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EFFECTIVENESS OF DIFFERENT TRAPS IN MANAGING INSECT PESTS OF TOMATO (*SOLANUM LYCOPERSICUM*) UNDER PROTECTED CULTIVATION.

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ABSTRACT

The experiment on effectiveness of different traps in managing insect pests of tomato (*Solanum lycopersicum*) under protected cultivation were carried out in polyhouse at the High-tech Unit of Department of Horticulture, Rajasthan College of Agriculture, MPUAT, Udaipur in 2018. Four traps as YST (Yellow sticky traps), BST (Blue sticky traps), YPT (Yellow pan trap) and BPT (Blue pan trap) were used. Traps are used as one of the effective IPM strategy for monitoring different types of insects. It provides an easy method for evaluation of pest population density which requires less skilled labour, cheaper than the use of chemicals and proved as an eco-friendly strategy. The results showed that YST was most attractive color, followed by BST, YPT and BPT against whitefly, *Bemisa tabaci* while YST proved most attractive followed by BST against leafminer, *Tuta absoluta* population density.

Key words: Traps, IPM, monitoring, eco-friendly

INTRODUCTION

Tomato is most popular vegetable crop and extensively grown all over the world. It is grown in open field and cultivated in warmer month where as under protected cultivation can be cultivated round the year. India contributes 6% of tomato production and ranked fifth in world, whereas tomato is the third highest producing crop having 8.5% share of total vegetable production (Singh, 2015). Protected cultivation protects crop from unfavourable and adverse environmental conditions The main principle of protected cultivation is to create a favourable and congenial environment to recognize its maximum potential even in adverse or harsh climatic conditions. Traps are used as one of the effective IPM strategy for monitoring different types of insects. It provide an easy method for evaluation of pest population density which requires less skilled labour, cheaper than the use of chemicals and proved as an eco-friendly strategy (Bashir *et al.*, 2014). Keeping in view the importance of traps, an experiment was conduteed to study the effectiveness against insect pests. A great diversity of insects were observed, out of which whitefly, *Bemisia tabaci* and Leafminer, *Tuta absoluta* observed as major pest under cover condition.

MATERIALS AND METHODS

Location of the experimental site: The experimental site was located in polyhouse at the High-tech Unit of Department of Horticulture farm, RCA, Udaipur. Geographically, Udaipur is located at 75.4^{0}E Latitude and 23.4^{0}N Longitude at an altitude of 582.17 Mean Sea Level in the sub-humid southern end of Aravalli Range in Zone IV (a), Rajasthan.

Experimental details: The experiment was carried out in a completely randomized design (CRD) with four replications in plot size 7.0x1.0 m^2 with row to row and plant to plant spacing of 50x45 cm^2. The seedlings of tomato were transplanted during first week of July, 2018. Traps were also fixed about 130 cm above ground level. Observations were recorded at interval of 7 days. The number of insects per trap were counted using 10x hand magnifying lens and all traps were replaced every week to avoid the glue material to dry up.

Observations: Whiteflies: The data was taken by counting the number of insects caught on traps, with the help of 10x magnifying hand held lens. Traps were also replaced every week to avoid the glue material to dry up.

Leaf miners: Population was estimated at an interval of 7 days by counting the number of insects caught on traps. Traps were also replaced to avoid the glue material to dry up.

Statistical analysis: The mean population/ trap of insect pest population in the different treatments were square root transformed and were then subjected to the analysis of variance (ANOVA). Population of the non- flying pests

was recorded and further standard deviation was calculated.

Pan traps are primarily used to capture micro Hymenopterans and other small insects, hence are not suitable for leaf miners. For comparison between traps (YST and BST), the mean population of leafminers/ trap were subjected to the test of significance using two sample t test

$$t = \frac{X_1 - X_2}{S} \times \sqrt{\frac{n_1 n_2}{n_1 + n_2}} \sim t_{n-2} d.f.$$

X_1 = mean of first sample

X_2 = mean of second sample

n_1 = number of observations in first sample.

n_2 = number of observations in second sample.

S = combined standard deviation

$t_{n-2} d.f$ = table value for n-2 degrees of freedom

The value of combined standard deviation S is calculated using the formula

$$S = \sqrt{\frac{(X_1 - \bar{X}_1)^2 + (X_2 - \bar{X}_2)^2}{n_1 + n_2 - 2}}$$

RESULTS AND DISCUSSION

The data presented in table 1 depicted that mean population of white fly trapped in different traps from second week of August (32th SMW) to last week of September (39th SMW) in 2018. The Yellow Sticky Traps proved most attractive towards adult whiteflies. The maximum mean number of whiteflies recorded on YST were 109.25 followed by Blue Sticky Traps with 55.25 mean number of whiteflies per trap. Yellow Pan Traps recorded 16.50 mean number of adult whiteflies while the least mean population of whiteflies were observed on Blue Pan Traps (11.75). YPT and BPT was observed statistically at par with each other. Similar findings were observed by Premalatha and rajangam (2011) who recorded that yellow chart impregnated with castor oil captured more no. of whiteflies than on yellow sticky traps therefore they advised use of yellow sticky traps with natural oils for the management of whiteflies. Lu *et al.* (2012) observed that in the greenhouse, YST significantly reduced the population increment of whitefly *Bemisia tabaci* (Hemiptera: Aleyrodidae) and proposed that YST could be used as an efficacious practice to check the whiteflies in the greenhouse. Shalaby *et al.* (2013) observed that the infestation of whitefly, *Bemisia tabaci* started during early stage of the crop.

Table 1. Effectiveness of various traps against whitefly, *Bemisia tabaci* infesting tomato under protected cultivation, 2018

Treatments	Mean population/ trap
YST	109.25 (13.23)
BST	55.25 (9.50)
YPT	17.00 (5.40)
BPT	11.75 (4.47)
S.Em	1.69
C.D. (0.05)	5.31
Fcal	5.68
Ftab (5%)	3.49

Note: Values in parenthesis are sqr (x + 0.5) transformed value

The data mentioned in table 2 reveal that the incidence of leaf miner, *Tuta absoluta* was first recorded during the 32th SMW on YST (Yellow Sticky Trap) and BST (Blue Sticky Trap) with the occurrence of mean count of 3.5 and 1.25 leaf miners per trap, while the maximum incidence was recorded during the 39th SMW on YST and BST being 11.25 and 3.00 mean count of leaf miners, respectively. YST was more effective while BST proved least effective with 7.09 and 2.25 mean population of leaf miner adults trapped respectively. Our results are similar with Bayisa *et al.* (2017) who recorded yellow sticky traps impregnated with castor oil, lavender oil and lemon oil attract more number of leaf miners.

Table 2. Comparison of traps against leafminer under protected cultivation, 2018

SMW	Mean population/ trap	
	Tuta absoluta	
	YST	BST
06-Aug(32)	3.50	1.25
13-Aug(33)	4.50	1.75
20-Aug(34)	5.50	1.75
27-Aug(35)	6.75	2.25
03-Sep (36)	7.00	2.50
10-Sep (37)	8.75	2.75
17-Sep (38)	9.50	2.75
24-Sep (39)	11.25	3.00
Mean	7.09	2.25
t-cal	2.21*	
t-tab (5%)	2.14	

CONCLUSION

The YST proved to be most attractive towards adult whiteflies. The maximum mean number of whitefly recorded

on YST was 109.25 while the minimum mean population of whitefly was observed on Blue Pan Traps (11.75). In case of leaf miner, YST proved more attractive with 11.25 maximum mean population per trap while BST was least effective with 3.00 mean population per trap.

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