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NON CHEMICAL CONTROL METHODS OF *TROPINOTA SQUALIDA* SCOP. ADULTS (COLEOPTERA: SCARABAEIDAE) IN THE NEWLY RECLAIMED LANDS.

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Abstract

Blue coloured traps, plant traps and plant extractions (Neem Azal formulations) were evaluated as a means of control against *Tropinota squalida* in Sharkia and Ismailia Governorates during 1995/96 and 1996/97. The blue traps were more efficient than pan blue water traps for mass trapping adults of these suppressing population density of the target pest.

Plant traps (Canola) was used as a plant trap in intercropping system with wheat or broad bean. The highest attracting effect was achieved 85.27% at the ratio of intercropping 3 canola/7 wheat, while the attraction of canola by 2, 3, 4 were nearly similar, therefore the suitable intercropping system with 2 caonla/8 wheat was considered as the best ratio for trapping *T. squalida.*

Canola with broad bean was the most effective intercropping ratio at rate of 2 canola/8 broad bean. In this ratio, the attraction reached 24% of the total number of beetles attracted to the plot.

The repellent effect of two Neem Azal formulations (T.s 1% & T 5%) on adult attraction to flowers was evaluated during 1995 & 1997 on 3 fruit trees, 3 field crops and wild mustard. Beetles were counted visually after 1, 2, 5, 7 and 11 days after application in both treated and untreated plants. Neem application on these host plants gave adequate protection for 5-11 days depending on the population density of both host plant flowering and the attracted adults.

INTRODUCTION

The web rose chafer, *Tropinota squalida* Scop. (Coleoptera : Scarabaeidae) was recorded previously in Egypt and known as a serious pest to ornamental plants, but its population was always bellow the economic threshold in valley lands foreseen (Alfieri, 1976). In recent years, *T.squalida* population outbreaked and caused great damage to various plantations (Ali and Ibrahim, 1988).

Southwood (1978) stated that the efficiency of a trap for a trapping particular insect can be tested by releasing a known number of newly emerged individuals. El-Deeb(1992) recorded that the blue coloured traps were highly effective in attracting *T.squalida* adults at El-khattara district and the accumulated percentages of captured adults by the blue pan water traps were during February, March and April was about 98.4 of the total captures. Haydar *et al.* (1993) mentioned that in an apple orchard in the newly reclaimed area of Nubaria, Egypt, mass trapping of *T. squalida* showed that blue plastic buckets captured the highest number of adults. Ali(1993) concluded that blue pan water traps sufficiently suppressed the pest population density of adults. Blue trap also used for forecasting and studying the population dynamics of *T. squalida* adults. El-Dein *et al* (1993) evaluated enamelled metal basins in an apple orchard at Belbeis with soapy water and a white plastic pyramid and found that it was twice effective than blue plastic basins with water. Dimetry *et al* (1994) tested Neem Azal-S as an oviposition deterrent and growth inhibitor gave an oviposition deterrent index, had a significant effect in increasing the incubation period of newly laid eggs and caused a notable mortality of the resulting larvae, related development and reduced the larval body weight against the rose scarabaeid beetle *T. Squalida.*

In newly reclaimed areas El-Khattara and New-Salhia districts, Sharkia Governorate, Nubaria, Behara Governorate and Ismailia, Ismailia Governorate, *T.squalida* beetles attract wide range of plant flowers, emerged during the period from mid January until mid may causing considerable damage and accordingly great losses. The flowers of field crops (broad bean, lupine, wheat), fruit trees (apple, pear, citrus), vegetables (cabbage, radish, turnip, rocket) and weeds between (wild mustard, wild radish) are severely attacked by this pest. Therefore, this work aimed to study the Non-Chemical control methods.

MATERIALS AND METHODS

Non-chemical control techniques were evaluated out in newly reclaimed lands at Sharkia and Ismailia Governorates during 1995/1996,1996/1997 and 1999/2000 seasons by bring three different non-chemical methods, the first is by testing the efficiency of two traps design (water blue trap and funnel trap). The second method is by using Neem extracts. The third method is by using plant traps (canola plant, *Prassica nabus*) as intercropping system.

1. Pan blue water trap and funnel trap : The pan blue water traps and funnel traps Fig. 1,2 were distributed between apple, pear and navel orange orchards and field strawberry at New Salhia, Sharkia Governorate, as mentioned above, were used for

mass trapping of *T. squalida.*

One feddan of each fruit or vegetable species was selected. Ten traps (5 pans + 5 funnels) were distributed alternatively, at a distance of 25 m. apart. Captured adults were collected and sexed weekly during the flowering season which extended from late December until mid-May, of the next year.

The efficiency of traps was determined by using the relative number of adults caught in each type of traps and that observed on trees in the selected area.

$$\text{The \% trap efficiency} = \frac{\text{No. of adult beetles in each trap weekly}}{\text{Total number of adults caught in all traps and visually counted on trees}} \times 100$$

2. Plant traps: Canola plants were planted as an intercropping with wheat or broad bean to suppress the population density of *T. squalida* adults as for as possible below the DTL. The experiment was carried out at Ismailia experimental station, during a period extended from January until mid-April, 1999/2000. A completely randomized block design was used; three replicates in each treatment and were applied in an area of each replicate (10 rows) 3m. x 7m. Weekly number of adults attracted to flowers of both crops were visually carried out at mid-noon.

3. Effect of two different Neem azal formulations: Experiments were carried out in New-Salhia, Old Kassassien and El-Tell El-Kebir district, during the flowering season of broad bean, wheat, lupin, wild mustard, apple, pear and navel orange, which applied during March and April 1995 and 1997 seasons. Two formulations of NeemAzal-T/S* (1% Azadrachtine A) at the rate of 10,000 ppm, NeemAzal-T* (5% Azadrachtin A) at the rate of 50,000 ppm were tested. Three randomly distributed trees of apple, pear, navel orange were chosen and as well as 3m2 area of broad been, lupine, wheat and wild mustard randomly for each treatment or non-treated.

The number of *T. squalida* beetles were counted before application and just 1, 2, 5, 7, 11 days after spraying at mid-noon. The percentage reduction in beetles population was calculated according to the equation developed by Henderson and Teliton (1955).

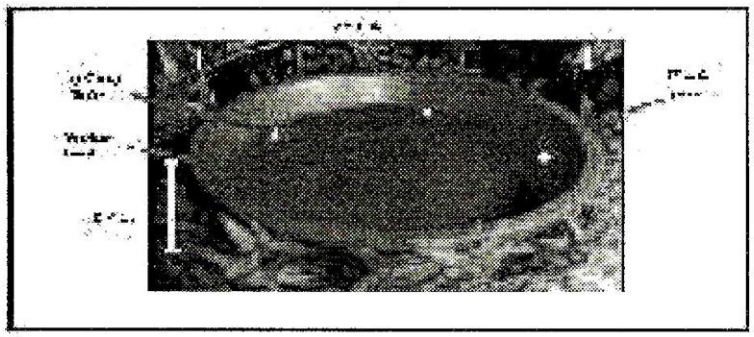

Fig 1. Pan blue water trap.

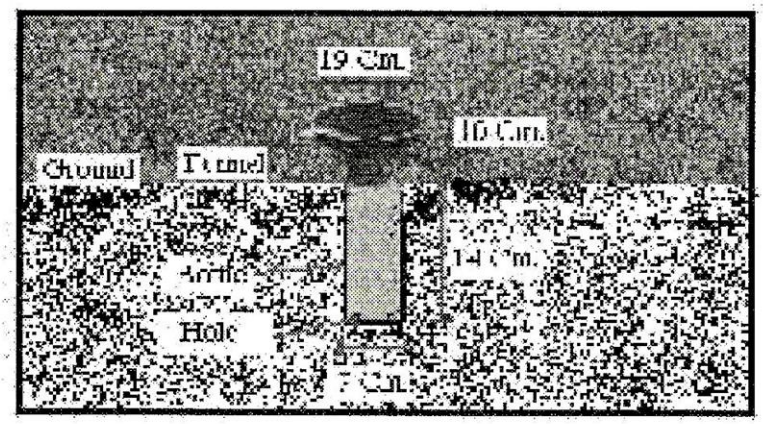

Fig. 2. Funnel blue trap.

RESULTS AND DISCUSSION

This study was undertaken to evaluate three non-chemical controlling methods (a blue colour traps, plant traps, and application of NeemAzal formulation*) for their efficient in suppressing *T. Squalida* adults on fruit and field plant flowers at Sharkia and Ismailia Governorates during 1995-2000 seasons.

1. Blue coloured traps: Two types of blue colour traps were used in this study (blue pan water and blue funnel traps).

Data obtained in Tables 1 and 2 during 1995 season using the funnel blue traps captured more adults in apple, pear, navel orange and strawberry (5.67, 2.36, 6.06 and 1.82 beetles/funnel trap/week), respectively.

Pan blue water traps, on the same hosts, captured 1.69, 0.78, 0.30 and 0.15 beetles/pan trap/week, respectively. Similar trend was observed during 1996, where the number of adults captured were 11.46, 3.82, 0.88 and 1.81 in the funnel traps, and 1.62, 1.60, 0.073, and 0.10 in ban traps/week, respectively.

Generally, the mean number of adults captured by funnel blue traps was 4.24 beetles/trap, which about five times more than that those captured by pan blue water traps (0.79 adults). The "t" value appeared highly significant value (5.58**).

Also, results in Table 2 revealed that the efficiency of funnel and pan traps capture were 72.48% and 14.05% (apple), 58.08 and 22.37 (pear), 83.38% and 4.48% (navel orange), 86.84% and 5.98% (strawberry) for both seasons, respectively. It could be concluded that controlling this pest might be achieved safely and efficiently by using the funnel blue traps on fruit trees and strawberry plants. The "F" value appeared significant value (7.99*) between treatments.

2. Plant traps: Plant traps are considered as one of the agricultural most applicable control method and the most suitable technique when used agriculture intercropping methods to reduce the infestation of pests below the damage threshold level. Canola plants attract and preferred for *T. squalida* than other host plants. Therefore, canola was used as plant trap intercropping with wheat or broad bean.

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Table 1. Mean number of *T. squalida* captured adults/blue funnel trap and pan water trap in orchards and fields at New-Salhia during the flowering period 1995 and 1996 seasons

Mean number of adults/trap/week				
Trap	Funnel blue trap		Pan blue water trap	
Year / Host	1995	1996	1995	1996
Apple	5.67 (3.78-8.00)	11.46 (5.50-26.20)	1.69 (1.11-2.56)	1.62 (0.20-4.20)
Pear	2.26 (1.67-3.00)	3.82 (0.10-7.60)	0.78 (0.44-1.11)	1.60 (0.20-4.20)
Navel orange	6.06 (4.80-8.40)	0.88 (0.56-1.37)	0.30 (0.20-0.50)	0.073 (0.06-0.12)
Strawberry	1.82 (0.89-3.33)	1.81 (0.92-3.07)	0.15 (0.0-0.33)	0.10 (0.08-0.16)
Total	15.91	17.97	2.92	3.39
Mean	3.98	4.49	0.73	0.85
G.M.	4.24		0.79	

"t" between the two traps design 5.58**

Table 2. The changes in the number of *T. squalida* adults as indicated by captured two types of blue traps during 1995 and 1996 flowering period at El –Khattara.

Host	Apple						Pear					
	Insects number				Eff. %		Insects number				Efficiency	
data / year	per fun	per pan	per tree	T.	fun. trap	pan trap	Per fun.	per pan	per tree*	T.	fun. trap	pan trap
1995	5.67	1.69	1.08	8.44	67.18	20.02	2.36	0.78	1.07	4.21	56.06	18.53
1996	11.46	1.62	2.1	15.18	75.49	10.67	3.82	1.6	1.01	6.43	59.41	24.88
Total	17.13	3.31	3.18	23.62	72.52	14.01	6.18	2.38	2.08	10.64	58.08	22.37
Mean	8.56	1.66	1.59	11.81	72.48	13.44	3.09	1.19	1.04	5.32	58.08	22.37
s.d.	± 4.09	± 0.04	± 0.72	± 4.76	± 5.78	±	± 1.03	± 0.57	± 0.54	± 1.56	± 2.36	± 4.39

Host	Navel orange						Strawberry					
	Insects number				Eff. %		Insects number				Efficiency	
data / year	per fun	per pan	per tree	T.	fun. trap	pan trap	Per fun.	per pan	per tree*	T.	fun. trap	pan trap
1995	6.06	0.3	0.36	6.72	90.18	4.46	1.82	0.15	0.1	2.07	87.92	7.25
1996	0.88	0.073	0.65	1.603	54.9	4.55	1.81	0.1	0.2	2.11	58.78	4.74
Total	6.94	0.373	1.1	8.323	83.38	4.48	3.63	0.25	0.3	4.18	86.84	5.98
Mean	3.47	0.187	0.505	4.162	83.37	4.48	1.815	0.125	0.150	2.090	86.84	5.98
s.d.	± 3.66	± 0.16	± 0.20	± 3.61	± 24.9	± 0.06	± 0.007	± 0.03	± 0.07	± 0.28	± 20.6	± 1.77

* = Visual count/tree + = Visual count/plot

Table 3. Effect of different intercropping ratios between canola plants (c) in wheat fields (w) and the corresponding captured adult number of *T. squalida*.

Plant	Canola: Wheat				Wheat: Canola				W:C	Total	C	W
Rows / obsrv.	1:9	2:8	3:7	4:6	1:9	2:8	3:7	4:6	5:5		10	10
Mean No. of adult on wheat	1.67	1.00	1.67	1.50	0.67	0.33	0.33	1.00	1.33	9.50	-	16
Mean No. of adult on canola	6.0	5.67	9.67	5.67	12.67	17.33	9.67	7.67	5.67	80.02	20.33	-
Total	7.67	6.67	11.34	7.17	13.34	17.66	10.00	8.67	7.00	89.52	36.33	
attract % on canola	78.23	85.01	85.27	79.08	94.98	98.13	96.70	88.47	81%	89.39	55.96	
attract on wheat	21.77	14.99	14.73	20.92	5.02	1.87	3.30	11.53	19%	10.61	44.04	
Reduction % by canola	78.23	85.01	85.27	79.08	94.98	98.13	96.70	88.74	81%	89.39	55.96	

Table 4. Effect of different ratios of canola plant (c) intercropping and broad bean (B.) on the number of captured *T. squalida* adults.

Plant	Canola: broad bean				Broad bean: Canola				B:C	Total	B	C
Rows / obsrv.	1:9	2:8	3:7	4:6	1:9	2:8	3:7	4:6	5:5		10	10
No. of adults attracted to broad bean	13.67	12.67	11	11.67	4.67	7	7	12	6.33	86.01	17	-
No. of adults on canola	2	4	4	5	13.33	5	5	10	7	55.33	-	20.33
Total No. attracted/plot	15.67	16.67	15.00	16.67	18.00	12.00	12.00	22.00	13.33	141.34	37.33	
attract% on canola	12.76	24.00	26.76	30.00	74.06	41.67	41.67	45.45	52.51	39.15	54.46	
attract% on broad bean	87.24	76.00	73.33	70.00	25.94	58.33	58.33	54.54	47.49	60.85	45.54	
Reduction % by canola	12.76	24.00	26.67	30.00	74.06	41.67	41.67	45.45	52.51	39.15	54.46	

a. Canola with wheat: Data obtained in Table 3 indicated that when wheat or canola plants are sown alone, the mean attracted number of *T. squalida* adults were 44.04% and 55.96%, respectively.

When equal number of rows of both canola and wheat were planted (1:1) the incidence of adult attraction to canola was increased to about 81%. But, when the wheat was considered as the main crop with ratios of canola 1, 2, 3, 4 rows the attraction to canola reached to the maximum percentage (89.39%).

The highest adult attraction was achieved by the ratio of 3 canola /7 wheat recording 85.27%, while the attraction percentage ratios of canola by 2, 3, 4 were nearly similar, therefore the suitable intercropping system with canola was 2 canola /8 wheat might be considered as the best economically ratio for mass trapping of *T. squalida* adults.

In case of intercropping canola with wheat with inverse ratios (1c/9w & 2/8 & 3/7 & 4/6) the attraction percentage was increased gradually by increasing canola ratio until reached the maximum 98.13% (2w/8c), but this intercropping method was not economic. The "F" value appeared highly significant value (6.67)** between treatments and (9.03**) between replicates.

b. Canola with broad bean: Data obtained in Table 4 indicated that, when both broad bean and canola plants were sown separately or intercropping in equal number of rows (plots) the percentage of attraction of *T. squalida* adults were nearly the same, where they were (45.54% and 54.46%) and (47.49% & 52.51%), respectively.

When the broad bean was planted, however, as a main crop with different intercropping ratios with canola, the attraction percentage to canola reached to the average percentage, 39.15%.

The attraction percentage of the different ratios of canola with 2, 3, 4 broad bean were increased gradually by increasing canola ratios. The most effective ratio of canola as plant trap was 2 canola + 8 broad bean, in this ratio, the attraction reached to 24% of the total number attracted to the plot. Therefore, it could be recommended that 2 canola /8 broad bean was the best ratio of intercropping canola with broad bean, in face of an important fact was that the broad bean have an attraction percentage more than canola (39.15% for canola and 60.85% for broad bean). The intercropping with canola was to help only in suppressing the population by the least canola and best attraction. The "F" value appeared highly significant value (7.31**) between treat-

ments and (21.22**) between replicates.

3. Repellent efficiency of two NeemAzal formulations on adult attraction to flowers of seven plant species: Data in Table 5 indicated the following results :

a. In apple orchards: In 1995, the repellent effect of T 5% resulted in 73.4% after one day, decreased to 34.5% after seven days of application. However, the repellent period started with (63.6%) after one day, but fluctuated to the 11^{th} day, (66.9%) during the second season 1997. The average repellent percentage of both seasons ranged between 68.5% (1^{st} day) – 33.4% (11^{th} day).

On the other hand, the repellent percentage of T/S 1% ranged between 36.4 – 81.5% and 86.3 – 88.3% for the two respective seasons. The average repellent in both seasons ranged between 61.4 (1^{st} day) – 44.2 (11^{th} day).

Generally, Neem application formulations on apple trees during apple flowering season gave protection for at least seven days depending upon the density of both flowering and adult population. Neem applications must be replicated every 7 days during the flowering season to keep the population density of adults to the lowest level as far as possible.

b. In pear orchards: In 1995, the repellent effect of T 5% was ranged between 74.6% after one day decreased to 10% on the fifth day of application. However, the repellent period started with 84.5% after one day, but continued to 11^{th} day (100%) during 1997. The average repellent of both seasons ranged between 79.6% - 50% (11^{th} days)

On the other hand, the repellent percentage of T/s 1% ranged between 73.1 – 46.3% and 87.4 – 100% for the two respective seasons. The average repellent percentage of both seasons ranged between 80.3 (1^{st} day)– 73.2% (11^{th} day).

Generally, Neem application formulations on pear trees during pear flowering season gave protection for at least five days depending upon the density of both flowering and attracted adults. Neem applications must be replicated every five days during the flowering season to keep the population density of adults to the lowest level as far as possible.

c. In navel orange orchards: In 1995, the repellent effect of T 5% ranged between 90.7% after one day to 3.7% on eleventh day of application. However, the re-

pellent period started with 76% after one day, but continued to 11th day (65.3%) during the second season 1997. The average repellent pertcentage of both seasons ranged between 83.4% (1st day) – 34.5% (11th day). On the other hand, the repellent percentage of T/s 1% ranged between 86.9 – 35.7% and 69.2 – 93.8% for the two respective seasons. The average repellent of both seasons for T/s 1% ranged between 78.1 – 64.8% during 11 days of application.

Generally, Neem application formulations on navel orange trees during navel orange flowering season gave protection for at least 11th depending upon the density of both flowering and attracted adults. Neem applications must be replicated every 11 days during the flowering to keep the population density of adults to the lowest level as far as possible.

d. In wheat fields: In 1995, the repellent effect of T 5 % ranged between 6.9% after one day to the more percentage 78.3% at the seven day of application. However, the repellent period was extended more during season 1997, where it ranged between 100% after one day to 100% also at the 11th. The average repellent of both seasons ranged between 53.5% (1st day) – 50% (11th day). On the other hand, the repellent percentage of T/s 1% ranged between 20.1 – 23.1% and 100 – 100% for two respective seasons. The average repellent of both seasons for T/s 1% ranged between 60.1 (1st day) – 50% (11th day).

Generally, Neem application formulations on wheat crop during wheat flowering season gave protection for at least seven day depending upon the density of both flowering and attracted adults. Neem application must be replicated every 5 days during the flowering to keep the population density of adults to the lowest level as far as possible.

e. In lupine fields: In 1995, the repellent effect of T/s % ranged between 18.9% after one day of application during 1995, However the repellent period was extended more during season 1997, where it ranged between 100% after one day to 75% at the 11th day. The average repellent of both seasons ranged between 59.5% (1st day) – 37.5% (11th day). On the other hand, the repellent percentage of T/s 1% ranged between 77.5% - 100% and 27.4 – 46.2% for two respective seasons. The average repellent of both seasons for T/s 1% ranged between 52.5 (1st day) – 23.1% (11th day) after application.

Generally, Neem application formulation on lupine crop during lupine flowering season gave protection for at least seven days depending upon the density of both

Table 5. The repellent potentiality of two NeemAzal formulations expressed number of *T.squalida* adults attracted to host plant species, fruit trees and field crop flowers in newly reclaimed areas during two flowering seasons (1995&1997).

Host	Year	Form / Day* / obs.	Average number of adults/tree											
			NeemAzal T (5%)						NeemAzal T/s (1%)					
			0	1	2	5	7	11	0	1	2	5	7	11
Apple	1995	treated	9.3	5	3.3	4.0	2.3	0.0	9.0	10.3	0.7	4.3	2.0	0.3
		Un.tre.	5.3	10.7	6.0	5.3	2.0	0.0	5.0	9.0	8.7	7.3	6.0	0.0
		Rep%		73.4	68.7	57.0	34.5	0.0		36.4	31.7	67.3	81.5	0.0
	1997	treated	4.3	0.7	1.0	0.0	1.3	0.7	5.7	0.3	0.7	0.3	0.3	0.3
		Un.tre.	6.7	3.0	4.3	1.7	3.0	3.3	6.0	2.3	2.0	2.3	3.0	2.7
		Rep%		63.6	63.8	100	32.5	66.9		86.3	63.2	86.3	89.5	88.3
	M. Mean			68.5	66.3	78.5	33.5	33.45		61.4	47.5	67.8	85.5	44.2
Pear	1995	treated	4.0	1.7	2.3	2.7	2.3	0.7	8.0	3.0	3.7	2.0	1.3	0.3
		Un.tre.	4.0	6.3	7.0	3	2.3	0.7	4.3	6.0	5.3	2.7	2.7	0.3
		Rep%		74.6	67.1	10.0	0.0	0.0		73.1	62.5	60.2	74.1	46.3
	1997	treated	4.3	0.3	0.3	0.0	0.0	0.0	5.0	0.3	0.7	0.0	1.7	0.0
		Un.tre.	6	2.7	3.7	2.0	2.3	1.3	6.3	3.0	3.0	1.7	2.3	1.7
		Rep%		84.5	88.7	100	100	100		87.4	70.6	100	6.9	100
	M. Mean			79.6	77.9	55	50	50		80.3	66.6	80.1	40.2	73.2
Navel orange	1995	treated	3.4	1.0	0.6	0.4	1.0	2.0	4.4	0.4	0.6	0.4	1.6	1.6
		Un.tre.	3.6	3.8	2.2	1.4	3.0	2.2	4.6	3.2	3.2	1.4	2.2	2.6
		Rep%		90.7	71.1	69.7	64.7	3.7		86.9	80.4	70.1	24.0	35.7
	1997	treated	4.4	0.4	0.2	0.4	1.2	1.0	5.2	0.6	0.2	0.6	0.6	0.2
		Un.tre.	5.8	2.2	2.6	1.4	5.2	3.8	6.4	2.4	3.4	1.0	2.8	4.0
		Rep%		76.0	89.9	62.3	69.6	65.3		69.2	92.8	26.2	73.6	93.8
	M. Mean			83.4	80.5	66.0	67.2	34.5		78.1	86.6	48.2	48.8	64.8
	M.G.M			77.2	74.9	66.5	50.9	23.3		73.3	66.9	68.4	58.2	60.7
Wheat	1995	treated	5.7	2.3	2.7	2.3	0.7	0.0	1.3	0.3	0.3	2.0	0.0	0.0
		Un.tre.	3.0	1.3	2.3	4.0	1.7	0.0	2.0	2.3	3.0	4.0	0.0	0.0
		Rep%		6.9	38.2	69.7	78.3	0.0		20.1	84.6	23.1	0.0	0.0
	1997	treated	3.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0
		Un.tre.	2.3	1.3	2.3	5.3	3.0	1.0	1.0	0.7	0.7	2.0	2.0	0.7
		Rep%		1.0	100	100	100	100		100	100	100	100	100
	M. Mean			53.5	69.1	84.9	89.2	50		60.1	92.3	61.1	50	50
Lupine	1995	treated	3.7	1.0	1.0	0.7	0.0	0.0	4.0	0.3	0.0	0.0	0.0	0.0
		Un.tre.	3.0	1.0	1.0	0.7	0.0	0.0	3.0	1.0	0.3	0.3	0.0	0.0
		Rep%		18.9	18.9	18.9	0.0	0.0		77.5	100	100	0.0	0.0
	1997	treated	8.0	0.3	0.0	0.7	0.3	2.0	4.0	1.3	0.3	2.0	1.3	2.7
		Un.tre.	5.3	1.7	8.0	13.3	15.0	5.3	6.7	3.0	4.3	7.7	16.7	8.4
		Rep%		100	100	96.5	88.7	75		27.4	88.3	56.5	87	46.2
	M. Mean			59.5	59.5	57.7	49.4	37.5		52.5	94.2	78.3	43.5	23.1
Broad bean	1995	treated	2.0	0.33	0.0	0.67	1.0	0.67	2.33	0.0	0.0	1.33	1.0	1.7
		Un.tre.	3.0	2.33	1.67	1.33	3.0	1.33	3.33	2.67	2.0	3.67	2.33	3.0
		Rep%		78.8	100	24.4	50	22.7		100	100	48.2	38.7	20.4
	1997	treated	2.0	0.0	0.0	0.3	1.7	1.0	1.0	0.0	0.0	1.3	0.0	0.3
		Un.tre.	2.0	1.3	1.3	2.0	4.3	2.3	1.0	1.3	1.3	3.7	1.0	2.3
		Rep%		100	100	85.0	60.5	56.5		100	100	64.9	100	87.0
	M. Mean			89.4	100	54.7	55.3	39.6		100	100	56.6	69.4	53.7
	M.G.M			67.5	67.2	65.8	64.6	42.4		70.9	95.5	65.3	54.3	42.3
Wild mustard	1995	treated	5.3	3.0	3.7	1.0	1.3	0.0	8.3	8.0	3.0	1.3	0.0	0.0
		Un.tre.	4.3	4.7	3.7	2.0	3.0	0.3	5.3	10.3	8.3	1.7	1.0	0.0
		Rep%		48.2	18.9	59.4	64.8	100		50.4	76.9	51.2	100	0.0
	1997	treated	4.3	0.0	0.0	0.0	0.0	0.0	14	1.0	0.3	1.3	0.0	0.0
		Un.tre.	3.7	2.3	8.0	14.7	7.0	0.3	3.0	5.0	1.3	8.3	6.0	0.7
		Rep%		100	100	100	100	100		95.7	95.1	96.6	100	100
	M. Mean			74.1	59.5	79.7	82.4	100		73.1	86	73.9	100	50

flowering and attracted adults. Neem application must be replicated every 5 days during the flowering to keep the population denity of adults to the lowest level as far as possible.

f. In broad bean fields: In 1995, the repellent effect of T 5% ranged between 78.8% after one day decreased to 22.7% after 11^{th} of application. However, the repellent period started after one day to the 11^{th} day (39.6%) The average repellent of both seasons ranged between 89.4 (1^{st} day) – 39.6% (11^{th} day). On the other hand, the repellent percentage of T/s 1% ranged between 100 – 20.4% and 100 – 87% for two respective seasons. The average repellent of both seasons for T/s 1% ranged between 100 (1^{st} day) – 53.7% (11^{th} day).

Generally, Neem application formulation on broad bean plants during broad bean flowering season gave protection for at least eleven days depending upon the density of both flowering and attracted adults., Neem applications must be replicated every 11 days during the flowering to keep the population density of adults to the lowest level as far as possible. The average repellent of both seasons for two formulations ranged between 67.5 – 42.4% (T) & 70.9 – 42.3% (T/s), with an average 69.2 – 42.3 during the same period.

g. In wild mustard: In 1995, the repellent effect of T 5% ranged between 48.2% after one day to the more percentage 100% at the 11^{th} day of application. However, the repellent period was extended during the second season 1997, where it ranged between 100% after one day to 100% on the eleventh day. The average repellent of both seasons ranged between 74.1 (1^{st} day) – 100% (11^{th} day). On the other hand, repellent percentage of T/s 1% ranged between 50.4 – 100% and 95.7 – 100% for two respective seasons. The average repellent was 73.1% (1^{st} day) and 50% (11^{th} day).

Generally, Neem application on wild mustard weeds during wild mustard flowering season gave protection for at least eleven days depending upon the density of both flowering and attracted adults. Neem applications must be replicated every 7 days during the flowering to keep the population density of adults to the lowest level as far as possible.

Since the concentration of both Neem Azal formulations reduced the mean number of insects and seemed to be significantly effective for control this target insect pest. The residual action of both formulations could protect plant flowers for more 11 days.

Generally, the correlation between the activity period of adult stage attacking flowers of different plant species and the repellent percentage of Neem-Azal formulations can be recommended as a suitable program for application to obtain the best reduction of attacking adults.

According to the appearance of adults on different hosts and their critical activity periods on every host, the following program may be suggested to repel this pest to the least significant numbers:

Host	Critical activity period Of flowering	Total period days	Least repellent period for each spray	Approximately No. of sprays needed	**used concentration**
Broad bean	31/1 – 28/3	56	11	5	**Neem Azal T/s (1%) Azadrachtin A**
Lupine	31/1 – 21/3	51	5	10	
Apple	14/2 – 28/3	42	7	6	
Wheat	21/2 – 21/3	28	5	6	
Pear	7/3 – 28/3	21	5	4	
Navel orange	14/3 – 4/4	21	11	2	

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المكافحة غير الكيماوية لجعل الورد الزغبى

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٢ – *معهد بحوث وقاية النباتات – مركز البحوث الزراعية – الدقى – الجيزة – مصر*

تنتشر فى المناطق المستصلحة حديثاً بعض أنواع الجعال والتى تسبب كثيراً من الأضرار للزراعات مثل جعل الخوخ ، الجعل ذو الظهر الجامد والجعل الزمردى وجعل الورد الزغبى التابعة لعائلة الجعال من رتبة غمدية الأجنحة ، وتمت الدراسة الحالية على جعل الورد الزغبى بمحافظتى الشرقية والإسماعيلية .

تم دراسة وتقييم ثلاث طرق للمكافحة غير الكيماوية وهى : (المصائد المائية الطبقية والقمعية ذات اللون الأزرق و الكانولا كمصيدة نباتية و مستحضرات النيم أزال) بالإسماعيلية والشرقية فى المناطق الحديثة المذكورة سابقاً لأعوام ١٩٩٩ ، ١٩٩٦ ، موسم ٢٠٠٠/٩٩ وتم تحديد كفاءة المصائد والنسبة المئوية لنقص حجم العشيرة الحشرية والنسبة المئوية للطرد الحشرى أيضاً (بإستخدام معادلة هندرسون وتلتون ١٩٥٥).

١ – مصائد اللون الأزرق :

كانت المصيدة القمعية زرقاء اللون أكثر كفاءة من المصيدة المائية الطبقية الزرقاء لإصطياد الحشرات الكاملة والأسهل فى إعاقة الاصابة وأكثر اماناً من حيث التأثيرات الجانبية .

٢ – المصائد النباتية :

استعمل نبات الكانولا كمصائد نباتية فى نظام التحميل المحصولى مع القمح أو الفول البلدى.

(أ) ألكانولا مع القمح: وصل أعلى جذب للحشرات الكاملة عند معدل تداخل ٣ كانولا/٧ قمح حيث كانت نسبة الجذب المسجلة ٨٥,٢٧٪ بينما معدلات النسبة المئوية للجذب للكانولا عند ٤،٣،٢ كانت متشابهة تقريباً، لذلك فإن نظام التداخل المحصولى الملائم مع ٢ كانولا/٨ قمح اعتبر أفضل معدل كمصائد نباتية لجعل الورد الزغبى.

(ب) الكانولا مع الفول البلدى : النسبة الأكثر تأثيراً للكانولا كمصائد نباتية كانت ٢ كانولا / ٨ فول بلدى ، ففى هذه النسبة وصلت نسبة الجذب إلى ٢٤٪ لجملة التعداد المنجذب إلى القطعة التجريبية ، لذلك يمكن التوصية بأن أفضل معدل للتداخل المحصولى للكانولا مع القمح هو ٢ كانولا