

**PESTICIDAL EFFICIENCY OF THE MINERAL OIL CAPL-2 ALONE
OR MIXED WITH ACTELIC AGAINST CABBAGE APHID
BREVICORYNE BRASSICAE L. AND *SPODOPTERA LITTORALIS*
(BOISD.) ATTACKING CABBAGE PLANTS.**

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Abstract

Pesticidal efficiency of the mineral oil CAPL-2 at 1.5 , 0.75% and Organophosphorous pesticide, actellic at full (385 cm³ / 100L) and 1/10 (38.5cm³ /100L) recommended rate and for the mixture of CAPL-2 at 0.75% + actellic at 1/10 (38.5cm³ /100L) recommended rate were determined against cabbage aphid by their spraying on cabbage plants highly infested with aphid while their effect against cotton leafworm were determined by collecting leaves samples directly and after different periods of spraying and transferred to laboratory where they were introduced to 4th instar larvae of cotton leafworm.

Results obtained indicated that actellic at full (385 cm³ / 100L) recommended rate showed the highest effect against both two studied insects followed by the mixture of mineral oil CAPL-2 at 0.75% + actellic at 1/10 (38.5cm³ /100L) recommended rate and CAPL-2 at 1.5%. Therefore the mixture is preferred than oil alone or pesticide alone for reducing their quantity, costs and less polluted to the environment.

INTRODUCTION

Cabbage plants is one of the most important food crops. Unfortunately, it is highly infested with some pests such as cabbage aphid *Brevicoryne brassicae* L. and cotton leafworm *Spodoptera littoralis* specially in the late stage of its life season. Since mineral oils are local, safe, cheap and preventing pests to building resistance against and have high pesticidal efficiency against sucking piercing pests (aphid, whitefly, spider mite and jasside) as proved by El-Sisi and El-Hariry, 1991; Iskander and El-Sisi,1998; Rizk *et al.*, 1999; Mousa and El-Sisi, 2001.

On the other hand, mineral oils proved their ovicidal effect against cotton leafworm egg-mass (Abdel-Haleem *et al.*, 1999), toxic and latent effect against cotton leafworm larvae (Badr *et al.*,1995; Hindi *et al.*, 1999.)

The aim of the present work is determination the pesticidal activity of the mineral oil CAPL-2 alone or mixed with low concentration of actellic to increase its

pesticidal efficiency and decrease both environmental pollution and costs of controlling pests compared with actellic alone against cabbage aphid and cotton leafworm larvae.

MATERIALS AND METHODS

CAPL-2: It is a mineral oil, medium cut of petroleum oil (cubrication cut), prepared as emulsifiable concentrate contained 96.62% (V./V.) base oil formulated by Central Agricultural Pesticides laboratory and produced by the Agric. Comp. of Modern Pesticide, Egypt.

Actellic 50% EC. It is an organophorous insecticide contained 50% premiphos-methyl, recommended at 385 cm³/100L .

Field experiment was carried out according to Ministry of Agriculture protocol (1993) at February 25, 2004 in highly infested cabbage plants with aphid *Brevicoryne brassicae* L. of an area of 240 m² divided into 18 plots, 3 plots each treatment at Giza.

Tested treatments were:

1. CAPL-2 at 1.5% (V./V.).
2. CAPL-2 at 0.75%.
3. Actellic at full rate . 385 cm³ / 100L
4. Actellic at 1/10 rate. 38.5 cm³ / 100L
5. CAPL-2 at 0.75% + actellic at 1/10 rate.
6. Untreated.

All tested treatments were sprayed with different tested chemicals while control using pack sprayer 10L capacity (200 liter spray solution/feddan).

For studying the pesticidal efficiency of the different treatments against cabbage aphid *Brevicoryne brassicae* L. samples of 15 leaves from each treatment were collected before spraying and after 1, 3, 5 and 7 days after spraying and inspected in the laboratory using binocular to determine the number of alive aphids . The reduction percentages were calculated according to Henderson and Tilton equation (1955). Initial and residual toxicity against the cotton leafworm larvae were studied by random collecting of cabbage leaves after, 1, 3, 5 and 7 days of spraying , transferred to the laboratory and introduced to 15 4th instar larvae placed in glass jar, 3 replicates for each treatment. Mortality data was recorded 48 hrs after exposure, then percentage of mortality was calculated. Latent effect of all treatments was studied by continuous feeding of alive larvae with sprayed leaves up to pupal stage, then total % mortality of larval during larvae stage % pupae and emerged moth correlated to larvae number in the beginning experiment were calculated.

RESULTS AND DISCUSSION

Results on the effect of different treatments against cabbage aphid infesting cabbage plants are shown in Table 1 which clearly indicated that : infestation (number / leaf) with aphid decreased as a result of treatments and as increasing period after up to 7 days.

Table 1. Pesticidal efficiency different treatments on the mean number and reduction % of cabbage aphid *Brevicoryne brassicae* L. on cabbage plants in the field.

Treatment	No. before spraying	Infestation (no./leaf) after days						%Reduction
		1	3	5	7	Total no./leaf	Mean no./leaf	
CAPL2 1.5%	21.5	8.6	5.4	5	4.9	23.9	5.98	65.8
CAPL2 0.75%	13.3	9	7.6	4.5	14	35.2	8.8	18.65
Actellic (full-rate)	19.9	3.9	1	1.5	1.8	8.2	2.05	87.33
Actellic (1/10 rate)	16.7	6.7	1.4	1.7	5.8	15.6	3.9	30.73
CAPL2+ Actellic 0.75%+1/10 rate	19.3	3.6	1.8	3	7.5	17.9	4.48	71.15
Untreated	21	15	18	17	19	68.3	17.05	

On the other hand, results of general reduction for 7 days post spraying indicated that actellic at full rate was the most effective followed by mixture of CAPL-2 at 0.75% + actellic at 1/10 rate and CAPL -2 at 1.5% while actellic at 1/10 rate and CAPL -2 at 0.75 showed the lowest effect.

Results on the effect of mineral oil CAPL-2 against aphid are well agree with El-Sisi and El-Hariry, (1991); Rizk *et al.*, (1999); Iskander and El-Sisi, (1998); Mousa and El-Sisi, 2001, findings. The effect CAPL-2 against aphid is due to suffocation effect (De Ong *et al.*, 1927) (Smith and Pearce, 1948).

Results in Table 1 also indicated that the effect of mixture CAPL-2 at 0.75% + actellic at 1/10 rate was increased than the sum of their effect separately, in other words the mixture of them caused potentiation effect against aphid, this result is complies with El-Sisi *et al.* (1994), Badr and El-Sisi (1999) who proved that mineral oil CAPL-2 caused changes in the physico-chemical properties of spray solution of some pesticide then increasing retention on treated leaves and increasing their pesticidal efficiency.

Toxicity of the tested materials against larvae of cotton leafworm was shown in Table 2 which indicated that CAPL-2 gave the lowest initial effect at their two tested concentrations, low concentration showed higher effect than highest, it is due to CAPL-2 at high concentration had antifeedent effect therefore it prevents larvae from feeding during exposure period (Badr *et al.*1995). Actellic at full dose gave the highest

initial and residual effect followed by mixture of CAPL-2 + actellic and actellic at 1/10 rate respectively.

Table 3 showed the latent effect of the tested materials which indicated that CAPL-2 at both two tested concentration gave high percentage dead larvae than mentioned before in table 2 and obvious decrease of pupal and moth emergence. Actellic alone at full dose showed the highest effect followed by mixture of CAPL-2 and actellic. Results of the latent effect of CAPL-2 against cotton leafworm is well agree with El-Sisi *et al.*, (1994) and Badr and El-Sisi, (1999).

Using of mineral oil / CAPL-2 as adjuvant to pesticide spray solution may causes change in physico-chemical properties of spray solution (Viscosity, surface tension and PH value) therefore it cause enhancement of pesticide efficiency (Furmidge, 1962 , Wolfenbarger, 1964 and O'Brien, 1967).

As a general conclusion of results shown in Tables 1, 2 and 3, it could be said that mixture of CAPL-2 at 0.75% + actellic at 1/10 rate showed suitable high effect against both cabbage aphid and cotton leafworm than CAPL-2 at 1.5%.

Table 2. Toxicity of different treatment against the fourth instar larvae of cotton leafworm *Spodoptera littoralis*.

Treatment	Initial kill %	% Mortality after days			Total	Mean
		3	5	7		
CAPL-2 1.5%	4.4	13.2	33.2	0	46.2	15.4
CAPL-2 0.75%	13.3	15.4	24.3	19.9	59.6	19.87
Actellic (full-rate)	100	100	93.2	86.6	279.8	93.27
Actellic (1/10 rate)	73.2	31	33.2	19.9	84.1	28.03
CAPL2+Actellic 0.75%+1/10 rate	86.6	65	59.9	22.1	233.6	49
Untreated	0	0	0	0		

Table 3. Effect of treatment of fourth instar larvae of *Spodoptera littoralis* with different component on the percentage of dead larvae, pupation and moth emergence.

Treatment	% dead larvae	% pupation	% Moth emergence
CAPL-2 1.5%	55.6	44.4	31.1
CAPL-2 0.75%	44.5	55.5	53.3
Actellic (full-rate)	100	0.0	0.0
Actellic (1/10 rate)	88.9	11.1	4.4
CAPL+Actellic 0.75%+1/10 rate	97.8	2.2	2.2
Untreated	84.5	15.5	11.1

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الكفاءة الابادية للزيت المعدني كابل^٢ بمفرده أو مخلوطا مع الاكتليك ضد من الكرب و دودة ورق القطن التي تهاجم نباتات الكرب

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تم تقدير الكفاءة الابادية للزيت المعدني كابل^٢ منفردا بتركيزات ١,٥% ، ٠,٧٥% و للمبيد الفوسفوري أكتليك بالجرعة الكاملة (٣٨٥سم^٣ / ١٠٠ لتر) ، ١٠ / ١ (٣٨٥سم^٣ / ١٠٠ لتر) الجرعة الحقلية و مخلوط الزيت المعدني بتركيز ٠,٧٥% + ١٠/١ (٣٨٥سم^٣ / ١٠٠ لتر) الجرعة الحقلية لمبيد أكتليك ضد من الكرب *Brevicoryne brassicae* L. و ذلك برشها علي نباتات الكرب شديدة الإصابة بمن الكرب. بينما تم تقدير كفاءتها ضد دودة ورق القطن و ذلك بأخذ عينات ورقية بعد الرش مباشرة و بعد فترات زمنية مختلفة و نقلها للمعمل و تغذية اليرقات عليها. دلت النتائج المتحصل عليها علي أن أقوى المعاملات ضد كل من الالفين كان الأكتليك بالجرعة الكاملة (٣٨٥سم^٣ / ١٠٠ لتر) يليه مخلوط الزيت المعدني بمعدل ٠,٧٥% + الأكتليك بمعدل ١٠ / ١ (٣٨٥سم^٣ / ١٠٠ لتر) المعدل الحقلية ثم الزيت المعدني كابل^٢ بمعدل ١,٥%. و علي ذلك يفضل استخدام المخلوط عن كلا من الزيت منفردا أو المبيد منفردا و ذلك لتقليل كمية الزيت و المبيد و التكاليف من جهة و زيادة الكفاءة الابادية عن الزيت منفردا بالمعدل العالي ١,٥% مع تقليل التلوث بالبيئة عن الزيت منفردا من جهة أخرى.