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EFFECT OF PLANT GROWTH RETARDANTS AND MICRONUTRIENTS ON YIELD ATTRIBUTES, YIELD AND QUALITY OF HYBRID COTTON UNDER HIGH DENSITY PLANTING SYSTEM

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ABSTRACT

A field experiment was conducted at the Annamalai University Experimental farm, Chidambaram, Cuddalore district, Tamil Nadu to study the influence of plant growth regulator and micronutrients on yield attributes, yield and quality of cotton under high density planting system during summer, 2024. The field experiment was laid out in Split Plot Design and replicated thrice. Treatments comprised of two plant growth retardants in main plot *viz*., M_1 – Water spray, M_2 - Mepiquat Chloride @ 50 ppm, M_3 - Cycocel @ 60 ppm and the sub plots include S_1 - Water spray, S_2 - 0.1% Boron + 1.0% $MgSO_4$, S_3 - 0.1% Boron + 0.5% $ZnSO_4$, 0.1% Boron + 2% KNO_3, S_5 - 1.0% $MgSO_4$ + 0.5% $ZnSO_4$, S6 - 1.0% $MgSO_4$ + 2% KNO_3. The plant growth retardants were sprayed on 45 and 75 DAS. The micronutrients were sprayed at peak flowering, boll formation and at boll development stage. Cotton seeds were sown at the spacing of 90 × 30 cm. Cotton Sprayed with Mepiquat chloride @ 50 ppm in conjuction with foliar application of 1.0% $MgSO_4$ + 0.5% $ZnSO_4$ (M_2S_5) significantly influenced the yield attributes like number of sympodial branches per plant (20.84), number of flowers per plant (24.45), number of bolls per plant (21.03), boll weight (5.12) and seed cotton yield (3549 kg ha^{-1}). Better quality parameters of cotton *viz*., Ginning percentage (36.85%), Seed index (12.86), Lint index (5.85), fibre elongation (6.13%), fibre length (29.94 mm), fibre bundle strength (28.85), fibre fineness (3.16), fibre uniformity index (84.89) was also observed with the treatment M_2S_5.

Key words : Cotton, Plant growth regulator, Micronutrients, High density planting system, Yield and quality.

Introduction

Cotton “The king of fibre” is the most important natural fibre of plant origin and accounts for about one third of the total world production of textile fibres. China, India, United States of America, Brazil and Pakistan together accounts for more than three-quarters of the global production (FAO, 2024). Due to its economic importance, it is also called as “White-Gold”. Cotton is one of the most important fibre and commercial crops cultivated in India and plays a dominant role in the industrial and agricultural economy of the country. It is the largest contributor to India’s net foreign exchange. India is the only country which grows all the four species of cotton *Gossypium arboreum* and *Gossypium herbaceum* (Asian cotton), *Gossypium barbadense* (Egyptian cotton) and *Gossypium hirsutum* (American Upland cotton). *Gossypium hirsutum* represents 90% of the hybrid cotton production in India and all the current Bt cotton hybrids are *Gossypium hirsutum*.

India has the largest area under cotton cultivation, covering 124.69 lakh hectares and is the second largest producer of cotton with production of 323.11 lakh bales in 2023–24. Cotton accounts for 65% of the raw material used in the Indian textile industry, where the fibre usage ratio stands at 60:40 for cotton to non-cotton, unlike the global ratio of 30:70. The textile sector in India provides employment to around 60 million people, with cotton alone supporting the livelihood of 6 million farmers and engaging 40–50 million individuals in its trade and processing. In Tamil Nadu, cotton is cultivated over 0.91 lakh hectares,

yielding 1.95 lakh bales, with an average productivity of 364 kg/ha (AICRP, 2024). The state contributes 19% to the nation's textile production and has a well-developed network across all sub-sectors of the textile value chain. Major cotton-producing districts in Tamil Nadu include Perambalur, Salem, Trichy, Dharmapuri, Krishnagiri, Ariyalur, Coimbatore, Madurai, and Cuddalore.

India, though having the largest area under cotton cultivation, ranks second in production due to low productivity (510 kg/ha), which has stagnated in recent years. High Density Planting System (HDPS) offers a solution by increasing plant density and optimizing spacing, leading to 30–40% higher yields. HDPS improves profitability, input use efficiency, and enables mechanization but requires effective canopy management and use of growth retardants to control excessive vegetative growth. It presents a promising alternative to boost productivity and reduce production risks for Indian cotton farmers.

Plant Growth Retardants (PGRs) are chemicals that modify plant growth by influencing hormone activity, particularly gibberellins, auxins, and cytokinins. In cotton, PGRs enhance photosynthetic efficiency and nutrient translocation, improving square and boll retention (Nawalkar and Kumar, 2017). They are essential for managing excessive vegetative growth, especially in high-density planting. Mepiquat chloride (MC), also known as Pix, is a widely used PGR that inhibits gibberellin production, reducing internode length and leaf area without affecting cell division, thereby improving yield and fibre quality (Ren *et al*., 2013). Another PGR, Cycocel or Chlormequat chloride (CCC), reduces vegetative growth by acting as an anti-gibberellin, promotes photosynthate allocation to reproductive parts, delays senescence, and supports better productivity (Shivamurthy and Biradar, 2014). Effective nutrient management is also crucial, as deficiencies can lead to physiological disorders like leaf reddening and boll shedding.

In cotton cultivation, external supplementation of nutrients is essential, especially under poor soil fertility conditions, to enhance yield per unit area. Foliar application is an efficient method of delivering nutrients directly to the plant at critical growth stages, allowing rapid absorption and distribution throughout the plant. Magnesium (Mg) plays a vital role in chlorophyll formation, nitrogen metabolism, protein synthesis, and oil production. Its foliar application has been shown to significantly improve plant growth parameters, including plant height, LAI, dry weight, fruiting branches, boll number and weight and ultimately seed cotton yield (El-Shazly, 2020). Zinc (Zn), another crucial micronutrient, is involved in enzyme activation, protein synthesis, auxin production, and carbohydrate metabolism, all of which are vital for proper growth and development in cotton.

Boron, though required in small quantities, is vital for cotton growth and development. It plays key roles in flowering initiation, seed and fruit production, pollen formation, and fertilization. Potassium, applied through foliar methods, is equally important due to its wide-ranging physiological and biochemical functions. It supports protein synthesis, enzyme activation, stress resistance, stomatal regulation, cation-anion balance, osmoregulation, and photosynthesis. Potassium also positively influences fibre quality, making it a crucial nutrient for improving both yield and fibre characteristics in cotton.

Materials and Methods

The field experiment was conducted at the Experimental Farm, Department of Agronomy, Faculty of Agriculture, Annamalai University, Annamalai Nagar, Tamil Nadu, India during Summer (March – August, 2024) to study the "Performance of high density cotton to foliar supplementation and PGR under irrigated condition". The experiment was conducted in a split plot design with three replications with 18 treatment combinations comprising three treatments in main plots and six treatments in sub plots. The main plots include M_1 – Water spray on 45 and 75 DAS, M_2 - Mepiquat Chloride @ 50 ppm on 45 and 75 DAS, M_3 - Cycocel @ 60 ppm on 45 and 75 DAS and the sub plots include S_1 - Water spray at peak flowering, boll formation and at boll development stage, S_2 - Foliar spray at peak flowering, boll formation and at boll development stage of 0.1% Boron + 1.0% $MgSO_4$, S_3 - Foliar spray at peak flowering, boll formation and at boll development stage of 0.1% Boron + 0.5% $ZnSO_4$, S_4- Foliar spray at peak flowering, boll formation and at the boll development stage of 0.1% Boron + 2% KNO_3, S_5 - Foliar spray at peak flowering, boll formation and at boll development stage of 1.0% $MgSO_4$ + 0.5% $ZnSO_4$, S_6 - Foliar spray at peak flowering, boll formation and at the boll development stage of 1.0% $MgSO_4$ + 2% KNO_3. Observations were recorded in five representative plants were tagged and labelled in each net plot randomly and the mean values were computed. Quality parameters were computed using the following formulas

$$\text{Ginning percentage } (\%) = \frac{\text{Lint weight (g)}}{\text{kapas weight (g)}} \times 100$$

$$\text{Seed Index} = \frac{\text{Seed weight (g)}}{\text{Number of seeds}} \times 100$$

$$\text{Lint Index} = \frac{\text{Lint weight (g)}}{\text{Number of seeds}} \times 100$$

Fibre quality parameters such as fibre length at upper half mean (U.H.M) (mm), fibre uniformity index (U.I), fibre fineness (micronaire reading), fibre bundle strength (g tex^{-1}) and fibre elongation (%) were analyzed at the Regional Quality Evaluation Unit, Central Institute for Research on Cotton Technology (ICAR), Coimbatore, India.

Results

Yield attributes and yield

All the yield attributes of cotton are significantly influenced by the combined effect of the foliar spray of plant growth retardants and micronutrients and their interactions in all stages of crop growth.

Among the plant growth regulator, mepiquat chloride @ 50 ppm on 45 and 75 DAS (M_2) registered the higher yield attributes *viz*., number of sympodial branches per plant (17.25), number of flowers per plant (21.83), number of bolls per plant (17.25), boll weight (4.83) and seed

Table 1 : Effect of plant growth retardants and micronutrients on the Number of sympodial branches $plant^{-1}$ and Number of flowers $plant^{-1}$ of cotton.

Stage	Number of sympodial branches $plant^{-1}$				Number of flowers $plant^{-1}$			
Treatments	**M_1**	**M_2**	**M_3**	**Mean**	**M_1**	**M_2**	**M_3**	**Mean**
S_1	12.43	13.23	13.99	**13.21**	14.44	18.70	18.01	**17.05**
S_2	14.23	19.37	17.97	**17.19**	16.63	23.15	22.31	**20.70**
S_3	14.18	18.75	17.18	**50.11**	16.59	23.02	22.23	**20.61**
S_4	13.88	16.39	15.67	**15.31**	15.91	23.51	20.82	**19.41**
S_5	14.37	20.84	19.89	**18.36**	17.32	24.45	23.76	**21.84**
S_6	13.38	14.92	14.13	**14.14**	15.18	20.13	19.41	**18.24**
Mean	**13.74**	**17.25**	**16.47**		**16.01**	**21.83**	**21.09**	
	M	**S**	**M at S**	**S at M**	**M**	**S**	**M at S**	**S at M**
S.Ed	0.22	0.13	0.31	0.23	0.18	0.09	0.29	0.29
CD (p=0.05)	0.62	0.27	0.74	0.47	0.50	0.21	0.68	0.43

M_1 – Water spray, M_2 - Mepiquat Chloride @ 50 ppm, M_3 - Cycocel @ 60 ppm (M_1, M_2, M_3 – on 45 and 75 DAS)
S_1 - Water spray, S_2 - Foliar spray of 0.1% Boron + 1.0% $MgSO_4$, S_3 - Foliar spray of 0.1% Boron + 0.5% $ZnSO_4$, S_4- Foliar spray of 0.1% Boron + 2% KNO_3, S_5 - Foliar spray of 1.0% $MgSO_4$ + 0.5% $ZnSO_4$, S_6 - Foliar spray of 1.0% $MgSO_4$ + 2% KNO_3(S_1, S_2, S_3, S_4, S_5, S_6 – at peak flowering, boll formation and at boll development stage).

Table 2 : Effect of plant growth retardants and micronutrients on the Number of bolls $plant^{-1}$, boll weight (g) and seed cotton yield (kg ha^{-1}) of cotton.

Stage	Number of bolls $plant^{-1}$				Boll weight (g)				Seed cotton yield (kg ha^{-1})			
Treatments	**M_1**	**M_2**	**M_3**	**Mean**	**M_1**	**M_2**	**M_3**	**Mean**	**M_1**	**M_2**	**M_3**	**Mean**
S_1	9.60	13.28	13.03	**11.97**	3.83	4.50	4.06	**4.13**	1835	3071	2922	**2609**
S_2	13.41	19.78	18.41	**17.20**	3.89	5.06	4.71	**4.56**	2700	3426	3302	**3143**
S_3	13.11	19.10	17.96	**16.72**	3.98	5.05	4.69	**4.58**	2656	3389	3275	**3107**
S_4	12.39	17.27	16.59	**15.42**	3.92	4.64	4.62	**4.40**	2542	3270	3153	**2988**
S_5	13.10	21.03	20.34	**18.49**	4.04	5.12	5.08	**4.75**	2806	3549	3461	**3272**
S_6	10.41	15.92	15.23	**13.85**	3.88	4.57	4.55	**4.34**	2388	3146	3079	**2871**
Mean	**14.61**	**17.25**	**16.98**		**3.92**	**4.83**	**4.62**		**2488**	**3309**	**3199**	
	M	**S**	**M at S**	**S at M**	**M**	**S**	**M at S**	**S at M**	**M**	**S**	**M at S**	**S at M**
S.Ed	0.18	0.14	0.29	0.25	0.01	0.01	0.02	0.01	52	35	75	60
CD(p=0.05)	0.50	0.29	0.67	0.50	0.02	0.03	0.04	0.02	145	70	180	122

M_1 - Water spray, M_2 - Mepiquat Chloride @ 50 ppm, M_3 - Cycocel @ 60 ppm (M_1, M_2, M_3 – on 45 and 75 DAS)
S_1 - Water spray, S_2 - Foliar spray of 0.1% Boron + 1.0% $MgSO_4$, S_3 - Foliar spray of 0.1% Boron + 0.5% $ZnSO_4$, S_4- Foliar spray of 0.1% Boron + 2% KNO_3, S_5 - Foliar spray of 1.0% $MgSO_4$ + 0.5% $ZnSO_4$, S_6 - Foliar spray of 1.0% $MgSO_4$ + 2% KNO_3(S_1, S_2, S_3, S_4, S_5, S_6 – at peak flowering, boll formation and at boll development stage).

Table 3 : Effect of plant growth retardants and micronutrients on the Ginning percentage (%), Seed Index and Lint Index of cotton.

Stage	Ginning percentage (%)				Seed Index				Lint Index			
Treatments	**M_1**	**M_2**	**M_3**	**Mean**	**M_1**	**M_2**	**M_3**	**Mean**	**M_1**	**M_2**	**M_3**	**Mean**
S_1	35.02	36.29	29.86	**33.72**	11.79	12.36	12.26	**12.13**	5	5.38	5.3	**5.22**
S_2	36	36.32	36.3	**36.20**	12.24	12.7	12.71	**12.55**	5.18	5.71	5.7	**5.53**
S_3	35.82	36.12	36.21	**36.05**	12.21	12.68	12.7	**12.53**	5.15	5.62	5.67	**5.48**
S_4	35.61	36.01	36.23	**35.95**	12.05	12.53	12.41	**12.33**	5.1	5.48	5.41	**5.33**
S_5	36.25	36.85	36.86	**36.65**	12.31	12.86	12.85	**12.67**	5.27	5.85	5.86	**5.66**
S_6	35.38	36.52	36.02	**35.97**	11.94	12.42	12.34	**12.23**	5.04	5.42	5.32	**5.26**
Mean	**35.68**	**36.35**	**35.24**		**12.09**	**12.59**	**12.54**		**5.12**	**5.57**	**5.54**	
	M	**S**	**M at S**	**S at M**	**M**	**S**	**M at S**	**S at M**	**M**	**S**	**M at S**	**S at M**
S.Ed	3.05	1.94	4.33	3.36	1.05	0.65	1.48	1.14	0.46	0.27	0.63	0.48
CD (p=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

M_1 - Water spray, M_2 - Mepiquat Chloride @ 50 ppm, M_3 - Cycocel @ 60 ppm (M_1, M_2, M_3 – on 45 and 75 DAS)
S_1 - Water spray, S_2 - Foliar spray of 0.1% Boron + 1.0% $MgSO_4$, S_3 - Foliar spray of 0.1% Boron + 0.5% $ZnSO_4$, S_4- Foliar spray of 0.1% Boron + 2% KNO_3, S_5 - Foliar spray of 1.0% $MgSO_4$ + 0.5% $ZnSO_4$, S_6 - Foliar spray of 1.0% $MgSO_4$ + 2% KNO_3(S_1, S_2, S_3, S_4, S_5, S_6 – at peak flowering, boll formation and at boll development stage).

Table 4 : Effect of plant growth retardants and micronutrients on the Fibre elongation (%), Fibre length UHM. (mm) and Fibre bundle strength (g tex^{-1}) of cotton.

	Fibre elongation (%)				Fibre length UHM. (mm)				Fibre bundle strength (g tex^{-1})			
	M_1	**M_2**	**M_3**	**Mean**	**M_1**	**M_2**	**M_3**	**Mean**	**M_1**	**M_2**	**M_3**	**Mean**
S_1	5.29	5.88	5.81	**5.66**	27.41	28.76	28.51	**28.23**	27.09	29.03	27.93	**28.02**
S_2	5.69	6.07	6.04	**5.93**	28.19	29.61	29.47	**29.09**	27.77	28.71	28.68	**28.39**
S_3	5.62	6.05	6.01	**5.89**	28.13	29.50	29.32	**28.98**	27.72	28.67	28.60	**28.33**
S_4	5.49	6.00	5.99	**5.83**	27.89	29.17	29.00	**28.69**	27.63	28.41	28.51	**28.18**
S_5	5.80	6.13	6.11	**6.01**	28.43	29.94	29.89	**29.42**	27.92	28.85	28.82	**28.53**
S_6	5.38	5.99	5.98	**5.78**	27.64	28.82	28.68	**28.38**	27.34	28.11	28.01	**27.82**
Mean	**5.55**	**6.02**	**5.99**		**27.95**	**29.30**	**29.15**		**27.58**	**28.63**	**28.43**	
	M	**S**	**M at S**	**S at M**	**M**	**S**	**M at S**	**S at M**	**M**	**S**	**M at S**	**S at M**
S.Ed	0.50	0.31	0.70	0.53	2.44	1.52	3.43	2.64	2.40	1.50	3.37	2.60
CD (p=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

M_1 - Water spray, M_2 - Mepiquat Chloride @ 50 ppm, M_3 - Cycocel @ 60 ppm (M_1, M_2, M_3 – on 45 and 75 DAS)
S_1 - Water spray, S_2 - Foliar spray of 0.1% Boron + 1.0% $MgSO_4$, S_3 - Foliar spray of 0.1% Boron + 0.5% $ZnSO_4$, S_4- Foliar spray of 0.1% Boron + 2% KNO_3, S_5 - Foliar spray of 1.0% $MgSO_4$ + 0.5% $ZnSO_4$, S_6 - Foliar spray of 1.0% $MgSO_4$ + 2% KNO_3(S_1, S_2, S_3, S_4, S_5, S_6 – at peak flowering, boll formation and at boll development stage).

cotton yield (3309 kg ha^{-1}) (Tables 1 and 2) and better quality parameters viz., Ginning percentage (20.84%), Seed index (12.59), Lint index (5.57), fibre elongation (6.02%), fibre length (29.30 mm), fibre bundle strength (28.63), fibre fineness (3.28), fibre uniformity index (83.85) (Tables 3, 4 and 5).

Among the different micronutrients, S_5 (application of 1.0% $MgSO_4$ + 0.5% $ZnSO_4$ at peak flowering, boll formation and boll development stage) recorded higher yield attributes *viz*., number of sympodial branches per plant (18.36), number of flowers per plant (21.84), number of bolls per plant (18.49), boll weight (4.75) and seed cotton yield (3272 kg ha^{-1}) (Tables 1 and 2) and better quality parameters *viz*., Ginning percentage (36.65%), Seed index (12.67), Lint index (5.66), fibre elongation (6.01%), fibre length (29.42 mm), fibre bundle strength (28.03), fibre fineness (3.19), fibre uniformity index (84.89) (Tables 3, 4 and 5).

With regard to interaction, mepiquat chloride @ 50 ppm on 45 and 75 DAS with 1.0% $MgSO_4$ + 0.5% $ZnSO_4$ at peak flowering, boll formation and boll development stage (M_2S_5) was identified as the best combination among the treatments in enhancing higher yield attributes viz., number of sympodial branches per plant (20.84), number

Table 5 : Effect of plant growth retardants and micronutrients on the Fibre fineness (micronaire reading) and Fibre Uniformity Index (UI) of cotton.

	Fibre fineness (micronaire reading)				Fibre Uniformity Index (%)			
	M_1	M_2	M_3	Mean	M_1	M_2	M_3	Mean
S_1	3.63	3.43	3.52	**3.53**	78.94	82.99	82.86	**81.60**
S_2	3.32	3.21	3.23	**3.25**	79.89	84.43	84.01	**82.78**
S_3	3.38	3.22	3.25	**3.28**	79.81	84.23	83.95	**82.66**
S_4	3.46	3.30	3.31	**3.36**	79.51	83.56	83.00	**82.02**
S_5	3.24	3.16	3.18	**3.19**	84.09	84.89	84.53	**84.50**
S_6	3.51	3.36	3.39	**3.42**	79.05	83.02	83.00	**81.69**
Mean	**3.42**	**3.28**	**3.31**		**80.22**	**83.85**	**83.56**	
	M	**S**	**M at S**	**S at M**	**M**	**S**	**M at S**	**S at M**
S.Ed	0.28	0.18	0.40	0.32	7.00	4.35	9.81	7.53
CD (p=0.05)	NS	NS	NS	NS	NS	NS	NS	NS

M_1 - Water spray, M_2 - Mepiquat Chloride @ 50 ppm, M_3 - Cycocel @ 60 ppm (M_1, M_2, M_3 – on 45 and 75 DAS)
S_1 - Water spray, S_2 - Foliar spray of 0.1% Boron + 1.0% $MgSO_4$, S_3 - Foliar spray of 0.1% Boron + 0.5% $ZnSO_4$, S_4 - Foliar spray of 0.1% Boron + 2% KNO_3, S_5 - Foliar spray of 1.0% $MgSO_4$ + 0.5% $ZnSO_4$, S_6 - Foliar spray of 1.0% $MgSO_4$ + 2% KNO_3(S_1, S_2, S_3, S_4, S_5, S_6 – at peak flowering, boll formation and at boll development stage).

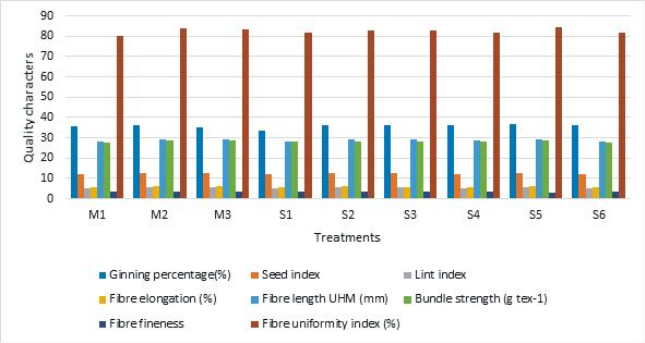

Fig. 1 : Effect of plant growth retardants and micronutrients on quality characters of cotton.

of flowers per plant (24.45), number of bolls per plant (21.03), boll weight (5.12) and seed cotton yield (3549 kg ha^{-1}) (Tables 1 and 2) and better quality parameters viz., Ginning percentage (36.85%), Seed index (12.86), Lint index (5.85), fibre elongation (6.13%), fibre length (29.94 mm), fibre bundle strength (28.85), fibre fineness (3.16), fibre uniformity index (84.89) (Tables 3, 4 and 5).

Discussion

The studies reveals that significant impact of different treatments on cotton yield attributes (number of sympodial branches per plant, number of flowers per plant, number of bolls per plant, boll weight) and seed cotton yield. Among the plant growth regulator, mepiquat chloride @ 50 ppm on 45 and 75 DAS (M_2) registered the higher yield attributes. This could be attributed to mepiquat chloride that increases the stomatal conductance, leaf CO_2 exchange rate, chlorophyll content, nutrient uptake and assimilate more photosynthates towards reproductive parts, thereby influencing the increased yield attributes and resulting in higher seed cotton yield. Shekar *et al*. (2015) reported that sympodial branches $plant^{-1}$ of Bt cotton were increased with the increase spray of mepiquat chloride. Priyanka *et al*. (2022) also reported that cotton plants treated with mepiquat chloride recorded a maximum number of bolls $plant^{-1}$. Among the different micronutrients, S_5 (application of 1.0% $MgSO_4$ + 0.5% $ZnSO_4$ at peak flowering, boll formation and boll development stage) recorded higher yield attributes. Tung *et al*. (2023) also stated that mepiquat chloride increased the number of flowers and yield by diverting energy from excessive leaves to flower buds and bolls. Our findings coincide with the results of Singh *et al*. (2015), who reported increase in boll weight by foliar application of $MgSO_4$ + $ZnSO_4$. With regard to interaction, mepiquat chloride @ 50 ppm on 45 and 75 DAS with 1.0% $MgSO_4$ + 0.5% $ZnSO_4$ at peak flowering, boll formation and boll development stage (M_2S_5) was identified as the best combination among the treatments in enhancing higher yield attributes. The increased number of sympodial branches and bolls per plant might be due to the ability of MC to translocate the photo-assimilates for reproductive growth and micronutrients to enhance better photosynthetic activity. The increased seed cotton yield might be due to the restricted vegetative growth coupled with smaller leaf size that has higher chlorophyll content, minimized shading effect and better light use efficiency which consequently decrease the boll shedding and increase the boll retention resulting in increased productivity. Our results confirm the findings of Mao *et al*. (2015), Ali *et al*. (2019).

Plant growth retardants and micronutrients does not significantly influenced the quality parameters of cotton (Ginning percentage, Seed index, Lint index, fibre elongation, fibre length, fibre bundle strength, fibre fineness, fibre uniformity index) (Fig. 1). The aforesaid results might be due to the fact that fibre quality is predominantly governed by genetical make-up of the cultivar. Sawan (2017) also emphasized that ginning out-turn, seed index, lint index and fibre characteristics were not affected by plant growth retardants. Fibre quality was not significantly affected by foliar spray of micronutrients. Similar findings were reported by Rajput *et al*. (2016).

Conclusion

From the experimental results, it can be concluded that the foliar application of mepiquat chloride @ 50 ppm on 45 and 75 DAS along with foliar spray of 1.0% $MgSO_4$ + 0.5% $ZnSO_4$ at peak flowering, boll formation and at boll development stage (M_2S_5) in hybrid cotton under high density planting system registered higher yield characters, Yield and does not have any significant effect on quality parameters.

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