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Performance of different sticky colour traps against thrips in BT cotton

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Abstract

To study the performance of different sticky colour traps against thrips in Bt cotton, a field experiment was conducted in a factorial randomized block design (RBD) using RCH-2 Bt genotype at ARS, Dharwad Farm, during *Kharif* 2012-13 and 2013-14. Performance of colour sticky traps at 15 DAS, white colour trap attracted more number of thrips population (1.55/ 10 cm²) and least in light green colour trap (0.56/ 10 cm²). Irrespective of colours the trap installed at 30 cm height recorded more number of thrips (2.01/ 10 cm²) when plant height was 28.5 cm. Interaction effect showed significant difference as white colour trap at 30 cm trap height attracted more number of thrips (3.40/ 10 cm²) and found to be superior compared to other colour traps and trap heights. However, irrespective of the colours 30 cm, 60 cm and 90 cm trap heights were suitable for recording more number of thrips at 15 – 30 DAS, 45 – 60 DAS and 75 - 90 DAS, respectively.

Keywords: Sticky, colour traps, 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. Though, several competitions from synthetic fibres, cotton continues to enjoy a place of prime importance in the textile industry. In India, cotton provides 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 the harvest. The insect pests are one of the major constraints in achieving optimum yield potential. Cotton crop is infested by 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 [7]. 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 [11] and thrips alone cause 39-50 per cent reduction in cotton yield [9] and 24.45 per cent reductions in cotton yield [3]. 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 they become thickened, silvery patches, blistered and bronzed due to continuous sucking of sap 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 performance of different sticky colour traps it play a vital role and acts as one of the tool 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 performance of different sticky colour traps against thrips in Bt cotton.

2. Materials and Methods

Monitoring of the field population of thrips was done with the help of card board sheets (15 x 15 cm) as traps. A field experiment was conducted in a factorial randomized block design (RBD) using RCH-2 Bt genotype at ARS, Dharwad Farm, during *Kharif* 2012-13 and 2013-14. The experiment consists of six different colors *viz.*, white, yellow, light blue, dark blue,

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light green and dark green with four different trap heights viz., 30, 60, 90 and 120 cm was erected in 10 X 10 m field after smearing with castor oil and replicated thrice.

2.1 Observations

Weekly observations on number of thrips per 3 leaves and thrips caught on each trap during morning hours was recorded from 15 days after sowing up to 90 days old crop. The traps were smeared with castor oil before installation and also after taking observations. All the observations were subjected to factorial analysis.

3. Results and Discussion

Performance of colour sticky traps against thrips population revealed that at 15 DAS white colour trap attracted more number of thrips population (1.55/ 10 cm²) and least in light green colour trap (0.56/ 10 cm²). Irrespective of colours the trap installed at 30 cm height recorded more number of thrips (2.01/ 10 cm²) when plant height was 28.5 cm (Table 1.). Interaction effect showed significant difference as white colour trap at 30 cm height attracted more number of thrips

(3.40/ 10 cm²) and found to be superior compared to other colour traps and heights (Table 1.). Similar trend was followed even at 30 DAS when crop growth was 40.8 cm. However, at 45 DAS, light green colour trap attracted less thrips (1.60/ 10 cm²) as compared to highest in white colour trap (4.88/ 10 cm²). The trap installed at 60 cm height with irrespective of colour recorded more number of thrips (6.07/ 10 cm²) when plant height was 57 cm (Table 1.). Interaction effect was significant and white colour trap at 90 cm height attracted more number of thrips (13.03/3 leaves). Similar trend was noticed even at 60 DAS. Trap height at 90 cm with irrespective of colour attracted more number of thrips (6.67/ 10 cm²) and was on par with 60 cm trap height (6.32/ 10 cm²) when plant height was 75.5 cm. While interaction effect was significant and white colour trap at 90 cm height recorded more number of thrips (13.03/ 10 cm²). Similar trend was followed even at 75 DAS and 90 DAS with respect to colour traps and different heights of traps when plant heights were 88.5 and 104.1 cm, respectively. However, interaction effect between different colour traps and trap heights was non significant (Table 1.).

Table 1: Performance of sticky color traps against cotton thrips, *Thrips tabaci* (L.) in field condition (Pooled)

Trap colour ↓	Trap height (cm) →	No. of thrips/trap (10 cm ²)														
		15 DAS (Plant height: 28.5 cm)					30 DAS (Plant height: 40.8 cm)					45 DAS (Plant height: 57 cm)				
		30 cm	60 cm	90 cm	120 cm	Mean	30 cm	60 cm	90 cm	120 cm	Mean	30 cm	60 cm	90 cm	120 cm	Mean
T1 – Yellow	2.30 (1.66)	1.43 (1.38)	0.33 (0.89)	0.00 (0.71)	1.02 (1.16)	6.87 (2.70)	3.07 (1.88)	0.93 (1.19)	0.00 (0.71)	2.72 (1.62)	6.03 (2.55)	6.70 (2.68)	2.37 (1.69)	0.00 (0.71)	3.78 (1.91)	
T2 – White	3.40 (1.97)	2.35 (1.68)	0.43 (0.95)	0.00 (0.71)	1.55 (1.33)	9.47 (3.14)	6.00 (2.54)	1.20 (1.30)	0.07 (0.75)	4.18 (1.93)	6.95 (2.73)	9.25 (3.08)	2.98 (1.86)	0.33 (0.89)	4.88 (2.14)	
T3 – Dark blue	1.75 (1.48)	0.53 (0.99)	0.07 (0.75)	0.00 (0.71)	0.59 (0.98)	3.40 (1.97)	1.90 (1.55)	0.73 (1.11)	0.00 (0.71)	1.51 (1.33)	2.45 (1.70)	5.25 (2.38)	1.23 (1.31)	0.00 (0.71)	2.23 (1.53)	
T4 – Light blue	2.20 (1.64)	1.20 (1.30)	0.20 (0.81)	0.00 (0.71)	0.90 (1.11)	5.17 (2.38)	2.97 (1.86)	0.58 (1.01)	0.00 (0.71)	2.18 (1.49)	4.38 (2.19)	7.02 (2.71)	1.93 (1.54)	0.00 (0.71)	3.33 (1.79)	
T5 – Dark green	1.10 (1.26)	0.80 (1.14)	0.45 (0.94)	0.00 (0.71)	0.59 (1.01)	2.37 (1.68)	1.48 (1.40)	0.67 (1.06)	0.00 (0.71)	1.13 (1.21)	2.03 (1.58)	5.12 (2.35)	0.67 (1.04)	0.00 (0.71)	1.95 (1.42)	
T6 – Light green	1.33 (1.34)	0.87 (1.15)	0.03 (0.73)	0.00 (0.71)	0.56 (0.98)	2.17 (1.62)	1.47 (1.39)	0.03 (0.73)	0.00 (0.71)	0.92 (1.11)	2.83 (1.82)	3.07 (1.83)	0.50 (0.97)	0.00 (0.71)	1.60 (1.33)	
Mean	2.01 (1.56)	1.20 (1.27)	0.25 (0.85)	0.00 (0.71)		4.91 (2.25)	2.81 (1.77)	0.69 (1.07)	0.01 (0.71)		4.11 (2.10)	6.07 (2.51)	1.61 (1.40)	0.06 (0.74)		
	S.Em.±	CD				S.Em.±	CD				S.Em.±	CD				
T	0.038	0.1				0.047	0.1				0.047	0.1				
H	0.031	0.1				0.038	0.1				0.039	0.1				
T x H	0.076	0.2				0.093	0.3				0.095	0.3				

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

*Mean thrips: 15 DAS (3.00 thrips/3 leaves)

30 DAS (10.15 thrips/3 leaves)

60 DAS (11.80 thrips/3 leaves)

Table 1: Contd...

Trap colour ↓	Trap height (cm) →	No. of thrips/trap (10 cm ²)														
		60 DAS (Plant height: 75.5 cm)					75 DAS (Plant height: 88.5 cm)					90 DAS (Plant height: 104.1 cm)				
		30 cm	60 cm	90 cm	120 cm	Mean	30 cm	60 cm	90 cm	120 cm	Mean	30 cm	60 cm	90 cm	120 cm	Mean
T1 – Yellow	2.92 (1.84)	7.15 (2.74)	8.63 (3.01)	1.00 (1.17)	4.93 (2.19)	1.00 (1.20)	3.87 (2.08)	10.77 (3.35)	4.03 (2.12)	4.92 (2.19)	1.00 (1.20)	3.60 (1.98)	6.72 (2.68)	5.30 (2.39)	4.15 (2.06)	
T2 – White	6.75 (2.69)	10.08 (3.25)	13.03 (3.66)	2.62 (1.75)	8.12 (2.84)	3.50 (1.99)	7.40 (2.81)	11.62 (3.47)	6.32 (2.58)	7.21 (2.71)	2.53 (1.73)	6.40 (2.62)	11.05 (3.39)	9.00 (3.06)	7.25 (2.70)	
T3 – Dark blue	1.37 (1.32)	4.70 (2.27)	4.40 (2.18)	1.03 (1.24)	2.88 (1.75)	1.00 (1.20)	2.93 (1.85)	6.28 (2.60)	2.67 (1.77)	3.22 (1.85)	1.13 (1.23)	3.07 (1.88)	5.60 (2.47)	3.20 (1.90)	3.25 (1.87)	
T4 – Light blue	4.20 (2.16)	7.72 (2.86)	6.68 (2.66)	1.33 (1.34)	4.98 (2.26)	1.72 (1.48)	3.90 (2.09)	9.27 (3.12)	4.17 (2.13)	4.76 (2.21)	1.50 (1.40)	3.90 (2.07)	6.57 (2.65)	5.29 (2.37)	4.30 (2.12)	
T5 – Dark green	1.33 (1.32)	4.70 (2.27)	3.90 (2.08)	0.00 (0.71)	2.48 (1.59)	1.00 (1.20)	2.67 (1.76)	5.60 (2.46)	2.37 (1.68)	2.91 (1.77)	0.97 (1.18)	3.17 (1.90)	6.67 (2.67)	3.87 (2.08)	3.67 (1.96)	
T6 – Light green	1.77 (1.77)	3.57 (3.57)	3.37 (3.37)	0.17 (0.17)	2.22 (2.22)	1.03 (1.03)	3.73 (3.73)	5.77 (5.77)	2.73 (2.73)	3.32 (3.32)	1.00 (1.00)	3.70 (3.70)	6.02 (6.02)	3.13 (3.13)	3.46 (3.46)	

	(1.50)	(2.01)	(1.90)	(0.79)	(1.55)	(1.21)	(2.05)	(2.48)	(1.76)	(1.87)	(1.20)	(2.03)	(2.54)	(1.86)	(1.91)
Mean	3.06 (1.80)	6.32 (2.57)	6.67 (2.58)	1.03 (1.17)		1.54 (1.38)	4.08 (2.10)	8.22 (2.91)	3.71 (2.01)		1.36 (1.32)	3.97 (2.08)	7.10 (2.73)	4.96 (2.28)	
	S.Em.±	CD				S.Em.±	CD				S.Em.±	CD			
T	0.067	0.2				0.064	0.2				0.059	0.2			
H	0.054	0.2				0.053	0.1				0.048	0.1			
T x H	0.133	0.4				0.129	NS				0.117	NS			

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

*Mean thrips: 60 DAS (12.40 thrips/3 leaves)

75 DAS (8.80 thrips/3 leaves)

90 DAS (7.85 thrips/3 leaves)

3.1 Discussion

Colored sticky cards can be used as an early warning method for detecting increases in aerial numbers of thrips adults. The present findings are in corroboration with [6] where sticky traps of light blue and white were effective for monitoring of green house populations of western flower thrips, *Frankliniella occidentalis* (Pergade). The observations on colored traps revealed that the blue colour was effective for monitoring thrips in chilli nursery; the next best trap was white and yellow coloured [2]. reported that blue, white and gold aluminium foils were found most attractive followed by silver, red, green, brown and black [5]. reported that *Scirtothrips citri* responded significantly more to fluorescent yellow polyvinyl rectangular traps [4]. reported that the colour responses of insects associated with sugar beet, Palestriped flea beetle, *Systema blanda* exhibited a strong visual response to yellow water pan traps as compared to black, red, green and orange [10]. studied the *Thrips palmi* population in mung bean through traps. Among white, yellow, blue and green sticky traps used to capture *Thrips palmi* (Karny) on mungbean and reported that the white colored traps captured significantly greater numbers along with *Frankliniella schultzei*, *S. dorsalis* and *Megalurothrips distalis*. The peak build up of *T. palmi* always coincide with six weeks age of the crop which in turn coincided with beginning of the flowering period [8]. Reported that when yellow sticky traps placed in horizontal and vertical positions at two heights with two positions, the largest population of thrips was captured at 25 cm above the plants for *Frankliniella* spp. at vertical positions. Present findings are contradictory to [12] who opined that the sticky traps did not prove to be efficient for thrips control and the mean yield of onion was not statistically significantly different among four treatments (insecticide, one sticky trap (11.0 x 14.0 cm) per plot (1.5 m²) and two sticky boards per plot and control). Though light blue sticky boards were not suitable for thrips control in onion, but they were useful for monitoring [1]. reported that yellow sticky traps were placed at three heights (50, 100 and 150 cm) in greenhouses of three districts, Al-Hasa, Qatif, and Riyadh. The data showed that the mean number of whitefly adults captured per yellow sticky trap placed at the three heights in May was higher in Qatif followed by Al-Hasa and Riyadh districts. The mean number of whiteflies/trap captured on sticky traps was also more than thrips in the respective districts. The whiteflies population was abundant in the three districts when compared with that of thrips. The variation of whiteflies and/or thrips population densities at different heights of sticky traps in different districts might be due to the natural flying ability affecting their migration due to climatic conditions. From the study it is concluded that, irrespective of the colours 30 cm, 60 cm and 90 cm trap heights were suitable for recording more number of thrips at 15 – 30 DAS, 45 – 60 DAS and 75 - 90 DAS, respectively.

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