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POTENTIAL OF SOME ESSENTIAL AND VEGETABLE OILS IN PROTECTING STORED COWPEA FROM THE COWPEA BEETLE "*CALLOSOBRUCHUS MACULATUS*"

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Abd El-Salam[1], A.M.E.

ABSTRACT

The efficacy of garlic, ethyl oleate, sesame, flax oils and in combinations at 5.0 and 10.0µl was evaluated against adults of *Callosobruchus maculatus* as oviposition deterrent. Treatments of seeds by the oils alone or in combinations were effective as oviposition deterrent at the concentration used. Garlic mixed with ethyl oleate oils was the most effective in deterring the adult females for laying eggs compared with the oils alone and the untreated check. The oviposition deterrent index was 100%. Sesame oil was the least effective in deterring the females for laying eggs at all concentrations used and there is no significant difference between it and the check. Mixture of garlic with ethyl oleate oils completely protected the seeds from damage by an introduced adults at 0.5%. In other treatments, seed damage was noticeable after 3 months, although significantly less than in untreated seeds. The percentage of weight loss varied in the different treatments where, 0.141% (garlic plus ethyl oleate), 1.024% (ethyl oleate), and 2.64% (sesame plus garlic) at 0.5% compared to 52.11% in the control after 3 months. At the end of the storage period the effect of the treatments on seed germination were evaluated, and no harmful effect was observed on the germination of oil treated seeds.

Key words: *Callosobruchus maculatus*, Garlic, Ethyl oleate, Sesame, Flax oils, Cowpea seeds, Oviposition deterrent.

INTRODUCTION

The cowpea bruchid, *Callosobruchus maculatus* (F.) (Coleoptera: Bruchidae) is a cosmopolitan field –to- store pest and ranked as the principal post –harvest pest of cowpea, *Vigna unguiculata* (L.) Walpers in the tropics (**Jackai and Daoust, 1986; Ogunwolu and Odunlami, 1996**). It causes substantial quantitative and qualitative losses manifested by seed perforation, and reductions in weight, market value and germinability of seeds (**Sekou *et al* 2001**). Under traditional storage conditions, 100% infestation of cowpea occurring within 3 to 5 months of storage is common (**Booker, 1967 and Caswell & Akibu, 1980**).

1- Pests and Plant Protection Department, National Research Centre, Dokki, Cairo, Egypt

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The integration of insecticidal natural products from locally – available plants for use in storage, and the growing of varieties of cowpea with some resistance to *C. maculatus* may lead to the sustainable management of the bruchid especially in subsistence agriculture.

Essential oils are potential sources of alternative compounds to currently used fumigants. Essential oils have low toxicity to warm- blooded animals, high volatility, and toxicity to stored –grain insect pests **(Regnault-Roger and Hamraoui 1993; Shaaya *et al* 1991, 1997)**. Their major constituents, monoterpenes, are also of interest to industrial markets because of other potent biological activities in addition to their toxicity to insects **(Crowell *et al* 1992 and Kubo *et al* 1994)**. Also, many vegetable oils have insecticidal activity against some stored product insects, however, exhibit ovicidal activity **(Golob and Webley, 1980)**. **Hill and Schoonhoven (1981a&b)** have reported that the insecticidal effectiveness of vegetable oils was determined by the triglyceride component. The use of vegetable oils as contact insecticides to protect grains, especially legumes, against storage insects is traditional practice in many countries in Asia and Africa. This method is convenient and inexpensive for the protection of stored seeds in households and on small farms. Many different vegetable oils have been studied as stored grain protectants against insects **(Varma and Pandey, 1978; Pandey *et al* 1981; Messina and Renwick, 1983; Ivbijaro, 1984 a&b; Pierrard, 1986; Ahmed *et al* 1988; Don Pedro, 1989; Pacheco *et al* 1995)**.

The aim of the present investigation was to evaluate the deterrent effect of some essential and vegetable oils against the cowpea beetle,*Callosobruchus maculatus*. Also, the role of these oils as seed protectant for the stored cowpea seeds against *C. maculatus* is considered.

MATERIAL AND METHODS

The tested insect

The culture of cowpea beetle, *Callosobruchus maculatus* was obtained from a colony maintained on cowpea seeds by the Pests and Plant Protection Department, National Research Centre, Cairo, Egypt, under a constant conditions of temperature and relative humidity by (28.0±2.0 °C & 65.0± 5.0% R.H.).

Oils used

1- Essential oil: Garlic oil, (*Allium sativum* L.) produced by Katoaromatic company, Egypt.
2- Vegetable oils: Ethyl oleate oil, (*Olea europaea* L.). It is well known as fatty ester and is a part naturally occurring chemical class of the natural oil, lipid waxes and essences. Common name: Ethyl ester of vegetable oils (Vicchem DOP) ($C_{20}H_{35}O_2$). Ethyl oleate used as adjuvants with weedicides, desiccants and defoliants. It was kindly obtained from Dr. Bob Killick, Victorian Chemical Company, Pry, Ltd., Richmond, Victoria, and Australia. Ethyl oleate (EO); (9-octadecenoic acid ethyl ester; CAS# 111-62-6) is the ethyl ester of oleic acid. Oleic acid is the most widely distributed and the most extensively produced of all fatty acids in nature **(Gunstone, 1999)**.
3- Flax oil, (*Linum usitatissimum* L.) produced by Katoaromatic Company, Egypt).

4- Sesame oil, (*Sesamum indicum* L.) produced by Katoaromatic Company, Egypt.
5- Mixed oils: Garlic + Ethyl oleate oils (1:1) and Garlic + Sesame oils (1:1).

Experimental procedure: (Deterrent effect)

To evaluate the deterrent effect of the different oils, 20 uninfested cowpea seeds were treated with 5 or 10 µl of each oil alone or with mixture of garlic and ethyl oleate or mixture of garlic and sesame oil and introduced in petri-dish of 7 cm diameter without cover. Another, 20 uninfested and untreated cowpea seeds were introduced in a petri-dish as check. Five replicates were carried out from each. Each petri-dish from treated and untreated seeds was placed inside a glass cage (120 length x 80 width x 80 height cm.) and arranged side by side at random.

Hundred pairs of adults (1-2 days old) were released inside the glass cage for oviposition. The cage was covered and left for 5 days periods under constant conditions of temperature and relative humidity of 28.0±2.0 °C & 65.0± 5.0% R.H.

After that, the adults discarded, the eggs laid by the females were recorded in each and the oviposition deterrent index was calculated. The deposited eggs were incubated under laboratory conditions until adult emergence. The percentage of hatchability and the percentage of reduction in progeny were calculated as follows:

$$\% \textit{ Hatchability} = \frac{\textit{No. adults emergence}}{\textit{No. eggs}} X\ 100$$

$$\% \textit{ Reduction in progeny} = \frac{NAEC - NAET}{NAEC} x\ 100$$

NAEC = No. adults emergence in control.
NAET = No.adults emergence in treatment.

The oviposition deterrent index (ODI) was calculated **according to Lundgren Formula 1975**, as:

$$ODI = \frac{C - T}{C + T} X\ 100$$

C = No. eggs in control.
T = No. eggs in treatment.

Storage experiment

The storage experiment was carried out at three stored periods, the first, second and third groups were stored for 1,2 and 3 months at intervals. The treatments were carried out at the same day for three stored groups but the artificial infestation carried out at the same treatment day for the first group while the second group was left without infestation then after one month from the treatment, the artificial infestation was carried out. The third group was infested with the same number of insects after two months from treatment. Mixture of garlic with ethyl oleate, sesame with garlic and ethyl oleate oil alone were used. Two concentrations i.e. 0.25 and 0.5 % (v/w) were used of each treatment in the storage experiment.

Hundred five samples of cowpea seeds were weighed and the number of seeds of each sample was recorded and ranged between 2229 min. and 2586 seeds max. (mean number of seeds was

2383.06 ± 80.23). Clean cowpea seeds were treated with each concentration of each treatment by shaking thoroughly for 30 sec. After treatment, the seeds were spread out in a thin layer and air-dried for 5 hr. A total of 250 gm of cowpea seeds of each of treatment were placed in 25 x 25 cm damour bags. Ten pairs of newly emerged adults (1-2 day old) of *C. maculatus* were placed in the bags containing the treated cowpea seeds. The open ends of the bags were tied with twine.

Bags of untreated seeds with the same number of insects were divided to three groups, each group was stored with treated group in the same time as control.

Each treatment was replicated 5 times. The bags were stacked randomly in a grain storehouse. The first, second and third groups were opened after 1,2 and 3 months from infestation at intervals. The adults emerged was recorded and discarded and the weight of seeds to each treated or untreated sample was determined by the formula as follows:

$$\% \text{ Weight loss in seeds} = \frac{WSBI - WSAES}{WSBI} X\ 100$$

WSBI : weight of seeds before infestation

WSAES: weight of seeds after the end of the storage period.

Also, the seeds damaged (eggs and holes) and undamaged were recorded and the percentage of seeds damaged was calculated by the formula as follows:

$$\% \text{ Seeds damaged} = \frac{\text{Number of seeds damaged}}{\text{Total number of seeds damaged and undamaged}} x\ 100$$

Effect of oils on seed germination

Ten undamaged seeds from the different treatments (garlic with ethyl oleate, sesame with garlic and ethyl oleate oil alone) stored in the storage experimental for 3 months periods were selected and placed in the pot (20cm diam.) containing clay soil for each of treatment and untreated. (50 seeds on each)

The seeds left till germination were irrigated with water. The percentage of seeds that germinated was noted after 8 days. All germination experiments were conducted in temperature range 28-30°C. The experiment was replicated 5 times.

Statistical analysis

The data obtained were statistically analyzed using one way analysis of variance (ANOVA)."F" test and the means were compared using the least significant difference statistics, L.S.D ($P \leq 0.05$) by Computer program Micro -stat version 2.5, 1991.

RESULTS

Effect of different oils on oviposition, egg hatchability and adults emergence

Data in Table (1) showed that seeds treated with ethyl oleate oil or mixture of oils were the most effective in deterring the females from oviposition. Mixture of garlic with ethyl oleate oil proved to be the most effective in deterring the females from eggs laying, where the ODI was 100% at concentration of 10.0µl/20 seeds compared with 85.34% hatch in the untreated check.

Table 1. Deterrent effects of some essential, vegetable oils alone or, in combination against cowpea beetle, *Callosobruchus maculatus* (means ± SD, n = 5)

Oils	Conc. µl / 20 seeds	Avg. No. Eggs	• ODI.	% Hatchability	Avg. No. Adults Emerged	% Progeny Reduction
Garlic	5.0	85.0 ± 19.7 c	28.08	72.0	61.2± 19.97 b	52.63
	10.0	52.4± 9.18 ef	48.58	49.24	25.8± 6.34 de	80.03
Garlic + Ethyl oleate	5.0	24.2± 4.81 h	72.4	18.18	4.4± 1.14 f	96.59
	10.0	0.0±0.0 I	100	0.0	0.0±0.0 f	100
Flax	5.0	71.4± 7.83 d	35.91	66.11	47.2± 4.49 c	63.46
	10.0	59.2±9.42 e	43.77	52.03	30.8± 9.17 d	76.16
Ethyl oleate	5.0	27.2± 5.12 h	69.54	0.0	0.0±0.0 f	100
	10.0	21.0± 6.78 h	75.64	0.0	0.0±0.0 f	100
Sesame	5.0	147.6± 7.83 a	1.27	11.78	17.4± 5.46 e	86.53
	10.0	126.2±4.32 b	9.07	4.28	5.4± 1.67 f	95.82
Sesame + Garlic	5.0	47.6± 3.21 fg	52.16	0.0	0.0±0.0 f	100
	10.0	21.2± 3.34 h	75.43	0.0	0.0±0.0 f	100
Untreated	0.0	151.4± 11.61 a	0.0	85.34	129.2± 9.066 a	0.0
F - values	----	170.825*	-----	------	136.96*	-----
LSD(0.05)	----	10.88	-----	------	9.04	----

Means followed by the same letters are not significant. ($P \leq 0.05$).

• ODI. = Oviposition deterrent index

Treatments of seeds with garlic, flax or sesame oil alone were the least effective in deterring the females from oviposition compared to mixture of oils. Eggs deposited on seeds treated with either ethyl oleate alone or with mixture of sesame and garlic failed to hatch on both concentrations. However, females laid 147.6 and 126.2 egg with 5 and 10µl of sesame oil, respectively.

Treatment of seeds with mixture of garlic and ethyl oleate and sesame oil alone caused reduction in percentage of progeny reached 96.59 and 95.82% at 5 and 10µl/20 seeds, respectively

Analysis of data show significant effect on the number of eggs laid except sesame oil at 5.0µl which proved insignificant compared with the untreated check.

Storage experiment

Data in Table (2) showed that all mixture of oils tested gave significant protection to cowpea seeds stored in damour bags for 1,2 and 3 months periods against damaged of *C.maculatus*.

Also, the treated stored seeds for 3 months lost its efficacy as average number of adults emerged and percentage of weight loss in seeds increased compared with seeds stored for 1 and 2 months.

Garlic plus ethyl oleate oils were the most effective where, no seeds damaged by the females at 0.5% (v/w) compared to 55.05% seeds damaged, 1806.0 adults emerged and 21.98 % weight loss in untreated seeds with 2 months period. However, after 3 months periods the females caused 0.51% seeds damaged , 7.0 adults emerged and 0.141% weight loss in the treated seeds compared to 92.196% seeds damaged, 4748.8 adults emerged and 52.11% weight loss in the untreated seeds.

In case of seeds treated with ethyl oleate at the higher concentration (0.5%) in 1 month period, the females caused 1.54% seeds damaged but there was no adults emerged. However, at 2 and 3months storage of the same concentration, the effective was reduced, where, the females were caused 2.34 % and 3.24% seeds damaged, respectively, average number of adults emerged was 53.2 and 77.6, respectively, and 0.6 and 1.024% weight loss in the seeds at intervals. Consideration of the data from all parameter indicated an order of potency as: mixture of garlic with ethyl oleate > ethyl oleate oil alone > mixture of sesame with garlic oil at 0.5% concentration.

The differences between treatments and untreated were statistically significant.

Effect of oils in seed germination

No loss in viability of the seeds treated with garlic + ethyl oleate oil at 0.25 and 0.5% and garlic + sesame oil at 0.25% were observed until 3 months of storage. A small reduction in the percentage of germination was found in the treatments with ethyl oleate oil at 0.25 and 0.5% and garlic +sesame oil at 0.5% when compared with the control (Table 3). However, **Cruz and Cardona, (1981)** did not find a significant reduction in germination of *V. unguiculata* seeds treated with soybean oil at the same doses, **Sujatha and Punnaiah, (1985)** also observed no adverse effect on the viability of seed after application of castor oil at 10 ml/kg to *V. radiata*.

Table 2. Efficacy of tested oils in protecting cowpea seeds from infestation by cowpea beetle *Callosobruchus maculatus* in storage for 1,2 and 3 months periods (means ± SD,n = 5)

Oils	Conc. % (V/ W)	Storage periods								
		1month			2 months			3 months		
		% Seeds damaged	Avg.No. adults emerged	% Weight loss	% Seeds damaged	Avg.No. adults emerged	% Weight loss	% Seeds damaged	Avg.No. adults emerged	% Weight loss
Garlic +Ethyl oleate	0.25	0.0 ± 0.0 f	0.0± 0.0 d	0.0± 0.0 b	1.67± 0.42 ef	27.2± 9.98 ef	0.35± 0.14 cd	3.06± 0.45 e	99.2± 20.12 de	1.28± 0.85 c
	0.5	0.0± 0.0 f	0.0± 0.0 d	0.0± 0.0 b	0.0± 0.0 fg	0.0± 0.0 fg	0.0± 0.0 cd	0.51± 0.16 e	7.0± 4.6 fg	0.141± 0.11 c
Ethyl oleate	0.25	3.5± 0.47 d	92.2± 10.7 c	0.92± 0.22 b	4.96± 0.5 cd	162.0± 9.2 c	2.44± 1.23 bc	10.32± 0.2 cd	276.8± 11.82 c	3.96± 0.27 c
	0.5	1.54± 0.39 e	0.0± 0.0 d	0.0± 0.0 b	2.34± 0.34 de	53.2± 5.8 de	0.6± 0.17 cd	3.24± 0.55 de	77.6± 7.92 ef	1.024± 0.22 c
Sesame+garlic	0.25	6.7± 0.64 b	131.6± 15.3 b	1.5± 0.43 b	14.3± 1.22 b	329.2± 70.5 b	4.74± 1.7 b	66.55± 2.4 b	985.2± 63.4 b	12.64± 1.4 b
	0.5	5.2± 0.48 c	0.0± 0.0 d	0.0± 0.0 b	7.96± 0.35 c	83.0± 13.73 cd	0.96± 0.26 cd	12.82± 0.51 c	142.0± 10.8 cd	2.64± 0.3 c
Untreated	0.0	8.95± 1.65 a	475.6± 42.9 a	7.52± 3.12 a	55.05± 4.2 a	1806.0± 102.7 a	21.98± 2.81 a	92.2± 7.06 a	4748.8± 185.15a	52.11± 4.02 a
F values		110.9 **	485.51**	26.7 **	149.102 **	255.14 **	49.73**	185.25**	592.66**	148.18**
LSD.(0.05)		0.94	22.91	1.544	4.611	118.042	3.24	7.83	205.52	4.476

Means followed by the same letters are not significant. (P≤0.05).

Table 3. Effect of different tested oils on cowpea seeds viability after 3 months of storage

Oils	% Conc.(v/w)	% germination
Garlic + ethyl oleate	0.5	90.0 ab
	0.25	96.0 ab
Ethyl oleate	0.5	86.0 b
	0.25	88.0 ab
Garlic + sesame	0.5	88.0 ab
	0.25	94.0 ab
Untreated	0.0	96.0 a
F-value	----	1.93 unsignificant
LSD(0.05)	-----	0.86

DISCUSSION

The present investigations show that garlic, flax, ethyl oleate or sesame oils did not prevent the adults *C. maculatus* from laying the eggs on treated seeds. However, the oils alone significantly reduced the percentage of egg hatchability at the concentrations 5.0 and 10.0µl, except for the eggs laid on seeds treated with ethyl oleate oil failed to hatch completely.

Flax oils gave efficiency as oviposition deterrent index reached 35.91 and 43.77% at concentrations 5.0 and 10.0µl. (The major constituents linocinnamarin (glucosyl-p-coumaric methylester) and linocaffein' (glucosyl caffeic methylester) from flaxseed hulls **(Ibrahim and Shaw, 1970)**.

Sesame oil was the least effective as oviposition deterrent index, however, sesame oil was the most effective as an ovicidal action whereas, no eggs hatched at all doses used compared with all treatments.

These trends are similar to those obtained with **Ho *et al* (1996)** who found that garlic oil did not prevent oviposition by adult *T. castaneum*. Even at concentrations that killed 80% or more of the adults, eggs were still laid on the treated filter papers. At lower concentrations, reduction in emergence was observed, but the weights of the F_1 adults were not significantly affected by the treatment. Petroleum ether extract of garlic repelled *Callosobruchus chinensis* (L.) **(Pandey *et al* 1976)**.

Cruz and Cardona, (1981) found that purified oils of soybean and corn, and crude corn oil showed efficacy against *Callosobruchus chinensis* L. at 5,10 and 15 mg/kg for 8 months in protectant of *Vigna unguiculata* (L.). These treatments and an improvement in their appearance and palatability did not affect seed germination was noted. **Rajapakse and Van Emden, (1997)** found that corn, groundnut, sunflower and sesame oils significantly reduced oviposition by all three bruchid species at 10 ml/kg. At this dose, groundnut and sesame oil reduced oviposition significantly more than corn and sunflower oil. However, at the lower dose of 5 ml/kg, the ranking of the oils differed noticeably from that at 10 ml/kg. All four oils significantly reduced oviposition by *C. maculatus* and *C. chinensis,* but groundnut oil gave a poor reduction while sesame oil gave the greatest reduction for all three bruchid species. With *C. rhodesianus,* the corn oil treatment failed to reduce oviposition significantly at 5 ml/kg.

Abd El-Salam, (2000) found that the number of deposited eggs by 10 adults females *Lasioderma serricorne* offered food treated with different dosages of Ethyl oleate oil decreased significantly in comparison with the control. The minimum number of eggs laid per 10 females was 38.0 eggs on an average at 10.0mg/g diet compared with 172.0 eggs for the control. The oviposition deterrent index (ODI) was 63.81%, 73.1% eggs hatched and 29.7% adults emergence.

It has been postulated that fatty acid chain lengths are related to the amount of insect control **(Shaaya *et al* 1976)**. Insecticidal activity has also been attributed to the triglyceride component and to the oleic acid content **(Hill and Schoonhoven, 1981a,b)**.

In the present study, when garlic mixed with ethyl oleate oil and sesame with garlic oil (1:1), the mixtures were the most effective as oviposition deterrent index and ovicidal action.

The present investigations showed the possibility to use oil mixtures as protectant the cowpea seeds by storage for 1,2 and 3 months periods in the damour bags from infestation by *C. maculatus*. After 3 months storage, mixture of garlic with ethyl oleate oils (0.5%) were the most effective followed by ethyl oleate and mixture of sesame with garlic oils. Higher concentration provided greater protection for 3 months period but the lower gave least protection. Also, the oils or the mixtures lost their efficacy at 3 months periods compared with 1 and 2 months periods.

These data are agreement with those obtained by **Singh *et al* (1978)** who found that castor oil was effective against *C. maculatus,* conferring complete protection when applied to *V. unguiculata* at 8 mg/kg and against *C. chinensis* for 18 months when applied to *V. radiata* at 10 ml/kg **(Babu *et al* 1989)**. **Singh *et al* (1990)** found unsignificant effect by soybean oil in the control of *C. chinensis* in chickpea and against *C. chinensis* in *V. unguiculata* at doses of 10and 15 ml/kg for 8 months **(Cruz and Cardona, 1981)**. Palm and coconut oils at 4 ml/kg were the most effective protectants of chickpea seeds against *C. chinensis,* for 3 months of storage, followed by groundnut, rape seed and mustard oils. Sesame, sunflower and soybean oils were considered inferior to the others **(Singh *et al* 1990)**. **Caswell, (1981)** reported a loss of approximately 50% of cowpeas in storage for 3 or 4

months due to infestation by *C. maculatus* (F.).

Immediately after application the oils reduced *C. maculatus* oviposition. This may be related to a repellent action of the mixtures of oils as found for this species and for *C. chinensis* in *V. radiata* treated with different vegetable oils, including castor oil (**Varma and Pandey, 1978; Babu *et al* 1989**). The oils probably affected the eggs and/or the larvae by chemical toxicity and/or physical properties by the mechanisms mentioned by **Singh *et al* (1978), Messina and Renwick (1983) and Don Pedro (1989).**

The efficacy of neem, citrus, garlic and podina powders and neem oil at 1 and 2% (w/w) in sorghum grains was evaluated against larvae of *Trogoderma granarium* by **Sudesh *et al* (1996)** and found that Neem kernel powder and neem oil completely prevented damage by an introduced larval population. Maximum loss (11.2%) was recorded in the control followed by garlic-treated grains (7.9%). Grains treated with neem kernel powder and neem oil did not show any weight losses after one-month storage. In other treatments, grain damage was noticeable after 3 months, although significantly less than in untreated grains.

The mechanism involved in the protection of oil-treated seeds is unclear. The mode of action of oils is partially attributed to interference in normal respiration, resulting in suffocation (**Schoonhoven, 1978**). However, factors other than oxygen starvation probably also play a role in their mode of action (**Schoonhoven, 1978**). Repellent and ovicidal properties of different oils have also been observed (**Varma and Pandey, 1978; Babu *et al* 1989**). Egg mortality has been attributed to toxic components (**Su *et al* 1972**) and also to physical properties, which cause changes in surface tension and oxygen tension within the egg (**Singh et *al* 1978**). It is also thought that oils exert some lethal action on developing embryos or first instar larvae, e.g. by the reduction in doses of gaseous exchange due to a "barrier" effect and/or direct toxicity by penetration doses of oil fractions (**Don Pedro, 1989**). Another hypothesis is that oil infiltration under the operculum may block respiration or disrupt the water balance of eggs and developing embryos (**Messina and Renwick, 1983**). Vegetable oil treatment is a convenient and inexpensive method of protection from insect infestation of stored seeds on small farms and in households. The oil doses not affect the germination seeds and the small amount of oil on the treated seeds does not affect the flavour. The nutritive value of the oil is retained by the treated seed when prepared for consumption (**Hill and Schoonhoven, 1981b**). **Cruz and Cardona, (1981)** noted that soybean and corn oils improved the palatability of *V. unguiculata.*

Finally it is recommended to use garlic + ethyl oleate to control *C. maculatus* in stored cowpea for approximately 3 months. During this period of time there was a reduction in the development of populations of this species in seeds treated with garlic + ethyl oleate oil at this concentration (0.5%) and use damour bags.

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مجلة حوليات العلوم الزراعية ، كلية الزراعة ، جامعة عين شمس ، القاهرة ، م٥٠ ، ع(١)، ٢٨٣-٢٩٦ ، ٢٠٠٥

كفاءه بعض الزيوت العطرية والنباتية في وقاية بذور اللوبيا من الاصابه بخنفساء اللوبيا

Callosobruchus maculatus (F.)

[٢٠]

أحمد محمد عزت عبد السلام[١]

١- قسم آفات ووقاية النبات - المركز القومي للبحوث - الدقى - القاهرة

تم خلال هذه الدراسة:در اسه تأثير زيوت الثوم والسمسم والكتان والايثايل أوليت ومخلوط من زيوت الثوم مع الايثايل أوليت وزيت الثوم مع زيت السمسم بنسبه ١:١ كمانعات لوضع البيض ضد خنفساء اللوبيا من خلال معامله البذور.وقد وجد أن معامله البذور بمخلوط زيت الثوم مع الايثايل أوليت كانت اكثر فعاليه كمانعه

لوضع البيض بالتركيزات المستخدمة مقارنه بالزيوت الأخرى والمخاليط والمقارنة حيث بلغت نسبه المنع في وضع البيض إلى ١٠٠%.

كان زيت السمسم بمفرده اقل فعاليه كمانع لوضع البيض مع جميع التركيزات المستخدمة ولكنه كان الأكثر فعاليه كقاتل للبيض حيث اثر على نسبه الفقس بدرجه معنوية وصلت إلى ١١,٧٨% عند ٥,٠ ميكروليتر و٤,٢٨% عند ١٠,٠ ميكروليتر مقارنه ٨٥,٣٤% نسبه فقس فى البذور غير المعاملة.

كما أوضحت الدراسة أن مخلوط زيت الثوم والايثايل أوليت أعطى حماية كاملة للبذور المخزنة لمده شهرين مع ٠,٥% تركيز. أما بعد ٣ شهور تخزين ارتفع متوسط نسبه البذور التالفة (أى تلك التي وضع عليها بيض أو بها ثقب خروج للحشرات الكاملة) والحشرات الكاملة الناتجة مما أدى إلي زيادة نسبه الفقد في وزن البذور في كل المعاملات مما يدل على فقد فعاليه الزيوت و والمخاليط حيث وصلت نسبه الفقد في وزن البذور آلي ٠,١٤١% (مخلوط زيت الثوم والايثايل أوليت) و١,٠٢٤(والايثايل أوليت) و٢,٦٤%(مخلوط الثوم والسمسم) مقارنه ٥٢,١١% في المقارنة وذلك للبذور المعاملة بتركيز ٠,٥% (حجم/وزن).

كما أظهرت النتائج المتحصل عليها من دراسة مدى تأثير الزيوت والمخاليط على إنبات البذور المعاملة والمخزنة لمده ٣ أشهر عدم وجود فرق معنوي بين البذور المعاملة وغير المعاملة .

تحكيم: أ.د محمد ابراهيم عبد المجيد
أ.د اسماعيل عبد الخالق اسماعيل