EFFICIENCY OF SOME PLANT EXTRACTS COMPARED TO PIRIMIPHOS-METHYL AS INSECTICIDAL AND OVICIDAL AGENTS

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ABSTRACT

Five plant species were collected from different regions in Egypt, Chenopodium murale and Ammi majus were collected from Kafr El-Sheikh, Artemesia herba alba L. from the north west part of upper Egypt, Pimpinella anisum and Eugenia aromatica were obtained from Aswan local markets South Egypt. The various parts of the collected plant species were extracted by n-hexane and ethanol. Insecticidal properties of their crude extracts were laboratory evaluated against adult insects of Sitophilus oryzae. L., Callosobruchus maculatus F. and against eggs of C. maculatus. The organo-phosporus insecticide, pirimiphos-methyl (actellic 50% EC) was included in this study used as a standard reference. The obtained data showed that the extracts of P. anisum and E. aromatica had the highest activity on the tested insects with the different methods of applications at the two periods of exposure. S. oryzae was more sensitive than C. maculatus against all tested plant extracts. There is no significant difference between n-hexane extract of E. aromatica and pirimiphos-methyl (actellic) for the effect on egg hatching of C. maculatus.

INTRODUCTION

In recent years the use of synthetic pesticides in crop protection resulted in potential hazards for mammals, disturbances of the environment, pest resistance to pesticides and lethal effects on non-target organisms and agroecosystems (Prakash and Rao, 1986 & 1987). Therefore, now it has become necessary to search for alternative means of pest control with lower mammalian toxicity which can minimize the use of these synthetic chemicals. Many insects are unable to infest certain plants because of the presence of particular noxious substances (Fraenkel, 1969). Use of botanical pesticides, natural plant products, in agroecosystems is now emerging as one of the prime means to protect crop produce and the environment from pesticidal pollution. Othman (2000) indicated that the essential plant oils can play an important role as natural alternative fumigants in stored grain protection and reduce the need for, and risks associated with the use of the chemical fumigants and/or pesticides. The present investigation aimed to evaluate the toxicity and ovicidal properties of some plant extracts.

MATERIALS AND METHODS

Preparation of crude extracts:

Dried plant powders (Table 1) were extracted according to Freedman *et al.* (1979), 250 g of each plant sample was separately soaked in 750 ml of polar solvent (ethyl alcohol) and non polar solvent (n-hexane) in a large conical flask for 72 hours with shaking for 3 hours. The contents of the flask were filtered through anhydrous sodium sulphates using filter paper. The extract was concentrated under reduced pressure using rotary evaporator . The obtained extracts were weighed and redissolved in an appropriate volume of pure acetone, kept in the refrigerator and served as stock concentration (w/v) of each plant extract. Such concentrations were prepared periodically.

Table (1): Information about the plant species used in the present study.

English name	Arabic name	Scientific name	Part used	Family
Wild mint	النعنة البرية	*Ammi majus* (A.m)	Leaves and flowers	Umbelliferae
Warm wood	الشيح البلدى	*Artemesia herba alba* (A.h)	Whole plant	Compositae
Fisseih	الزربيح	*Chenopodium murale* (Ch.m)	Leaves	Chenopodiaceae
Clove	القرنفل	*Eugenia aromatica* (E.a.)	Flower buds	Myrtaceae
Anise	اليانسون	*Pimpinella anisum* (P.a.)	Seeds	Umbelliferae

Test insects:

Rice weevil, *Sitophilus oryzae* L. and cowpea weevil, *Callosobruchus maculatus* F. used in the present study were continuously reared free of insecticidal contamination at 30 ± 2°C and 70 ± 5% relative humidity (R.H) at the Department of Stored Product Pests, Plant Protection Research Institute, Sakha Agriculture research Station.

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Bioassay tests:

Thin film residue (exposure to treated surface) and seed treatment (mixing with feeding media) were used with *S. oryzae* and *C. maculatus*.

1. Thin film residue (exposure to treated surface)

In this method, concentrations of each of the tested materials (plant extracts or pirimiphos-methyl) were diluted with acetone. One ml from each concentration was spread into Petri-dishes (9 cm-in diameter) by moving the dishes gently in circle. The Petri-dishes used as control were treated only with one ml acetone. The acetone evaporated in few minutes leaving thin film of the tested materials on the surface of the Petri-dishes . Ten adults of the tested insects, *S. oryzae* (7-14 day old) and *C. maculatus* (0-24 hours old) were released separately into the treated dishes. Each concentration was replicated three times. Mortality percentage was recorded after 3 days. All obtained results were corrected for natural mortality (control) by using Abbott's formula (Abbott, 1925).

Correct mortality % =

$$\frac{\text{Mortality \% of treatment - mortality \% of control}}{\text{100 - mortality \% of control}} x100$$

2. Seed treatment (mixing with feeding media):

***S. oryzae*:**

For seed treatment, concentrations of each of the tested materials were diluted with acetone. 20 g of wheat grains were placed in small cylindrical glass jars (11.5 x 6 cm). One ml of each concentration was placed on each jar above the surface of grain using micropipette. The jars were shaken by hand to mix the grain with extract. The treated wheat grains were left on jars until the evaporation of the solvent. Each concentration was replicated three times. The three jars treated with acetone only served as control. Ten pairs unsexed of newly emerged adults of *S. oryzae* were transferred to each jar, covered with muslin cloth and kept under laboratory conditions. After 3 and 5 days, mortalities were recorded and corrected with Abbott's formula. The values of LC50 as well as the slopes of toxicity lines were determined by probit analysis according to Finney (1971). To determine the reduction of progeny, the values produced after 5 days of treatment were used and the treated insects were allowed to complete their lifecycle for 30 days. Percent reduction of progeny was calculated by the following equation:

% Reduction =

$$\frac{\text{Mean adults emerged in control - mean adults emerged in treatment}}{\text{Mean adults emerged in control}} x100$$

Adults emerged were recorded for five weeks after the first emergence.

***C. maculatus*:**

Different concentrations of each of the tested plant extracts or pirimiphos-methyl were diluted with acetone, 20 g of cowpea seeds were placed in small cylindrical glass jars (11.5 x 6 cm). One ml of each concentration placed on each glass jars above the surface of cowpea seeds. The jars were shaken by hand to mix the seeds with the tested materials. Each concentration was replicated three times. The jars which contain acetone only served as control. After the evaporation of the solvent, (five males and females) of *C. maculatus* adults (0-24 hrs old) were transferred to each jar. The jars were covered with muslin cloth and left under laboratory conditions for 15 days. Percentage of mortalities were recorded after 3 and 5 days. All adult mortalities were corrected with Abbott's formula (Abbott, 1925) and statisticaly analyzed to obtain the values of LC50 and LC90 according to Finney (1971).

Ovicidal activity:

To determine the ovicidal activity of the tested materials, two concentrations were used, LC_{50} and LC_{90} values produced after five days from treatment. Ten adults of *C. maculatus* (0-24 hrs old), five males and five females released in glass Petri-dishes (9 cm-diameter) containing 20 g of cowpea seeds ,and allowed to lay their eggs for 3-days. On the fourth day the adults were removed. Then the laid eggs on cowpea seeds were treated with the previously obtained LC50 and LC90 values in mixing treatment after five days of each tested material by spraying the seed surface using glass atomizer, one ml of each dilute concentration was applied to 20g seed sample. The petri-dishes containing seeds sprayed only with acetone served as control. Each concentration was replicated three times. 9-days after treatment, the number of hatched eggs were recorded, then the hatched eggs percentage were calculated.

RESULTS AND DISCUSSION

Thin film residue (ethanol extracts):

Results obtained in Table (2) showed that, the ethanolic extracts of *P. ansium* had the most lethal effect against both tested insect species followed by *E. aromatica, A. herba alba, A. majus and C. murale* with LC_{50} levels of 16.2, 20.6, 244.4, 518.4 and 574.3 $\mu g/cm^2$ respectively against *C. maculatus,* while the LC_{50} against *S. oryzae* were, 9.8, 19.3, 152.7, 228.2 and 371.9 $\mu g/cm^2$., respectively .

S. oryzae was more sensitive for all tested plant extracts than *C. maculatus.*

The most effective extract was that of *E. aromatica* among the n-hexane plant extracts against the two tested insect species in this experiment, while, the least effective extract was that of *C. murale.*

According to the LC_{50} levels of the tested extracts, the rank of their efficiency against *C. maculatus* was as follows: *E. aromatica* (16.04), *P. ansium* (63.03), *A. herba alba* (79.2), *A. majus* (300.3) and *C. murale* (467.4 μg/cm²), while its values for the same mentioned extracts on *S. oryzae* were 8.9, 28.1, 41.7, 235.1 and 275.5 μg/cm², respectively.

Table (2): Comparative toxicity of both ethanol, and n- hexane plant extracts and pirimiphos-methyl on *S. oryzae* and *C. maculatus* by using thin film residue after three days of treatment.

Tested materials	Ethanol plant extracts							
	S. oryzae				*C. maculatus*			
	LC_{50} μg/cm²	Slope value	Confidence limits Lower	Upper	LC_{50} μg/cm²	Slope value	Confidence limits Lower	Upper
C. murale	371.9	2.82	350.1-528.1		574.3	1.72	220.6	692.2
A. majus	228.2	2.58	224.2-347.2		518.4	3.10	439.4	630.2
A. herba alba	152.7	2.59	116.3-185.9		244.4	2.62	201.3	305.3
E. aromatica	19.3	3.65	14.3-23.4		20.6	1.54	11.9	25.6
P. ansium	9.8	5.19	7.4-11.1		16.2	2.06	12.3	20.7
	n-hexane plant extracts							
C. murale	275.5	1.80	202.7	367.5	467.4	1.84	360.3	662.7
A. majus	235.1	2.32	159.2	297.2	300.3	1.38	204.3	440.2
A. herba alba	41.7	2.93	28.2	71.4	79.2	1.73	54.9	105.1
E. aromatica	8.9	5.70	7.6	10.1	16.04	2.55	12.8	19.7
P. ansium	28.1	3.00	14.2	35.0	63.03	2.63	27.1	77.6
Pirimiphos-methyl	0.006	2.55	0.004	0.009	0.019	2.29	0.001	0.0369

These results agree with those obtained by Su (1977), Abbassy *et al.* (1979) and Obeng *et al.* (1997). Othman (2000) assessed the toxicity of essential oils isolated from three herb plant species in the laboratory using both thin-film technique and fumigation tests. His results indicated that the insecticidal effect of the tested oils depended on a strong contact and fumigant action. With the highly contact active *Cymbopogon proximus* plant oil, the LC50's for 2 hours of exposure in Petri dishes 11 cm in diameter were 0.05, 0.08 and 0.13 μg per square cm, respectively, against adults of *Callosobruchus chinensis, Sitophilus granarius* and *Tribolium confusum*, while it was 0.08, 0.16 and 0.25 μg/cm² for *Thumus vulgaris* oil and 0.12, 0.18 and 0.30 μg/cm² for the marigold plant oil, *Tagetes minuta* L. In fumigation tests, he found that the period of exposure appeared to be the main factor affecting the efficiency of oil vapor as indicated by the considerable increase in *S. granarius* and *T. confusum* adult mortality with increasing the period of exposure from 24 to 48 hours at 30±1°C and 60% R.H.

2. Seed treatment (mixing with feeding media):

After three days of treatment, data in Table (3) showed that the ethanol extract of *P. ansium* against *S. oryzae* or *C. maculatus*, showed strongest effect if compared with the other tested extracts with LC_{50} values of 7.7 mg/kg of wheat grains and 12.5 mg/kg of cowpea seeds against *S. oryzae* and *C. maculatus*, respectively. The ethanol extract of *C. murale* had the lowest effect against *S. oryzae* with LC_{50} level of 45.8 mg/kg of wheat grains, while the extract of *A. majus* had the lowest effect on *C. maculatus* with LC_{50} level of 52.7 mg/kg of cowpea seeds (Table 3). The insecticidal effect after five days of treatment with *P. ansium* extcact was similar to that after three days on the two tested insect species but with LC_{50} values of 5.3 and 6.8 mg/kg of wheat grains and cowpea seeds for *S. oryzae* and *C. maculatus*, respectively. Data in (Table 3) also revealed that the tested other ethanol plant extracts on *S. oryzae* or *C. maculatus* showed the following order of toxicity on both tested insects: *A. majus* < *C. murale* < *A. herba alba* < *E. aromatica* < *P. ansium*, the LC_{50} values were (28.8, 31.5), (21.8, 26.5), (13.5, 16.6), (6.9, 8.7) and (5.3, 6.8) mg/kg of wheat grains and cowpea seeds against *S. oryzae* and *C. maculatus*, respectively.

The same ascending order of toxicity of these plant materials was also obtained when the treated insects of the both species were examined 5 days after the threatment but the LC50 values were more highly decreased than those obtained after 3 days (Table 3). This is due to the longer exposure period (from 3 to 5 days).

Results recorded in (Table 4) revealed that the n –hexane exctracts of *E. aromatica*-and *P. ansium* gave the best effect against both *S. oryzae* and *C.*

maculatus after the two periods of exposure (3 and 5 days) with LC_{50}'s of 6.4, 7.5 for *E. aromatica* and 15.6, 20.5 mg/kg of wheat grains and cowpea seeds, respectively, for *P. ansium*. On the other hand,the extracts of *A. majus* and *C. murale* gave the lowest effect against both tested insects species after three days of exposure with LC_{50} values of 44.5, 55.3 and 50.8, 45.3 mg/kg, respectively. While, *A. herba alba* had the moderate effect against both tested insect species with LC_{50} values of 28.1 and 38.2 mg/kg treated media for *S. oryzae* and *C. maculatus*, respectively. Results recorded after five days of exposure in Table (4) proved that extacts of *E. aromatica* and *P. ansium* could be promised as grain and as seed protectants. On the other side *C. murale* and *A. majus* had the lowest effects against the two tested insects at the same period of exposure in this study. The descending order of tested plant extracts according to their LC_{50}'s was as following *E. aromatica* (3.5 and 6.5) > *P. ansium* (12.0 and 14.9) > *A. herba alba* (13.4 and 19.5) > *C. murale* (26.2 and 25.3) > *A. majus* (33.5 and 37.8 mg/kg) of treated wheat grains and cowpea seeds for *S. oryzae* and *C. maculatus*, respectively. Generally, *C. maculatus* was more tolerant than *S. oryzae* to the all plant extracts of ethanol or n-hexane after 3 or 5 days of exposure. These findings agree with those of Zidan *et al.* (1993), who evaluated four plant extracts against *S. oryzae* and *C. maculatus* by mixing method technique and indicated high efficiency of *Mentha longifolia* and *E. aromatica*. In this regard El-Borolosy *et al.* (1989) tested sesame, olive, castor and paraffin oils against adults of *S. oryzae* when mixed with wheat at rates of 2.5, 5.0, 10.0, 15.0 and 20 mg/kg. The authors recorded that, all concentrations caused a significant mortality when compared with untreated ones as well as the adult mortality increased by increasing the concentration of the oils tested.

Table (3): Comparative toxicity of the different ethanol plant extracts and pirimiphos-methyl mixing with media on *S. oryzae* and *C. maculatus* after three and five days of treatment.

Tested materials	Three days after treatment							
	S. oryzae				*C. maculatus*			
	LC_{50} mg/kg	Slope value	Confidence limits Lower	Upper	LC_{50} mg/kg	Slope value	Confidence limits Lower	Upper
C. murale	45.8	2.5	39.3	56.8	44.5	2.7	38.5	53.9
A. majus	38.3	2.8	33.7	44.6	52.7	2.9	45.3	65.9
A. herba alba	34.2	2.8	27.9	45.6	36.4	2.7	30.8	46.00
E. aromatica	16.8	2.5	14.2	21.5	17.2	3.5	10.2	53.8
P. ansium	7.7	3.7	6.9	8.7	12.5	3.7	5.7	20.2
Pirimiphos-methyl	0.0023	2.05	0.0019	0.0027	0.0028	1.9	0.0023	0.0034
	Five days after treatment							
C. murale	21.8	2.3	18.3	25.3	26.5	2.4	22.7	30.7
A. majus	28.8	2.0	24.8	33.6	31.5	2.4	27.2	36.8
A. herba alba	13.5	1.3	9.8	17.8	16.6	1.3	12.5	21.8
E. aromatica	6.9	1.6	4.4	8.9	8.7	2.04	6.7	10.4
P. ansium	5.3	2.8	2.5	9.7	6.8	3.5	4.6	11.5
Pirimiphos-methyl	0.0012	2.0	0.0008	0.0015	0.0021	4.0	0.001	0.003

Abd El-Kawy (1992) reported that, treatment of yellow meal corn with cotton seeds, sesame and peanut oils at (1, 3, 5 mg/kg) increased adult mortality of *S. oryzae*. Hedaya (1996) also recorded that, rice grain treated with azadrachtin repelled *T. castaneum* adults. Repellency increased with increase in concentration. Mahgoub *et al.* (1998) treated wheat grains and cowpea seeds with LC_{25}, LC_{50}, LC_{95} of *Petroselinum sativum* oil. The oil was relatively toxic to *S. oryzae* and to *C. maculatus*, however mortality increased by increasing the concentration of the oils. Don-Pedro (1984) stated that powdered sun-dried orange and grape fruit peels were toxic to *C. maculatus* when mixed with cowpea seeds especially ground orange peel.

Table (4): Comparative toxicity of the different n-hexane plant extracts mixing with media on *S. oryzae* and *C. maculatus* after three and five days of treatment.

Tested materials	Three dayes after treatment							
	S. oryza				*C. maculatus*			
	LC_{50} mg/kg	Slope value	Confidence limits Lower	Upper	LC_{50} mg/kg	Slope value	Confidence limits Lower	Upper
C. murale	50.8	2.8	43.7	63.3	45.3	2.9	39.5	54.2
A. majus	44.5	1.7	39.3	52.4	55.3	3.4	48.2	68.2
A. herba alba	28.1	1.9	23.2	36.08	38.2	1.8	30.4	54.1
E. aromatica	6.4	1.9	4.4	8.07	7.5	1.5	3.8	10.7
P. ansium	15.6	1.8	12.9	19.5	20.5	1.7	16.6	28.5
Pirimiphos-methyl	0.0023	2.05	0.0019	0.0027	0.0028	1.9	0.0023	0.0034
	Five days after treatment							
C. murale	26.2	2.1	22.0	74.9	25.3	2.4	21.7	29.2
A. majus	33.5	2.5	43.8	63.3	37.8	2.7	33.2	44.6
A herba alba	13.4	2.3	11.2	15.6	19.5	2.5	16.9	22.8
E. aromatica	3.5	1.7	1.6	5.2	6.5	1.6	3.9	8.4
P. ansium	12.0	2.2	10.2	14.0	14.9	2.0	12.6	17.9
Pirimiphos-methyl	0.00012	2.0	0.0008	0.0015	0.0021	4.0	0.001	0.003

Ovicidal activity:

The susceptibility of eggs of *C. maculatus* (1-3 day-old) to the tested plant extracts and pirimiphos-methyl was studied at levels of LC_{50} and LC_{90} using spray application. The results obtained in Table (5) show the effects of both ethanol and n-hexane plant extracts on egg hatchability of *C. maculatus* at LC_{50} level. Based on LC_{50}, values statistical analysis indicated that *P. ansium* and *E. aromatica* extracts had the highest effect among ethanol and n-hexane extracts, which gave 17.4 and 21.3 and 25.9, 13.2% hatching with ethanol and n-hexane, respectively followed by *A. herba alba* but *A. majus and C. murale* extracts had the lowest effect on egg hatchability either with ethanol or with n-hexane solvent. At all levels of tested plant extracts, i.e. ethanol and n-hexane, there were significant differences between control and these extracts which significantly reduced the number of hatching eggs. With ethanol extracts significant differences, at LC_{50} level, were found between pirimiphos-methyl and the all plant extracts. Both *P. ansium* and *E. aromatica* had the same category of the effect on egg hatching of *C. maculatus*. No significant difference was found between n-hexane extract of *E. aromatica* and pirimiphos-methyl while, a significant difference was found between *E. aromatica* and *P. ansium*. At LC_{90} level, all tested plant extracts and pirimiphos-methyl significantly reduced the number of hatching eggs of *C. maculatus* compared to control (Table 6). Although ethanol extracts of *E. aromatica* and *P. ansium* exhibited the same effect (according to the statistical analysis) clear differences were found between ethanol extract of *E. aromatica* and pirimiphos methyl while there was no significant difference was found between *P. ansium* and pirimiphos methyl.

Table (5): Hatchability percentage of *C. maculatus* eggs (1-3 days old) after surface treatment of ethanol and n-hexane plant extracts using LC_{50} values (mg/kg) after 5-days.

Tested materials	LC_{50} mg/kg	M. No. of eggs observed	M. No. of eggs hatched	% hatch	% productivity index
	Ethanol				
C. murale	31.5	197.6	80.6 b	40.9	52.5
A. majus	26.5	202.3	69.6 b	34.4	44.2
A. herba alba	16.6	192.3	70.3 b	36.5	46.9
E. aromatica	8.7	197.0	42.0 c	21.3	27.3
P. ansium	6.8	210.0	36.6 c	17.4	22.3
	n-hexane				
A . majus	25.3	198.6	73.5 c	37.0	47.5
A. herba alba	19.5	212.0	59.7 d	28.0	35.9
C. murale	37.8	209.6	112.5 b	53.6	68.8
E . aromatica	6.5	188.3	25.0 f	13.2	16.7
P. ansium	14.9	186.3	48.3 e	25.9	33.2
Pirimiphos-methyl	0.0021	212.6	23.6 f	11.0	14.0
Control		201.0	156.0 a	77.9	

Means followed by the same letter are not significantly different at the level 5% by DMRT (Duncan Multiple Range Test, Duncan, 1955).

$$\text{Percent productivity index} = \frac{\%\text{ egg hatching in treated}}{\%\text{ egg hatching in control}} \times 100$$

On the other hand, with n-hexane extracts pirimiphos-methyl was the most effective among tested materials with percent productivity index 7.2 followed by *E. aromatica* and *P. ansium* with percent productivity index of 14.5, 20.0, respectively (Table 5). The different effects between organophosphate insecticide pirimiphos-methyl and the plant extracts may be due to the mechanism of action, the penetration rate of each toxicant introduced to eggs or the type and amounts extracted by the two different solvents used. In general all tested extracts significantly reduced the number of hatching eggs of *C. maculatus* at either LC_{50} or at LC_{90} level. *E. aromatica* and especially *P. ansium* markedly reduced percentage of hatching eggs and their productivity.

Table (6): Hatchability percentage of *C. maculatus* eggs (1-3 days old) after surface treatment with ethanol and n-hexane plant extracts using LC_{90} values (mg/kg).

Tested materials	LC_{90} mg/kg	No. of eggs	No. of eggs hatched	% hatch	% productivity index
	Ethanol				
C. murale	112.2	197.6	65.3 b	32.6	42.0
A. . majus	105.8	202.3	40.6 c	20.0	25.6
A. herba alba	61.7	212.0	45.5 c	21.4	27.5
E. aromatica	40.5	197.0	23.6 d	11.9	15.3
P. ansium	15.3	210.0	18.5 de	9.0	11.5
	n-hexane				
A . majus	83.4	206.3	46.4 c	22.4	28.7
A . herba alba	89.8	183.6	38.6 cd	21.0	26.9
C. murale	125.4	193.6	72.2 b	37.1	47.6
E. aromatica	37.8	191.0	21.6 ef	11.3	14.5
P. ansium	52.5	188.0	29. de	15.6	20.0
Pirimiphos-methyl	0.0044	198.0	10.8 f	5.6	7.2
Control		201.0	156.6 a	77.9	

Means followed by the same letter are not significantly different at the level 5% by DMRT (Duncan Multiple Range Test, Duncan, 1955).

Percent productivity index =

$$\frac{\%\text{egg hatching in treated}}{\%\text{egg hatching in control}} x100$$

The progressive findings are in agreement with those of Pereira (1983) who indicated that the use of neem kernel oil, karite oil, groundnut oil, palm kernel oil, and palm oil exhibited significant ovicidal activity on *C. maculatus* eggs at and above 3 ml g oil/kg cowpea seeds.Also, Abdel Aziz and Kelany (2004) found that the reproduction of *Tetranychus urticae* females directly sprayed with different concentrations of Neem Azal-T/S and Neem Azal-T significantly decreased and most of them failed to lay eggs. Kelany *et al.* (2000) found that aqueous neem kernel powder extract (ANKPE), Neem kernel powder (NKP) and Neem Azal F affected significantly the deposited eggs of *Phthoremia operculella*. As the concentration of neem forms mentioned above increased, the reduction of deposited eggs was increased.

Also, the effectiveness of the various plant extracts in suppressing the oviposition and percent eggs hatching has been recorded by several authors, e.g. Makanjuola (1989) found that, extracts of neem leaves and seed significantly reduced ovipoistion, percent hatched eggs and percent adult emergence of *C. maculatus* on treated cowpeas. He also concluded that neem does not act only as an oviposition but also as an ovicide. EL-sayed (1985) also reported that citrus oils, navel orange, sweet orange and grape fruit significantly reduced the oviposition. Furthermore all oils reduced total egg deposited on seeds and egg hatchability percentage.

Our results also indicated that, the ethanol and n-hexane plant extracts of *E. aromatica* (flower buds) and *P. ansium* (seeds) gave the highest effects on the tested insect species by the two different method techniques. These results suggest that these plants may be a good source for naturally occurring phytochemicals with the potential of protecting stored product from attack of certain insect pests. Therefore we selected these two mentioned plant extracts to carry out some further phytochemical experiments to clarify and insure these findings.

REFERENCES

Abbassy, M.A.; A.H. Hosney, Lamei and O. Shoukri (1979). Insecticidal and synergistic citrus oils isolated from citrus peels. Med. Fac. Landbouww. Rijks Univ., Gent. 44(1): 12-29.

Abbott, W.S. (1925). A method for computing the effectiveness of an insecticide. J. Econ. entomol. 18: 265-267.

Abdel-Aziz, E. Basha and I.M. Kelany (2004). Laboratory studies on effect of Neem Azal-T/S and neem Azal-T on some biological aspects of the two-spotted spider mite, Tetranychus urticae Koch proceeding of the 10th workshop, "Practice oriented results on use of plant extracts and pheromones in integrated and biological pest control" Cairo, Feb. 10-11, 2001, 297-287 (Eds. H. Kleeberg and I.M. Kelany).

Abd El-Kawy, F.K. (1992). Treatment with different oils for the control of the rice weevil, Sitophilus oryzae (L.). in Yellow Meal Corn. Bull. ent. Soc. Egypt. Econ. Ser., 19: 115-121.

Duncan, D.B. (1978). Multiple range and Multiple F tests. Biometrics, 11: 1-42.

Don-Pedro (1984). Toxicity of some citrus peels to Dermestes maculatus Deg and Callosobruchus maculatus (F.). J. Stored Prod. Res. 21(1): 31-34.

El-Borolosy, F.M.; A.H. Ibtisam; E.Z. Fam and M.A. Sanaa (1989). Evaluation of the effectiveness of some plant and paraffin oils against the rice weevil, S. oryzae (L). Proc. 1st Int. Conf. Econ. Ent. 1: 393-401.

El-Sayed Ferial, M.A. (1985). Citrus oils as protectants of cowpea against infestation by C. maculatus (F) (Coleoptera: Bruchidae) Bull ent. Soc. Egypt. Econ. Ser., 14, 184-198.

Finney , D.J. (1971). Probit analysis (3rded.)Cambridge university press. London.

Fraenkel, G. (1969). Evaluation our thoughts on secondary plant substances. Entomologia Exp. Appl. 12: 473-486.

Freedman, B.; L.J. Nowak; W.F. Kowak; E.C. Berry and W.D. Guthrie (1979). A bioassay for plant derived pest control agents using the European corn. J. Econ. Entomol. 72, 541-545.

Hedaya, S. (1996). Neem-based insecticide as a repellent and growth inhibitor the red flour beetle Triboium castaneum (Coleoptera: Tenebrionidae). Bull. ent. Soc. Egypt, Econ. Ser., 23: 78-85.

Kelany, I.M.; EL -Zohairy, M.M..; Hegab , A. M. and Salem, H.E.M. (2000): 52 Deutsche pflanzenschutztagung, freising, weihenstephan,9-12-Oktober-2000,Heft376-Berlin-2000. Mitteilungen aus der Biologishen Bundesanstalt FÜr landand Forstwirtschoft – Berlin – Dahlem .

Makanjoula, W.A. (1989). Evaluation of extracts of neem (Azadirachta indica A. Juss). For the control of some stored product pests. J. of Stored Product. Res. Vol. 25, No. 4, pp. 231-237.

Mahgoub, S.M.; S.M. Ahmed and S.M. Abd El-Baki (1998). Use of Petroselinum sativum oil for the protection of wheat grain and mung bean seeds against the rice weevil Sitophilus oryzae (L)

and the cowpea beetle, Callosobruchus maculatus (F). Egypt. J. Agric. Res., 76 (1): 117-124.

Obeng, D.; C.H. Ofori; R.J. Bekel and A. Hassanli (1997). Biological activity of 1, 8 cineole, A major component of essential oil of Ocimum kenyense (Ayobangira) against stored product beetles. J. Appl. Entol. 121, 237-243.

Othman (2000). Insecticidal potential of essential oils plant origin as protectants in stored grains.J.Egypt .Ger . Soc .Zool., 32: 91 – 103.

Pereira, J. (1983). The effectiveness of six vegetable oils as protectants of cowpeas and bermbara groundnuts against infestation by Callosobruchus maculatus (F) (Coleoptera: Bruchidae). J. Stored Prod. Res. 19, 57-62.

Prakash, A. and J. Rao (1986). Evaluation of plant products as antifeedants against the rice storage insects. Proc. Symp. Resid and Environ Pollution: 201-205.

Prakash, A. and J. Rao (1987). Use of chemicals as grain protectatns in storage ecosystem and its consequences. Bull. Grain. Tech. 25(1): 65-69.

Prakash, A.; J. Rao; S.P. Gupta and T.C. Binh (1989). Rice storage and insect pest management. B.R. Publishing Crop. New Delahi P. 337.

Prakash, A.; J. Rao; S.N. Tewari and S.P. Gupta (1990). Rice agro-ecosystem management by pesticides and its consequences. Natcon. Publ. in Growth Develop and Naturear Resource Conservation: 131-137.

Su, H.C.F. (1977). Insecticidal properties of black pepper to rice weevils and cowpea weevils. J. Econ. Entomol. 70(1): 18-21.

Zidan, Z.A.; A.A. Gomaa; F.A. Afifi; E.A. Fam and Salwa M.S. Ahmed (1993). Bioresidual activity of certain plant extraction on some stored grain insects, in relation with seed viability. Arab Univ. J. Agric. Sci., Ain Shams Univ., Cairo, 1(1): 113-123. 1993.

الملخص العربى

كفاءة مستخلصات بعض الأنواع النباتية مقارنة بالأكتيليك كمواد فعالة ضد البيض والأطوار الكاملة لبعض آفات الحبوب المخزونة

رأفت بدر سعد أبو عرب ــ عبير عبد السلام سالم محمد

قسم بحوث آفات المواد المخزونة ــ معهد بحوث وقاية النباتات ــ مركز البحوث الزراعية ــ الجيزة ــ مصر

تناولت هذه الدراسة تجميع خمس أصناف نباتية من مناطق مختلفة في مصر

الخلة البرية *Ammi majus* ، نبات الزربيح *Chenopodium mural* ، والشيح البلدي *Artemesia herba alba* والينسون *Pimpinella anisum* ونبات القرنفل *Eugenia aromatica*.استخلصت بعض المواد الفعالة من أجزاء مختلفة من النباتات السابقة باستخدام مذيب الأيثانول ومذيب الهكسان العادي وتم اختبار الخواص الأبادية للمواد الخام الناتجة من الاستخلاص وتقييمها معمليا ضد الأطوار البالغة من سوسة الأرز *Sitophilus oryzae* وخنفساء اللوبيا *Callosobruchus maculatus* وطور البيض في خنفساء اللوبيا وتم مقارنة النتائج بأحد المبيدات التقاسية الموصى بها وهو مبيد البيرميفوس ميثيل pirimiphos methy l.

وكانت النتائج المتحصل عليها كالتالي:

١- نبات الينسون ونبات القرنفل هما أكثر النباتات المستخدمة فعالية ضد الحشرتين موضع الاختبار مع طرق التقييم المختلفة (المعاملة السطحية ــ الخلط مع بيئة التربة ــ معاملة البيض).

٢- كانت سوسة الأرز أكثر حساسية من خنفساء اللوبيا للمواد المختبرة.

٣- لم يظهر فرق معنوي ملحوظ بين مستخلص الهكسان لنبات القرنفل ومبيد البيرميفوس ميثيل في التأثير على نسبة الفقس في البيض.