

STICKY TRAP AND SOME FACTORS AFFECTING ITS CATCH NUMBERS OF CERTAIN INSECT PESTS OF SUGAR BEET

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ABSTRACT

Certain sugar beet insect pests were assessed by height, area and shape of yellow sticky traps placed in sugar beet fields at Kafr El-Sheikh region, during 2002/03 and 2003/04 seasons.

Results indicated that *Pegomyia mixta* Vill., *Cassida vittata* Vill., *Aphis gossypii* Glov., *Empoasca* spp. and *Bemisia tabaci* Genn. were the most insects caught on traps placed at 30, 60 and 90 cm above ground. The results also revealed that traps placed at 90 cm significantly caught more numbers of *C. vittata*, *A. gossypii*, *Empoasca* spp. and *B. tabaci* than that positioned at 30 and 60 cm above ground, which were more attractive for *P. mixta* adults.

Data revealed that wind velocity had no significant effect on catch numbers. Results also indicated that there was a positive and highly significant relationship ($r = 0.99$) between area of trap and its numbers of catch.

Results also, revealed that the three tested shapes of trap (circle, square and triangle) were attractive for the considered insects without significant differences.

INTRODUCTION

To avoid some of the environmental problems as pollution of air, water and soil; increase number of pests as well as resistance of pests associated with the widespread and some indiscriminate use of pesticides (Mesbah, 1995 and Shower, 2000), an effective and save method for monitoring and reducing population of some injures insect pests are needed. Yellow sticky traps have been suggested for use in attracting adult flies for monitoring population (Byrne, 1986; Roa *et al.*, 1991; Metwally, 1995 and Ismail *et al.*, 1998). Under cotton field conditions, yellow sticky trap may be used as a mechanical control tool for suppression populations of many sucking insect pests as well as it was found a rapid and easy method for detecting adult leafminer populations (Chandler, 1985 and Mesbah, 2001).

Few studies have been conducted to indicate the relationship between sticky trap height and its efficiency as a mechanical control for reducing populations of some insect pests in sugar beet fields. So, the present study aimed to determine the trap height which may be useful for monitoring and mass trapping for some sugar beet insect pests, in addition to study the effect of wind velocity, area and shape of trap on its catch of sugar beet insect pests.

MATERIALS AND METHODS

This study was conducted at the experimental farm of the Faculty of Agriculture, at Kafr El-Sheikh Governorate, Tanta University, during 2002/03 and 2003/04 seasons.

One feddan was cultivated with Raspoly sugar beet variety in the first half of November of both seasons for determining the optimal height of yellow sticky trap for catching the most common insect pests occurring in sugar beet fields and to evaluate its effectiveness as a monitoring and control for insect pests in sugar beet fields.

For this study, 9 yellow double sticky traps were used, each consisted of yellow carton sheet paper measured 10 x 22 cm, fixed on one wooden stand. Sticky was carefully distributed on the yellow carton sheet, which was subjected to change at weekly interval by a new one. Traps were positioned at 30, 60 and 90 cm above the ground in sugarbeet field. For each height three traps were used and distributed in a regular distance (10 m from each other) along the longitudinal axis. Traps were positioned and fixed parallel to cardinal directions from North to South, not to obstruct the winds. At weekly intervals, traps were taken to the laboratory where the trapped insects were sorted, identified and counted.

The effect of daily mean wind velocity (DMWV) on yellow sticky traps catch was studied. The wind velocity data were taken from Sakha meteorological station.

To study the effect of yellow sticky trap area on its catch, three different areas [large (456 cm²) medium (294 cm²) and small (160 cm²)] of traps were tested, each area was replicated three times. Also, the relationship between shape of yellow sticky trap and its catch numbers was studied. For this purpose three different shapes (circle, square and triangle) with the same area (144 cm²) were tested to determine the most attractive shape for insect pests in sugar beet field. Each shape was replicated three times. Yellow sticky traps were prepared, distributed and fixed in sugar beet field (one feddan) as above mentioned (Fig. 1: A and B).

Throughout the period of this study, chemical control was not applied. Data obtained were statistically analyzed using Duncan's Multiple Test (Duncan, 1955).

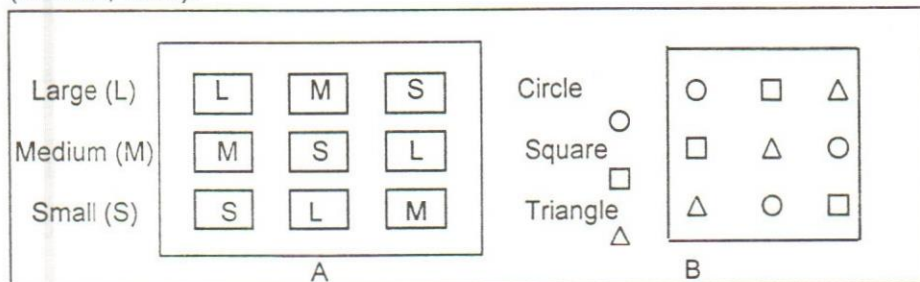


Fig. (1): Diagrammatic sketches show the distribution of yellow sticky traps [different areas (A) and different shapes (B)] in sugar beet field.

RESULTS AND DISCUSSION

1. Effect of trap height on insect catches:

Mean numbers and general mean of adults of *Pegomyia mixta*, *Cassida vittata*, *Aphis gossypii*, *Empoasca* spp. and *Bemisia tabaci* caught on yellow sticky traps placed at 30, 60 and 90 cm above ground in sugar beet fields, during the two seasons of study are presented in Tables 1, 2, 3 and 4.

As shown in Tables 3 and 4, the mean number of *P. mixta* adult caught throughout the two seasons of study on traps positioned at 30 and 60 cm were 362 and 334 individuals/trap while those placed at 90 cm trapped 172 individuals

The analysis of the obtained data confirms the previous findings, as it clearly shows a significant difference in population of *P. mixta*. On traps placed at 30 & 60 cm and 90 cm above ground.

In comparison the mean number of *C. vittata* adults caught on traps placed at 30, 60 and 90 cm above ground were greatly lower (30, 35 and 48 individuals/trap) than those of *P. mixta* trapped on traps positioned at the same heights (Table 3). The average number of *C. vittata* adults caught on sticky trap placed at 90 cm was significantly more than those trapped on traps placed at 30 and 60 cm above ground (Table 4).

Also, as shown in Tables 1, 2, 3 and 4, sticky traps placed at 90 cm above ground, significantly caught a great number (1900 individuals/trap) of *A. gossypii* followed by traps positioned at 60 cm (1456 individuals/trap) and that placed at 30 cm (933 individuals/trap).

Table (1): Mean number of trapped insect by one yellow sticky trap at three selected heights in sugar-beet fields at Kafr El-Sheikh region during 2002/03 season.

Date of inspection	Mean no. of trapped insects/trap at selected heights (cm)														
	<i>P. mixta</i>			<i>C. vittata</i>			<i>A. gossypii</i>			<i>Empoasca</i> spp.			<i>B. tabaci</i>		
	30	60	90	30	60	90	30	60	90	30	60	90	30	60	90
5/1/2003	8	10	2	0	+	0	0	14	76	23	45	20	4	2	0
12/1	12	12	2	0	+	0	22	14	30	11	22	36	0	2	0
19/1	13	14	4	0	+	0	108	63	76	10	66	48	2	0	0
26/1	37	20	14	0	+	0	33	46	172	26	22	14	2	2	0
2/2	40	23	10	0	+	0	4	58	250	14	24	24	2	0	0
9/2	34	53	12	0	+	0	42	128	350	17	81	22	4	4	1
16/2	4	22	8	0	+	0	94	162	322	31	80	64	0	0	0
23/2	50	10	2	0	2	0	118	222	354	34	34	16	0	0	0
2/3	56	20	4	0	0	0	143	236	130	24	44	38	0	0	2
9/3	2	66	8	0	6	0	142	256	34	16	47	60	0	0	3
16/3	12	4	6	3	4	0	116	120	4	32	74	40	0	0	3
23/3	14	10	9	0	0	4	42	28	2	46	164	173	4	0	0
30/3	18	9	16	0	2	2	4	2	2	107	57	90	0	3	3
6/4	10	16	36	0	0	0	0	10	0	37	192	127	5	0	0
13/4	2	6	14	0	4	4	2	2	6	144	358	348	0	6	6
20/4	14	3	2	6	0	4	0	0	2	287	164	132	0	0	1
27/4	2	16	8	0	0	16	2	0	4	118	108	210	0	0	7
4/5	2	2	6	12	2	14	13	8	6	200	94	180	0	2	0
11/5	0	0	0	4	6	12	5	4	3	228	106	202	0	0	0
Total mean	330	316	163	25	26	56	890	1373	1823	1405	1782	1844	23	21	26

Table (2): Mean number of trapped insect by one yellow sticky trap at three selected heights in sugar-beet fields at Kafr El-Sheikh region during 2003/04 season.

Data of inspection	Mean no. of trapped insects/trap at selected heights (cm)														
	<i>P. mixta</i>			<i>C. vittata</i>			<i>A. gossypii</i>			<i>Empoasca</i> spp.			<i>B. tabaci</i>		
	30	60	90	30	60	90	30	60	90	30	60	90	30	60	90
5/1	10	14	2	0	0	0	27	14	13	9	16	2	0	3	0
12/1	12	13	5	0	0	0	11	66	92	25	44	35	2	1	2
19/1	11	22	15	0	0	0	33	48	35	14	51	21	2	1	1
26/1	43	22	10	0	0	0	34	61	81	12	22	45	2	0	0
2/2	46	70	15	0	0	0	16	131	184	30	68	33	4	0	0
9/2	26	25	12	0	0	0	112	170	266	16	23	14	0	4	2
16/2	19	11	2	0	2	2	94	311	375	17	25	26	0	0	1
23/2	42	22	5	2	0	0	147	253	343	37	82	24	0	0	2
2/3	60	62	7	5	7	0	142	261	377	42	82	69	0	0	0
9/3	21	5	6	0	0	0	118	128	138	23	35	17	0	0	0
16/3	12	11	4	0	5	0	37	30	36	27	46	39	0	0	0
23/3	17	11	18	0	0	0	4	3	4	38	49	61	0	0	0
30/3	21	18	40	0	0	0	0	11	3	50	78	42	0	3	0
6/4	13	7	13	8	9	5	2	3	3	70	165	176	0	0	4
13/4	7	1	2	0	0	2	0	1	0	97	67	99	0	0	0
20/4	13	26	9	0	0	0	1	1	0	136	183	151	6	5	2
27/4	7	4	7	14	0	6	6	16	9	235	355	355	8	0	4
4/5	4	0	0	3	8	5	8	4	2	211	172	136	0	0	0
11/5	1	0	0	0	10	17	2	5	7	216	113	211	0	3	0
Total mean	385	344	172	32	41	37	895	1517	1968	1305	1676	1556	24	20	18

Table (3): Mean number of trapped insect by one yellow sticky trap at three selected heights in sugar-beet fields at Kafr El-Sheikh region during 2002/03 season.

Data of inspection	Mean no. of trapped insects/trap at selected heights (cm)														
	<i>P. mixta</i>			<i>C. vittata</i>			<i>A. gossypii</i>			<i>Empoasca</i> spp.			<i>B. tabaci</i>		
	30	60	90	30	60	90	30	60	90	30	60	90	30	60	90
5/1	9	12	2	0	0	0	11	14	45	16	31	11	2	3	0
12/1	12	13	4	0	0	0	67	40	61	18	33	36	1	2	1
19/1	12	18	10	0	0	0	71	56	56	12	59	35	2	1	1
26/1	40	21	12	0	0	0	34	54	127	19	22	30	2	1	0
2/2	43	47	13	0	0	0	15	95	217	22	46	29	3	0	0
9/2	30	39	12	0	0	0	112	149	308	17	52	18	2	4	2
16/2	12	16	5	0	1	1	94	237	349	24	53	45	0	0	1
23/2	46	16	4	1	1	0	133	238	349	36	58	20	0	0	1
2/3	58	41	6	3	4	0	143	249	254	33	63	54	0	0	1
9/3	12	36	7	0	3	0	130	192	86	20	41	39	0	0	2
16/3	12	8	5	2	5	0	77	75	20	30	60	40	0	0	2
23/3	16	11	14	0	0	2	23	21	3	42	107	117	2	0	0
30/3	20	14	28	0	1	1	2	7	3	79	68	66	0	3	2
6/4	12	12	25	4	5	3	1	7	2	54	179	152	3	0	2
13/4	5	4	8	0	2	3	1	2	3	121	213	224	0	3	3
20/4	14	15	6	3	0	2	1	1	1	212	174	142	3	3	2
27/4	5	10	8	7	0	11	4	8	7	177	232	283	4	0	6
4/5	3	1	3	8	5	10	10	6	5	206	133	158	0	1	0
11/5	1	0	0	2	8	15	4	5	4	222	110	207	0	2	0
Total mean	362	334	172	30	35	48	933	1456	1900	1360	1734	1706	24	23	26

Table (4): Mean number of trapped insect by one yellow sticky trap at three selected heights in sugar-beet fields at Kafr El-Sheikh region during 2002/03 and 2003/04 seasons.

Species	Mean no. of trapped insect/trap at selected heights (cm)		
	30	60	90
<i>P. mixta</i>	362b	334 b	172 a
<i>C. vittata</i>	30 a	35 b	48 c
<i>A. gossypii</i>	933 a	1456 b	1900 c
<i>Empoasca</i> spp.	1360 a	1734 b	1706 b
<i>B. tabaci</i>	24 a	20 a	22 a
The general mean	2709 a	3579 a	3848 a

Data presented in Table 4 indicated that the different among the mean numbers of *A. gossypii* caught on yellow sticky traps placed at the three tested heights were significant.

As for *Empoasca* spp., data presented in Tables 3 and 4 indicate that the mean numbers of insects caught on traps placed at 30, 60 and 90 cm above ground were 1360, 1734 and 1706 individuals/trap, respectively. Statistical analysis (Table 4) show that the insect numbers trapped on traps placed at 60 and 90 cm height were significantly more than those captured on traps placed at 30 cm above ground. El-Khouly (1998) and Shalaby (2001) reported that yellow sticky trap was the most attractive for *P. mixta*, *C. vittata* and *Empoasca* spp. in sugar beet fields.

In case of *B. tabaci*, data in Tables 1, 2, 3 and 4 indicate that the mean numbers of whitefly adults captured on sticky traps positioned at the three tested heights were greatly lower than those of the other considered insects, also no significant difference was detected among mean numbers of whitefly adults trapped on traps placed at the three selected heights.

As shown in Table 4, data indicated that the general mean numbers of all considered insects trapped on yellow sticky traps, placed at 30, 60 and 90 cm above ground, during the two seasons of study were 2709, 3579, and 3848 individuals/trap, respectively, without any significant differences between them. The results also revealed that traps placed at 90 cm above ground significantly caught more numbers of *C. vittata*, *A. gossypii*, *Empoasca* spp. and *B. tabaci* than that positioned at 30 and 60 cm above ground which were more attractive for *P. mixta* adults. These results are in agreement with those of Adlerz (1976); Capinera (1978) and Lewis (1995) they found that the trap height had significant effect on its catch numbers.

2. Effect of daily mean wind velocity (DMWV) on trapped numbers of certain sugar beet insects on yellow sticky traps:

The effect of daily mean wind velocity on trapped numbers of certain sugar beet insect pests (*P. mixta*, *C. vittata*, *A. gossypii*, *Empoasca* spp. and *B. tabaci*) were estimated by working out simple correlation coefficients (Table 5). The relationship between mean number of capturing insect and mean number of DMWV for the two seasons for study were positive and insignificant (0.161, 0.412 and 0.078) for *P. mixta*, *C. vittata* and *Empoasca*

spp., respectively, and insignificant negative (-0.391 and -0.047) for both *A. gossypii* and *B. tabaci*.

Table (5): Simple correlation coefficients between captured insect pests in sugar beet fields and wind velocity during 2002/03 and 2003/04 seasons.

Captured insects	Simple correlation coefficients (r) 2002/03 +2003/04
W.V.X <i>P. mixta</i>	0.161
W.V.X <i>C. vittata</i>	0.412
W.V.X <i>A. gossypii</i>	-0.391
W.V.X <i>Empoasca</i> spp.	0.078
W.V.X <i>B. tabaci</i>	-0.047

W.V. wind velocity

Relying on the simple correlation values, it could be concluded that wind velocity as a weather factor had not a significant role in insect populations captured on yellow sticky traps. It could be suggested that trap height and colour are important factors influencing insect catches. These results are in agreement with those of Cillespie and Vernon (1990) and Mesbah (2001).

3. Impact of yellow sticky trap area on catch:

The effect of yellow sticky trap area on catch of sugar beet insect pests was evaluated by working out simple correlation coefficients (Table 6). The results revealed that numbers of sugar beet insect pests caught on yellow sticky traps increased with increasing the trap area. As there was a positive and highly significant relationship between these variables ($r = 0.94$). The mean number of sugar beet insects caught on small trap was 1868 individuals/trap/season, while it was 4715 individuals/trap/season on large trap. These results are in agreement with those of Laska *et al.* (1986) he found that numbers of insect pests caught on sticky traps increased with increasing the trap area.

4. Impact of yellow sticky tarp shape on catch:

Effect of shapes of yellow sticky traps on their catch was evaluated by study the relationship between shape of trap and its number of catch in sugarbeet fields. As shown in Table (6) yellow sticky traps of circle, square and triangle shapes were attractive for the considered sugar beet insect pests.

Table (6): Impact of yellow sticky trap area on average number of certain trapped insects in sugar beet fields during 2002/03 and 2003/04 seasons.

Trap area (cm ²)	Average number of trapped insects/trap
Small (160)	1868
Medium (294)	3151
Large (456)	4715

$r = 0.99$

The average numbers of insects caught on circle, square and triangle traps were 1680, 1761 and 1422 individuals/trap/season, respectively. Data tabulated by Table (7) also revealed that both circle and square trap attracted highest numbers of insects in comprising with triangle trap, but without significant differences.

It could be concluded that the yellow sticky traps may be useful with other control methods for reducing population densities of certain insect pests in sugar beet fields or other crop, especially that this method is so easy to use by the growers, not expensive and safe for human public health, ecosystem elements and less damaging for biological control agents. These results are in agreement with those of Adlerz (1976) and Robin and Mitchele (1987).

Table (7): Impact of yellow sticky trap shape on average number of certain tapped insects in sugar beet fields during 2002/2003 and 2003/2004 seasons.

Trap shape	Average number of trapped insects/trap
Circle	1680 a
Square	1761 a
Triangle	1422 a

REFERENCES

- Adlerz, W.C. (1976). Comparison of aphids trapped on vertical-sticky board and cylindrical aphid traps and correlation with water melon mosaic virus 2 incidence. J. Econ. Entomol. 69, 495-498.
- Byrne, ND.N.; P.K. Von Bretzel and C.J. Hoffman (1986). Impact of trap design and placement when monitoring for the sweet potato whitefly (Homoptera: Aleyrodidae). Environ. Entomol. 15: 300-3004.
- Capinera, J.L. and M.R. Walmsley (1978). Visual responses of some sugar-beet insects to sticky traps and water pan traps of various colors. J. Econ. Entomol., 71(6): 926-927.
- Chandler, L.D. (1985). Flight activity of *Liriomyza trifolii* (Diptera: Agromyzidae) in relationship to placement of yellow traps in bell pepper. J. Econ. Entomol. 18: 825-828.
- Cillespie, D.R. and R.S. Vernon (1990). Trap catch of western flower thrips (Thysanoptera: Thripidae) as affected by colour and height of sticky traps in mature greenhouse cucumber crops. J. Econ. Entomol. 83: 971-975.
- Duncan, D.B. (1955). Multiple range test and Multiple F-test. Biometrics, 11: 1-124.
- El-Khouly, M.I.I. (1998). Ecological studies and control of the tortoise beetle *Cassida vittata* Villers in sugar-beet. Ecosystem. Ph.D. Thesis, Fac. Agric. Al-Azhar Univ.
- Ismail, I.I.; R.A.K. Salam; S.A. Emara and I.S. Abd El-Wahab (1998). Efficiency of yellow traps used for monitoring and suppression the population density of certain cotton sucking insects. Bull. Int. Sci. Egypt, 76: 199-210.

- Leshchenko, F.G. (1980). Increased use of integrated systems. *Zashchita Rastenii*. No. 3, 11-13.
- Lewis, T. (1995). A comparison of water traps, cylindrical sticky traps and suction traps for sampling thysanopteran populations at different levels. *Entomol. Exp. Appl.*, 2: 204-215.
- Mesbah, I.I. (1995). Determination of the economic injury level of *Spodoptera littoralis* (Boisd.) on soybean plants at Kafr El-Sheikh region. *J. Agric. Res. Tanta Univ.*, 21(2): 311-322.
- Mesbah, I.I. (2001). Sticky traps: Evaluation of performance under cotton field conditions. *J. Agric. Sci. Mansoura Univ.*, 26(4): 2331-2341.
- Metwally, E.M.; M.M. Helaly; S.S.M. Hassanein; W.M.H. Desuky and H.M.H. Al-Shannaf (1995). Efficiency of two types of traps and daily flight activity of some cotton insects at Zagazig region, Egypt. *Zagazig J. Agric. Res.*, 22(1): 175-181.
- Roa, N.V.; A.S. Reedy and K.T. Roa (1991). Monitoring of cotton whitefly, *Bemisia tabaci* (Genn.) with sticky traps. *Madras Agricultural Journal*, 78(1-4): 1-7 (C.F. R.A.E., 81(8): Abst. No. 8120).
- Robin, M.R. and W.C. Mitchell (1987). Sticky trap for monitoring leafminers *Liriomyza sativae* and *Liriomyza trifolii* (Diptera: Agromyzidae) and their associated hymenopterous parasites in watermelon. *J. Econ. Entomol.*, 80(6): 1345-1347.
- Shawer, D.M.B. (2000). Ecological studies on some insect pests attacking cotton plants. M.Sc., Thesis, Fac. of Agric., Kafr El-Sheikh, Tanta Univ., 92 pp.

بعض العوامل التي تؤثر على أعداد حشرات بنجر السكر المصادة بالاصقة اللاصقة

اسمهان السعيد يوسف

قسم الحشرات الاقتصادية - كلية الزراعة بكفر الشيخ - جامعة طنطا

اجريت هذه الدراسة في منطقة كفر الشيخ بهدف دراسة تأثير ارتفاع ، مساحة وشكل المصيدة الصفراء اللاصقة على فاعليتها كوسيلة ميكانيكية يمكن التوسع في استخدامها بغرض جذب ، تذبذب ومكافحة بعض حشرات بنجر السكر خلال موسم ٢٠٠٢/٢٠٠٣ ، ٢٠٠٣/٢٠٠٤ م. وقد امكن تلخيص النتائج المتحصل عليها في النقاط التالية:

- ١- أوضحت الدراسة أن أهم الحشرات التي انجذبت إلى المصائد الصفراء اللاصقة عند وضعها في حقول بنجر السكر على ارتفاع ٣٠ ، ٦٠ ، ٩٠ سم من سطح الأرض كانت كما يلي:
Aphis gossypii, *C. vittata*, *P. mixta*, *Empoasca* spp. and *B. tabaci*.
- ٢- أوضحت الدراسة أن وضع المصائد الصفراء اللاصقة في حقول بنجر السكر على ارتفاع ٩٠ سم من سطح الأرض زاد من كفاءتها في جذب أعداد كبيرة من حشرات خنفساء البنجر ، الجاسيد ، الذباب الأبيض اما التي وضعت على ارتفاع ٣٠ ، ٦٠ سم فقد كانت أشد جذبا لحشرة ذبابة البنجر.
- ٣- لم يكن لقوة الرياح تأثير معنوي على الكثافة العددية لحشرات البنجر المصادة بواسطة هذه المصائد.
- ٤- أظهرت الدراسة وجود علاقة موجبة وعالية المعنوية بين مساحة المصيدة والعدد الكلي للحشرات المصادة.
- ٥- أوضحت الدراسة أن للمصيدة الصفراء اللاصقة قوة جذب عالية بصرف النظر عن كونها مستديرة أو مربعة أو مثلثة الشكل ، حيث لم توجد فروق معنوية بين الأشكال الثلاثة.