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SEVERAL TOOLS USED TO CONTROL COTTON LEAFWORM, *Spodoptera littoralis* (BOISD.) AND AMERICAN BOLLWORM, *Helicoverpa armigera* (HÜB.) IN PEANUT FIELDS.

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ABSTRACT

The present paper discusses the integrated control of cotton leafworm, *Spodoptera littoralis* and Americam bollworm, *Helicoverpa armigera* using four sprayer types *i .e.* (Power knapsack sprayer EFCO-16 (60 & 80) L. /fed., Manual sprayer (UNX-18 100L/fed.) and conventional motor sprayer 300L/fed. Moreover, the insecticides (Dipel DF , Radical, Dursban& Consult and Dursban only) in peanut fields were tried in new Salhea region ,Sharkia Governorate.

Data indicated that Radical compound gave the highest initial reduction percentage and gave the best tool of integrated control of *S. littoralis* and *H. armigera* followed by Dursban & Consult and Dursban only on peanut fields. While the lowest initial reduction percentage of *S. littoralis* and *H. armigera* recorded with Dipel DF in 2010 and 2011. On the other hand the highest mean residual reduction percentage (as a latent effect) was recorded with Radical compound in both seasons 2010 and 2011 treated by Dursban & Consult and Dursban only for *S. littoralis* and *H. armigera*. Meanwhile, the lowest mean residual reduction percentage was recorded for Dipel DF.

While,the lowest influence of compounds on predators was recorded with Dipel DF followed by Radical (bioinsecticid)compared with Dursban& Consult and Dursban only (conventional insecticides) in 2010 - 2011 seasons.

The obtained results revealed that the highest percentages of covering peanut plants were 62 – 61 % obtained using power knapsack motor sprayer (EFCO – 16) 60 L./ fed. followed by 59 – 60 , 57 – 59 and 45 – 42 % for EFCO – 16 (80 L./fed.) , UNX-18 and conventional motor sprayer with all used compounds, respectively. On the other hand, the lowest losses on land were recorded with EFCO – 16 (60 L. / fed.) 15 – 17 % followed by 16 – 18, 21 – 22 and 27- 28% using EFCO – 16 (80 L./fed.) , UNX – 18 and conventional motor sprayer, respectively.

Also, the obtained results revealed that the lowest contamination for applicator was recorded using the manual sprayer (NUX – 18) 20 – 21 % contamination on the appreciator followed by 22- 23, 22 – 25 and 27–31% with using EFCO–16 (60 and 80 L./fed.) and conventional motor sprayer, respectively.

***Key words**: Several tools,(CLW) Spodoptera littoralis,(ABW) Helicoverpa armigera , Peanut*

1. INTRODUCTION

The Egyptian cotton leafworm, *S. littoralis* (Boisd.) and the American bollworm, *H. armigera* (Hub.) have been considered a serious economic pests of cotton, many field crops and vegetables in Egypt. Although they are active all the year round without a hibernation period attacking cotton plants and cause many losses of many hosts from other crops and vegetables in Egypt,(Alford, 2000; Al-Shannaf , 2007 and Amin, 2007).

Helicoverpa armigera is the most widely distributed and considered a pest of major importance in most areas where it is damaging a wide variety of food, fiber and oil seeds. The effect of three biocides and two insect growth regulators were evaluated against *H. armigera* and their side effects against some common predators (Pearson, 1958).

Hindy(1998) assessed two groups of sprayer types. The first group included three recommended techniques with satisfactory results as follows: Knapsack motor sprayer, Arimistu flow No2, No3 and Micro ULVA sprayer. The second group included lower operated (CP3) A,B and C. The obtained results indicated that, a great relationship was found between the coverage indicator on plants and the bioefficiency result, which confirmed the importance of proper selection of a spraying equipment and its vital role affecting cotton leafworm control on cabbage.

Badr *et al.*, 1999 and Hindy *et al.*, 1999 used a hand lever operated, conventional hydraulic Knapsack sprayed Mitabi, Arimistu and Micro ULVA sprayer for controlling cotton leafworm on clover plants. The results showed that using knapsack motor sprayer gave higher reduction for small larvae more than using Micro ULVA. Ammar, 2007 tested spraying equipment "Semco sprayer" with hand lance at 6 L./fed., and conventional sprayer at 300 L./fed., using of preempt and jojoba (plant extract) insecticide .The data indicated that "Semco sprayer" with hand lance gave satisfactory coverage on tomato plants ,but in the case of conventional sprayer it caused a moderately reduction of weight fly compared with "Semco sprayer".

The aim of this study was to evaluate the performance of some different sprayers using different insecticides as a tool of control for cotton leafworm and American bollworm in peanut fields.

2. MATERIALS AND METHODS

The research took place at the new Salheia, Sharkia Governorate during the summer of 2010 and 2011 on peanut plants.

2.1.The pesticide used

2.1.1. The chemical insecticide

Chlorpyrifos methyl, (Dursban EC 48%) used at a rate of 1000 ml/fed.)

2.1.2.Insect growth regulator

Benzoylurea, ,Hexaflumuron (Consult 10% EC) used at a rate of 200 ml/fed.

2.1.3.The bioinsecticide

2.1.3.1. Radical 0.5 % EC (Avermectin) used at a rate of 200 ml/100L. water).

2.1.3.2. Dipel DF®, *Bacillus thuringiensis Kurstaki* (32,258 Potency I.U./mg) WP used at a rate of 200g/fed.

2.2.Experimental design

Field experiments were carried out in the new Salheia-region, Sharkia Governorate on CLW and ABW in peanut fields. Field treatments were chosen as 4 fed. divided into 4 blocks. The first block was treated with bio-insecticide (Dipel DF), the second block was treated with Radical compound, the third block was treated with Dursban & Consult and the forth block was treated with Dursban only using the recommended doses. Each block was treated with 4 different sprayer types (Power knapsack sprayer (EFCO-16) used at a rate of 60 and 80 L. water/fed., Manual sprayer (UNX-18) was used at a rate of 100 L. water/fed. and conventional motor sprayer used at a rate of 300L. water/fed.. Each treatment was divided in to three replicates (262.5 m^2 for each replicate) and untreated plots during 2010 and 2011 seasons. The experimental area of each treatment was sprayed at appearance of the 1st, 2nd and 3rd instar larvae of CLW. Previous design was carried out on another area (4 fed) in the same region infested with ABW at the 1st, 2nd and 3rd instar larvae on peanut plants.

The number of larvae of *S.littoralis* and *H. armigera* species and associated predators (The harmful effect of the tested compounds against some predators, *e.g.,* aphidlion, *Chrysoperla carnea*; beetles, *Coccinella* spp.; anthrocoride bugs *Orious* spp.; staphylinid beetle, *Peaderus alfierii*; *Scymnus* spp. and true spiders) were counted in each treatment, before the treatment and after 3,7 and 10 days of bio-insecticides (Dipel DF and Radical).On the other hand 24 hours, 7 and 10 days after treatment with (Dursban & Consult) and Dursban of 25 hills for each replicate and in the untreated plots. The initial reductions were calculated for 24h. of conventional insecticide and 3 days for bio-insecticide, the mean residual reduction was calculated 7 and 10 days after the treatment. Reduction percentages were calculated according to the equation of Henderson and Tilton (1955).

2.3.Spraying applications

2.3.1. Power knapsack sprayer (EFCO-16)

A medium spraying volume was applied pneumatic with a sprayer on the targeted plantations. Specifications and information are contained in Table (1).

2.3.2. Manual sprayer (UNX-18)

The sprayer was tested as a target sprays in order to evaluate their spraying quality. It is classified with the pump handle by a crankshaft mechanism. The technical data are presented in Table (1).

Table(1):Technical data of the equipment used against cotton leafworm and American bollworm in peanut fields.

Data	Power knapsack sprayer (EFCO-16)		Manual sprayer (UNX-18)	Conventional motor sprayer
Spray volume L/ fed	60	80	100	300
Swath width (m)	5.0	5.0	1.0	3.0
Mean working speed (km /h)	2.4	2.4	2.4	2.4
Flow rate (L/min)	2.860	3.810	0.952	8.570
Spray height (m)	0.50	0.50	0.50	0.50

Mean working speed ~± 5

2.3.3. Conventional motor sprayer

Spray gun of motor sprayer is composed mainly of a chemical tank (300 liters) and reciprocating pump powered by 5 Hp benzene motor .The spray gun is connected to the pump by a 40-80m.lon rubber hose. The pump could provide pressure up to 30kg/cm^2 .

2.3.4. Description of sampling line

The sampling line consisted of 6 wire holders fixed in a diagonal line inside each treatment to collect sprayed chemicals.

Three sensitive cards were distributed on some plants (right, middle and left) at distances of one meter. Water sensitive paper (Syngenta) with the wire holders were fixed in "L shap" on the top of the wire holders. All cards were collected and transferred carefully to the laboratory for measurements and calculation of the deposited droplets.While sensitive cards were fixed on the applicator (Head, Thorax and legs) for measuring of contamination deposit (Ammar, 2003). On the other hand, the number and size was considered droplet on cards were measured with a special scaled monocular lens (Struben®) with magnification of X 15 (Abou Amer, 1993), spread factor was estimated (Gehan, 2000).

3. RESULTS AND DISCUSSION

In peanut fields, two methods of integrated control were used of *S. littoralis* and *H. armigera*, the 1st using four sprayer types *i .e.*, (Power knapsack sprayer EFCO-16 (60 & 80 L./fed.). manual sprayer (UNX-18 100L/fed) and conventional motor sprayer 300L/fed. The 2nd methed using the insecticides (Dipel DF, Radical,Dursban& Consult and Dursban only).

3.1. Spray coverage on peanut plants

Results in Table (2) revealed that, the highest percentage covering peanut plants were 62-61 % obtained using the power Knapsack motor sprayer (EFCO-16) 60L./fed. Low volume mean droplets (VMD) of 120-135 µ and the highest number of droplets was 163-190 N/cm^2. The previously mentioned results, showed that the highest general means of reduction were (90.00-89.67), (85.33-85.33),(82.67-82.33) and (17.67-17.33 %) respectively for Radical ,Dursban &Consult, Dursban and Dipel DF for CLW in 2010 and 2011 seasons. While, they were (88.00-82.67),(83.67-82.33),(75.00-79.00) and (10.00-7.00%) obtained with Radical, Dursban mixed with Consult, Dursban and Dipel DF for controlling ABW in 2010 and 2011 seasons,. Also, the highest general mean reduction for the predators were (64.00-63.67),(56.00-7.33),(49.00-47.33) and (3.33-2.00%) respectively recorded with Dursban mixed with Consult, Dursban, Radical and Dipel DF in both seasons.

Data in Table (2) indicated that the use of EFCO-16 80L./fed. recorded the plant coverage (60-59%),VMD (145-165 µ) and N/cm2 (172-200).The general mean reductions of CLW were (88.67-88.33),(84.67-83.00),(81.67-81.33) and (16.00-14.67%) for Radical, Dursban mixed with Consult, Dursban and Dipel DF in 2011 season, respectively. Also the general mean reductions of ABW were (86.00-82.33),(82.67-81.33), (74.00-77.33) and (9.67-6.00%) for Radical, Dursban & Consult, Dursban and Dipel DF, in 2010 and 2011 seasons ,respectively. While the general mean reductions of the predators were (58.67-61.00),(55.67-55.67),(44.00-43.67) and (2.00-1.67%) for Dursban mixed with Consult, Dursban, Radical and Dipel DF, 2010 and 2011 seasons, respectively.

Data in Table (2) cleared the effect using Manual sprayer (UNX-18)100L./fed., the percentage covering of peanut plants were (57.00 - 58.00%), (210-230) VMD and (75-83) N/cm^2. On the other hand, this sprayer gave the moderate general mean reduction.

The general mean reductions of CLW were (85.67-85.00), (84.00-82.33), (80.33-79.67) and (8.33-11.33%) for Radical , Dursban& Consult, Dursban and Dipel DF during 2010 and 2011 seasons, respectively. Reductions of *H. armigera* were (83.00-79.67), (80.67-79.33), (71.67-75.67) (8.33-5.67%) in both seasons, respectively. While reductions of predators were (58.67-58.67),(54.33-51.00), (39.33-38.67) and (2.00-1.67%) for Dursban & Consult, Dursban, Radical and Dipel DF during 2010 and 2011 ,respectively.

On the other hand, using conventional motor sprayer, the results showed the lowest mean reduction. The lowest covering of peanut plants were (42.00-45.00%), low of N/cm^2 (10-20) and biggest droplets VMD (970-980µ). From the previously mentioned results, the conventional motor sprayer recorded the lowest efficiency for controlling CLW and ABW in both seasons. Vadivelu *et al.* , 1986 evaluated the effectiveness of using high volume (knapsack sprayer 225 L./ha), low volume (Aspee power sprayer 60L./ha) and ultra- low volume (A fogair sprayer 12.5L./ha) for controling cotton pests using conventional insecticides. Results indicated that, the aphid lion, *Chrysoperla carnna* and cicadellid populations were higher in plots treated with knapsack sprayer than in those treated with the other two sprayers. The bade kapas content was

the lowest deposit density and the good coverage in plots treated with the Fogair sprayer. In a comparison of high low volume, low –volume and ultralow-volume pesticide sprayer trials in cotton in India, found that ultralow-volume sprayers were the most economical.

3.2. Losses on land

Data in (Table 2) indicated that, the lowest losses efficiency of insecticides on land recorded with EFCO-16 60L/fed.were (15-17%) sprayed by EFCO-16 (80 L/fed.) were (16-18%),Manual sprayer (UNX-18)100L/fed. were (21.-22%). On the other hand, using conventional motor sprayer, recorded the highest percentage of losses on land were (27-28%).

3.3. Contamination of applicator

The obtained results revealed that the lowest contamination of applicator (20-21%) was recorded with using the manual sprayer (UNX-18) 100L/fed. while the using of power Knapsack sprayer (EFCO-16) 60 and 80 L/fed. recorded the moderate contamination (22-23%) and ((22-25%), respectively. On the other hand, using the conventional motor sprayer recorded the highest contamination on the applicator (27.5-31%). Ammar, 2007 tested two sprayers, semco sprayer with hand lance at 6 L/fed. and conventional sprayer at 300 L/fed. Semco sprayer gave satisfactory coverage on tomato plants amounted 93.75 and 90.70% and minimum lost compound

Table (2). Spray coverage produced by different sprayers and spraying volume with different insecticides on peanut plants for controlling cotton leafworm and American bollworm .

Equipment		Power knapsack sprayer (EFCO-16)						Manual sprayer (UNX-18)			Conventional motor sprayer		
Spray volume L/Fed.		60			80			100			300		
Insecticide \ Droplets		VMD µ	N/cm²	N%	VMD µ	N/cm²	N%	VMD µ	N/cm²	N%	VMD µ	N/cm²	N%
Dipel DF	1	135	163	62	165	172	60	230	75	58	980	14	42
	2	148	40	15	171	52	18	245	28	22	995	9	27
	3	103	60	23	130	62	22	175	26	20	870	10	31
	4	17.67 / 17.33			16.00 / 14.67			8.33 / 11.33			9.00 / 11.33		
	5	10.00 / 7.00			9.67 / 6.00			8.33 / 5.67			7.00 / 4.83		
	6	3.33 / 2.00			2.00 / 1.67			2.00 / 1.67			1.67 / 1.33		
Radical	1	130	170	61	158	178	60	225	78	58	978	15	42
	2	141	47	17	168	49	16	236	29	22	985	10	28
	3	100	63	22	126	71	24	167	27	20	950	11	30
	4	90.00 / 89.67			88.67 / 88.33			85.67 / 85.00			81.67 / 82.00		
	5	88.00 / 82.67			86.00 / 82.33			83.00 / 79.67			81.33 / 78.67		
	6	49.00 / 47.33			44.00 / 43.67			39.33 / 38.67			37.33 / 37.00		
Dursban + Consult	1	125	187	61	156	197	59	217	80	59	975	18	45
	2	135	49	16	163	55	17	225	29	21	980	11	27.5
	3	98	71	23	120	80	24	165	27	20	940	11	27.5
	4	85.33 / 85.33			84.67 / 83.00			84.00 / 82.33			82.33 / 80.67		
	5	83.67 / 82.33			82.67 / 81.33			80.67 / 79.33			78.00 / 76.00		
	6	64.00 / 63.67			58.67 / 61.00			58.67 / 58.67			56.33 / 56.00		
Dursban	1	120	190	61	145	200	59	210	83	57	970	20	44
	2	133	52	17	156	53	16	220	32	22	990	13	28
	3	100	72	22	118	84	25	162	30	21	930	13	28
	4	82.67 / 82.33			81.67 / 81.33			80.33 / 79.67			76.33 / 76.67		
	5	75.00 / 79.00			74.00 / 77.33			71.67 / 75.67			69.33 / 72.67		
	6	56.00 / 57.33			55.67 / 55.67			54.33 / 51.00			53.00 / 50.67		

1= Coverage on plant 2=Losses on land 3= Contamination of applicator
4= General mean reduction of *S. littoralis* in 2010 and 2011
5= General mean reduction of *H. armigera* in 2010 and 2011
6= General mean reduction of predators in 2010 and 2011
N/cm²= Number of droplets/cm². VMDµ =Volume mean diameter of droplets.
N%= Efficiency of sprayer type.

tested between plants accounted for 0.59-1.48 % and very poor contamination on the applicator by 5.66 -8.14 % of spray deposit. However conventional sprayer percentage of spray deposit ranged presented by 42.7 and 34.20 % on tomato plants, lost on land between tomato plants was 17.95 and 15.60 %, and contamination of applicator reached 47.43 and 41.7 %. Data showed that semco sprayer gave excellent control against whitefly, meanwhile conventional sprayer gave percent reduction ranged between 59.40 and 56.60% with prempet insecticide.

3.4.Efficiency using different sprayer types on reduction of *S. littoralis*

Results in Table (3) indicated that, using the EFCO-16 80 L/fed. recorded the highest initial reduction (93.00-91.00)& (92.00-91.00);(89.00-88.00)&(89.00-86.00), (87.10086.0) & (87.00-85.00) and (8.00-78.00) & (9.00-8.00%) for Radical, Dursban+ Consult, Dursban and Dipel DF during 2010 and 2011 seasons, respectively.

The moderate initial reduction recorded by using the UNX-18 100L/fed. were (91.00-90.00), (88.00-86.00), (82.00-81.00) and (5.00-6.00%) for Radical, Dursban& Consult, Dursban and Dipel DF in 2010 and 2011 seasons, respectively.

The conventional motor sprayer recorded the lowest initial reduction of *S. littoralis* with all compounds during both seasons. Data in Table (3) showed that, the highest mean reduction obtained with using EFCO-16 60 L/fed. were (88.5150-83.50),(80.50-80.00)and (17.50-21.50%) for Radical, Dursban+ Consult, Dursban and Dipel DF in both seasons 2010 and 2011 ,respectively. On the other hand, the lowest mean residual of reduction recorded with using conventional motor sprayer were (80.50-78.50),(77..50-78.00),(75.50-76.00) and (11.00-13.50%) for Dursban+ Consult, Radical, Dursban and Dipel DF during 2010and 2011 seasons, respectively. Dipel DF, the lowest mean residual of reduction obtained with using UNX-18 were10.00 % in 2010 season only. Sprayers EFCO-16 80 L/fed. and UNX-18 100L/fed. for controlling CLW and ABW recorded moderate effects with all tested compounds.

3.5.Efficiency using different sprayer types on reduction of *H. armigera*

The data in Table (4) cleared that, the highest initial reduction was recorded with using the EFCO-16 60L/fed. (90.00-89.00),(86.00-87.00), (78.00-83.00) and (4.00-4.00 %) for Radical, Dursban+ Consult ,Dursban and Dipel DF in 2010 and 2011 seasons, respectively. But the lowest initial reduction obtained with using the same sprayer type were (80.00-87.00),(80.00-80.00),(70.00-76.00) and (3.00-2.50%) for Radical, Dursban+ Consult, Dursban and Dipel DF in both seasons2010 and 2011,respectively.

The highest mean residual of reduction recorded using the EFCO-16 60L/fed. Followed by UNX-18/ 100 L/fed. And conventional motor

Table (3): Reduction percentage of bioinsecticide and conventional insecticides on *Spodoptera littoralis* larvae in peanut fields during 2010 and 2011 seasons.

Compound	Sprayer type	2010					2011				
		Initial %		Residual %			Initial %		Residual %		
		1 day	3 day	7 day	10 day	Mean residual	1 day	3 day	7 day	10 day	Mean residual
Dipel DF	EFCO-16/60 L		8.00	12.00	23.00	17.50		9.00	19.00	24.00	21.50
	EFCO-16/80 L		7.00	10.00	21.00	15.50		8.00	16.00	20.00	18.00
	UNX-18/100 L		5.00	8.00	12.00	10.00		6.00	12.00	16.00	15.00
	Convintional/300 L		5.00	10.00	12.00	11.00		7.00	12.00	15.00	13.50
Radical	EFCO-16/60 L		93.00	89.00	88.00	88.50		92.00	89.00	88.00	88.50
	EFCO-16/80 L		91.00	89.00	86.00	87.50		91.00	88.00	86.00	87.00
	UNX-18/100 L		91.00	84.00	82.00	83.00		90.00	83.00	82.00	82.50
	Convintional/300 L		90.00	79.00	76.00	77.50		90.00	79.00	77.00	78.00
Dursban+ Consult	EFCO-16/60 L	89.00		86.00	81.00	83.50	89.00		86.00	81.00	83.50
	EFCO-16/80 L	88.00		86.00	80.00	83.00	86.00		84.00	79.00	81.50
	UNX-18/100 L	88.00		84.00	80.00	82.00	86.00		82.00	79.00	80.50
	Convintional/300 L	86.00		82.00	79.00	80.50	85.00		80.00	77.00	78.50
Dursban	EFCO-16/60 L	87.00		82.00	79.00	80.50	87.00		81.00	79.00	80.00
	EFCO-16/80 L	86.00		80.00	79.00	79.50	85.00		80.00	79.00	79.50
	UNX-18/100 L	82.00		81.00	78.00	79.50	81.00		80.00	78.00	79.00
	Convintional/300 L	78.00		76.00	75.00	75.50	78.00		77.00	75.00	76.00

sprayer 300L/fed. with Radical, Dursban+ Consult, Dursban and Dipel DF in both seasons 2010 and 2011, respectively. Vadivelu , *et al.* 1986 evaluate the effectiveness of using high volume(knapsack sprayer 225 L/ha), low volume (knapsack sprayer 225 L/ha) and ultra- low volume(a Fogair sprayer 12.5 L/ha) for control cotton pests using conventional insecticides. Results indicated that, the little difference between the incidence of bollworms pink, spiny and American bollworms and between plots treated with the various sprayer types. Also, the data proved that the low-volume sprayer was better than high volume sprayers for controlling cotton insects. Mambiri, 1987 using Electrodyn, Ulva micron and conventional knapsack sprayers for controlling the cotton pests (specially, *Heliothis* and *Earias* spp.). Results indicated that, the highest seed cotton yield increased compared with conventional knapsack sprayer.

Singh, *et al.* 1987 found that high and low volume treatments to control pink bollworm and spiny bollworm were least effective with an ultra low-volume treatment (ULV). Dashad *et al.* 2001 evaluate of different sprayer (hydraulic knapsack manual-operated sprayer, KS; hydraulic knapsack manual operated, HI-TECH; hydraulic knapsack manual operated sprayer, KSHT; power operated knapsack sprayer-cummist blower, PS and controlled droplet applicator, CDA. Found that PS sprayer during the vegetative phase of cotton caused the lowest leafhopper 0.96 nymph/leaf and whitefly 1.27 adults/leaf population; while during the reproductive phase of cotton it was recorded the lowest bollworm incidence in shed fruiting bodies (14.50%) and 14.2 and 6.40% incidence in open bolls and locule, respectively. The yield of seed cotton was highest in PS (14.5 q/ha).

Table (4): Reduction percentage of bioinsecticide and conventional insecticides on *Helicoverpa armigra* larvae in peanut bean fields during 2010 and 2011 seasons.

Compound	Sprayer type	2010					2011				
		Initial %	Residual %				Initial %	Residual %			
		1 day	3 day	7 day	10 day	Mean residual	1 day	3 day	7 day	10 day	Mean residual
Dipel DF	EFCO-16/60 L		4.00	12.00	14.00	13.00		4.00	8.00	9.00	8.50
	EFCO-16/80 L		4.00	12.00	13.00	12.50		3.00	6.00	9.00	7.50
	UNX-18/100 L		3.00	10.00	12.00	11.00		3.00	6.00	8.00	7.00
	Convintional/300L		3.00	8.00	10.00	9.00		2.50	5.00	7.00	6.00
Radical	EFCO-16/60 L		90.00	87.00	87.00	87.00		89.00	83.00	76.00	79.50
	EFCO-16/80 L		88.00	86.00	84.00	85.00		89.00	82.00	76.00	79.00
	UNX-18/100 L		87.00	82.00	80.00	81.00		88.00	81.00	70.00	75.50
	Convintional/300L		86.00	80.00	78.00	89.00		87.00	79.00	70.00	74.50
Dursban+ Consult	EFCO-16/60 L	86.00		84.00	81.00	82.50	87.00		83.00	77.00	80.00
	EFCO-16/80 L	86.00		84.00	78.00	81.00	86.00		82.00	76.00	79.00
	UNX-18/100 L	84.00		80.00	78.00	79.00	84.00		80.00	74.00	77.00
	Convintional/300L	83.00		80.00	76.00	78.00	80.00		78.00	70.00	74.00
Dursban	EFCO-16/60 L	78.00		75.00	72.00	73.50	83.00		80.00	74.00	77.00
	EFCO-16/80 L	78.00		74.00	70.00	72.00	82.00		79.00	71.00	75.00
	UNX-18/100 L	75.00		71.00	69.00	70.00	79.00		78.00	70.00	74.00
	Convintional/300L	73.00		70.00	65.00	67.50	76.00		74.00	68.00	71.00

3.6.Efficiency using different sprayer types on reduction of some predators

Results in Table (5) indicate that ,the highest initial reduction of some predators associated with cotton leafworm and American bollworm larvae in peanut fields were (62.00-64.00), (59.0061.00), (49.00-48.00%) and (1.00-1.00%), while using the power Knapsack sprayer (EFCo-16 60L/fed. for Dursban+ Consult, Dursban, Radical and Dipel DF during 2010 and 2011 seasons, respectively.

The lowest initial reduction recorded using the conventional motor sprayer 300L/fed. were (48.00-49.00), (58.00-50.00),(37.00-38.0) and (1.00-1.00 %) for Dursban + Consult, Dursban, Radical and Dipel DF during 2010 and 2011 seasons, respectively.

On the other hand, using Dursban mixed with Consult and Dursban alone gave the highest mean residual effect against of some predator associated both cotton leafworm and American bollworm larvae compared to both Radical and Dipel DF (2010 and 2011 seasons). Abd-Allah and Ammar, 2008 tested three sprayers (knapsack sprayer, Solo 22 L/fed., conventional sprayer 200L/fed and knapsack motor sprayer, Arimitsu 25 L/fed. Using two insecticides (primiphos –methyle and achook) against highfly, leafhopper and green stink bug pests and common green lacewing, *Chrysoperla*

Table (5): Reduction percentage of bioinsecticides and conventional insecticides on some predators accessioned of cotton leafworm and American bollworm larvae in peanut bean fields during 2010 and 2011 seasons.

Compound	Sprayer type	2010					2011				
		Initial %		Residual %			Initial%		Residual%		
		1 day	3 day	7 day	10 day	Mean residual	1 day	3 day	7 day	10 day	Mean residual
Dipel DF	EFCO -16/60 L		1.00	2.00	7.00	3.50		1.00	1.00	4.00	2.50
	EFCO-16/80 L		1.00	1.00	4.00	2.50		1.00	1.00	3.00	2.00
	UNX-18/100 L		1.00	1.00	4.00	2.50		1.00	1.00	3.00	2.00
	Convintional/300L		1.00	1.00	3.00	2.00		1.00	1.00	2.00	1.50
Radical	EFCO-16/60 L		49.00	50.00	48.00	49.00		48.00	48.00	46.00	47.00
	EFCO-16/80 L		45.00	45.00	42.00	43.50		46.00	46.00	40.00	42.00
	UNX-18/100 L		42.00	39.00	37.00	38.00		41.00	37.00	37.00	37.00
	Convintional/300L		39.00	37.00	37.00	37.00		38.00	36.00	36.00	36.00
Dursban+ Consult	EFCO-16/60 L	62.00		69.00	61.00	65.00	64.00		67.00	60.00	63.50
	EFCO-16/80 L	59.00		62.00	55.00	58.50	59.00		64.00	60.00	62.00
	UNX-18/100 L	52.00		64.00	60.00	62.00	51.00		65.00	60.00	62.50
	Convintional/300L	48.00		61.00	60.00	62.50	49.00		63.00	56.00	59.50
Dursban	EFCO-16/60 L	59.00		56.00	53.00	54.50	61.00		57.00	54.00	55.50
	EFCO-16/80 L	59.00		56.00	52.00	54.00	59.00		55.00	53.00	54.00
	UNX-18/100 L	59.00		54.00	50.00	52.00	53.00		50.00	50.00	50.00
	Convintional/300L	58.00		51.00	50.00	50.50	53.00		50.00	49.00	49.50

carnea as a high number of natural enemies on cowpea, eggplant and okra plants. Results indicated that insecticides used were moderate hazardous for *C. carnea* specially with a shook compound. Also, Abd-Allah *et al.*, (2011), found that all the tested insecticides (chemisol, mospilan,Sumicidin, MTI-446 and jojoba) exhibited a moderate hazardous effect on *Scyminus* sp., *Orius* sp. and *Syrphus corolla* after the 1st & 2nd sprays and high hazardous effect on *Paederus alfierii*, while mospilan, MTI-446 and jojoba proved to be the most save compounds for predators and parasites.

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دراسة عن استخدام ادوات رش متنوعة لمكافحة دودة ورق القطن ودودة اللوز الامريكية فى حقول الفول السودانى

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ملخص

تمت دراسة المكافحة المتكاملة لدودة ورق القطن و دودة للوز الامريكية من خلال كفاءة استخدام ٤ الات رش مختلفة هى (موتور EFCO -16 ٦٠ و٨٠ لتر ماء للفدان ، الرشاشة اليدوية UNX-18 ١٠٠ لتر ماء/ فدان و موتور الرش التقليدى ٣٠٠ لتر ماء/فدان بالاضافة الى تأثير نوع المبيد المستخدم (Dipel DF ، راديكال ، دورسبان خلط مع الكونصلت و الدورسبان منفردا) فى حقول الفول السودانى بمنطقة الصالحية الجديدة محافظة الشرقية موسمى ٢٠١٠ و ٢٠١١ .

اظهرت النتائج ان مركب الراديكال اعطى أعلى نسبة خفض فورية فى مكافحة كلا من دودة ورق القطن و دودة اللوز الامريكية متبوعا بمخلوط الدورسبان مع الكونصلت ثم الدورسبان منفردا فى حقول الفول السودانى، بينما سجلت اقل نسبة خفض فورية مع مركب Dipel DF خلال موسمى الدراسة . سجلت اعلى نسبة خفض للاثر الباقى مع مركب الراديكال فى كلا الموسمين متبوعا بمخلوط الدورسبان مع الكونصلت ثم الدورسبان منفردا. سجلت اقل نسبة خفض للاثر الباقى مع مركب Dipel DF

سجلت النتائج اقل تأثير للمركبات على المفترسات المصاحبة مع مركب Dipel DF متبوعا بمركب الرادكال كمركبات حيوية مقارنة بالمركبات التقليدية (الدورسبان خلط مع الكونصلت و الدورسبان منفرد) فى موسمى الدراسة.

اوضحت النتائج المتحصل عليها ان نسبة تغطية النباتات الفول السودانى بمحلول الرش كانت من ٦١ – ٦٢ % مع الـ EFCO – 16 ٦٠ لتر / فدان يلية ٥٩ – ٦٠، ٥٧ – ٥٩ و ٤٢ – ٤٥ % EFCO-16 ٨٠ لتر /ف ، الرشاشة اليدوية و موتور الرش اليدوى على التوالى و من ناحية اخرى سجلت اقل نسبة فقد لمحلول الرش على الارض مع EFCO -16 ٦٠ لتر/ف يلية EFCO -16 ٨٠ لتر/ف ، الرشاشة اليدوية و موتور الرش التقليدى على التوالى.

سجلت النتائج ان اقل نسبة تلوث على عامل الرش كانت ٢٠ – ٢١ % مع الرشاشة اليدوية متبوعة ٢٢ – ٢٣ ، ٢٢ – ٢٥ و ٢٧ – ٣١ % مع EFCO -16 ٦٠ و ٨٠ لتر/ف و موتور الرش التقليدى على التوالى.

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