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MONITORING OF VARIOUS TRAPS AGAINST INSECT PESTS OF CUCUMBER (*CUCUMIS SATIVUS* L.) UNDER PROTECTED CULTIVATION

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ABSTRACT

An experiment was conducted in polyhouse to evaluate the efficacy of various traps *viz.* yellow sticky trap (YST), blue sticky trap (BST), yellow pan trap (YPT) and blue pan trap (BPT) to trap populations of whiteflies, thrips and leaf miners infesting cucumber. The whiteflies, leaf miners and thrips were captured in the different traps from first week of August (30th SMW) through the last week of September (37th SMW) and their mean numbers per plant on YST were 112.20, on BST 85.00, on YPT 18.20 and on BPT 13.20.The quantum of leaf miners trapped were 12.65 on YST and 3.85 on BST; and 15.67 and 6.97 caught on BST and YST for thrips. Leaf miner and thrips were not trapped in YPT and BPT.

Key words: Whitefly, leaf miner, thrips, cucumber, traps and sucking pests.

INTRODUCTION

Cucumber (*Cucumis sativus* L. Family: Cucurbitaceae) is a popular and widely grown vegetable all over the country. It is reported to have originated in India. It is one of the quickest maturing vine vegetable crops and is the second most widely cultivated cucurbit after watermelon. Cucumber is grown in an area of 74, 000 hectares with the production of 1142, 000 metric tons (Anon., 2017). Nutritively, 100 g of edible portion of cucumber contains 96.3 g moisture, 2.5 g carbohydrates, 0.4 g protein, 0.1 g fat, 0.3 g minerals, 10 mg calcium, 0.4 g fiber and traces of vitamin C and iron. The protected vegetable cultivation technology can be utilized for year-round production of high quality vegetable crops, with higher yield. Increasing photosynthetic efficiency and reduction in transpiration loss are added advantages of protected cultivation. Crops under protected cultivation are free from adverse environmental conditions (Sood *et al*., 2015). In India, about twenty insect and mite species have been recorded to be associated with the crops under protected cultivation (Sood *et al*., 2006). Thrips, whitefly, leaf miner, aphids, gall midge, mites and nematodes are serious problems on vegetable crops under protected cultivation. Among all the sucking pests attacking cucumber, whitefly, leaf miner and thrips are the dominant pests. It is well known that insects are differentially attracted to coloured surfaces; particularly, yellow is known as a general insect attractant. This feature has been exploited by entomologists for collection of Coleoptera, Cicadellidae, aphids, Hymenoptera and Thysanoptera (Riley & Schuster, 1994).The use of sticky traps for population monitoring in commercial greenhouse cultures was introduced, recommendations were blue for monitoring thrips and yellow for whitefly/ alate aphids and other insects. In practice, however, most often yellow sticky traps are used whereby the lower efficiency in monitoring of thrips is generally not considered affecting control decisions (Loomans *et al.,* 1999) also other pests may be monitored simultaneously.

MATERIALS AND METHODS

Experiment on cucumber crop variety Terminator was carried out at the High-tech Unit of Department of Horticulture, Rajasthan College of Agriculture, MPUAT, Udaipur during *kharif* 2017, have been summarized and detailed as under:

The treatments comprised the following traps: yellow sticky trap; blue sticky trap; yellow pan trap; and the blue pan trap. The sticky traps were made of art paper smeared with sticky glue. During the experiment traps were fixed about 140cm above ground level. The length of blue and yellow sticky traps were 35.56cm and 36.83cm and width 24.13cm and 24.13cm, respectively. Observations were taken at weekly interval during morning hours from 7.00 to 9.00 AM. The number of insects per trap was counted using hand held magnifying lens and were replaced every week. Thrips, whiteflies

and leaf miner adults were caught on the cards. Whitefly catch tended to be uniform, but thrips were caught on the bottom half of the cards. One-inch-wide vertical column in the center of each card to estimate the total numbers of insects caught. Cards were placed just above the crop canopy to trap insects more effectively.

RESULTS AND DISCUSSION

Whitefly:

The data presented in Table (1) reveal that the incidence of whitefly was observed from first week of August (30th SMW) which were captured in various traps. The activity of whitefly was observed to be maximum during last week of September (37th SMW) in 2017. From the present study, it may be concluded that Yellow Sticky Traps were most attractive to the adult whiteflies. The maximum mean number of whiteflies recorded on YST was 112.20 followed by Blue Sticky Traps which had 85 mean number of whitefly per trap. Yellow Pan Traps recorded 18.20 mean numbers of adult whiteflies while the lowest mean population of whiteflies was recorded on Blue Pan Traps (13.20). YPT and BPT remained statistically at par with each other. Earlier Lu et al. (2012) asserted that in the greenhouse, yellow sticky traps significantly suppressed the population increase of adult and immature whiteflies, *Bemisia tabaci* (Gennadius) and suggested that yellow sticky traps could be used as an effective method for the control of whiteflies in the greenhouse. Wagan *et al.* (2017) observed that yellow sticky traps were most effective for monitoring and managing whiteflies and thrips in okra. Bayisa *et al.* (2017) found that higher numbers of whiteflies and thrips were attracted by lavender oil and basil oil coated yellow sticky traps, respectively. While Premalatha *et al.* (2011) observed that yellow chart coated with castor oil harbored more whiteflies than on yellow sticky traps; therefore, using yellow sticky traps with natural essential oils contributed in the pest management of whiteflies.

Table1. Efficiency of various traps against whitefly during, 2017

Treatment	Mean population
YST	112.20
BST	85.00
YPT	18.20
BPT	13.20
S.Em±	1.859
C.D.(P=0.05)	5.573

Thrips:

The data presented in Table (2) show that after installation of traps; significantly higher numbers of thrips were trapped on BST as compared to that on YST, YPT and BPT. The maximum mean number of thrips was 15.67 captured on BST followed by 6.97 mean number of thrips trapped on YST while no thrips were trapped on YPT and BPT, indicating that blue colour was the best for thrips, while yellow was less attractive. The pan traps were not effective for trapping thrips as no thrips were trapped in the pan traps. Similar findings were noted by Sridhar *et al.* (2015) who evaluated different colour sticky traps for the purpose of monitoring chilli thrips, *Scirtothrips dorsalis* Hood on Rose both under open field and protected conditions. Among the colour traps used, blue colour attracted highest number of *S. dorsalis* adults followed by yellow and pink. Similarly, Kaas *et al*. (2005) observed that blue sticky trap was significantly more attractive to thrips than yellow in one of two tests. Gillespie *et al*. (2014) observed that at 2.4m height, blue traps captured more females than other colors, and yellow captured more males of western flower thrips, *Frankliniella occidentalis.* The efficiency of blue sticky traps used in our trials was in conformity with the findings of Devi *et al*. (2017), who observed that blue coloured sticky trap attracted more number of thrips over the crop growth period than white, yellow and fluorescent green sticky traps. Sampson *et al*. (2013) revealed that in semi-protected strawberry crops, mass trapping of *F. occidentalis* using blue sticky roller traps reduced the number of adult thrips per flower by 61 per cent and fruit bronzing by 55 per cent. Muthuram *et al*. (2017) used five different coloured sticky boards *viz*. green, yellow, orange, violet and white for testing their efficiency against thrips and found that green coloured sticky boards were most effective in attracting *T. tabaci* than other boards. Hassan *et al*. (2004) also carried out a greenhouse experiment to evaluate the trapping efficiency of various coloured traps in cucumber (*Cucumis sativus* L.) against thrips, *Thrips tabaci* (Lindeman) and the leaf miner *Liriomyza trifolii* (Burgess) and recorded significantly more insect pests on fluorescent yellow as compared to other traps whereas, pink, green and orange colored traps caught significantly lower number of insects and were found statistically at par.

Table 2. Efficiency of various traps against thrips during, 2017

SMW	Mean population	
	YST	BST
02-Aug	0.2	7.6
09-Aug	0.4	8.6
16-Aug	1.8	9.8
23-Aug	5.4	12.6
30-Aug	7.8	16.6
06-Sep	10.2	20.6
13-Sep	13.4	23.8
20-Sep	16.6	25.8
Mean	6.97	15.67
t-cal.	|-2.62|*	
T	2.33	

* Significant at 5 per cent level of significance

Leaf miner:

The data presented in Table (3) show that the incidence of leaf miner was first noticed during the first week of August (30th SMW) while peak incidence was observed during third week of September (37th SMW) on YST. YST was more effective for trapping leaf miner population and BST was least affective with 12.65 and 3.85 total mean number of leaf miner adults trapped, respectively. No leaf miner was trapped in BPT and YPT. The timing of peak activity of different insect pests appearing on cucumber crop differs depending on crop cultivation under protected condition or field condition and the region where it is being cultivated. Similar to our findings, Perdikis *et al.* (2008) observed that greenhouse crops were susceptible to infestation by a number of insect pests and the most important of these pests are whiteflies, leaf-miner and thrips. Similarly, Maklad *et al.* (2012) stated that the population of aphids, whitefly, spider mites and thrips in cucumber were maximum under polythene sheet. Kaur *et al.* (2010) observed that leaf miner incidence was considerably low, whitefly incidence was noticed early during the season and thrips (*Scirtothrips dorsalis* Hood) were serious pests on cucumber. Shalaby *et al.* (2013) also reported that the infestation by *B. tabaci* started early on the crop.

Table 3. Efficiency of various traps against leaf miner during, 2017

SMW	Mean population	
	YST	BST
02-Aug	4.2	0
09-Aug	6.8	1.4
16-Aug	9.6	1.8
23-Aug	10.8	2.6
30-Aug	13.4	3.8
06-Sep	15.4	5.2
13-Sep	18.6	6.4
20-Sep	22.4	9.6
Mean	12.65	3.85
t-cal.	3.49*	
T	2.41	

* Significant at 5 per cent level of significance

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