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Effect of plant spacing on incidence of whitefly, *Bemisia tabaci* on Bt cotton

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Abstract

Effect of plant spacing on incidence of whitefly, *Bemisia tabaci* on Bt cotton was studied at Research Farm, College of Agriculture, SKRAU, Bikaner during Kharif, 2018. The incidence of whitefly, *B. tabaci* on different plant spacing i.e. 67.5 cm × 105 cm, 67.5 cm × 90 cm, 67.5 cm × 67.5 cm, 67.5 cm × 45 cm and 67.5 cm × 30 cm was studied. The maximum populations of whitefly, *B. tabaci* was noticed in the plant spacing of 67.5 cm × 30 cm followed by 67.5 cm × 45 cm. Whereas, minimum population was noticed in plant spacing 67.5 cm × 105 cm followed by 67.5 cm × 90 cm. The maximum seed cotton yield was reported from the plots having spacing of 67.5 cm × 67.5 cm.

Keywords: Plant spacing, whitefly, *B. tabaci* and Bt cotton

Introduction

Cotton is one of the major fibre and cash crops of all around world. It is grown under tropical and subtropical regions of more than 80 countries of world occupying an area nearly 33 m ha with an annual production of 19 to 20 million tonnes of bales. China, U.S.A., India, Pakistan, Uzbekistan, Australia, Brazil, Greece, Argentina and Egypt are main cotton producing countries. An approximately 85% of the overall cotton production contribute by these countries. Release of Bt cotton for mercantile cultivation in India during 2002 has come as a blessing to the cotton farmers who have harvested improved yields with maximum returns. Bt cotton distinctly came to have been playing a key role in production and productivity. Although introduction of Bt cotton could reduce the bollworm incidence, number of other pests viz., whitefly, leafhopper, mirid bugs, aphids and thrips are becoming potential threats (Kranthi *et al.*, 2011) ^[11] and these sucking pests were responsible for the loss of 50 per cent of young cotton plants (Sakimura, 1963) ^[6]. Among them whitefly is most destructive sucking pest of cotton. Whitefly is widely distributed polyphagous pest in tropical and subtropical regions of India. There is much scope to improve the Bt cotton production by increasing the productivity through adoption of appropriate agronomic practices. The plant spacing may play an important role in the change of the population density levels of this pest attacking the plants. So, there is need to find out the suitable spacing for Bt hybrid and their effect on population of whitefly.

Materials and Methods

Present investigation on effect of plant spacing on incidence of whitefly, *B. tabaci* on Bt cotton were recorded at the Research farm College of Agriculture, Swami Keshwanand Rajasthan Agricultural University Bikaner, (Rajasthan). The experiment was laid out in a simple randomized block design and plant spacing's were considered as treatments. There were five such treatments and each replicated four times. The seeds of NCS-855 BG II were sown in the plot size 6.0 x 4.05 m on 22th May in 2018. The recommended package of practices, except spraying of insecticides were followed for raising the crop. The populations of whitefly, *B. tabaci* were recorded on five randomly selected tagged plants in morning hours (Before 8 AM), when insects has minimum activity. The observations were recorded on whole plant in the initial stage and on three leaves two from upper, middle and lower portion of randomly selected and tagged plants. The population was counted by holding the base of leaves gently until the entire underside of leaf was clearly visible. Population was estimated with least disturbance at early hours of the day. From this, the average population per leaf was worked out.

The data on whitefly population recorded at weekly interval from experimental plots were transformed into $\sqrt{x} + 0.5$ values and subjected to analysis of variance. Seed cotton yield per plot per kg was converted into per hectare and then subjected to statistical analysis.

Results and Discussion

The occurrence of adults of whitefly started in 26th standard week *i.e.* last week of June. Initially the population was very low but increased week after week and attained to its peak population in the 38th standard week which was third week of September then declined till the crop maturity (table 1). At the peak, the maximum population 66.49 adults/3 leaves were noticed in the plots having plant spacing 67.5 cm x 30 cm and the minimum population 39.08 adults/3 leaves of were noticed in the plots having plant spacing 67.5cm x 105 cm. On the basis of over all season mean of whitefly, it was indicated that maximum number of adults 29.78 adults/3 leaves were observed in the plots having plant spacing 67.5 cm x 30 cm followed by 67.5cm x 45 cm (27.61adults/3 leaves). Minimum population of adults 16.55 adults/3 leaves were noticed in the plots having plant spacing 67.5cm x 105 cm followed by 67.5 cm x 90 cm (17.96 adults/3 leaves). These results are in conformity with those of Thakare *et al.* (1986) [8] who found that closer spacing led to high population of whitefly, *B. tabaci* in cotton, Giri *et al.* (1993) [4] studied that the greater numbers of adults of whitefly, *B. tabaci* was observed in plots having 60 cm x 15 cm compared with 60cm x 30 cm spacing, Arif *et al.* (2006) [3] observed that the population of whitefly, *B. tabaci* effected by plant spacing

and decreasing with the increase in plant spacing, Singh (2015) [7] revealed that 67.5 cm x 75 cm plant spacing was most susceptible while, 67.5 cm x 105 cm plant spacing was least susceptible against whitefly, *B. tabaci*. The population of whitefly, *B. tabaci* was recorded significantly higher in the plant spacing 67.5 cm x 30 cm and significantly lower in 67.5 cm x 105 cm.

Effect of plant spacing on seed cotton yield

The data of seed cotton yields obtained from the treatments having different plant spacing revealed that maximum seed cotton yield 16.40 q ha⁻¹ (table 2) was obtained from the plots having plant spacing of 67.5 x 67.5 cm and the minimum seed cotton yield (10.85 q ha⁻¹) in the plots having 67.5 x 105 cm plant spacing followed by 67.5 x 90 cm (11.55 q ha⁻¹) and 67.5 x 45.0 cm (14.25 q ha⁻¹). However, these were at par and inferior to the other treatments. The seed cotton yields in other plants spacing 67.5 x 30 cm was (13.50 q ha⁻¹) The present results are in agreement to that of Acharya and Bhargawa (2008) [1] who reported that maximum seed cotton yield was observed in the treatment where plant spacing was 67.5 x 60cm and minimum seed cotton yield was obtained in the treatment where plant spacing was 67.5 x 100cm contrary to the present investigation, the maximum seed cotton yield was recorded in the plots having plant spacing of 0.675 x 0.30 m. However, significant higher seed cotton yield was obtained in the plots having plant spacing of 0.675 x 0.60 m which was comparable to that of 0.675 x 0.30 m spacing and minimum seed cotton yield was obtained in the plots having spacing of 1.00 x 0.60 m (Anonymous, 2001) [2] support these findings.

Table 1: Effect of plant spacing on incidence of whitefly, *B. tabaci* on Bt cotton during *Kharif*, 2018

Plant Spacing (cm)	Population / 3 leaves on different standard weeks																			Mean	
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43		44
67.5 × 105	7.16 (2.77)*	4.16 (2.16)	10.18 (3.26)	5.56 (2.46)	5.52 (2.45)	6.04 (2.54)	4.24 (2.18)	6.84 (2.71)	9.87 (3.21)	7.06 (2.74)	24.68 (5.00)	32.45 (5.72)	27.55 (5.28)	39.08 (6.27)	34.74 (5.92)	36.91 (6.11)	36.69 (6.09)	17.54 (4.24)	11.75 (3.50)	2.92 (1.85)	16.55
67.5 × 90	8.16 (2.92)	4.74 (2.29)	10.60 (3.33)	6.54 (2.64)	6.54 (2.65)	6.21 (2.59)	4.80 (2.30)	7.39 (2.81)	10.56 (3.32)	8.04 (2.92)	27.46 (5.28)	34.13 (5.87)	30.51 (5.56)	41.71 (6.49)	36.90 (6.10)	39.46 (6.30)	39.46 (6.30)	20.22 (4.54)	12.68 (3.63)	3.16 (1.91)	17.96
67.5 × 67.5	10.35 (3.29)	6.47 (2.62)	13.83 (3.78)	8.46 (2.98)	8.12 (2.93)	8.23 (2.95)	6.16 (2.58)	9.94 (3.22)	13.22 (3.70)	10.36 (3.29)	34.51 (5.92)	42.56 (6.55)	38.22 (6.21)	52.12 (7.24)	46.40 (6.83)	49.22 (7.04)	49.19 (7.04)	25.87 (5.12)	15.84 (4.03)	4.20 (2.16)	22.66
67.5 × 45	12.35 (3.58)	7.79 (2.88)	17.83 (4.27)	10.48 (3.31)	9.71 (3.19)	9.66 (3.19)	7.55 (2.84)	10.97 (3.38)	15.86 (4.04)	13.35 (3.72)	42.17 (6.52)	51.53 (7.20)	46.68 (6.86)	63.03 (7.96)	55.77 (7.49)	59.86 (7.76)	61.23 (7.85)	32.15 (5.71)	19.04 (4.41)	5.13 (2.37)	27.61
67.5 × 30	14.11 (3.82)	8.91 (3.07)	20.64 (4.60)	11.49 (3.46)	10.42 (3.30)	10.10 (3.25)	8.41 (2.97)	11.62 (3.48)	17.46 (4.24)	15.24 (3.97)	46.86 (6.88)	55.23 (7.46)	50.29 (7.12)	66.49 (8.18)	58.78 (7.69)	62.59 (7.94)	65.66 (8.13)	35.32 (5.98)	20.49 (4.58)	5.61 (2.47)	29.78
S.Em.±	0.13	0.08	0.12	0.09	0.09	0.10	0.08	0.10	0.11	0.12	0.17	0.20	0.19	0.23	0.21	0.22	0.22	0.16	0.12	0.06	
C.D.at 5%	0.39	0.25	0.37	0.29	0.27	0.30	0.24	0.30	0.35	0.36	0.54	0.62	0.58	0.70	0.65	0.68	0.69	0.49	0.37	0.19	

*Figures in parenthesis are $\sqrt{x} + 0.5$ values

Table 2: Effect of plant spacing on seed cotton yield

S. No.	Plant Spacing (cm)	Yield (q ha ⁻¹)
1	67.5 × 105.0	10.85
2	67.5 × 90.0	11.55
3	67.5 × 67.5	16.40
4	67.5 × 45.0	14.25
5	67.5 × 30.0	13.50
	S.Em.±	0.45
	C.D.at 5%	1.38

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