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Monitoring of whiteflies and thrips on greenhouse cucurbit plants using yellow sticky traps in Al-Hasa district, Saudi Arabia

By

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ABSTRACT

The seasonal abundance of whiteflies *Bemisia* spp. and thrips *Thrips* spp. was monitored on cucurbit plants (cucumber, squash, melon and watermelon) by using yellow sticky traps technique. Sticky traps were placed at three levels above ground surface 50, 100 and 150 cm. Whiteflies showed two peaks of infestation on cucurbit plants, the lowest being reported in June while the highest occurred in September. Sticky traps placed at 100 cm caught more adults of whiteflies, compared to those placed at 50 or 150 cm.For thrips adults three peaks of infestations were observed, the highest one was reported in April and the other two peaks were in September and November. Along the monitoring months, sticky traps placed at 100 cm captured more thrips adults than those placed at 50 or 150 cm. The data revealed that the yellow sticky traps were effective for monitoring whiteflies and thrips flight activities in greenhouses.

Captured insects will reflect the size of their populations and will supply useful information to limit the size of insect problems through their economic threshold and to help in taking the decision to introduce the different control methods.

MATERIALS AND METHODS

Three greenhouses (1000 m^2/each) cultivated with cucurbit plants (cucumber, squash, melon and watermelon) in three different farms in Al-Hasa District, Saudi Arabia were chosen to evaluate the performance of yellow sticky traps for monitoring whiteflies and thrips and to study the seasonal abundance of these insect pests. Yellow sticky traps each 15 X 30 cm^2 were purchased from Gempler's™ Co., USA and placed in the greenhouses for a year starting in November 1999. Six yellow sticky traps were placed in each greenhouse at three different heights (50, 100 and 150 cm) above ground surface. The traps were changed weekly and transferred to the laboratory for inspection and counting the captured whiteflies and thrips adults. A binocular microscope was used to identify insects on the traps. Statistical analysis was done according to (CoHort software, 1986).

RESULTS AND DISCUSSION

Incidence of whiteflies on greenhouse cucurbit plants: The data showed that the mean number of whiteflies captured per yellow sticky trap (15 X 30 cm^2) was low at the beginning of monitoring months from November to March where it reached 27.0, 77.0, 110 and 6.3 adults/trap, when the traps were placed at the height of 50 cm. In the following months the mean number of whiteflies caught per trap increased and reached its

first peak (lowest) in June (1247 adults/trap). The number started to decline afterwards and then rose again to reach the second peak (highest) in September (1577.3 adults/trap), when the traps were placed at the height of 50 cm from the ground surface. The same trend was recorded when the traps were placed at 100 and 150 cm (Table 1 and Fig. 1). The mean number of insects reported at the first peak in June was (1209.5 and 644 adults/trap), while it was (2422.5 and 988.3), adults/trap at the second peak in September when the traps were placed at the height of 100 cm and 150 cm, respectively. These results indicate that the number of captured whiteflies was higher on yellow sticky traps placed at 100 cm when compared with those placed at 50 cm level. The lower number of whifeflies was recorded on the traps placed at 150 cm. The total numbers of whiteflies along the inspection months were (4685.7, 5595.5 and 2989.4 adults/trap) at 50 cm, 100 cm and 150 cm of traps height, respectively (Table 1 and Fig. 1). This might reflect the flight activity and behavior of whiteflies. These results are in agreement with those of Kumawat *et al.* (2000) who reported two peaks of whiteflies on okra. Moreover, Liu (2000) studied the population dynamics of *Bemisia argentifolii* on spring collard and reported that adult whiteflies first appeared on the plant in early April, increased rapidly within a month, peaked in May and declined at the end of the season in mid to late June.

Incidence of thrips on greenhouse cucurbit plants: The obtained results in Table (2) and Figure (2) show that the mean number of thrips captured per yellow sticky trap was very low at the beginning of second and third months of monitoring (December and January). However, the lowest peaks were observed in November and December, while the mean number of thrips declined afterwards until January then increased in February to reach the highest peak in April. The mean number

Table (1). Mean number of whiteflies at different heights of yellow sticky traps placed ingreenhouses cultivated with cucurbit plants.

Month	Mean No. of adults/trap ± SE at different heights		
	50 Cm.	100 Cm.	150 Cm.
November	27.0 ± 7.3	42.8 ± 25.3	56.75 ± 20.4
December	77.0 ± 10.6	26.5 ± 5.6	45.0 ± 11.4
January	110.0 ± 14.5	30.8 ± 9.2	31.0 ± 7.3
February	6.3 ± 2.5	3.0 ± 1.1	3.8 ± 1.5
March	15.8 ± 6.6	5.0 ± 1.6	6.0 ± 1.6
April	38.3 ± 14.4	23.5 ± 7.7	23.0 ± 7.7
May	95.5 ± 52.0	98.0 ± 57.1	81.0 ± 40.4
June	1247.0 ± 718.1	1209.5 ± 781.7	644.0 ± 224.1
July	388.0 ± 115.5	208.8 ± 36.7	321.3 ± 69.4
August	510.5 ± 378.4	537.8 ± 295.1	510.5 ± 390.6
September	1577.3 ± 413.5	2422.5 ± 668.3	988.3 ± 334.3
October	643.3 ± 370.9	959.4 ± 512.6	278.8 ± 124.6
Total	4685.7	5595.5	2989.4

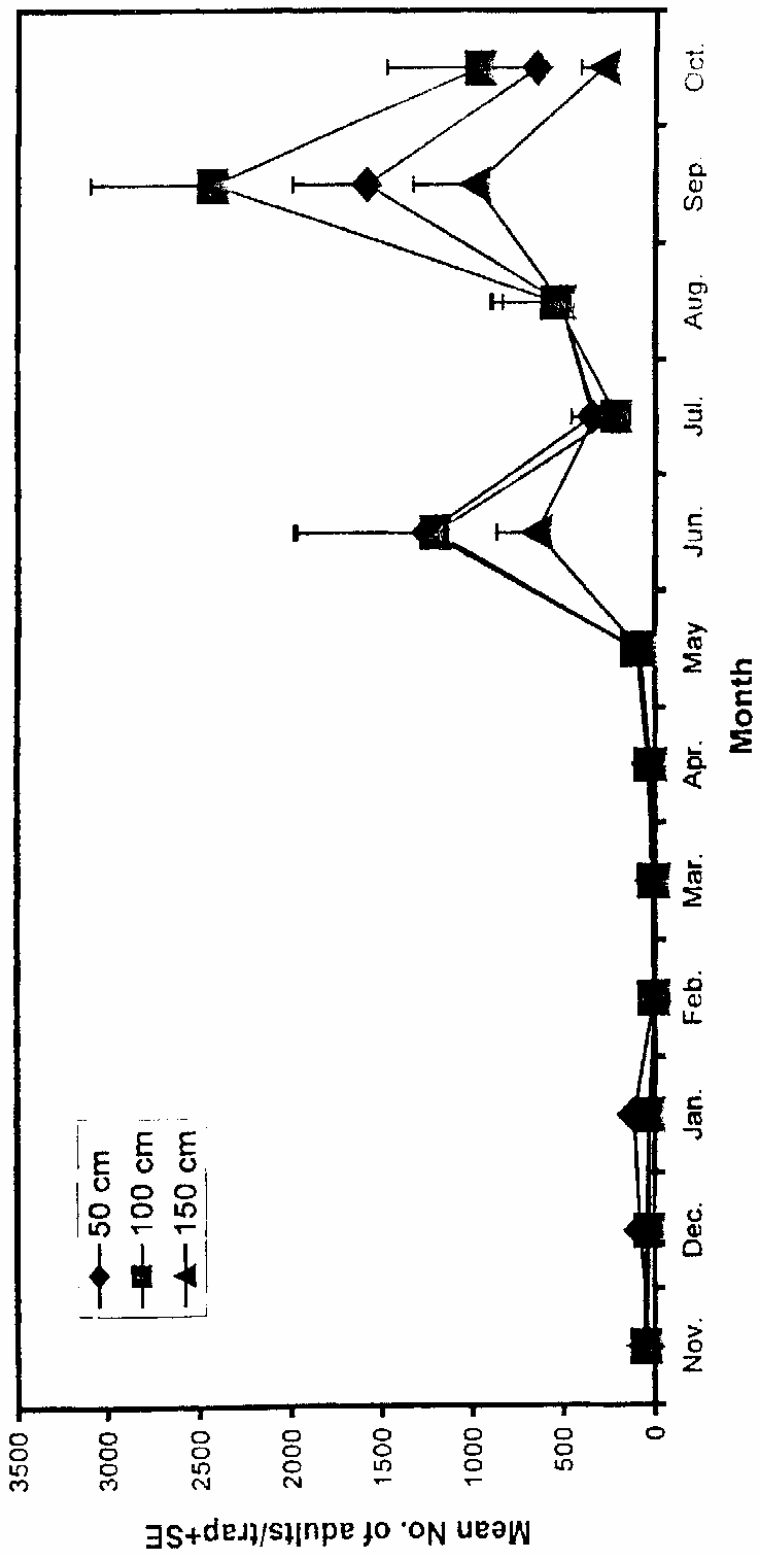

Fig (1). Population dynamic of whiteflies on greehouse cucurbit plants at different levels of yellow sticky trap

Table (2). Mean number of thrips at different heights of yellow sticky traps placed in greenhouses cultivated with cucurbit plants.

Month	Mean No. of adults/trap ± SE at different heights		
	50 Cm.	100 Cm.	150 Cm.
November	187.3 ± 68.9	216.0 ± 60.2	295.0 ± 87.0
December	27.3 ± 15.7	31.5 ± 21.9	29.0 ± 17.3
January	3.8 ± 0.6	2.8 ± 1.0	2.0 ± 0.6
February	205.2 ± 77.4	107.0 ± 37.9	55.8 ± 17.4
March	1568.5 ± 241.1	1070.5 ± 128.5	656.5 ± 151.0
April	2364.5 ± 127.1	3545.0 ± 734.1	3066 ± 598.6
May	995.0 ± 612.2	1594.3 ± 1123.3	1658.0 ± 1186.4
June	583.5 ± 147.3	681.8 ± 86.8	546.5 ± 56.6
July	118.3 ± 37.6	56.5 ± 17.5	89.0 ± 30.5
August	135.5 ± 88.3	60.8 ± 24.8	100.5 ± 75.8
September	167.8 ± 57.8	163.3 ± 66.6	38.5 ± 10.9
October	19.8 ± 6.36	32.6 ± 10.6	26.3 ± 14.1
Total	6376.5	7562.0	6563.0

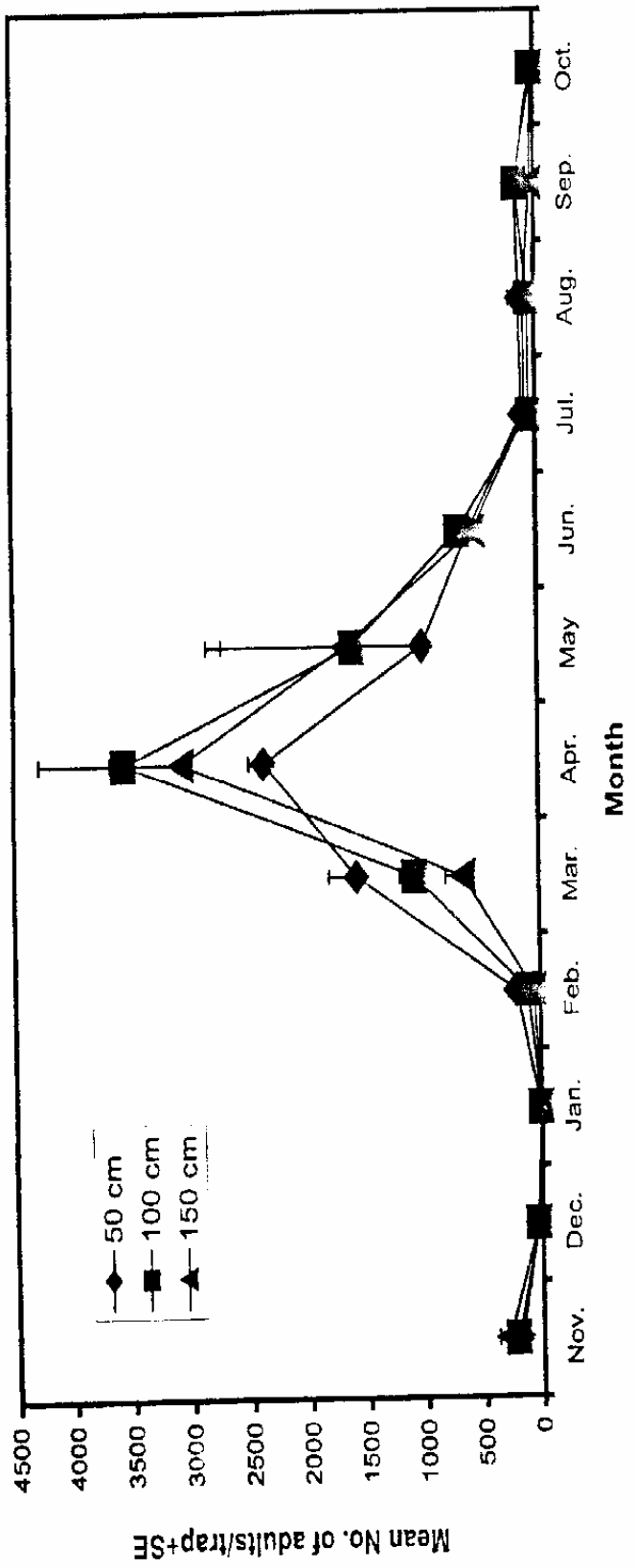

Fig (2). Relative abundance of thrips on greehouse cucurbit plants at different levels of yellow trap

of thrips caught per trap reached (187.3, 216 and 295 adults/trap) at the first lowest peak in November while it was (2364.5, 3545 and 3066 adults/trap) at the highest peak in April. The mean number of thrips reached (167.8, 163.3 and 38.5 adults/ trap) at the second lowest peak in September at 50, 100 and 150 cm height of trap, respectively.

It my be noticed that the number of thrips captured was greater on yellow sticky traps placed at 100 cm when compared with 50 cm or 150 cm. The total numbers of thrips along the inspection months were (6376.5, 7562.0 and 6563.0 adults/trap) at 50 cm, 100 cm and 150 cm of traps height, respectively (Table 2 and Fig. 2). Pearsall and Myers (2000) reported two peaks of the Western flower thrips in nectarine orchards in British Columbia and Canada, the lowest during early bud development and a second major peak several weeks later after husk fall. Moreover, Cho *et al.* (1998) and Kim *et al.* (1999) used yellow sticky traps to study the distribution of thrips on greenhouse cucumber and the management of greenhouse whitefly on cherry tomatoes. Shipp and Zariffa (1991) reported that monitoring of thrips population is necessary to detect thrips problems in crops and to determine the efficiency of control measures.

From the previous data, it is apparent that trap height and location influenced the effectiveness of trap and /or trap captures due to the flight activity and behavior of whiteflies and thrips. The data also proved the convenience of yellow sticky traps for predicting whiteflies and thrips infestation and damage on greenhouses cucurbit plants. Moreover, prevention of crop losses by early detection of whiteflies and thrips as well as reduction of pesticide costs were all realized.

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الملخص العربي

رصد الذباب الأبيض والتربس على نباتات القرعيات في البيوت المحمية باستخدام المصائد اللاصقة الصفراء في محافظة الأحساء بالمملكة العربية السعودية

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تم رصد الوفرة العدديه من الذباب الأبيض والتربس على نباتات القرعيات (الخيار- الكوسة- الشمام – البطيخ) المنزرعة داخل البيوت المحمية باستخدام المصائد اللاصقة الصفراء. حيث تم وضع المصائد على ثلاث ارتفاعات مختلفة ٥٠ ، ١٠٠ ، ١٥٠ سم من سطح التربة. وقد أوضحت النتائج ظهور ذروتين للإصابة بالذباب الابيض إحداهما في شهر يونيه والثانية وهى الأعلى في شهر سبتمبر. كما أظهرت النتائج أن عدد الحشرات الكاملة من الذباب الأبيض في المصائد التي وضعت على ارتفاع ١٠٠ سم من سطح التربة وكانت أعلى من تلك التي وضعت على ارتفاع ٥٠ أو ١٥٠ سم. وفي حالة التربس تم رصد ثلاث ذروات على نباتات العائلة القرعية. حيث ظهرت الذروة الأعلى في شهر إبريل بينما ظهرت الذروتان الأقل في شهري سبتمبر ونوفمبر. كما أوضحت النتائج ايضا أن العدد الكلي للحشرات الكاملة للتربس والتي سجلت خلال الإثنى عشر شهراً من الرصد والفحص وكانت أعلى في المصائد التي وضعت على ارتفاع ١٠٠ سم مقارنة بالأخرى التي وضعت عند ٥٠ أو ١٥٠ سم. كما أشارت النتائج إلى فعالية استخدام المصائد اللاصقة الصفراء في رصد عشائر الذباب الأبيض والتربس في داخل البيوت المحمية.