Whiteflies *Bemisia* spp. and Thrips *Thrips* spp. Monitored in Greenhouses at Three Districts in Saudi Arabia

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Abstract:

Yellow sticky traps were used to monitor two piercing-sucking insects; whiteflies *Bemisia* spp. and thrips *Thrips* spp. on cucurbit plants during May and June, 2001. These sticky traps were placed at three heights (50, 100 and 150 cm) in greenhouses of three districts, Al-Hasa, Qatif, and Riyadh. The data showed that the mean number of whitefly adults captured per yellow sticky trap that placed at the three heights in May was higher in Qatif followed by Al-Hasa and Riyadh districts. The mean number of whiteflies/trap captured on sticky traps was also more than thrips in the respective districts. The whiteflies population was abundant in the three districts when compared with that of thrips. The variation of whiteflies and/or thrips population densities at different heights of sticky traps in different districts might be due to the natural flying ability affecting their migration due to climatic conditions.

Introduction

Whiteflies and thrips are piercing-sucking insects that cause major damage to vegetable crops cultivated in the greenhouses. These insects transfer viral diseases from the infected to uninfected plants and are associated with serious losses in the yield. Early detection of these damaging insects is very important because symptoms of feeding often go unnoticed until serious damage is done (Parker *et al*., 1995; Daughtrey *et al*., 1997; Gupta *et al.*, 1997; Labonne *et al*., 1998; Liu, 2000; Fueutes and Salazar, 2003). Thus population monitoring is useful to detect insect problems in crops and to determine whether control measures have been effective (Milligan *et al*., 1988). One of the most effective means developed to detect the presence of the adults is the yellow sticky traps. These traps are widely used for monitoring and management of whiteflies, aphids, leaf miners, thrips, leafhoppers and certain other insect pests (Liburd *et al*., 1998; Kim *et al*., 1999; Kumawat et *al*., 2000; Doukas, 2002; Fiedler and Sosnowska, 2002). However, the trap location and trap height have effect on capture numbers of insects (Bruck and Lewis, 1998; Toscano *et al*., 2002).

The purpose of this study is to monitor the population densities of whiteflies and thrips in greenhouses of three districts in Saudi Arabia by using yellow sticky traps during two months of cucurbit plant growing season.

Materials and Methods

Three greenhouses (1000 m^2 each) cultivating cucurbit plants, cucumber, squash, melon and watermelon from three different districts Al-Hasa, Qatif and Riyadh in Saudi Arabia were selected. Performance of yellow sticky traps for monitoring whiteflies, *Bemisia* spp. and thrips, *Thrips* spp. and the population of these insect pests were evaluated during May and June, 2001. The experiment was the completely randomized design (CRD). Yellow sticky traps each 15X30 cm^2 (Gempler's® Com. USA) were placed in greenhouses during May and June. Six yellow sticky traps were placed in each greenhouse at three different heights 50, 100 and 150 cm above the ground, as a total of eighteen sticky traps were used for each district per week. Traps were changed weekly and transferred to the laboratory for inspection observations and counting the captured number of whiteflies and thrips adults. Binocular microscope was used to identify insects on traps. Statistical analysis of data was done using Costat, 1988 program.

Results and Discussion

Frequency of *Bemisia* spp. in Al-Hasa, Qatif and Riyadh districts

The data showed that the mean number of whitefly adults captured per yellow sticky trap that placed at the three heights in May was high in Qatif followed by Al-Hasa and Riyadh districts (Table, 1 & Figure, 1). However, at Qatif district the mean number of whiteflies was more on sticky traps that placed at height of 50 cm than those at 100 or/and 150 cm. While in Al-Hasa and Riyadh districts, the mean number of whitefly adults on the sticky traps that placed at height of 150 cm was more than those at 50 and/or 100 cm.

The whiteflies population was abundant in June in Qatif when compared with those of Al-Hasa and/or Riyadh districts (Table, 1 & Figure, 2).

Apparently, the mean number of whiteflies on sticky traps that placed at the three heights was abundant in June when compared with those in May at Riyadh district; however, not significant variation of those in Qatif and Al-Hasa districts. No significant differences were observed in the mean number of whiteflies on sticky traps that placed at the three heights in May or June in the three districts. Statistical analysis revealed a significant difference in the mean numbers of whiteflies between Qatif at one side and Al-Hasa and/or Riyadh at the other side. The variation of whiteflies population densities between the three districts might due to the deviation in climatic conditions i.e temperature and humidity. The results are in line with that of Liu (2000), who reported adult whiteflies *Bemisia argentifolii* on spring collard first appeared on the

plant in early April, increased rapidly within the month, peaked in May and declined at the end of the season. Fiedler and Sosnowska (2002) recorded that the number of whiteflies was the highest in spring (April, May) and in autumn (October). Kim *et al*. (1999) reported the numbers of whiteflies on yellow sticky traps were significantly correlated to plants. However, Soto *et al*. (2001) mentioned that the abundance and population dynamics of whiteflies varied depending on whiteflies species, area and crops. Furthermore, Kumawat *et al*. (2000) reported temperature was significantly correlated with whitefly densities.

Table (1)

Average of *Bemisia* spp./trap at three heights placed traps in greenhouses in May and June at Al-Hasa, Qatif and Riyadh districts

District	Trap Height (cm)	Mean of whiteflies adults ± SE		Average
		May	June	
Al-Hasa	50	1488.0 ± 781.6	1247.0 ± 19.2	1486.3 [a]
	100	1342.3 ± 183.7	1792.0 ± 37.6	
	150	1621.5 ± 413.3	1427.2 ± 11.0	
Qatif	50	3372.0 ± 710.6	2689.7 ± 909.6	2899.2 [b]
	100	3082.5 ± 785.9	2839.2 ± 762.2	
	150	2481.5 ± 407.5	2930.5 ± 689.3	
Riyadh	50	104.8 ± 54.9	2054.3 ± 1053.6	789.35 [a]
	100	78.8 ± 41.1	425.7 ± 32.6	
	150	150.8 ± 75.2	1954.8 ± 975.4	

No significant difference between any two means with the same letter(s).
LSD 0.05 (between districts) = 873.2 (between months) = N.S. (between heights) = N.S.

Table (2)

Average of *Thrips* spp./trap at three heights placed traps in greenhouses in May and June at Al-Hasa, Qatif and Riyadh districts

District	Trap Height (cm)	Mean of thrips adults ± SE		Average
		May	June	
Al-Hasa	50	366.8 ± 8.5	225.0 ± 10.2	291.1 [b]
	100	202.3 ± 19.2	192.0 ± 37.6	
	150	446.8 ± 68.8	314.0 ± 5.7	
Qatif	50	68.8 ± 18.3	91.2 ± 5.6	100.6 [a]
	100	97.8 ± 4.8	132.8 ± 18.5	
	150	106.5 ± 30.6	106.8 ± 17.6	
Riyadh	50	736.8 ± 102.0	410.8 ± 90.4	514.3 [c]
	100	619.0 ± 44.5	577.3 ± 183.6	
	150	331.0 ± 25.9	477.5 ± 128.2	

No significant difference between any two means with the same letter(s).
LSD 0.05 (between districts) = 109.3 (between months) = N.S. (between heights) = N.S.

Frequency of *Thrips* spp. in Al-Hasa, Qatif and Riyadh districts

The data showed that the mean number of thrips adults captured per yellow sticky trap placed at the three heights in May was high in Riyadh district followed by Al-Hasa and Qatif districts (Table, 2 & Figure, 3). Seemingly, the mean number of thrips on the sticky traps placed 50 cm above the ground was more in Riyadh district when compared with those at 100 and/or 150 cm while the trend is not clear in those sticky traps placed in Al-Hasa and Qatif districts. Similar pattern of the mean number of thrips was recorded in June at Riyadh district had more thrips per sticky trap followed by Al-Hasa and Qatif (Table, 2 & Figure, 4). The mean number of thrips captures was more in May when compared with June in Riyadh and Al-Hasa districts (Table, 2 & Figures, 3, 4). The suppression of thrips population in June might due to the effect of high temperature that caused by less ventilation in greenhouse on the growth and prevention of insects. On the other hand, no significant variation in the number of thrips captured per trap in May and June in Qatif district (Table, 2 & Figures, 3, 4). Statistical analysis revealed a significant difference in the mean numbers of thrips among the three districts, Al-Hasa, Qatif and Riyadh. Several researches indicated appropriated use of yellow sticky traps to study the distribution of thrips and whiteflies. Those traps provided a measure of the relative abundance of thrips and a highly significant relationship was reported between the number of trapped insect and the trap size (Cho *et al.*, 1998; Kim *et al*., 1999, Tomkins, 2002; Carrizo and Benitez, 2002). Moreover, Reitz (2002) reported that thrips were much more abundant in the spring than in autumn, which conforming the present data.

In conclusion the number of whiteflies captured on sticky traps was more than thrips in the three districts. Comparison between whiteflies and thrips in May at Riyadh district showed that thrips on traps placed at the three heights were more than whiteflies. In general, the mean number of whiteflies population was abundant in the three districts compared to that of thrips. The variation of whiteflies or thrips population densities at different heights of sticky traps or between districts might due to the natural flying ability that affect migration owing to deviation in climatic conditions. Whiteflies and thrips population monitoring is a tool to detect insect pest problems in crops and to determine if control actions being effective. The existence of certain insect species in certain region depends on the intrinsic factors of insect population and/or extrinsic factors of the environment. Data collecting through yellow sticky traps should be used for predicting whiteflies and thrips infestation in greenhouses. Captured insects would be a sign of the size of their

populations and deliver useful information to control the magnitude of insect problems and help in deciding the start point of insect management programs.

Acknowledgement

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Fig. (1). The mean number of *Bemisia* spp./trap at three heights traps placed in greenhouses in May at Al-Hasa, Qatif and Riyadh districts

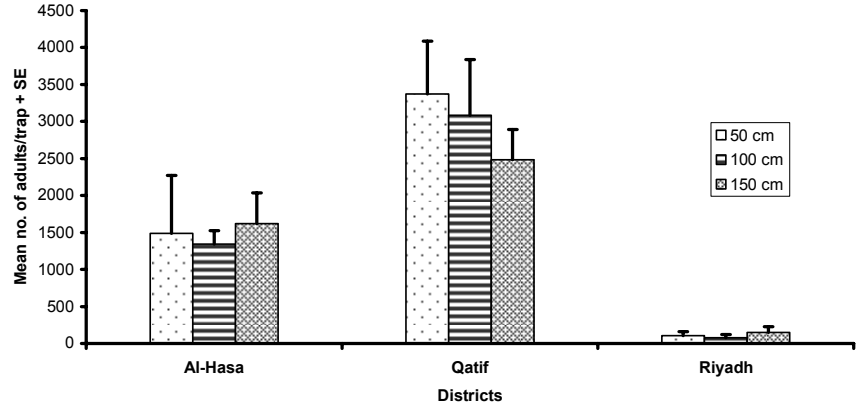


Fig. (2). The mean number of *Bemisia* spp./trap at three heights traps placed in greenhouses in June at Al-Hasa, Qatif and Riyadh districts

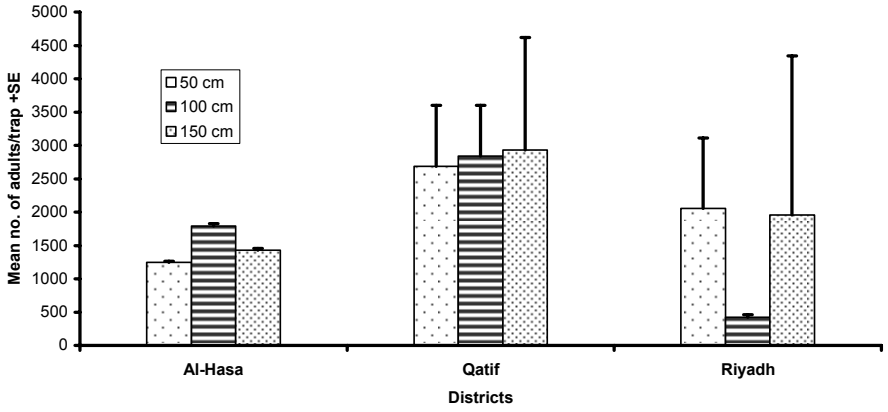


Fig. (3). The mean number of *Thrips* spp./trap at three heights traps placed in greenhouses in May at Al-Hasa, Qatif and Riyadh districts

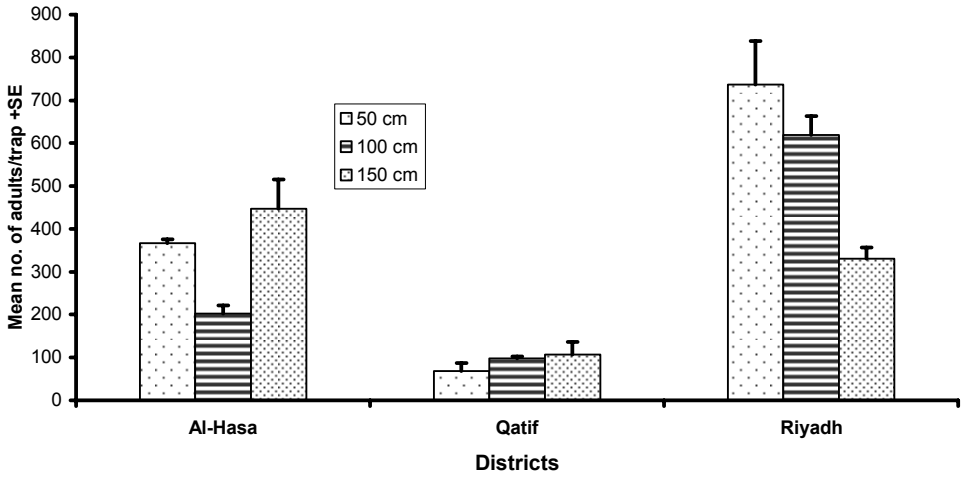
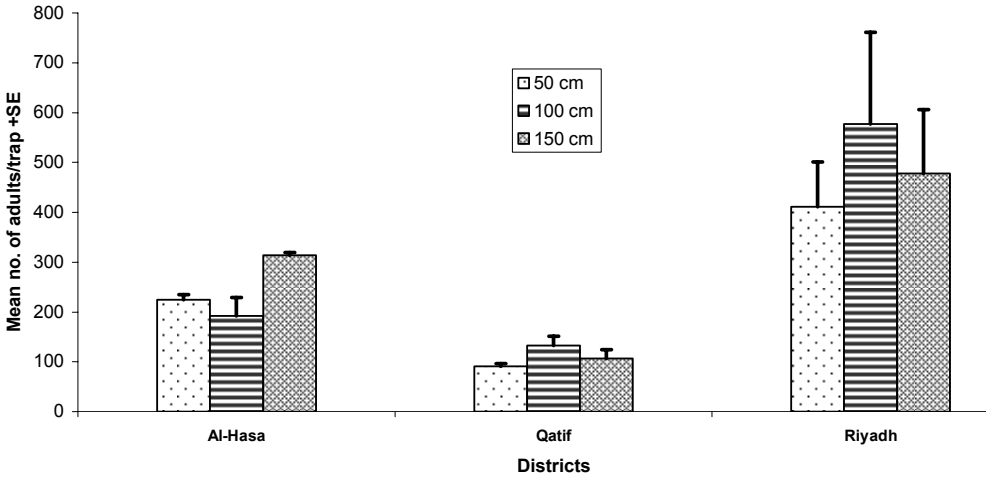


Fig. (4). The mean number of *Thrips* spp./trap at three heights traps placed in greenhouses in June at Al-Hasa, Qatif and Riyadh districts



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رصد الذباب الأبيض والتربس في البيوت المحمية لثلاث محافظات بالمملكة العربية السعودية

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الملخص :

تم استخدام المصائد الصفراء اللاصقة لرصد وجود حشرتين من الحشرات الثاقبة الماصة هي الذباب الأبيض والتربس على نباتات القرعيات المنزرعة في البيوت المحمية في شهري مايو ويونيو من عام ٢٠٠١م. حيث تم وضع المصائد عند ثلاث ارتفاعات ٥٠ - ١٠٠ - ١٥٠ سم في البيوت المحمية لثلاث محافظات هي الإحساء والقطيف والرياض. أوضحت النتائج أن متوسط أعداد الذباب الأبيض لكل مصيدة عند الثلاث الارتفاعات في شهر مايو كان مرتفعاً في محافظة القطيف تلاها محافظتي الإحساء والرياض. كان أعداد الذباب الأبيض أعلى من أعداد التربس على المصائد في الثلاث محافظات. وعموماً كانت عشيرة الذباب الأبيض أكثر وفرة في الثلاث محافظات مقارنة بعشيرة التربس. التباين الواضح في كل من عشيرة الذباب الأبيض والتربس خلال شهري الحصر سواء عند الارتفاعات المختلفة من المصائد أو بين المحافظات ربما يرجع إلى اختلاف طبيعة الطيران للحشرة والتي تحدد الهجرة وكذلك اختلاف الظروف المناخية بين المحافظات.