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Effect of growth regulators and de-topping on productivity of cotton

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ABSTRACT : A field experiment was conducted to study the effect of growth regulators application and de-topping on seed cotton yield and economics during *kharif* seasons of 2015-2016, 2016-2017 and 2017-2018 at Cotton Research Scheme, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani. The experiment was laid out in a randomized block design with three replications and seven treatments *viz.,* T_1. Spraying of CC 50 per cent SL (cycocil) @ 60ppm at 75 DAS; T_2-spraying of CC 50 per cent SL (cycocil) @ 60ppm at 90 DAS; T_3-spraying of MC 5 per cent AS (Chamatkar) @ 250 ppm at 75 DAS T_4. Spraying of MC 5 per cent AS (Chamatkar) @ 250 ppm at 90 DAS; T_5-de-topping at 75 DAS; T_6-de-topping at 90 DAS; T_7-control.Non Bt.cotton variety NH 615 was sown by dibbling at spacing of 60 x 15 cm spacing.The pooled data revealed that,de-topping at 75 DAS recorded significantly highest seed cotton yield (1050, 1214, 1015 kg/ha) during 2015, 2016, 2017, respectively over rest of the treatments except it was *at par* with T_6 *i.e.* de-topping at 90 DAS and T_4 *i.e.* Spraying of MC @ 250ppm at 75 DAS. Increased cotton yield were observed in mepiquat chloride (50 ppm) sprayed at 90 DAS.

Key Words : *Bt* cotton, de topping, growth regulator, seed cotton yield

Cotton (*Gossypium* spp.) popularly known as white gold is an important crop for the rural economy of India and livelihood of the Indian farming community. Presently, India ranks first in area and second in production of cotton in the world (Anonyous,2017). Cotton is a crop with an indeterminate growth habit. Though vegetative growth is necessary to support reproductive growth, excessive vegetative growth can be detrimental. It is therefore necessary to control the excessive vegetative growth and divert the photosynthates towards reproductive parts of plant. Farmers apply growth regulators to the foliage in an effort to maintain a balance of vegetative and reproductive growth. The most commonly used growth regulator is mepiquat chloride, which decreases vegetative growth.Mepiquat inhibits a key enzyme in the production of gibberellic acid (Rademacher, 2000). Kolar and Patil (2012) reported that the application of mepiquat chloride @ 50 ppm at 90 DAS recorded significantly more seed cotton yield (1190 kg/ha) as compared to application of cycocil (934.3 kg/ha). de-topping is another way to divert the photosynthates towards sink in growing plants and avoid excess plant growth. de-topping at 30 days after flowering recorded higher seed cotton yield of 4911 kg/ha in Iran (Mirshekari *et al.*, 2013) The work on de-topping and its effect in cotton crop is not common. Therefore, a field experiment was conducted at cotton research scheme, VNMKV, Parbhani with objective to find out the effect of de-topping in comparison with growth regulators.

MATERIALS AND METHODS

A field experiment was carried out during *kharif* seasons of 2015 to 2017 at Cotton Research Scheme farm, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani. The soil of experimental plot was clayey in texture, low in available nitrogen (173kg/ha) and available phosphorus (10 kg/ha) and very high in available potash (410 kg/ha).The experiment was laid out in a randomized block design with three replications and seven treatments.*viz.,* T_1-spraying of CC (50 % SL) (cycocil) @ 60ppm at 75 DAS; T_2-spraying of (CC 50 % SL) (cycocil) @ 60ppm at 90 DAS; T_3-spraying of (MC 5 %) AS (Chamatkar) @ 250 ppm at 75 DAS, T_4-spraying of (MC 5 %) AS (Chamatkar) @ 250 ppm at 90 DAS; T_5-de-topping at 75 DAS; T_6-de-topping at 90 DAS and T_7-control.Sowing of cotton variety NH 615 was done by dibbling the seed at spacing 60 x 15 cm (1.11 lakh) with fertilizer 120:60:60 kg NPK ha^{-1} was applied. Spraying of growth regulators was undertaken with the help of knapsack sprayer whereas, de-topping was done with secateur. The data on seed cotton yield were recorded on the basis of net plot area and the crop was picked in three pickings in each treatment. The data were analysed by the analysis of variance method as suggested by Gomez and Gomez (2010).

RESULTS AND DISCUSSION

Effect on yield (kg/ha)and yield attributes of cotton : The data on seed cotton yield (kg/ha), boll weight (g) and number of bolls per plant are presented in Table 1. There were significant differences among treatments on yield and yield components.

The pooled data on seed cotton yield (kg/ha) indicate that, among the different treatments, T_5 *i.e.* de-topping at 75 DAS recorded significantly highest seed cotton yield (1050, 1214, 1015 kg/ha) during 2015, 2016 and 2017 respectively over rest of the treatments except it was *at par* with T_6 *i.e.*de-topping at 90 DAS and T_3 *i.e.* spraying of MC @ 250ppm at 75 DAS. Beneficial effect on seed cotton yield was in conformity with the findings of Virdia (2011). de-topping at 75 DAS recorded significantly highest boll weight (g) and boll number over rest of the treatments except it was *at par* with T_6 *i.e.* de-topping at 90 DAS and T_3 *i.e.* spraying of MC @ 250ppm at 75 DAS during all the years of experiment.

Effect on gross and net monetary returns : The data on gross and net monetary returnsare are presented in Table 2. The pooled data indicates that, among the different treatments, T_5 *i.e.* de-topping at 75 DAS recorded significantly higher gross monetary returns (Rs. 46200, 66770, 50750) and net monetary returns (Rs. 21457, 37565, 22161) during 2015, 2016, 2017 respectively over rest of the treatments except it was *at par* with T_6 *i.e.*de-topping at 90 DAS and T_4 *i.e.* spraying of MC @ 250ppm at 75 DAS.

CONCLUSION

For highest seed cotton yield and higher economic returns de-topping at 75 DAS or spraying of Mepiquate Chloride 5% AS @ 250 ppm (25 ml /10 l water) at 75 DAS is recommended for *hirsutum* cotton under high density planting

Table 1. Yield and Yield attributes of cotton as influenced by different treatments

Treatment	Seed cotton yield (kg/ha)				Boll weight (g)				Number of bolls			
	2015-2016	2016-2017	2017-2018	**Pooled mean**	2015-2016	2016-2017	2017-2018	**Pooled mean**	2015-2016	2016-2017	2017-2018	**Pooled mean**
T1. Spraying of CC (50 % SL) @ 60 ppm at 75 DAS	814	1069	903	**938**	2.56	2.77	2.57	**2.6**	15.2	34	16.8	**22**
T_2. Spraying of CC (50 % SL) @ 60 ppm at 90DAS	819	988	870	**893**	2.53	2.77	2.81	**2.72**	16.3	34.3	19.6	**23.4**
T_3. Spraying of MC (5% AS) @ 250 ppm at 75 DAS	851	1100	1004	**985**	2.63	2.87	2.63	**2.74**	17.7	33.6	20.4	**23.9**
T_4. Spraying of MC (5%AS) @ 250 ppm at 90 DAS	886	930	980	**932**	2.66	2.87	2.56	**2.73**	18.5	36.6	19.4	**24.8***
T_5. De-topping at 75 DAS	1050	1214	1015	**1093**	2.56	2.97	3.1	**2.91**	20.4	35.3	24.2	**26.6**
T_6. De-topping at 90 DAS	1021	1094	1011	**1052**	2.4	2.67	3	**2.75**	20.1	34	23.6	**25.9**
T_7. Control	681	947	732	**787**	2.76	2.77	2.71	**2.72**	15	25.3	16.5	**18.9**
SE +	56	43	30	**45**	0.2	0.18	0.13	**0.16**	0.8	1.8	1	**1.5**
CD (p0.05)	172	133	92	**131**	N.S.	N.S.	0.33	**N.S.**	2.4	5.5	3.1	**4.3**
Mean	**879**	**1049**	**910**	**946**	**2.59**	**2.8**	**2.74**	**2.75**	**17.5**	**36.1**	**20.5**	**25.6**

Table 3. Gross and Net monetary returns and B:C ratio as influenced by different treatments

Treatment	GMR (Rs.)				NMR (Rs.)				Cost of cultivation (Rs.)				B:C Ratio			
	2015-2016	2016-2017	2017-2018	**Pooled mean**	2015-2016	2016-2017	2017-2018	**Pooled mean**	2015-2016	2016-2017	2017-2018	**Pooled mean**	2015-2016	2016-2017	2017-2018	**Pooled mean**
T_1. Spraying of CC 50 % SL@ 60 ppm at 75 DAS	35816	58795	45150	**45587**	12396	30893	17712	**20333**	23420	27902	27438	**25254**	1.52	2.1	1.64	**1.75**
T_2. Spraying of CC 50 % SL@ 60 ppm at 90DAS	36036	54340	43500	**44625**	12591	27086	16359	**18678**	23445	27254	27141	**25947**	1.54	1.99	1.6	**1.71**
T_3. Spraying of MC 5% AS@ 250 ppm at 75 DAS	37444	60500	50200	**49381**	13084	31595	21098	**21925**	24360	28905	29102	**27456**	1.58	2.09	1.72	**1.8**
T_4. Spraying of MC 5% AS @250 ppm at 90 DAS	38984	51150	49000	**46378**	14449	23605	20114	**19389**	24535	27545	28886	**26989**	1.59	1.85	1.69	**1.71**
T_5. De-topping at 75 DAS	46200	66770	50750	**54573**	21457	37565	22161	**27061**	24743	29205	28589	**27512**	1.86	2.28	1.77	**1.97**
T_6. De-topping at 90 DAS	44924	60170	50550	**51881**	20326	31925	21997	**24749**	24598	28245	28553	**27132**	1.83	2.12	1.77	**1.9**
T_7. Control	29964	52085	36600	**39549**	7634	25581	11126	**14781**	22330	26504	25747	**24768**	1.34	1.96	1.43	**1.58**
SE+ 3292	3872	3345	3210	**768**	1091	839	1270	**-**	-	-	-	**—**	—	—	—	
CD (p=0.05)	9122	8296	9802	**8620**	2363	3357	2520	**3908**	-	-	-	**-**	—	—	—	**—**
Mean 38481	**57687**	**46535**	**47567**	14562	**29750**	**18652**	**20988**	23919	**27937**	**27883**	**26579**	**—**	**—**	**—**	**—**	

System (60 x 15 cm).

REFERENCES

Anonymous, 2017. All India coordinated cotton improvement project, Coimbatore, Annual report, **1 :** 1-5.

Gomez, K.A. and Gomez, A.A. 2010. Statistical procedures for agricultural research. 2nd Edn.,John Wiley and Sons, New York. pp.13-175.

Kolar, P. and B.C. Patil. 2012. Plant growth regulators and its influence on yield, morphophysiological and biochemical parameters in hybrid cotton *(Gossypium hirsutum L.) Indian J. Plant Physiol.,* **10 :** 187-90.

Mirshekari, B. and B. Meshkinshar. 2013. Response of cotton cultivars to topping and plant growth regulators. *Seed Plant Prod. Jour.*, **292 :** 97-108.

Rademacher, W. 2000. Growth Retardants: Effects onGibberellin Biosynthesis and Other Metabolic Pathways.*Ann. Rev. Pl. Phy. Pl. Mol. Biol.* **51 :** 501-31.

Virdia, H.M. 2011. Effect of topping on growth and yield of hybrid cotton *(Gossypiumhirsutum L.). Adv. Res. Jour. Crop Improv.* **2 :** 21-23.

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