Efficacy of yellow sticky traps against greenhouse whitefly, *Trialeurodes vaporariorum* (Westwood) (Aleyrodidae: Hemiptera) in gerbera

K. Premalatha and J. Rajangam

ABSTRACT

In vegetables and flower crops, greenhouse whitefly, *Trialeurodes vaporariorum* (Westwood) is an important pest which damages the crop drastically. Development of alternative methods for the management of agriculturally important pests is needed due to the adverse effect of pesticides to human health and environment. The main objective of the present study is to test the efficacy of yellow sticky traps and yellow charts coated with castor oil by which manages the pest effectively. The number of whitefly adults attracted towards yellow sticky trap was compared with conventional method *ie*, tieing of yellow charts coated with castor oil. The experimental results revealed that irrespective of the varieties, yellow chart coated with castor oil caught whiteflies more than the yellow sticky trap. Marginal benefit cost ratio (MBCR) was also higher in the treatment of yellow charts coated with castor oil whereas MBCR of yellow sticky traps was only 0.88.

Key words: *Trialeurodes vaporariorum*, yellow sticky trap, yellow charts coated with castor oil, gerbera varieties.

INTRODUCTION

Whiteflies are tiny, sap sucking insects that are frequently abundant in vegetable and flower crops and cause severe economic loss worldwide (Byrne *et al.,* 1990). They excrete sticky honey dew and cause yellowing or death of leaves. Outbreaks often occur when the natural biological control is disrupted. Economic losses caused by silverleaf whitefly, *Bemisia argentifolii*, Bellows and Perring have touched one billion dollars (Birdsall *et al.,* 1995) in the imperial valley of California. Whiteflies are becoming a very serious menace and have shown resistance to synthetic insecticides since early 1980s.

The various whitefly species and biotypes look very much alike, but they have physiological differences. These differences can cause them to respond differently to control strategies. Sticky traps have been widely used to monitor flying insects in many agro-ecosystems especially for monitoring whitefly, thrips and leafhopper and are the most preferable method for the management of some insects. The traps, if they are cost effective, will be economical as well as environmentally safe. So the present study was carried out to investigate the effective and economical method of trapping for the management of whitefly. Moreau and Isman (2011) tried trap crops and yellow sticky trap for the management of *Trialeurodes vaporariorum* under screen house.

MATERIALS AND METHODS

The investigation was conducted in 250m^2 polyhouse at Horticultural Research Station, Kodaikanal. Sixteen varieties were planted in sixteen beds with a bed length of 9.0 m. each. Yellow sticky traps (triangular shape with sticky card inside) were placed horizontally at a height of 25.0 cm. Yellow charts were cut into pieces of 18x18 cm^2 and uniformly coated with a thin layer of castor oil on both sides. The cards were suspended on a wooden rod at a height of 25.0 cm vertically. Yellow sticky traps and yellow charts were placed in every varietal block @ 2 per replication. Treatments were replicated thrice in a completely randomized design along with untreated check.

Observation was made on the number of whiteflies on the sticky card and yellow chart on third, fifth, seventh and fifteenth days after initial installation of traps. After each count sticky cards and yellow charts were changed by new cards and charts. No insecticides were used throughout the sampling period. A standard drip system was used for irrigation and fertilization. Temperatures ranged from 23±2 C during day to 20±2 C at night, with a mean relative humidity fluctuating between 60±5 % during day and 76±5 % at night in summer. The data were subjected to analysis of variance and means were separated by Duncan's multiple range test. Comparison of data on trap catches was done using AGRES,

AGDATA package. Daily flower yield from each varietal bed was also recorded and the Marginal Benefit Cost Ratio (MBCR) for each treatment was also calculated by using the formula followed by Altaf Hossain (2007).

RESULTS AND DISCUSSION

The data collected from the field experiment were presented in Table 1. From the table it was observed that on third day after treatment yellow chart coated with castor oil coat attracted more number of whitefly adults (220.00) in the variety Cassiana, whereas yellow sticky trap attracted only 19.00 adults in the same variety. The same trend was observed on 5, 7 and 15 DAT (Days After Treatment). Next to Cassiana, more number of adults was attracted in the variety Flavia (186.00) on yellow charts, whereas yellow sticky trap catch was only 18.67. Irrespective of the varieties yellow chart coated with castor oil attracted more number of whiteflies than yellow sticky trap. The difference in trap catches may be due to the position (horizontal/vertical) of traps (Ibrahim Gencsoylu, 2007). Throughout the study period, the varieties Dalma, Dana Ellen and Goliath recorded very low catches on yellow chart with castor oil coat. It may be due to low incidence of whitefly populations in these varieties due to the tolerant nature of these varieties (Oliver Berndt and Rainer Meyhofer, 2008)

The cost of yellow chart coated with castor oil was only Rs. 940 whereas the cost of yellow sticky traps were Rs. 7116 during the study period. The flower yield was also more in the beds with yellow chart coated with castor oil (15,680 flowers) than in the beds with yellow sticky traps (8,960 flowers). The MBCR of yellow sticky trap and yellow charts coated with castor oil indicated that the yellow chart coated with castor oil is more cost effective and easily available method to control economically important whitefly pest in greenhouses. If the initial population is low, yellow chart with castor oil coat will definitely play an important role in the reduction of whitefly population. Two cards (18 cm^2 size) per meter length of bed is enough for controlling whitefly population. This is the preliminary study and further research is needed to determine the efficacy of yellow charts coated with castor oil. We also recommend the use of plastic boards which are reusable.

Table 1. Efficacy of yellow sticky trap for the management of greenhouse whitefly in gerbera

S. No	Name of the variety	Mean No. of whiteflies caught on the trap/chart									
		3 DAT		5 DAT		7 DAT		15 DAT		Cumulative mean	
		YST	YC	YST	YC	YST	YC	YST	YC	YST	YC
1	Tecla	14.67^{m}	169.67^{c}	15.33^{m}	136.00^{c}	14.33^{n}	99.33^{c}	15.33^{i}	71.67^{c}	14.92^{o}	119.17^{c}
2	Carocci	11.33^{o}	139.33^{f}	10.67^{c}	119.67^{d}	11.33^{o}	85.67^{ef}	10.67^{n}	64.33^{d}	11.00^{q}	102.25^{f}
3	Noblesse	19.00^{kl}	152.67^{e}	18.67^{jk}	109.33^{d}	18.67^{l}	87.33^{de}	18.67^{ij}	62.67^{d}	18.75^{m}	103.00^{f}
4	Harmony	11.33^{o}	158.67^{d}	10.33^{o}	119.00^{d}	11.33^{o}	89.67^{d}	10.33^{on}	54.33^{e}	10.83^{q}	105.42^{e}
5	Flavia	18.67^{kl}	186.00^{b}	18.67^{jk}	148.33^{b}	18.67^{l}	109.67^{b}	18.67^{ij}	84.00^{b}	18.67^{m}	132.00^{b}
6	Gescom	20.00^{k}	115.00^{g}	19.67^{jk}	98.00^{e}	20.00^{k}	75.33^{g}	19.67^{i}	43.67^{f}	19.83^{l}	83.00^{h}
7	Cassiana	19.00^{kl}	220.00^{a}	18.67^{jk}	191.67^{a}	19.00^{kl}	175.33^{a}	18.67^{ij}	150.67^{a}	18.83^{lm}	184.42^{a}
8	Ambra	18.67^{kl}	94.00^{h}	19.33^{jk}	76.00^{g}	18.33^{lm}	43.33^{i}	19.33^{i}	22.67^{h}	18.92^{lm}	59.00^{i}
9	Redstar	17.33^{k}	76.00^{i}	16.67^{lm}	54.00^{i}	16.67^{m}	32.67^{j}	16.67^{jk}	17.67^{jk}	16.83^{n}	45.08^{k}
10	Dana Ellen	3.33^{r}	12.67^{no}	2.33^{s}	6.33^{qr}	3.67^{s}	4.33^{r}	2.33^{r}	2.00^{r}	2.92^{u}	6.33^{s}
11	Dalma	1.67^{s}	9.00^{p}	0.67^{t}	5.67^{qt}	1.33^{t}	5.67^{q}	1.00^{s}	4.33^{q}	1.17^{v}	6.17^{s}
12	Goliath	5.33^{q}	27.67^{j}	4.67^{r}	17.67^{l}	5.33^{q}	13.67^{n}	5.00^{q}	8.67^{p}	5.08^{t}	16.92^{n}
13	Rosalin	9.00^{p}	93.33^{h}	8.33^{p}	64.67^{h}	9.00^{p}	43.00^{i}	9.33^{p}	25.67^{g}	8.92^{r}	56.67^{j}
14	Quote	13.33^{mn}	144.00^{f}	13.33^{n}	121.33^{d}	13.33^{n}	100.67^{c}	13.67^{n}	83.67^{b}	13.42^{p}	112.42^{d}
15	Salvadare	19.00kl	110.00^{g}	18.67^{jk}	94.00^{f}	18.67^{l}	84.33^{f}	19.00^{ij}	62.33^{d}	18.83^{lm}	87.67^{g}
16	Balance	19.00^{kl}	75.33^{i}	18.67jk	64.67^{h}	18.67^{l}	54.00^{h}	19.67^{i}	43.67^{f}	19.00^{lm}	59.42^{i}
SED		0.1179		0.08803		0.07169		0.08152		0.05807	
CD (.05)		0.2355		0.17586		0.14323		0.16286		0.11600	

YST - Yellow Sticky Trap; YC - Yellow chart castor oil; DAT - Days After Treatment

Based on the whiteflies caught in yellow chart coated with castor oil it was concluded that two numbers of 18cm^2 yellow chart coated with castor oil per sq.m of flower bed can be used for controlling whitefly effectively along with other management practices under greenhouse condition.

REFERENCES

Atlaf Hossain. 2007. Efficacy of some synthetic and biopesticides against pod borer, Helicoverpa armigera (Hubner) in chickpea. *Tropical Agricultural Research and Extension*, **10**: 74-78.

Byrne, D. N., Bellows, T. S. and Parrell, M. P. 1990. Whiteflies in agricultural systems. **In:** *Whiteflies: their bionomics, pest status and management.* (Gerling, D. ed.), Intercept Ltd., UK, 227-261 **PP**.

Birdsall, S.L., Ritter, D. and Cason. P.L. 1995. Economic impact of the silverleaf whitefly in Imperial Valley, California. **In :***Silverleaf whitefly supplement to the 5-year national research and action plan.* (Henneberry, T. J. *et al*. eds.) 162 **P**.

Ibrahim Gencsoylu. 2007. Evaluation of yellow sticky traps on populations of some cotton pests . *American – Eurasion Journal of Agricultural and Environmental Sciences*, **2** (1): 62-67.

Moreau, T. L. and Isman, M. B. 2011. Trapping whiteflies? A comparison of greenhouse whitefly (*Trialeurodes vaporariorum*) responses to trap crops and yellow sticky traps. *Pest Management Science*, **67**: 408–413. doi: 10.1002/ps.2078

Oliver Berndt and Rainer Meyhofer. 2008. Whitefly control in cut gerbera: Is it possible to control *Trialeurodes vaporariorum* with *Encarsia Formosa*? *BioCon* Kim, J.-K., J.-J. Park, H. Park, and K. Cho. 2001. Unbiased estimation of greenhouse whiteßy, Trialeurodes vaporariorum, mean density using yellow sticky trap in cherry tomato greenhouses. Entomol. Exp. Appl. 100: 235Ð243. *trol*, **53**: 751-762.

Malumphy, C., Delaney, M. A., Pye, D. and Quill, J. 2010. Screening sticky traps under low magnification for adult *Bemisia tabaci* (Gennadius), *Trialeurodes vaporariorum* (Westwood) and *Aleyrodes* spp. (Hemiptera: Sternorrhyncha: Aleyrodidae). EPPO Bulletin, 40: 139–146. doi: 10.1111/j.1365-2338.2009.02364.x

K. Premalatha and J. Rajangam
Horticultural Research Station, Kodaikanal 624 103

Received: August 13,2011 Revised: August 25, 2011 Accepted: September15,2011