

**EVALUATION OF MALATHION AND BIOCIDES
AGAINST OLIVE LEAF MOTH, *PALPITA
UNIONALIS* HB. (LEPIDOPTERA,
PYRAUSTIDAE)**

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Received 8 / 1 / 2002

Accepted 26 / 2 / 2002

ABSTRACT: Under laboratory conditions of 26 ± 3 C° and 68 ± 5 % R.H., tender twigs of olive were treated with different concentrations, (1.2500, 0.6250, 0.3125, 0.1563 and 0.0781 %) of aqueous extract of larvae of *Palpita unionalis* Hb. (resulted from laboratory mass-culture) infected with nuclear poly-hedrosis viruses (NPVs), by dipping and spray techniques and offered for 48 hrs. to the 3rd larval instar of the same insect. After 4 days of treatment, larval mortalities ranged between 61.37 – 85.00 and 15.00 – 62.73 % for dipping and spray techniques, respectively. All treated larvae, in case of dipping, died after 10 days at all tested concentrations giving no pupation. But in case of spray technique, small numbers of larvae succeeded to pupate after 12 days of treatment showing highly significant differences in % pupation that ranged between 5.00 – 28.57 % for the treated individuals compared with 96.67 % for untreated ones. Also, the differences between both pupal weight and % emergence were highly significant.

In field experiment, the aqueous extract of NPVs-infected larvae (at 0.156 %) was evaluated with both Dipel 2 X (at 0.05 %) and malathion 57 % EC (at 0.15 %). The reductions in infested twigs on treated olive trees were 42.71, 65.00, 35.00; 35.53, 59.11, 19.42 and 37.80, 58.20, 16.02 % for extract of NPVs-infected larvae, Dipel 2 X and malathion after 1, 2 and 3 weeks of treatment, successively.

Dipel 2 X was the most effective after 3 weeks of treatment recording 93.24 % reduction in larvae resulted from infested twigs followed by the aqueous extract of viri-infected larvae (64.05 %), whereas malathion had the lowest % reduction of 41.26 %. The reduction percentages in numbers of the parasite, *Apanteles syleptae* F. resulted from parasitized larvae ranged between 64.70 – 100 %.

Key words: *Biocides, Malathion, Nuclear polyhedrosis viruses (NPVs), Dipel, Palpita unionalis, Apanteles syleptae.*

INTRODUCTION

Olive trees were attacked with several serious insect pests (Mosallam, 1999; Hassanein *et al.*, 2000 and El-Hakim *et al.*, 2001). The olive leaf moth, *Palpita unionalis* Hb. (Lep., Pyraustidae) that considered one of these serious insects causing severe damage at all olive-growing countries differed from year to year and from place to another (Fouda, 1973; El-Sherif, 1975; Fodale *et al.*, 1990; Pinto & Salerno, 1995 and El-Hakim *et al.*, 2002). In Egypt, this pyraustid species was considered a secondary insect pest of olive but, recently with the increase of cultivated area of olive trees, it becomes one of the major pests causing heavy infestation. Hence, several trials, using various

conventional insecticides or biocides of *Bacillus thuringiensis* Berliner for controlling this insect, were conducted by many authors such as Fouda (1973), El-Sherif (1975), Foda *et al.* (1976), El-Hakim & Hanna (1982) and Fodale *et al.*, (1990).

The objective of the present work is to evaluate the efficiency of certain pesticides and biocides against olive leaf moth.

MATERIALS AND METHODS

A- Laboratory Experiment:

Cadavers of larvae of the olive leaf moth infected with nuclear polyhedrosis viruses (NPVs) produced from laboratory mass-culture (on 26 ± 3 C° and 68 ± 5 % R.H.) were blended with tap water at ratio of 1.25 gm to 100 ml for 3 minutes. Hence, the suspension was sieved by muslin

clothes to remove both big and fine particles. Four concentrations were prepared from the obtained filtrate. Tender olive twigs containing fresh leaves were treated with 5 concentrations of 1.2500, 0.6250, 0.3125, 0.1563 and 0.0781 % by two techniques of dipping (for 5 seconds) and spray (by using an atomizer) and left about 1 hr. for air - drying.

For each concentration; 60 newly moulted larvae (3rd instar), in 3 replicates, were fed for 48 hrs. on the treated leaves in petridishes (15 cm. diam.). The check individuals were fed on leaves treated with tap water only. Afterthat, every two days periodically, both treated and untreated larvae were transferred to another clean petridishes with untreated fresh olive leaves.

Larval mortalities were recorded after 2, 4, 7, 10 and 12 days of treatment. Pupation percentage, pupal weight and % emergence were statistically analyzed according to Snedecor (1957).

B- Field Experiments:

Small olive trees of 1.5 – 2 m. height heavily infested with *P. unionalis*; in the Horticulture Research Institute Farm, Giza,

Egypt; were sprayed with Dipel 2 X (*B. thuringiensis* formulation contain 32000 IU) at 0.05 %, malathion 57 % EC (an organophosphorus compound) at 0.15 % and a concentrate of 0.156 % of aqueous extract of larvae infected with nuclear polyhydrosis viruses on early April, 2001. Trees chosen as control were only sprayed with water and all these treatments were distributed in four replicates for each treatment according to randomized complete block design.

The infested twigs on both treated and untreated trees were directly counted before treatment and for three times periodically every week after treatment. Also, randomized samples of vegetal twigs were collected before and after 21 days of treatment and put in plastic vials (10 cm. diam, × 8 cm. height) under laboratory conditions to estimate parasitized larvae of *P. unionalis*. These results were corrected with Hendrson and Tilton formula (1955).

RESULTS AND DISCUSSION

A- Laboratory Experiments:

Data given in Table (1) show the effect of different

Table (1): Effect of different concentrations of aqueous extract of NPVs – infected larvae of *P. unionalis* on 3rd larval instar of *P. unionalis* with two methods of treatment.

Concen. (%)	Dipping technique							Spray technique									
	% Mortality after				% Pupation	Mean pupal weight (g)	% Emergence	% Mortality after					% Pupation	Mean Pupal weight (g)	% Emergence	Sex ratio	
	2 days	4 days	7 days	10 days				2 days	4 days	7 days	10 days	12 days				Male	Female
1.2500	0	85.00	100	-	0	-	0	0	62.73	90.48	90.48	90.48	9.52 C	0.0203 E	9.52 B	0	1
0.6250	0	72.73	100	-	0	-	0	0	45.00	90.00	95.00	95.00	5.00 C	0.0242 D	5.00 B	0	1
0.3125	0	61.37	87.12	100	0	-	0	0	32.73	38.10	71.43	71.43	28.57 B	0.0313 ^c C	9.52 B	0	1
0.1563	0	75.00	100	-	0	-	0	0	15.00	40.00	90.00	90.00	10.00 C	0.0469 B	O C	-	-
0.0781	-	-	-	-	-	-	-	0	0	30.00	60.00	95.00	5.00 C	0.0505 A	O C	-	-
Control	0	0	0	6.67	93.33	0.0529	93.33	0	3.33	3.33	3.33	3.33	96.67 A	0.0521 A	96.67 A	0.93	1
"F" test	-	-	-	-	-	-	-	-	-	-	-	-	**	**	**	-	-

concentrations of NPVs extraction against the 3rd larval instar of *P. unionalis*, as cumulative mortalities and on certain biological aspects, with two methods of dipping and spray techniques. There were no mortalities for all tested concentrations after 2 days of treatment with both dipping and spray technique. But after 4 days, mortalities increased gradually with increase of concentrations in case of spray technique at range of 15 – 62.73 %, whereas, in case of dipping technique the corresponding mortalities were high than those of spray treatment and slightly varied with various concentrations recording; 85.00, 72.73, 61.37 and 75.00 % for 1.2500, 0.6250, 0.3125 and 0.1563 %, respectively. In both of the two methods of treatment, the cumulative mortalities increased with time elapsed ranging between 87.12 – 100 % (with dipping) and 30 – 90.48 % (with spray) after 7 days of treatment. After 10 days, in case of dipping technique, all treated larvae died at all tested concentrations. While, in case of spray treatment, larval mortalities differed with the graduated concentrations which ranged between 60 – 95 %, stabilizing

after 12 days with all tested concentrations except with 0.0781 % that recorded 95 % mortality. This means that there were some treated individuals succeeded to pupate showing highly significant differences between the tested concentrations. The percentages of pupation were 9.52, 5.00, 28.57, 10.00 and 5.00 % for the tested concentrations of 1.2500, 0.6250, 0.3125, 0.1563 and 0.0781 %, respectively, compared with 96.67 % in case of check individuals. Also, both mean pupal weight and % emergence had highly significant differences with the tested concentrations. The pupal weight decreased with the elevation of concentration. Percentages of emergence of the treated individuals were very low (0 – 9.52 %) compared with control individuals (96.67 %). The sex ratio of adults emerged from treated larvae was 1 female: 0 male compared with those of control that was 1 female : 0.93 male.

B- Field Experiments:

As shown in Table (2), the mean numbers of infested twigs; in case of trees sprayed with NPVs extraction, Dipel 2 X and malathion; generally decreased after 1, 2 and 3 weeks of treatment

Table (2): Effect of malathion and entomopathogens on infestation of olive trees with *P. unionalis* and its parasite *Apanteles syleptae* in Giza.

Compound	Mean no. of infested twigs before treatment	Mean no. of infested twigs after treatment by						Mean no. of larvae / twig		% Reduction	% Parasitism		% Reduction
		1 week		2 weeks		3 weeks		Before treatment	After 3 weeks of treatment		Before treatment	After 3 weeks of treatment	
		Mean no.	% Reduction	Mean no.	% Reduction	Mean no.	% Reduction						
NPVs extract	24.00	13.75	42.71	17.50	35.53	18.75	37.80	1.30	1.25	64.05	33.67	0.00	100.00
Dipel 2 X	40.00	14.00	65.00	18.50	59.11	21.00	58.20	8.30	1.50	93.24	3.82	0.00	100.00
Malathion	32.00	20.75	35.00	28.25	19.42	33.75	16.02	3.66	5.75	41.26	35.34	8.00	64.70
Control	42.00	42.00	-	47.50	-	52.75	-	4.30	11.50	-	27.85	17.86	-

compared with control trees. The reduction percentages were 42.71, 65.00, 35.00; 35.53, 59.11, 19.42 and 37.80, 58.20, 16.02 % for NPVs extraction, Dipel 2 X and malathion after 1, 2 and 3 weeks of treatment, respectively. Dipel 2 X was the most effective recording the lowest gradual decrease in % reduction, whereas malathion gave the lowest % reduction in infestation throughout the three weeks of treatment. Also, larvae resulted from infested twigs reduced after 3 weeks of treatment by 64.05, 93.24 and 41.26% for aqueous extract of viri-infected-larvae, Dipel 2 X and malathion, successively. With respect to the parasitized larvae with *Apanteles syleptae*, it is clearly to show that % reduction in parasitism were 100, 100 and 64.70% for extract of NPVs – infected – larvae, Dipel 2 X and malathion, consecutively. The completely disappearance of parasites, in case of treatments with biocides, may be due to preventing of *A. syleptae* adults to attack the infected larvae. It is obviously to conclude that all cadavers of viri-infected-larvae of this pest resulted from laboratory mass – production must be collected, extracted, purified and formulated as a natural, effective

and specified biocide for the olive leaf moth.

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تقييم الملائيون والمبيدات الحيوية ضد فراشة أوراق الزيتون

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تم معاملة أفرع زيتون غضة بتركيزات ١،٢٥ ، ٠،٦٢٥ ، ٠،٣١٢٥ ، ٠،١٥٦٣ ، ٠،٠٧٨١ % بالمستخلص المائى ليرقات فراشة أوراق الزيتون (الناجمة من التربية المعملية) المصابة بالفيروسات بطريقتى الغمر والرش ثم قدمت ليرقات العمر الثالث لنفس الحشرة لمدة ٤٨ ساعة وذلك تحت الظروف المعملية (٢٦ ± ٥٣ م ، ٦٨ ± ٥ % رطوبة نسبية). وقد تراوحت نسب موت اليرقات بعد ٤ أيام من المعاملة بين ٦١،٣٧ - ٨٥ ، ١٥ - ٦٢،٧٣ % فى حالتى الغمر والرش على التوالى. وبالنسبة لمعاملة الأوراق بالغمر وبعد ١٠ أيام من المعاملة ماتت كل اليرقات المعاملة عند التركيزات المختبرة ولم تصل أى منها لطور العذراء. ولكن فى حالة رش الأوراق نجحت بعض اليرقات فى التعذير بعد ١٢ يوما مع وجود اختلافات عالية المعنوية فى نسبة التعذر التى تراوحت بين ٥ - ٢٨،٥٧ % بالنسبة للأفراد المعاملة مقارنة بنسبة ٩٦،٦٧ % للأفراد غير المعاملة. كذلك كانت الاختلافات بين كل من وزن العذارى الناتجة ونسبة الخروج منها عالية المعنوية.

ومن جهة أخرى وفى تجربة حقلية تم تقييم المستخلص المائى لليرقات المصابة بالفيروسات بتركيز ٠،١٥٦ % مع كل من مركبى الدايبيل بتركيز ٠،٠٥ % والملائيون بتركيز ٠،١٥ % وكانت نسب الخفض فى اعداد الافرع المصابة على الاشجار كالتالى ٤٢،٧١ ، ٦٥ ، ٣٥ ، ٣٥،٥٣ ، ٥٩،١١ ، ١٩،٤٢ ، ٣٧،٨ ، ٥٨،٢ ، ١٦،٠٢ % لكل من المستخلص المائى لليرقات المصابة بالفيروسات، الدايبيل والملائيون وذلك بعد ١،٢،٣ أسابيع من رش الاشجار على الترتيب. وكان مركب الدايبيل اكثرها فعالية بعد ٣ أسابيع من المعاملة فى خفض اعداد اليرقات الناتجة من الافرع المصابة مسجلا ٩٢،٢٤ % يليه المستخلص المائى لليرقات المصابة بالفيروسات (٦٤،٠٥ %) فى حين أعطى الملائيون أقل % خفض فى أعداد اليرقات وهى ٤١،٢٦ % . وقد تراوحت نسبة الخفض فى أعداد الطفيل *syleptae Apanteles* الناتجة من اليرقات المتطفل عليها بين ٦٤،٧ - ١٠٠ %.