DAILY FLIGHT ACTIVITY OF CERTAIN SAP SUCKING INSECTS INVADING SOME VEGETABLE CROPS AND EFFICIENCY OF TWO METHODS FOR TRAPPING THEM AT GEMMEZA REGION, EGYPT

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Abstract

Studies on daily flight activity of certain leaf insects attacking potato, common bean and squash plants and efficiency of two types of traps in capturing them during the two successive growing seasons 1991 and 1992 were carried out at Gemmeza region, Gharbia Governorate, Egypt. During summer season, the number of *Empoasca decipiens* Paoli swept from potato, common bean and squash field was significanly affected by the daily time of sweeping . This factor had insignificant effect on flight activity of *Myzus persicae* Sulz. and *Thrips tabaci* Lind. The flight activity of adults of *Bemisia tabaci* (Genn.) and *E. decipiens* in winter (Potato) and nili (common bean & squash) seasons was insigificantly affected during sunrise, mid-day and sunset.

With regard to the efficiency of yellow sticky board and yellow pan water traps in capturing adults of Aphis craccivora Koch., *M. persicae, E. decipiens, T.tabaci* and *B.tabaci,* water trap was more efficient in trappin *A. craccivora* than the yellow sticky board. The opposite was true in case of the other insects.

INTRODUCTION

The sap sucking insects namely the leguminous aphid, *Aphis craccivora* Koch, the green peach aphid, *Myzus persicae* Sulz., the potato leafhopper, *Empoasca deci-*

piens Paoli, the cotton thrips , *Thrips tabaci* Lind. and the cotton white fly, *Bemisia tabaci* (Genn.) are considered serious pests attacking potato, common bean and squash crops.

Little is known about the daily flight activity of the above mentioned pests or the use of sticky and water traps in capturing them (Meyerdirk *et al.*, 1979; Reader and Southwood, 1984; Youngman *et al.*, 1986; Byrne and von Bretzel, 1987; Bellows Jr. *et al.*, 1988; El-Sharakawy, 1989; Hegab *et al.*, 1989., Huang *et al.*, 1989; Roa *et al.* 1991; Kahrer, 1992 and Hander *et al.*). Our study was designed at Gemmeza region during two successive growing seasons to clarify the daily flight activity of certain sucking insects invading leaves of potato, common bean and squash plants and to determine the efficiency of both yellow sticky board and yellow pan water in capturing these insects. The most efficient trap can be used as an easy method for either measuring the insect population size or for mechanical control purpose.

MATERIALS AND METHODS

Studies were conducted on different flying sucking insects attacking leaves of potato, common bean and squash plants during winter and summer seasons for potato, summer and nili ones, for both common bean and squash throughout the years (1991 and 1992) at the Experimental Farm of Gemmeza Research STation, Gharbia Governorate, Egypt. To study the daily flight activity of *A. craccivora, M.persicae, E. decipiens, T. tabaci* and *B. tabaci*, an area of about 175m^2 was planted by Diamont potato variety on 29th of January (summer season) and 14th of October (winter season), whereas common bean (Giza-3 var.) and squash (Skandarany var.) were sown on 15th of April in summer season and on 15th of September in nili season. To determine the efficiency of the two tested traps in catching the flying insects, an area of about 1/4 feddan for each crop was used. Fields received normal agricultrual treatments and no chemical control applications were attempted.

Sweeping was carried out when the plants were 12-14 days old and continued at weekly intervals until harvest time, by means of a regular insect net, 30 cm diameter and 60 cm deep. Each sample consisted of 50 double strokes from both diagonal directions of the experimental area. In each crop this technique was performed daily during sunrise, mid-day and sunset. The collected insects were killed then

identified and counted in the laboratory on the same day.

Three of both yellow cylindrical sticky board and yellow pan water traps (10x10 and 26x4 cm in diameter x height for first and second trap, respectively) were used as replicates distributed between plants in regular equal distance along the longitudinal axis of each crop when the plants reached three weeks old. Wooden stands with different heights were used to give the suitable position of the trap (over plants by about 20cm). Both sticky card board and water of each trap were changed weekly and the captured insects were identified and counted.

All results obtained were statistically analyzed using the "F" test and Duncan's multiple range test (Fisher, 1944 and Snedecor, 1957).

RESULTS AND DISCUSSION

Daily flight activity

Summer plantation

The data presented in Table 1 indicate the mean number per 50 double strokes of the aphid, *M. persicae,* the jassid, *E. decipiens* and the thrips, *T.tabaci* attacking summer potato, common bean and squash plants in 1991and 1992. The green peach aphid was collected only during sweeping the flying insects on potato plants grown during summer season of 1992. The population of swept aphids did not differ greatly according to the time of sweeping. The mean number of 1.0, 0.88 and 1.13 aphids per 50 double strokes were recorded when sweeping was undertaken during sunrise, mid-day and sunset, respectively.

The Jassid insects fly over the three vegetable crops in high numbers during sunrise recording the mean numbers of 23.88 , 6.00, 13.60, 19.30, 9.20 insects/ 50 double strokes on potato, common bean and squash plants in 1991 and 1992 seasons, respectively. Mid-day time proved to be unsuitable for insect flight activity showing the lowest corresponding values of 13.38, 2.50, 7.10, 4.40; 7.302.50. During sunset moderate numbers of insects were swept.

Generally, the thrips population density was more abundant during sunrise and sunset compared to that in mid-day. The highest averages of 3.13 (1991) and 1.73 (1992) /50 double strokes were obtained during sunset and sunrise irrespective of

Table 1. Mean numbers per 50 double strokes of certain sap sucking insects infesting indicated vegetable crops during three different times of the day in summer plantation of 1991 and 1992.

Vegetable crop	Myzus persicae		Empoasca decipiens		Thrips tabaci	
	1991	1992	1991	1992	1991	1992
Potato :						
Sunrise	0.0	1.0	33.88	6.00	0.00	1.0
Mid-day	0.0	0.88	13.38	2.50	0.00	0.0
Sunset	0.0	1.13	22.25	4.88	0.00	0.0
Common bean :						
Sunrise	0.00	0.00	22.80	13.60	3.20	0.60
Mid-day	0.00	0.00	7.10	4.40	0.40	0.00
Sunset	0.00	0.00	14.40	8.70	3.60	0.50
Squash :						
Sunrise	0.00	0.00	19.30	9.20	4.10	3.60
Mid-day	0.00	0.00	7.30	2.50	0.50	0.80
Sunset	0.00	0.00	14.40	5.30	5.80	4.40
Av. irresp. of crop:						
Sunrise	0.00	0.33	21.99 a	9.60 a	2.43	1.73
Mid-day	0.00	0.29	9.26 b	3.13 b	0.30	0.27
Sunset	0.00	0.38	17.02 c	6.29 ab	3.13	1.63
F. test		N.S.	**	*	N.S.	N.S.

N.S. = Not significant.
* = Significant at 5% level of probability.
** = Highly significant at 1% level of probability.
Differences between averages followed by similar letters are statistically insignificant

the cultivated crop, respectively. On the other hand the corresponding lowest averages of 0.30 and 0.27 were recorded in mid-day.

Statistical analysis of the obtained results showed that the daily flight avtivity of *E. decipiens* was significantly affected in both seasons by the time of sweeping. In case of both *M. persicae* and *T. tabaci*, insignificant differences were found between insect numbers swept in three tested times.

Winter and nili plantation

Table 2 shows the mean numbers per 50 double strokes of the white fly, *B. tabaci* and the leaf hopper, *E. decipiens* attaking leaves of winter potato plants and nili common bean and squash during 1991 and 1992 . In general , the time of day in which the white fly flight activity reached its maximum varied from one year to another showing the highest average number of 2.97 and 1.14 adults/50 double strokes during sunset in 1991 and mid-day in 1992. Irrespective of the crop, the time of the jassid minimum flight activity varied from one year to another. This time was mid-day in 1991 and sunrise in 1992. In the years of study the differences between the average numbers of this insect collected by the sweeping net during the three tested times were statistically insignificant.

Meyerdirk and Moreno (1984) reported that the daily flight activity of *Parabemisia myricae* in citrus orchards varied according to the time of day. Also , Bellows Jr. *et al.* (1988) reached the same conclusion with *Bemisia tabaci* in three cropping systems (cotton, watermelon and cantaloupe).

Efficiency of two types of traps

Insects infesting potato plants

Data given in Table 3 indicate that the two tested traps differed significantly in their attractive efficiency to flying adults of *A. craccivora, M. persicae, E. decipiens* and *B. tabaci* invading potato plants during summer and winter seasons of 1991 and 1992.

The leguminous aphid was not attracted to the sticky board trap. On the other hand, yellow water pan trap was more efficient in attracting this insect recording average numbers of 10.25 and 13.29 / trap in 1991 and 1992 summer seasons, respectively.

The yellow sticky board trap was more effective in capturing the flying adults

Table 2. Mean numbers per 50 double strokes of certain sap sucking insects infesting indicated vegetable crops during three times of the day in winter and nili plantation of 1991 and 1992.

Vegetable crop	Bemisia tabaci		Empoasca decipiens	
	1991	1992	1991	1992
Winter Potato :				
Sunrise	0.0	0.00	2.25	1.50
Mid-day	0.0	3.13	1.38	2.50
Sunset	0.0	0.25	2.00	1.25
Nili common bean :				
Sunrise	6.40	0.50	4.00	5.30
Mid-day	0.00	0.30	0.40	6.20
Sunset	5.80	0.10	6.60	11.30
Nili squash :				
Sunrise	2.20	0.30	3.60	5.90
Mid-day	0.40	0.00	1.70	18.50
Sunset	3.10	0.30	4.00	14.60
Av. irresp. of crop:				
Sunrise	2.87	0.27	3.28	4.23
Mid-day	0.13	1.14	1.16	9.07
Sunset	2.97	0.22	4.20	9.05
F. test	N.S.	N.S.	N.S.	N.S.

Table 3. Average numbers of certain sap sucking insects captured by two types during summer and winter potato seasons (1991 and 1992).

Year	Trap	Aphis craccivora	Myzus persicae	Empoasca decipiens	Bemisia tabaci
		Summer season			
1991	Yellow sticky board trap	0.0 a	240.38 a	60.25 a	0.00
	Yellow pan water trap	10.25 b	65.38 b	7.59 b	0.00
1992	Yellow sticky board trap	0.0 a	280.33 a	105.34 a	0.00
	Yellow pan water trap	13.29 b	70.42 b	1.21 b	0.00
F. test :					
1991		*	*	*	
1992				**	
		Winter season			
1991	Yellow sticky board trap	0.0	0.0	40.59 a	735.17 a
	Yellow pan water trap	0.0	0.0	6.17 b	4.46 b
1992	Yellow sticky board trap	0.0	0.0	27.21 a	621.17 a
	Yellow pan water trap	0.0	0.0	1.46 b	3.71 b
F. test :					
1991				**	**
1992				*	**

of *M. persicae, E. decipiens* and *B. tabaci* than the yellow water trap when atttacking potato plants. During summer season, the highest average number of 240.38 , 280.33 and 60.25 . 105.34 insects/trap for the first and second species in 1991 and 1992, respectively occurred with the sticky type . Also in winter season of both years , the same type recorded the highest average numbers of 40.59, 27.21 and 735.17, 621.17 insects /trap for jassid and white fly in the first and second year, successively.

Therefore, water trap can be recommended to determine the population size of *A. craccivora.* However, in case of *M. persicae, E. decipiens* and *B. tabaci* the sticky trap was more suitable.

Insects infesting common bean plants

As clearly showin in Table 4, the differences between average numbers of A. craccivora, M. persicae, E. decipiens and T. tabaci trapped by sticky and water traps hung during summer in common bean fields were statistically significant. The leguminous aphid was attracted only to water traps, while the sticky type captured the individuals of green peach aphid, potato leaf hopper and cotton thrips in relatively higher numbers.

During nili season of common bean. individuals of green peach aphid were captured by the two traps in 1991 but in relatively low number without significant difference. On the other hand, the differences between average numbers of both jassids (1991) and white flies (1991 and 1992) trapped to sticky and water traps were highly significant. It is worthy to note that the sticky trap appeared to be more efficient in trapping jassids and white flies than the water trap recording the highest average numbers of 107.23 jassids/trap in 1991 season and 823.20 , 1531.47 white flies in 1991 and 1992, respectively, whereas, the corresponding average number of 2.93, 10.33 and 7.80 were recorded in case of using water trap (Table 4).

Insects infesting squash plants :

Statistical analysis of the obtained results given in Table 5 revealed that the population density of *A. craccivora, M. persicae, E. decipiens* and *T. tabaci* infesting summer squash plants varied significantly according to the type of trap, but the numbers of *B. tabaci* recorded on the two tested traps showed insignificant difference. Water trap proved to be more effective in trapping the leguminous aphids, but the other tested type showed high efficiency with the other insects.

Table 4. Average numbers of certain sap sucking insects captured by two types of traps during summer and nili common bean seasons (1991 and 1992).

Year	Trap	*Aphis craccivora*	*Myzus persicae*	*Empoasca decipiens*	*Thrips tabaci*	*Bemisia tabaci*
		Summer season				
1991	Yellow sticky board trap	0.0	0.0	38.73 a	6.67 a	0.00
	Yellow pan water trap	0.0	0.0	12.67 b	2.03 b	0.00
1992	Yellow sticky board trap	0.0 a	118.47 a	58.03 a	4.07 a	0.00
	Yellow pan water trap	15.33 b	2.70 b	15.33 b	1.87 b	0.00
F. test :						
1991				**	**	
1992		**	**	**	*	
		Nili season				
1991	Yellow sticky board trap	0.0	0.07	107.23 a	0.0	735.17 a
	Yellow pan water trap	0.0	0.10	2.93 b	0.0	4.46 b
1992	Yellow sticky board trap	0.0	0.0	0.0	0.0	621.17 a
	Yellow pan water trap	0.0	0.0	0.0	0.0	3.71 b
F. test :						
1991			N.S.	**		**
1992						**

Table 5. Average numbers of certain sap sucking insects captured by two types of traps during summer and nili squash seasons of 1991 and 1992.

Year	Trap	*Aphis craccivora*	*Myzus persicae*	*Empoasca decipiens*	*Thrips tabaci*	*Bemisia tabaci*
		Summer season				
1991	Yellow sticky board trap	0.0	0.0	34.37 a	0.0	12.30
	Yellow pan water trap	0.0	0.0	12.70 b	0.0	3.23
1992	Yellow sticky board trap	0.0 a	90.87 a	43067 a	5.93 a	0.00
	Yellow pan water trap	9.33 b	7.50 b	3.70 b	1.20 b	0.00
F. test :				*		
1991		*	*	**	*	N.S.
1992						
		Nili season				
1991	Yellow sticky board trap	0.0	0.0	36.70 a	0.0	1291.35 a
	Yellow pan water trap	0.4	0.0	0.73 b	0.0	26.50 b
1992	Yellow sticky board trap	0.0	0.0	19.17	0.0	1615.70 a
	Yellow pan water trap	0.0	0.0	1.77	0.0	9.27 b
F. test :				*		**
1991		N.S.				
1992				*		**

Concerning the efficiency of sticky board and yellow pan water trap in the attraction of A. craccivora, E. decipiens and B. tabaci adults in nili squash fields, the two traps varied insgnificantly, significantly and highly significantly, respectively. The highest average numbers of 36.70, 1291.35 in the first year and 19.17, 1615.70 insects/trap in the second was recorded on sticky trap for potato leaf hopper and cotton white fly, successively. The corresponding lowest values caught by water trap were 0.73, 26.50 and 1.77, 9.27 adults per trap.

The present results are in harmony with those obtained by many authors (El-Sharkawy 1989; Hegab *et al.*, 1989; Huang *et al.*, 1989; Roa *et al.*, 1991) who reported that both sticky and water traps attracted adults of sucking insects attaking different crops and that the first type was more efficient than the other one.

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دراسة النشاط اليومى لطيران بعض الحشرات الماصة للعصارة التى تصيب بعض محاصيل الخضر وكفاءة طريقتين لاصطيادها فى منطقة الجميزة - جمهورية مصر العربية

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اجريت هذه الدراسة فى محطة بحوث الجميزة - محافظة الغربية بهدف دراسة النشاط اليومى لطيران بعض الحشرات التى تصيب نباتات البطاطس والفاصوليا والكوسة وكذلك كفاءة نوعين من المصائد وهما المصيدة اللاصقة الصفراء والمصيدة المائية الصفراء وذلك خلال عامين متتاليين (١٩٩١ ، ١٩٩٢) . ولقد أظهرت النتائج المتحصل عليها فى الموسم الصيفى أن أعداد نطاط أوراق البطاطس والتى كنست من حقول البطاطس والفاصوليا والكوسة قد تأثرت معنويا بالوقت من النهار الذى أجريت فيه عملية الكنس بينما كان تأثر هذا العامل غير معنوى على نشاط طيران كل من حشرات من الخوخ الأخضر وتربس القطن. لقد أظهر التحليل الإحصائى أن الإختلاف فى نشاط طيران كل من ذبابة القطن البيضاء وجاسيد أوراق البطاطس لم تكن معنوية فى أوقات النهار المختبرة (شروق الشمس - منتصف النهار - غروب الشمس) .

وبخصوص كفائة المصيدة اللاصقة الصفراء والمصيدة المائية الصفراء فى إصطياد حشرات من البقوليات، من الخوخ الأخضر، جاسيد أوراق البطاطس، تربس القطن وذبابة القطن البيضاء وجد أن المصيدة المائية هى الأكثر كفاءة فى إصطياد من البقوليات مقارنة بالمصيدة اللاصقة. بينما كان العكس صحيحاً بالنسبة للحشرات الأخرى.