+DA-6	5.56b	5.69a	1.95b

## Discussion

Many studies have indicated that Mepiquat chloride (MC) (1,1-dimethyl piperidinium chloride) have a good control on plant height. DA-6 (dichyl aminoethyl hexanoate) is positive to plant growth which can accelerate plant growth. Our study showed that the mixture of MC and DA-6 could inhibit the excess vegetative growth of insect-resistant transgenic cotton GK12, which decreased the plant height and reduce the length of fruit branches. the treatment with DA-6 appeared less control than MC and MC+DA-6. In addition, both mixture and MC could increase boll numbers and boll weight, therefore could raise the cotton yield. However, mixture could increase cotton yield more obviously than MC.

## References

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