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Effect of sowing dates on the incidence of thrips in BT cotton

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Abstract
The field experiment was carried out at Agricultural Research Station (ARS), Dharwad Farm during Kharif seasons 2012-13 and 2013-14. Effect of sowing dates on seed cotton yield revealed that first Fortnight of June was significant in recording highest seed cotton yield in protected and unprotected conditions (28.47 q/ha and 21.87 q/ha, respectively) as compared to other sowing dates. First fortnight of August sowing was inferior by recoding lowest yield in protected and unprotected conditions (20.48 q/ha and 14.04 q/ha, respectively). It is concluded that, first fortnight of June sowing was superior in recording least thrips population with higher yield in BT cotton hybrids.

Keywords: Sowing dates, thrips, BT cotton

1. Introduction
Cotton is an important fibre crop of India and World, which occupies an enviable place amongst the commercial crops of India. Cotton known as the "king of fibre" and "white gold" is the most vital crop of commerce to many countries including India. Cultivated cotton (*Gossypium* spp.) is the world's leading natural fibre crop and it is the cornerstone of textile industries worldwide. Inspite of several competitions from synthetic fibres, cotton continues to enjoy a place of prime importance in textile industry. In India, cotton provides a means of livelihood to millions of farmers and workers and sustains cotton textile industry which annually produces cloth of the value exceeding a thousand crore rupees. Cotton is infested by a large number of insect pests right from the sowing till harvest. The insect pests are one of the major constraints in achieving optimum yield potential. Cotton crop harboured 1326 species of insects from sowing to maturity in different cotton growing areas of the world and 162 species have been reported on the crop in India[4]. Among these, nine are of utmost important inflicting significant losses in yield including thrips, *Thrips tabaci* (Linderman). The monetary value of yield losses due to insect pests has been estimated to be Rs. 33,966 crores[8] and thrips alone cause 39-50 per cent reduction in cotton yield[6] and 24.45 per cent reductions in cotton yield[2]. Among the sucking pests attacking cotton in early stages of crop growth, thrips constitute as one of the important sap feeders. Both nymphs and adults suck the sap from under surface of the leaves. Most damage occurs during the early vegetative stage of the crop, when nutritional quality of tissues is ideal for these insects. The affected leaves become thickened, silvery patches, blistered and bronzed due to continuous feeding which lead to drying of leaves affecting the growth and reduction in square number and ultimately yield loss. Feeding on developing bolls, makes them turn brown due to development of necrotic patches. Though there are many options for managing the thrips they are not fully effective and by studying seasonal dynamics of thrips and the impact of abiotic factors on the population of thrips play a vital role and acts as one of the tools to manage the thrips abundance. Considering the challenges and critical factors in the management of thrips in Bt-cotton, the present investigation was planned to know the effect of sowing dates on thrips incidence.

2. Materials and Methods
To study the effect of different sowing dates, experiment was laid out at Agricultural Research Station (ARS), Dharwad during *kharif* seasons 2012-13 and 2013-14. The station which is situated in the northern transitional zone (Zone-8) of Karnataka with latitude of 15° 26' north, longitude of 76° 46east and altitude of 678 m above mean sea level (MSL). The annual rainfall ranges between 619 and 1303 mm confined to monsoon period between June and November with occasional showers during pre-monsoon months of April and May. The average rainfall received for the year 2012-13 and 2013-14 was 759.06 mm and 738.3 mm, respectively.

2.1. Effect of sowing dates on the incidence of thrips in Bt cotton

2.2 Différent sowing dates

The Bt cotton hybrid RCH-2 Bt was sown at fortnightly intervals *viz*., first fortnight of June, second fortnight of June, first fortnight of July, second fortnight of July, and first fortnight of August. The experiment was laid out in Factorial Randomized Block Design (FRBD) with five sowing dates as subplots in a plot size of 5.4 x 6.0 m in protected conditions with (seed treatment + chemical sprays) and unprotected conditions without (seed treatment + chemical spray) as main plots and replicated four times.

2.3 Observations

The observations on thrips (adult/nymph) population were recorded on 10 randomly selected plants from top, middle and bottom leaves per plant in each treatment at 30, 60, 90 and 120 days after each sowing. Observations were also recorded on qualitative yields parameters like number of bolls, number of good and bad opened bolls per plant on randomly selected 10 plants in each treatment. Seed cotton yield per plot was recorded and then converted on hectare bases. The data on the thrips population, GOB's, BOB's and seed cotton yield recorded year wise and also pooled and were subjected to statistical analysis.

3. Results and Discussion

Five dates of sowing were under taken to know the effect of sowing on activity of cotton thrips in a field experiment during 2012-13 and 2013-14 *kharif* seasons. The results revealed that, the mean thrips population in protected and unprotected plots was significantly least in 1st fortnight of June sowing (3.67/3 leaves) followed by 2nd fortnight of June sowing (5.13/3 leaves) which clearly indicated that the crop sown during 1st fortnight of June and 2nd fortnight of June escaped from thrips damage as they could harbour very less population as compared to other dates of sowing (Table 1.). While, 1st fortnight of August sowing recorded highest thrips population (6.53/3 leaves) and it was said to be inferior in reducing thrips population. The mean thrips population of all sowing dates, protected plots recorded least thrips population (2.20/3 leaves) as compared to unprotected plots (8.75/3 leaves). However, interaction effect between sowing dates and protected plots was non significant and it was significant in unprotected plots. In unprotected plots, 1st fortnight of June sowing recorded significantly least thrips population of 5.48/3 leaves, followed by 2nd fortnight of June sowing (8.27/3 leaves) and first fortnight of July sowing (9.62/ 3 leaves). First fortnight of August sowing recorded more number of thrips population (10.26/3 leaves) when compared to other sowing dates. Among different sowing dates, 1st fortnight of June sowing was said to be superior in managing thrips population followed by 2nd fortnight of June sowing (Table 1.).

There was lack of literature pertaining to effect of sowing dates on thrips incidence, so the findings were discussed with other sucking pests. Present findings are in close affirmative with [1] who determined the effects of six dates of sowing *viz*., April 1, April 15, April 30, May 15, May 30, and June 1 on cotton during *kharif* season. Results revealed that whitefly population remained very low up to last week of July and thereafter increased gradually and reached its peak in the month of September and then declined irrespective of sowing dates.

Table 1: Effect of sowing dates on population of cotton thrips, *Thrips tabaci* (L.) of two seasons (Pooled)

Sowing dates	No. of thrips/3 leaves												Mean		
	30 DAS			60 DAS			90 DAS			120 DAS					
	P	UP	Mean	P	UP	Mean	P	UP	Mean	P	UP	Mean	P	UP	Mean
D1	1.28	3.28	2.28	1.88	6.19	4.03	2.38	8.35	5.36	1.90	4.09	2.99	1.86	5.48	3.67
D2	1.40	5.75	3.58	2.08	9.50	5.79	2.55	11.24	6.89	1.93	6.59	4.26	1.99	8.27	5.13
D3	1.63	6.31	3.97	2.51	11.35	6.93	2.93	13.53	8.23	2.38	7.30	4.84	2.36	9.62	5.99
D4	1.65	6.30	3.98	2.55	11.68	7.11	2.90	13.93	8.41	1.89	7.63	4.76	2.25	9.88	6.06
D5	1.58	6.59	4.08	2.81	12.28	7.54	3.45	15.05	9.25	2.45	8.01	5.23	2.57	10.48	6.53
Mean	1.51	5.65		2.37	10.20		2.84	12.42		2.11	6.72		2.20	8.75	
	S.Em±	CD		S.Em±	CD		S.Em±	CD		S.Em±	CD		S.Em±	CD	
D	0.114	0.3		0.179	0.5		0.352	1.0		0.169	0.5		0.125	0.4	
P	0.072	0.2		0.113	0.3		0.223	0.6		0.107	0.3		0.079	0.2	
D x P	0.162	0.5		0.253	0.7		0.498	1.4		0.239	0.7		0.176	0.5	

P-Protected, UP-Unprotected

D1-First fortnight of June, D2-Second fortnight of June, D3- First fortnight of July, D4- Second fortnight of July, D5- First fortnight of August

Table 2: Effect of sowing dates on yield parameters and seed cotton yield of Bt cotton

Sowing dates	GOB's/plant		BOB's/plant		Yield (q/ha)		Avoidable yield loss (q/ha)
	P	UP	P	UP	P	UP	
D1	83.09	69.93	12.79	19.31	28.47	21.87	6.6
D2	75.74	66.54	15.90	20.18	25.27	20.23	5.04
D3	71.84	62.11	18.70	22.35	23.92	18.01	5.91
D4	67.38	59.38	18.56	22.19	21.49	15.04	6.45
D5	65.94	53.56	20.18	23.20	20.48	14.04	6.44
S.Em±	1.15	1.15	0.56	0.70	0.58	0.70	
CD	3.54	3.55	1.74	2.17	1.79	2.17	
CV	4.63	5.74	8.31	6.31	5.97	7.58	

P-Protected, UP-Unprotected

D1-First fortnight of June, D2-Second fortnight of June, D3- First fortnight of July, D4- Second fortnight of July, D5- First fortnight of August

The higher population was recorded in late sown crop throughout the season as compared to early sown crop. [3] Studied the influence of three planting dates, *viz*., early planted, timely planted and late planted of the cotton variety SG125 on thrips. The populations of *Frankliniella occidentalis* dominated on flowers and colonized the flowers rapidly with high numbers in early and normally planted cotton, while *Frankliniella intonsa* was significantly found higher on flowers in the late planted cotton crop. The activity of sucking pests revealed that June I and II fortnight sowings as well as July I fortnights emerged as better and optimum dates planting Byadgi Chilli to escape from sucking pest infestation both in protected and unprotected conditions and significantly lower mean population of 2.98 and 3.41 thrips per leaf and 8.63 and 5.23 mites per leaf of were recorded in protected and unprotected conditions, respectively [7]. These findings are in agreement with the present studies. Among different sowing dates, 1st fortnight of June sowing under protected and unprotected condition recorded highest good opened bolls (83.09 and 69.93 bolls/plant, respectively) and found significant compared to other dates of sowings while 1st fortnight of August sowing recorded lowest GOB's (65.94 and 53.56 bolls/plant, respectively) and found inferior in recording good opened bolls as compared to other dates of sowing (Table 2.). First fortnight of June sowing was found effective in increasing yield as recorded least BOB's in protected and unprotected condition (12.79 and 19.31 bolls/plant) as compared to other sowing dates. However, next best sowing dates in order of superiority were 2nd fortnight of June sowing (15.90 and 20.18 bolls/plant) and 1st fortnight of July sowing (18.70 and 22.35 bolls/plant) in protected and unprotected condition (Table 2.) while, 2nd fortnight of July sowing and 1st fortnight of August were inferior in recording lowest yield and recorded highest BOB's (18.56 and 22.19 bolls/plant) and (20.18 and 23.20 bolls/plant).

Results on effect of sowing dates on seed cotton yield revealed that 1st fortnight of June sowing both in protected and unprotected conditions was significant in recording highest seed cotton yield (28.47 q/ha and 22.37 q/ha respectively) as compared to other sowing dates while 1st fortnight of August was inferior in recoding lowest yield (20.48 q/ha and 14.04 q/ha). The mid or late sown crops recorded relatively more incidence of thrips and suffered much. The overlapping generation of thrips caused more damage that lead to higher yield loss. The early sown crop escaped from higher incidence of the pest and documented higher yield. The present findings are in agreement with different genotypes studied by [5] who investigated the effects of planting date of cotton variety on the incidence of sucking pests of cotton. Three varieties *viz*., SZ 9314, CRI MS1 and CRI MS2 were planted on three different dates (October 20, November 17 and December 15) representing early, midseason and late planting. The result of the study clearly concluded that early planting resulted in lower incidence of sucking pests and recorded higher yield.

4. References

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