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Short Communication

Use of De-topping as a Management Tool for Higher Productivity in Cotton

Ashok S. Jadhav
Cotton Research Scheme, Vasantrao Naik Marathwada Krishi Vidhyapeeth, Parbhani 431402 (M.S.) India. Email : asjadhav31@rediffmail.com

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 2015-16, 2016-17 and 2017-18 at Cotton Research Scheme, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (M.S.). 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 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 & T_4 i.e. Spraying of MC @ 250 ppm at 75 DAS. Increased cotton yield was observed in mepiquat chloride (50 ppm) sprayed at 90 DAS.

Keywords : Growth regulator, De-topping, Bt. cotton, Seed cotton yield

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1. Introduction

Cotton (*Gossypium spp.*) popularly known as white gold and 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 (Anonymous, 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 photosynthesis towards reproductive parts of the 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 yields a higher seed cotton yield of 4911 kg/ha in Iran (Mirshekari *et al.*, 2013). The work on de-topping and its effect on the 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.

2. Material 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 (M.S.). The soil of the experimental plot was clayey in texture, low in available nitrogen (173 kg/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) @ 60 ppm at 75 DAS T_2. Spraying of CC 50 % SL (cycocil) @ 60 ppm 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 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 a sector. The data on seed cotton yield was 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).

3. Results and Discussion

3.1. 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 was a significant difference between treatments on yield and yield components.

The pooled data on seed cotton yield (kg/ha) indicates 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, 2017 respectively over rest of the treatments except it was at par with T_6 i.e. De-topping at 90 DAS & T_3 i.e. Spraying of MC @ 250 ppm 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 & T_3 i.e. Spraying of MC @ 250 ppm at 75 DAS during all the years of experiment.

3.2. Effect on Gross and Net Monetary Returns

The data on gross and net monetary returns 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 highest 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 & T_4 i.e. Spraying of MC @ 250 ppm at 75 DAS.

4. 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 lit. water) at 75 DAS is recommended for *hirsutum* cotton under high density planting System (60 X 15 cm).

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

Treatment	*Seed Cotton Yield (kg ha^{-1})*				*Boll weight (g)*				*No. of bolls*			
	2015-16	*2016-17*	*2017-18*	*Pooled mean*	*2015-16*	*2016-17*	*2017-18*	*Pooled mean*	*2015-16*	*2016-17*	*2017-18*	*Pooled mean*
T_1. Spraying of CC 50 % SL@ 60 ppm at 75 DAS	814	1069	903	938	2.56	2.77	2.57	2.60	15.2	34.0	16.8	22.0
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	3.10	2.91	20.4	35.3	24.2	26.6
T_6. De-topping at 90 DAS	1021	1094	1011	1052	2.40	2.67	3.00	2.75	20.1	34.0	23.6	25.9
T_7. Control	681	947	732	787	2.76	2.77	2.71	2.72	15.0	25.3	16.5	18.9
SE ±	56	43	30	45	0.20	0.18	0.13	0.16	0.8	1.8	1.0	1.5
CD @ 5%	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	2.80	2.74	2.75	17.5	36.1	20.5	25.6

CC – Chlormequat chloride MC- Mepiquate chloride

Table 2: Gross and Net monetary returns and B:C ratio as influenced by different treatments

Treatment	*GMR (Rs.)*				*NMR (Rs.)*				*B:C Ratio*			
	2015-16	*2016-17*	*2017-18*	*Pooled mean*	*2015-16*	*2016-17*	*2017-18*	*Pooled mean*	*2015-16*	*2016-17*	*2017-18*	*Pooled mean*
T_1. Spraying of CC 50 % SL@ 60 ppm at 75 DAS	35816	58795	45150	45587	12396	30893	17712	20333	1.52	2.10	1.64	1.75
T_2. Spraying of CC 50 % SL@ 60 ppm at 90DAS	36036	54340	43500	44625	12591	27086	16359	18678	1.54	1.99	1.60	1.71
T_3. Spraying of MC 5% AS@ 250 ppm at 75 DAS	37444	60500	50200	49381	13084	31595	21098	21925	1.58	2.09	1.72	1.80
T_4. Spraying of MC 5% AS @250 ppm at 90 DAS	38984	51150	49000	46378	14449	23605	20114	19389	1.59	1.85	1.69	1.71
T_5. De-topping at 75 DAS	46200	66770	50750	54573	21457	37565	22161	27061	1.86	2.28	1.77	1.97
T_6. De-topping at 90 DAS	44924	60170	50550	51881	20326	31925	21997	24749	1.83	2.12	1.77	1.90
T_7. Control	29964	52085	36600	39549	7634	25581	11126	14781	1.34	1.96	1.43	1.58
SE ±	3292	3872	3345	3210	768	1091	839	1270	--	--	--	--
CD @ 5%	9122	8296	9802	8620	2363	3357	2520	3908	--	--	--	--
GM	38481	57687	46535	47567	14562	29750	18652	20988	--	--	--	--

Cotton Price Rs. Qt^{-1} = 4500/- (2015-16) Rs. Qt^{-1} = 5500/- (2016-17) Rs. Qt^{-1} = 5000/- (2017-18)