

MONITORING OF COTTON WHITEFLY, *Bemisia Tabaci* GENN. WITH STICKY TRAPS¹

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ABSTRACT

Rectangular yellow sticky trap was most effective for monitoring the adult whitefly, *Bemisia tabaci* Genn. in cotton. Stick-gum (poly-isobutane) and castor oil were effective in trapping the attracted adults. Increasing the trap height was effective with the plant growth. The traps facing the sky and placed horizontally either inside or adjacent to the cotton field attracted more whiteflies. It was established that yellow sticky traps can be used for predicting the incidence of whitefly. A positive correlation was observed between trap catches and number of eggs in the field.

KEY WORDS : Cotton whitefly, Sticky trap.

Monitoring of the population of pests paves a way to understand the fluctuations in a particular ecosystem. Chromotropism of whiteflies (both sexes) was recorded by Lloyd (1921). Mound (1962) found that *B. tabaci* is attracted by blue-ultra violet and yellow part of the light spectrum but had no easily detectable olfactory reactions. It was suggested that partial check of this pest might be received by coloured traps (Webb and Smith, 1980; Patti and Rapisarda, 1981 and Sharaf, 1982). However, informations on the utility of traps, influence of colour, shape (model), sticky media, height and direction of trap are scarce. Hence studies to explore the possibility of enhancing the monitoring efficiency of sticky traps *vis-a-vis* types of traps were made at Regional Agricultural Research Station, Lam, Guntur.

MATERIALS AND METHODS

Traps made of G.I. sheet of 20 x 15 cm diameter fixed on a wooden stick in the centre were coated with different colours (Table 1), replicated thrice and were arranged in cotton

field at a constant height of 0.9m. The traps were coated at weekly intervals with poly-isobutane³, a sticky substance. The population of whitefly was recorded daily at morning hours during March to May in Rabi Cotton and August-October in Kharif cotton.

Traps with contrasting shapes (Table 2) were evaluated. Yellow colour was coated uniformly on these traps of different shapes and fixed in a cotton field at a constant height of 0.9 m. Stick gum (polyisobutane) was smeared at weekly intervals.

Five sticky substances *viz.*, castor oil, paraffin liquid, grease, white vaseline and stick gum were evaluated for their effectiveness in trapping the adults and also for their persistence of sticky nature. The colour and height as mentioned earlier were kept constant.

A barrel made up of G.I. sheet wrapped with an yellow coloured sheet scaled from 0.0 to 2.1 m was erected in the centre of the cotton field. The yellow sheet was smeared with stick gum at weekly interval and fly catches on the barrel at different heights were

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separately recorded. Simultaneously the heights of the crop was also recorded for correlating the catches at different regions of the trap with the height of the plant canopy.

Yellow traps were erected in different directions both inside and outside the cotton field at a constant height of 0.9 m. Trapped insects were recorded at weekly interval and stickgum was smeared after each recording.

With a view to study the validity of the identified monitoring method, the trap catches recorded in varied cotton cultures of contrasting characters during Kharif season were corre-

lated with the field incidence of whitefly viz., adults/leaf; nymphs and eggs/cm².

The data collected in all the experiments were statistically analysed.

RESULTS AND DISCUSSION

Yellow colour of the trap was significantly superior over five other colours and four colour combinations with maximum trap catches of 11.83 and 75.59/day/trap during Rabi and Kharif seasons respectively. This was followed by yellow + white (50 : 50) combination and black colour was ineffective in attracting whiteflies (Table 1).

Table 1. Catches of whitefly adults in coloured traps

Trap colour	Mean daily catches during	
	Rabi (March-May)	Kharif (August-October)
Yellow	11.83 (3.48)	75.59 (8.14)*
Red	0.01 (0.67)	1.57 (1.40)
Green	1.01 (1.18)	5.92 (2.44)
White	0.07 (0.74)	1.81 (1.44)
Blue	0.04 (0.73)	1.86 (1.42)
Black	0.00 (0.71)	0.42 (0.93)
Yellow + red (50 : 50)	4.63 (2.22)	12.22 (3.44)
Yellow + Green (50 : 50)	5.50 (2.41)	18.88 (4.24)
Yellow + White (50 : 50)	6.90 (2.69)	22.39 (4.56)
Yellow + Blue (50 : 50)	2.31 (1.77)	5.30 (2.35)
Mean	3.23 (1.66)	14.59 (3.04)
C D (0.05)	0.237	0.347

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

The effectiveness of yellow traps in monitoring whiteflies and other insects were reported by Bateman (1976), Hart *et al.* (1978), Melamed Madjar *et al.* (1979) and Meyerdirk *et al.* (1986).

The trap with rectangular shape was found most efficient, recording the highest number of 24 adults/day/trap (Table 2). The

work of Byrne *et al.* (1986) and Youngman *et al.* (1986) revealed that cylindrical traps caught more flies than other designs. However, the work of Meyerdirk *et al.* (1986) is in agreement in that the traps with more horizontal surface attracted more flies.

It was found that stick gum (poly-isobutane) retained its stickiness for 12 days and

Table 2. Influence of shape of trap on mean daily catches of whitefly

Trap shape	No. of adults/trap/day				Mean
	June	July	August	September	
Round plate	12.48 (3.59)	17.18 (4.19)	24.58 (4.99)	33.18 (5.80)	21.9 (4.6)*
Rectangular sheet	13.50 (3.72)	19.68 (4.49)	29.00 (5.42)	29.00 (5.42)	24.0 (4.9)
Wooden plank	9.53 (3.16)	14.28 (3.84)	16.38 (4.09)	20.68 (4.60)	15.2 (3.9)
Horizontal cross	7.33 (2.79)	13.15 (3.68)	15.13 (3.94)	16.08 (4.06)	12.9 (3.6)
Box with rectangular sides	9.73 (3.20)	13.10 (3.68)	17.28 (4.21)	21.45 (4.68)	15.4 (3.9)
Plastic dome	4.83 (2.30)	8.80 (3.04)	10.95 (3.32)	13.08 (3.67)	9.4 (3.1)
Round bottle	8.75 (3.04)	11.08 (3.39)	20.68 (4.59)	21.53 (4.66)	15.5 (3.9)
Mean	9.50 (3.1)	13.90 (3.8)	19.1 (4.4)	22.8 (4.8)	
C D (0.05)	Period 0.226		Shape 0.258		Interaction Not significant

* Figures in parentheses are means of $\sqrt{x+0.5}$ values

effective in trapping the adults; it was followed by castor oil. However, it required replenishment at an interval of five days. The other sticky media tried i.e., paraffin liquid/grease/white vaseline were less effective in trapping the whiteflies besides their lack of persistence (Fig.1).

Up to 30 days after sowing the optimum height of the trap was 0.3 m (9.2 flies/day/trap) and thereafter upto 90 days 0.6 m height was appropriate (32.6 flies/day/trap). Beyond

90 days, traps at a height of 0.9 m (Table 3) attracted more adults (81.5/trap/day). Locating the trap above the canopy was found to be effective by Sharaf (1982) and Melamed Madjar *et al.* (1982). However, Gerling and Horowitz (1984) found that traps fixed at ground level were more attractive.

The traps erected inside the cotton field attracted 73 flies/trap as compared to 61.4/trap in the traps fixed adjoining the cotton field. The traps arranged horizontally facing the sky

Table 3. Influence of trap height on catches of whitefly (July-October '86)

Height Trap (m) \ Crop (m)	Mean daily catches/trap				Mean
	0.5 (45 DAS)	0.7 (60 DAS)	1.1 (75 DAS)	1.2 (90 DAS)	
0.3	9.23 (3.12)	21.67 (4.62)	20.63 (4.59)	40.70 (6.41)	23.06 (4.7)
0.6	3.97 (2.08)	25.27 (5.06)	32.60 (5.72)	57.83 (7.63)	29.92 (5.1)
0.9	1.20 (1.29)	13.80 (3.77)	23.07 (4.82)	81.53 (9.04)	29.90 (4.7)
1.2	0.10 (0.78)	11.27 (3.42)	15.63 (4.01)	52.20 (7.26)	29.80 (3.9)
1.5	0.03 (0.71)	5.90 (2.47)	9.50 (3.15)	32.23 (5.72)	11.91 (3.0)
1.8	0.03 (0.71)	2.13 (1.61)	4.40 (2.54)	22.13 (4.75)	7.17 (2.4)
2.1	0.03 (0.71)	0.37 (0.90)	1.97 (1.56)	9.77 (3.20)	3.20 (1.6)
Mean	2.07 (1.4)	11.49 (3.1)	15.4 (3.8)	42.34 (6.3)	
Crop (0.05)	Crop height 0.626		Trap height 0.476	Interaction 0.952	

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

Table 4. Influence of trap direction on catches of whitefly

Trap Direction	Mean number of whitefly catches / trap /day							
	Rabi				Kharif			
	Inside crop		Adjoining cropped field		Inside crop		Adjoining cropped field	
East	7.97	(2.90)	8.23	(2.95)	62.27	(7.86)	98.65	(9.95)
North east	8.17	(2.93)	17.03	(4.18)	77.07	(8.80)	65.43	(8.11)
North	7.23	(2.74)	15.13	(3.35)	83.43	(9.10)	56.20	(7.52)
North west	8.96	(3.08)	7.57	(2.83)	76.97	(8.98)	47.76	(6.92)
West	5.30	(2.40)	6.63	(2.64)	73.27	(8.56)	57.27	(7.59)
South west	9.30	(3.12)	11.43	(3.44)	96.13	(8.81)	50.40	(7.11)
South	8.53	(2.99)	7.80	(2.87)	67.87	(8.26)	40.23	(6.33)
South east	4.70	(2.26)	5.57	(2.46)	61.47	(7.87)	43.27	(6.60)
Skyward	15.90	(4.05)	12.80	(3.65)	127.33	(11.86)	148.80	(12.08)
Ground direction	0.70	(1.08)	0.13	(0.79)	4.23	(2.14)	8.10	(2.92)
Mean	7.68	(2.76)	9.23	(3.10)	73.0	(8.24)	61.42	(7.51)
C.D (0.05)	Spot NS	Direction 0.354	Int. NS	Spot NS	Direction 0.805		Int. Ns	

* Figures in parentheses are means of $\sqrt{x+0.5}$ values
NS = Not significant

were most attractive (127.3/trap). The traps erected with surface facing the ground was least effective (Table 4). The present findings agree with that of Melamed Madjar *et al.* (1982). Similarly, observations on the location of traps confirm the findings of Gerling and Horowitz (1984) and Youngman *et al.* (1986).

The whitefly catch in the traps progressively increased as the season advanced in proportion to the increase in the incidence of different stages of whitefly in the field. The trap catches reached the peak level of 3504/week/trap during November more or less a little ahead when the highest field incidence of 11.2 adults/leaf and 8.3 eggs/cm² in the third week of November and 6.4 nymphs/cm² during the succeeding week. The earlier

increase in the traps is an indication that the movement of whitefly precedes settling down and multiplication in the cotton field. A correlation coefficient (*r*) of 0.7275 and 0.6932 were recorded for egg stage and adults/leaf respectively with the trap catch of adults.

This shows that the catch in the trap can be taken as a reliable tool for predicting the intensity of the whitefly attack at any given time (Fig. 2). According to Musuna (1986) the field incidence can be assessed accurately for monitoring whiteflies by the levels of the catch recorded in yellow sticky traps. The advantage of the yellow sticky trap for timing of insecticidal spray for effective control brought out in the present studies was also indicated by the earlier studies of Melamed

Madjar *et al.* (1982), wherein existence of different correlation between trap catches and egg laying followed by adult and nymphal populations was reported.

Hence, it is inferred that rectangular yellow sticky traps smeared with poly-iso-butane (stick gum) fixed at suitable heights depending on the growth of the crop with face turned towards sky is highly efficient and reliable for monitoring adult movement in the cotton eco-systems. It is concluded that the trap catches could be suitably interpreted to estimate pest population and insecticides applied for effective control of the pest.

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FIG : 1. PERSISTANCE OF STICKY MEDIA OF TRAP ON WHITEFLY CATCH

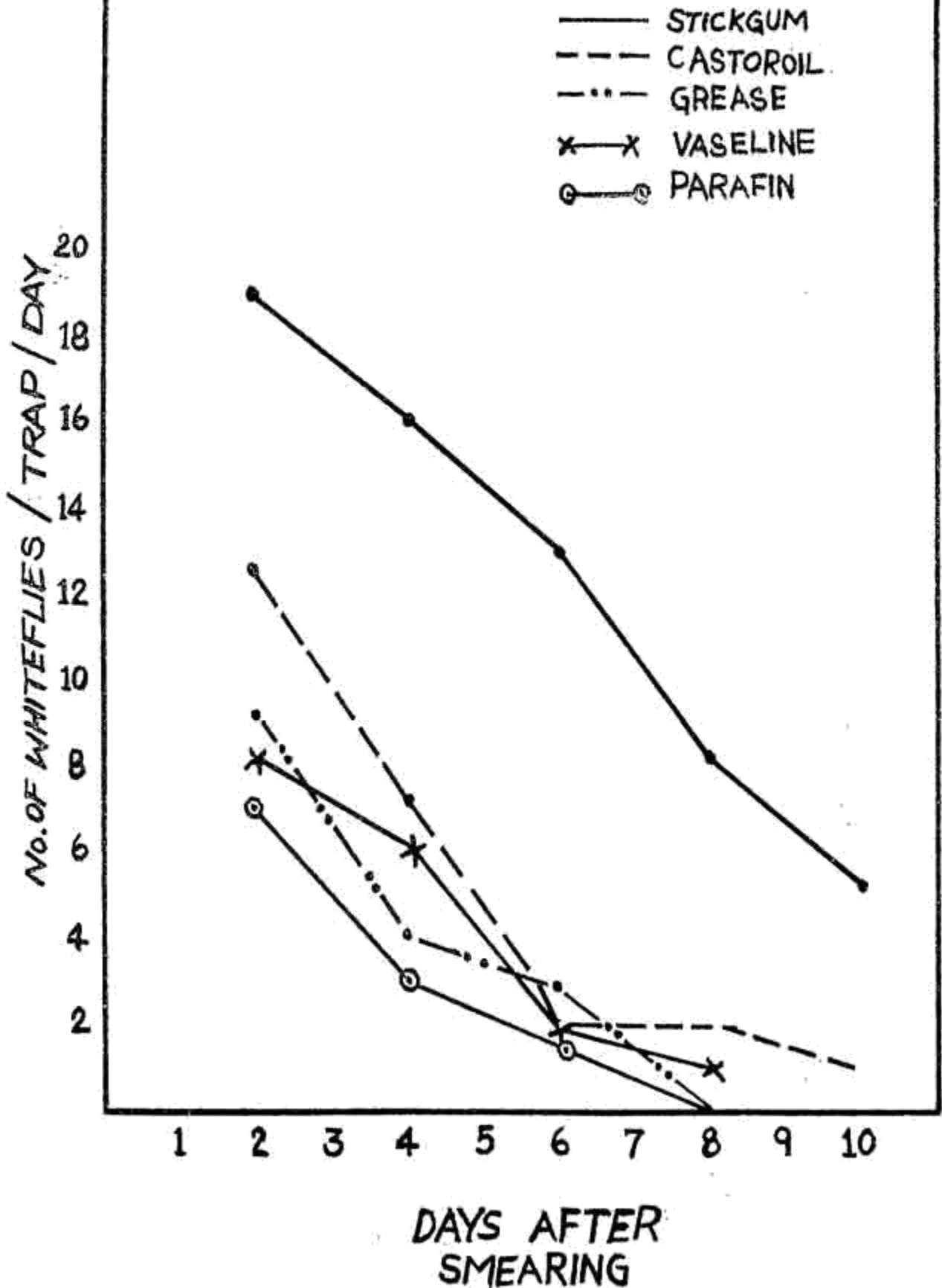


FIG : 2. YELLOW TRAP CATCHES IN COMPARISON WITH FIELD INCIDENCE OF WHITEFLY

