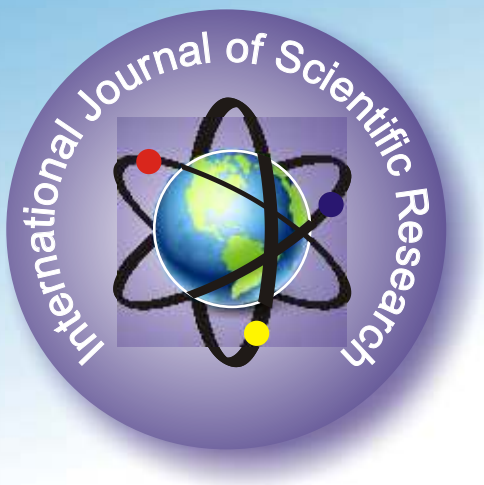
Volume 1 | Issue 1 | June 2012

International Journal of Scientific Research

Listed in International ISSN Directory, Paris



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ISSN:2277–8179

EFFECT OF CYCOCEL AND MEPIQUAT CHLORIDE ON PHYSIOLOGY, GROWTH AND YIELD OF IRRIGATED BT COTTON (*Gossypium hirsutum* L.)

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June,2012

Abstract

Physiology, growth and yield attributes of Bt cotton were evaluated with the application of varying doses of Mepiquat Chloride (MC) and Cycocel (CCC) during *Kharif* 2010. The experiment was comprised of total nine treatments with control (water spray) and laid out in Randomized Complete Block Design with replicated four times at Cotton Research Station, JAU, Junagadh. Cotton plants were sprayed with the growth regulator MC @ 50 and 70 ppm, once at 60 days after planting (DAP) or 90 DAS and CCC @ 40 and 80 ppm once at 60 DAP or 90 DAS. The results revealed that the applied Cycocel @ 40 ppm at 90 DAS had significant increased the chlorophyll content (34.44 µg/cm2) at 95 DAS, specific leaf weight -SLW (929.5 mg/dm2) at 120 DAS, number of squares (108), number of bolls (58), seed cotton yield (3091 kgha-1) and one week early 50 per cent boll opening and crop mature with decreased the plant height. Therefore, PGR might be considered a component of cotton growth management to provide higher seed cotton yields.

Key words: chlorophyll, growth regulators, specific leaf weight, squares, cotton, yield.

Introduction

Cotton (*Gossypium hirsutum* L.) is a subtropical, perennial plant with an indeterminate growth habit grown as important cash crop in India. Globally, India ranks first in acreage, third in overall production after China and USA. It plays an important role in Indian agriculture, industrial development and contribution to the national economy. Excessive vegetative growth results in shade within the plant canopy, increased fruit abscission and reduced yield (Guinn, 1974). Growth retardants are known to reduce inter nodal distance thereby reducing plant height (Deotale *et al*., 1995) and enhancing source sink relationship and stimulate the translocation of photosynthates towards sink (Chandrababu *et al*., 1995). Young squares and bolls are more susceptible to shedding. The application of plant growth regulators (PGRs) have been shown to reduce the shedding of fruiting bodies (Sharma and Dungarwal, 2004). Growth retardants reduce internode length, thereby, reducing plant height and stimulating the translocation of photosynthates towards sink (Prakash and Prasad, 2000). An attempt has, therefore, been made to evaluate the impact of mepiquat chloride (MC) and cycocel (CCC) on physiological traits, yield attributes and their relationship with seed cotton yield.

Materials and Methods

Field trial was carried out on a medium black soil with a spacing of 120 x 45 cm in a RBD with four replications during the *kharif* 2010 at the Cotton Research Station, Junagadh Agricultural University, Junagadh. NHH-44 Bt hybrid was seeded and all cultural practices and plant protection measures were undertaken as the recommendations. The experiment consisted of nine treatments : T_1 – MC (50 ppm) at 60 DAS, T_2 – MC (50 ppm) at 90 DAS, T_3 – MC (70 ppm) at 60 DAS, T_4 – MC (70 ppm) at 90 DAS, T_5 – CCC (40 ppm) at 60 DAS, T_6 – CCC (40 ppm) at 90DAS, T_7 – CCC (80 ppm) at 60 DAS, T_8 – CCC (80 ppm) at 90 DAS, T_9 –Control (water spray).

Five plants from each treatment were selected randomly and tagged for recording various observations on morphological, growth, physiological parameters & yield components at periodically and at harvest. Leaf dry weight was used furtherer for computing specific leaf weight (SLW). Top fully expanded (second from top) leaf was used for measuring the chlorophyll content by using chlorophyll content meter (Model CCM -200 Plus). Seed cotton yield was worked out based on the mean of two cotton row's yield. Statistical analysis was carried out following the procedure of Panse and Sukhat, (1985).

Results and Discussion

Plant Physiological traits & growth

Plant height and sympodial length

Significant decrease in plant height (Table 1) was observed with mepiquat chloride and cycocel treated plants however mepiquat chloride @ 50 ppm and cycocel @ 40 ppm at 60 DAS remained ineffective. The minimum plant height was observed in the treatment T_2 (107 cm). Cycocel and mepiquat chloride are anti-gibberellin dwarfing agents and reduce the growth by blocking and conversion of geranyl pyrophosphate to coponyl pyrophosphate which is the first step of gibberellins synthesis reported by Moore, (1980). The experiment result shown that in number of sympodial length was found no significant differences.

Chlorophyll content

Application of growth retardants may also enhance the chlorophyll content of leaves which helps to increase the functional life of the source for a longer period leading to improved partitioning efficiency and increased productivity (Pankaj Kumar *et al.,* 2006 and Kashid *et al*., 2010). Significantly highest chlorophyll content in T_6 (33.44 µg/cm^2) was observed at 95 DAS with application of CCC@40 ppm at 90 DAS; however no significant deference in chlorophyll content was shown at 75 DAS.

Specific leaf weight and dry matter production

Generally specific leaf weight was increased up to 120 DAS and then after it was decreased due to photosynthate is diverted towards boll development and treatment differences were found significant. Maximum SLW was decreased in the treatment T_6 (977.89 mg/dm^2) followed by T_8, T_7 and T_4 (Table 1). This shift in partitioning increased the ability of the plant to acquire more photosynthates towards reproductive structures and enhanced the yield. The results are in accordance with the findings of Kumar *et al*., (2006). It was observed that the differences found in dry matter production (DMP) with application of both PGR. The highest dry matter produced in treatment T_5 (6.349 t.ha^{-1}) and T_6 (6.295t.ha^{-1}) compared to the control (Table 1). The growth retardants were more beneficial in terms of the translocation of photo-assimilates towards developing reproductive parts compared to growth promoters (Pankaj Kumar *et al.,* 2006).

Earliness in boll opening and Crop maturity (Days)

Significantly 50 percent boll opening and crop maturity was

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observed one week early (Table 1) in T_6, with the application of CCC@40 ppm at 90 DAS (T6). Application of growth retardants were restricts the vegetative growth (plant ht.) and enforces plant toward reproductive stage and early maturity. Similar result has been reported by Sawan *et al*., (2006).

Yield attribute

Squares, bolls and boll weight

There was significant differences were obtained in squares and bolls production, the highest number of square and bolls per plant were produced in T_6, 108 and 58 respectively with application of CCC @ 40 ppm at 95 DAS (Table 1). It was reported that squares and bolls on cotton plants treated with PGRs have larger photosynthetic sinks for carbohydrates and other metabolites that increased cotton yield than control plot bolls (Zhao and Oosterhuis, 1999 and Sawan *et al*., 2006). The boll weight difference was found no significant with application of both PGR.

Seed cotton and lint yield

As shown in Table 1, the significantly highest seed cotton yield (3091 kg ha^{-1}) and lint yield (948 kg ha^{-1}) were obtained with application of CCC @ 40 ppm at 90 DAS (T_6) as compare to control (T_9). The yield enhancement with application of PGR is due to accelerate chlorophyll formation in the plants and increase vegetative sections, thereby, increase the synthesis of substances such as carbohydrates, protein, sugar, oil etc., and result in increased number of bolls and seed cotton yield (Kumar *et al*., 2006, Oosterhuis and Robertson 2000, Bhatt and Ramanujam, 1970 and Zhao and Oosterhuis, 1999). MC 50 ppm sprayed at 90 days after sowing resulted in significantly higher yield (11.9 %) over control (Kumar *et al*., 2006).

Conclusion

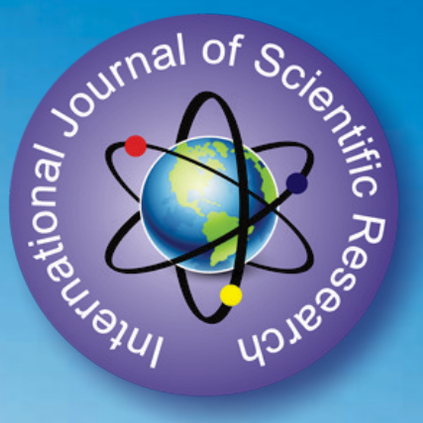
From the present investigation it is evident that foliar spray of growth retardants on cotton is beneficial in many aspects. Regulation of plant height and increase in leaf chlorophyll content, specific leaf weight, dry matter production, number of bolls are some of the few advantages. Among the growth retardants, application of cycocel @ 40 ppm at 90 DAS is beneficial effect on physiological and yield attributes resulted in increased seed cotton. Hence, this is considered to be a suitable technology for realizing higher economic yield of cotton.

Table-1: Effects of MC and CCC on physiological parameters, growth, yield attributes and seed cotton yield.

Treatment	Plant Height (cm)	Sympodial Length (cm)	Days to 50% Boll Opening	Chlorophyll Content (µg/cm^2) at 75 DAS	Chlorophyll Content (µg/cm^2) at 95 DAS	Specific Leaf weight - SLW (mg/dm^2) at 120 DAS	Specific Leaf weight –SLW (mg/dm^2) at 150 DAS	Squares $Plant^{-1}$	bolls $Plant^{-1}$	Boll wt. (g)	Cal. lint yield ($kgha^{-1}$)	Seed cotton yield ($kgha^{-1}$)	DMP ($t.ha^{-1}$)	Days to Maturity
T_1	114	26.7	184	19.93	28.62	888.04	1029.72	79	45	3.3	744	2474	5.526	231
T_2	107	27.9	187	19.94	32.75	879.41	1081.55	87	47	3.3	806	2624	5.615	229
T_3	112	28.3	195	25.90	31.94	874.22	1043.54	89	42	3.4	640	2116	5.681	233
T_4	110	26.4	193	23.37	29.14	932.96	1008.98	94	49	3.3	784	2563	5.747	233
T_5	116	27.2	192	22.62	33.08	881.13	1057.36	93	43	3.5	731	2420	6.349	232
T_6	110	26.0	184	23.18	34.44	929.51	977.89	108	58	3.7	948	3091	6.295	223
T_7	109	29.0	187	20.87	30.51	891.50	984.80	81	49	3.6	808	2724	5.837	228
T_8	108	29.7	193	23.33	34.04	912.23	981.34	80	48	3.4	812	2697	5.804	227
T_9	122	26.3	191	20.54	28.53	839.67	1109.19	85	44	3.3	706	2358	5.808	230
S.Em.±	3.059	0.970	1.167	1.459	1.458	17.378	30.248	5.829	2.668	0.204	54.84	177.92	0.280	1.455
CD at 5%	8.928	NS	3.406	NS	4.255	50.724	88.293	17.01	7.788	NS	160.08	519.33	0.817	4.247
CV %	5.470	7.05	1.23	13.15	9.27	3.90	5.87	13.19	11.28	11.98	14.15	13.88	6.33	1.27

References

1. Bhatt, J.G. and Ramanujam, T. (1970). Effect of cycocel on yield, chlorophyll content and fibre properties of lint of MCU cotton. Indian J. Pl. Physiol., 13: 80-84. |2. Chandrababu, R., Mmanian, K., Nagarajan, M. and Ramachandran, T. K., (1995). Effect of Mepiquat chloride on growth and yield of groundnut. Madras Agricultural Journal, 82 (3): 229-230. |3. Deotale, R. D., Katekhaye, D. S., Sorte, N. V., Raut, J. S. and Golliwar, V. J. (1995). Effect of TIBA and B-Nine on morphophysiological characters of soybean. Journal of Soils and Crops, 5 (2): 172-176. |4. Guinn, G. (1974). Abscission of cotton floral buds and bolls as influenced by factors affecting photosynthesis and respiration. Crop Science, 17: 291-293. |5. Kashid, D. A., Doddamanil, M. B., Chettil, M. B., Hiremath, S. M. and Arvindkumar B. N. (2010). Effect of growth retardants on morpho-physiological traits and yield in sunflower. Karnataka J. Agric. Sci., 23 (2): 347-349. |6. Kumar, K. A. K., Ravi, R., Patil, B.C. and Chetti, M. B. (2006). Influence of plant growth regulators on morpho-physiological traits and yield attributes in hybrid cotton (DHH- 11). Ann. Biol. 22: 53-58. |7. Moore, T. C. (1980). Biochemistry and Physiology of Plant Hormone, Narosja publishing house, New Delhi, 107-131. |8. Oosterhuis, D. M. and Robertson, W. C. (2000). The use of plant growth regulators and other additives in cotton production. Proceedings of the Cotton Research Meeting. Informacoes Agronomicas, 95. |9. Pankaj Kumar, Hiremath, S. M. and Chetti, M. B. (2006). Influence of growth regulators on dry matter production and distribution and shelling percentage in determinate and semi-determinate soybean genotype. Legume Res., 29:191-195. |10. Panse, V. G. and Sukhatme, P. V. (1985). Statistical methods for Agricultural workers. ICAR, New Delhi, 4th edn. |11. Prakash, R. and Prasad, M. (2000). Effect of nitrogen, chlormequat chloride, farmyard manure applied to cotton (G. hirsutum L.) and their residual effect on succeeding wheat crop. Ind. J. Agron. 45: 263-268. |12. Sharma, S. K. and Dungarwal, H. S. (2004). Effect of growth regulators, sulphur fertilization and crop geometry on cotton productivity and returns. J. Cotton Res. Dev. 18: 52-56. |13. Sawan, Z. M., Mahmoud, H. M. and El-Guibali, A. H. (2006). Response of Yield, Yield Components, and Fiber Properties of Egyptian Cotton (Gossypium barbadense L.) to Nitrogen Fertilization and Foliar-applied Potassium and Mepiquat Chloride. The Journal of Cotton Science, 10: 224-234. |14. Zhao, D. and Oosterhuis, D. M. (1999). Physiological, growth and yield response of cotton to Mepplus and mepiquat chloride, proc. Beltwide Cotton Conf., Orlando, FL. 3-7.



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