

## TOXIC EFFECT OF SOME RESIDENTIAL PESTICIDES RESIDUES ON MALE ADULTS OF AMERICAN COCKROACHES, *Periplaneta americana* AND ON WHITE RATS ENZYMES ACTIVITIES

Bayoumi, O.C.; I.I. El-Fakharany; M.M.F. El-Naggar and A. I. El-Tokhy  
Faculty of Agriculture, Pesticides Department, Kafr El-Sheikh, Tanta University

### ABSTRACT

The efficiency speed of some pesticides (Gokilaht, Solfac, Delta Fog and Neocidol) against American cockroaches, *Periplaneta americana* at intervals with time were tested. Results showed that, after 10 min. of contact treatments, Gokilaht showed the most toxic effect against *Periplaneta americana* followed by Solfac, Delta fog and Neocidol. While with contact toxicity test under laboratory condition, results showed that, Solfac pesticide had the highest toxic effect against *Periplaneta americana* followed by Neocidol, Gokilaht and Delta-Fog pesticides, the  $LC_{50}$  values were 0.066, 0.8, 0.92 and 0.95  $\mu\text{g}/\text{cm}^2$  respectively.

Pesticides residues of neocidol and solgac were also determined at intervals with time in different materials types (ceramic, thermal tiles, texture (cotton, wool), unpainted wood and glasses) by using gas liquid chromatography.

The side effects of these insecticides on some enzymes activities (cholinesterase (ChE), Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), alkaline phosphatase (AP), total protein, Albumin, uric acid and Cholesterol) in white rats were studied 24 hours and 21 days after treatments. Data revealed that Solfac, Gokilaht and Neocidol gave a normal behaviour without any toxicity symptoms, while Delta-fog exhibited abnormal behaviour. Also different changes in the enzymes activities were detected during the experimental period for all pesticides tested.

### INTRODUCTION

The use of the pesticides to control the public health pests has rapidly increased in the last few years. These pests were known as one of the most important way to transmit the human diseases. Importance to study the pesticide residues in different materials around us which had a direct contact with human and may cause serious hazards to human health and created a pollution problem to our environment. The specific condition of pesticides application in agriculture, forestry, industry, public health and households make them one of the most common type of chemicals coming into contact with all group of population. Indoor residential pesticide applications present the potential for human exposures, particularly for small children. Personal contact with target and nontarget surfaces can result in transfer of pesticides to the skin. (Chensheng Lu and Fenski, 1999). Studies indicated that human skin removes substantially less residue from carpets and furniture than either conventional wipe sampling methods following residential pest control applications of chlorpyrifos. Also pesticides application in public areas requires different safety modes and concentrations capable of killing houses

pests. On the other hand the protective measures of both workers and domestic animal species are very limited and specific. The concentration of some pesticides residues have already been detected in different surfaces in different places of the world Leidy et al. (1987; Roinstead, 1993; Ross, 1990, 1991) determined insecticides residues on surfaces (Formica, unfinished plywood, stainless steel and vinyl tiles) and its application to food handling establishment and Stout et al. (1995) detected cyfluthrin in ambient air and stainless steel plates. Also the residues of the tested pesticides were determined from human skin (Fenske et al. 1994). So the dermal transfer of such residues were determined from residential surface (carpet, furniture, wipe and pufroller) after residential pesticides application ( Lexsen and stefan, 1993; Colts et Al., 1998; Lu-Chensheng et al. 1999). Also the transfer efficiencies of pesticides were determined from surface to food and transfer from surface to hands to food ( Lewis, 1989; Alkand et al. 2000; Lemley, 2002). Broad cast and aerosol applications are employed to treat large interior surfaces (e.g., floor, carpets, furniture) and consequently may result in significant dermal exposure for occupants as respiratory exposures (Chensheng Lu and fenske, 1998). So the present study was directed to focus the efficiency of pesticides, pyrethroid (Gokilaht, Solfac, and Delta fog) and the organophosphorus pesticides (Neocidol) to control American cockroaches, *Periplaneta americana* which can transmit some diseases to human and to determine the pesticides residues in different samples which had a direct contact with human such as ceramic, thermal tiles, texture (cotton, wool), unpainted wood and glass at intervals with time after different application methods. As well as to study the side effects of these pesticides on some enzymes activities (cholinesterase, aspartate aminotransferase, alanine aminotransferase and alkaline phosphatase). Also to determine the concentration changes of cholesterol, uric acid, albumin and total protein in treated white rats.

## MATERIALS AND METHODS

### Insecticides used: -

**Neocidol:** O,O-diethyl O-2-isopropyl-6-methylpyrimidin-4-yl phosphorothioate. Diazinon 99%. Neocidol 600 EC. Recommended rate of application: 30  $\text{cm}^3$ /(18 gm a.i.)/L/25 $\text{m}^2$ . Introduced by Ciba Geigy AG., Swissland.

**-Solfac:** (RS)- $\alpha$ -cyano-4-fluoro-3-phenoxybenzyl (1RS, 3RS; 1RS, 3SR)-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate. Cyfluthrin 90.4%. Solfac EC 050. Recommended rate of application: 10  $\text{cm}^3$  (0.5 gm a.i.)/L/20 $\text{m}^2$  Introduced by Bayer AG., Germany

**Gokilaht NF:** Gokilaht is a mixture of cyphenothrin 12% and d-tetramethrin 4%. Cyphenothrin 93%: (RS)- $\alpha$ -cyano-3-phenoxybenzyl (1RS, 3RS; 1S, 3SR)-2,2-dimethyl-3-(2-methylprop-1-enyl) Cyclopropanecarboxylate. d-tetramethrin 92%: Cyclopropanecarboxylate; cyclohex-1-ene-1,2-dicarboximidomethyl (1RS)-cis-trans 2,2-dimethyl-3-(2-methylprop-1-enyl). Recommended rate of application: 2 $\text{cm}^3$  (0.32 gm a.i.)/L/20 $\text{m}^2$ , Introduced by Sumitomo Chemical Co. Ltd.

**-Delta fog15/10 SC:** Delta fog is a mixture of deltamethrin 15% and tetramethrin 10%.

-deltamethrin 98%: (S)- $\alpha$ -cyano-3-phenoxybenzyl (1R,3R)-3-(2,2-dibromovinyl)-2,2-dimethylcyclopropanecarboxylate.

- tetramethrin 93%: cyclopropanecarboxylate; cyclohex-1-ene-1, 2-dicarboximidomethyl (1RS)-cis-trans 2,2-dimethyl-3- (2-methylprop-1-enyl).

Recommended rate of application: 10Cm<sup>3</sup>(0.25gm a.i.)/750cm<sup>3</sup>/150m<sup>2</sup>, Manufacture Rossel Uclaf and de Haen, Germany.

All Pesticides were supplied from International Atomic Energy (IAEA), Mona Co., Cairo Egypt.

**Pests:**

**A. Rearing of American cockroaches, *periplaneta americana*:**

A susceptible strain of *Periplaneta americana*, adult and Nymph was purchased from research institute of medical entomology, Mathf of El-Zeraï street, Dokki, Giza, Egypt in 2000 and reared under the laboratory conditions in incubation of 28±1°C and 70 ± 5% RH. The colonies were kept in glass cages (40 x 25x 30 cm); these are greased on the inside on the top half with medical vizlin. It also has two pieces of rolled corrugated Cardboard which sterilized at 70°C for 8 hours, and 3 wood cake case which placed in the center and gave plenty of nesting sites for the cockroaches. Six small water bottles placed inside, and put in these bottle pieces of medical cotton, which formed the twisted. The water is renewed after 4 days. The food was drying bread, and renewed weekly. The cages clean up every 4 - 5 weeks, and covered on the top by pieces of muslin.

**B. Rearing of white rats**

A pure strain of healthy white albino mature male and female rats were purchased from house economic Dept., Agric. Faculty, Alexandria University and reared under the laboratory condition of 25±5°C and 65 ±5% RH. The rats were housed in glass Cage 45x35x20 Cm; fed daily with balanced ration consisted of bread, lettuce, snake cucumber and soaked wheat in water. The new progenies were reared for experiment tests. Male rats with the mean average weight of 200 gm were used in the current study.

**Toxicity tests against American cockroaches, *periplaneta american*:**

Contact toxicity tests were used to evaluate the efficiency of the tested insecticides against the susceptible strain of American cockroaches (*periplaneta americana*). Serial concentrations of the tested insecticides were prepared by dissolving in acetone. Three replicates, each of five male adults with the mean weight of 0.997gm were done for each concentration. The jars (19x14x20 Cm) were treated with the concentration, and then the Jars left to dry. The cockroaches were contacted with each insecticide concentration for 10 seconds under laboratory condition, and then transfer to clean Jars. Two control were used the first by using acetone only and the second without any treatment. Mortality counts were recorded 24 hours after application and were corrected according to Abbott's formula (1925). The corrected mortality was plotted on a log-dosage probit paper and regression lines were flitted and statistically analyzed according to Finney (1952).



### **Field studies**

Two different residential areas were used in this study. These areas were treated using different applications instruments against pests, these methods were (Sprayer, Mesto: Model No.: 3610G, ULV applicator, Hurricane: The Hurricane (Electric portable Aerosol applicator) Model No.: 2792. Thermal Fogger: k-10 SP. Puls Fog, Dr. stahl + Sohn GmbH-Germany

#### **a. Industrial areas, Daewoo work shop:**

This industrial area is situated at Katamea - Cairo - Egypt. The different samples (ceramic tiles, wall ceramic and thermal tiles) were put in these area and then were treated using Mesto sprayer with Neocidol insecticide that was diluted in water with the rate of  $30 \text{ Cm}^3$  (18 gm a.i./L/25m<sup>2</sup>) and three replicate of each sample were left without any treatment as control at May 2000.

#### **b. Petrol plant, Rigs (Mercury and Comet offshore)**

The petrol plant was situated in the south of Sina in the Red Sea A.R.E. This plant was treated using ULV applicator (Hurricane) with Solfac insecticide with recommended doses [ $10 \text{ cm}^3$  (0.5 gm a.i./L/20m<sup>2</sup>)]. Samples were taken from different areas of the plant.

-Textures (cotton & wool) were taken from the bedrooms of workers.

-Woods were taken from kitchen and restaurant of Mercury.

-Glasses were taken from workers offices.

All samples were taken at intervals with time after treatment.

#### **Analysis:**

The method of extraction, clean up and determination methods according to the method of Association of Official Analytical Chemists (AOAC, 1990) with minor modifications

#### **Samples:**

Three replicates were taken for each sample after treatments. The control was used for all samples without any pesticides treatment. Samples of glass of 8x10cm were collected from the offices in Mercury offshore rig at intervals (one hour after application (zero time), 9, 16 days). Clean new polyethylene bags were used for preservation of the collected sample until time of the analysis. Some samples were wiped with a small portion of cotton texture.

-Samples of woods, 11.5 x 14.5 cm were collected from the kitchen and restaurant in Mercury rig at intervals one hour after application (zero time), 9, 16 days.

-Samples of wall ceramic, ceramic tile and thermal tile were collected at intervals one hour after application (zero time), 14, 30 days.

-Samples of different texture of (10cmx10cm) were collected from the bedrooms of workers in Mercury offshore rig at intervals [one hour after application (zero time), 7, 14 days].

Clean new Polyethylene bags were used for preservation of the collected sample until time of the analysis.

#### **Extraction methods:**

Two extraction methods were used depending on the chemical structure of the tested pesticides.



- 1-Using acetone and chloroform from wood, glass, ceramic and different textures: Samples were put in Jar with 100ml acetone: chloroform (50:50) and shook at high speed for 3 minutes using soxhelt. This method should be repeated for 3 times. Extract was filtered through what man No. 4 paper on Buchner funnel and anhydrous sodium sulphate then, evaporated using a rotary evaporator at 40°C.
2. With distilled water from ceramic and thermal tiles. The sample of wall ceramic, ceramic tiles and thermal tiles were put in jar with 250 ml-distilled water and shaken at high speed for 1 min. using soxhelt. The extraction water was shook at high speed for 3 minutes with 50 ml methylene chloride using soxhelt. This method should be repeated for 3 time. Extract was filtered through what man No. 4 paper on Buchner funnel and anhydrous sodium sulphate then, evaporated using a rotary evaporator at 40°C.

**Clean up:**

This method was used for all experimental samples. Clean up was done using florisil adsorption chromatography with 30 ml hexane: ethyl acetate (75:25). The extracts were concentrated to 1 ml and then analyzed by gas chromatography.

**Determination methods of pesticides using GLC:**

Pesticides residues were quantitatively analyzed by a Hewlett-Packard 6890 series II gas chromatography equipped with a 30m x 0.25 mm x 0.25 µm Hp-5 capillary column and working in the splitless mode.

Gokilaht, Solfac and Delta Fog insecticides were quantified in a gas chromatograph equipped with an electron capture detector (ECD) at the temperature of 320 °C. The initial oven temperature of these insecticides was 80 °C and the temperature programmed at 30 °C/min until 180 °C, 3 °C/min until 250 °C and 20 °C/min until 290 °C that was held during 2min. injector temperature was 275°C

Neocidol insecticide was quantified in a gas chromatography equipped with nitrogen phosphorus detector (NPD) at the temperature of 225 °C. The initial oven temperature for Neocidol was 60 °C. Then programmed as 25 °C/min to 190 °C, 2 °C/min to 225 °C and 5 °C/min to 280°C that held for 10 min. injector temperature was 220 °C.

The compounds were identified and quantified using standards from International Atomic Energy Agency (IAEA). Mona co. Recoveries of the four pesticides were determined and ranged from 71-90%.

**Biochemical study: -**

**A-Treatment of white rats:**

Five groups of male rats' (6 rats/group) equal in old age and weight as described above were used in the present experiment for each pesticides. Different pesticides concentration for this experimental were prepared by dissolving in food oil. The LD<sub>50</sub> of Delta fog insecticide which contain deltamethrin 15% (LD<sub>50</sub> = 1080 mg/kg) and tetramethrin 10% (LD<sub>50</sub> = > 5000 mg/kg) was calculated as the LD<sub>50</sub> of deltamethrin and LD<sub>50</sub> of tetramethrin. The concentration used were (54mg/kg for deltamethrin and 250 mg/kg for tetramethrin) which present the 1/20 LD<sub>50</sub> of each compound. LD<sub>50</sub> of Gokilaht insecticides which contain cyphenothrin 12% (LD<sub>50</sub>=318 mg/kg) and

d-tetramethrin 4% ( $LD_{50} \Rightarrow 5000$  mg/kg) was calculated as the  $LD_{50}$  of cyphenothrin and  $LD_{50}$  of d-tetramethrin. The used concentrations were (15.9 mg/kg for cyphenothrin and 250 mg/kg for d-tetramethrin) which present the 1/20  $LD_{50}$  of each compound. 1-4 Groups was given of 1/20  $LD_{50}$  (these concentration 53.18, 5, 60.8 and 8.5 mg/200gm for Gokilaht, solfac, Delta fog and Neocidol as described in the pesticides Manual. 1994). The five groups were given a single oral dose of food oil, which was used as control.

#### **B-Determination of enzyme activity:**

Three rats from each group were slaughtered after 24 hours and 21 days of treatment and blood sample were collected. The blood was centrifuged for 10 minutes at 4000 r.p.m. Blood serum was used in this experimental to determine the different enzymes activities of cholinesterase (ChE), Aspartate aminotransfers (AST), Alanine aminotransferase (ALT), alkaline phosphatase (AP), total protein, Albumin, uric acid and Cholesterol.

The activity of cholinesterase (ChE) was determined according to the method of Ellman *et al.* (1961). Transaminase activity was determined by diamond-diagnostics kits. The calorimetric method according to Reitman *et al.* (1957) Was used for determination serum AST and ALT activity in rats according of the following reactions: Alkaline phosphatase activity was determined by bioMerieux kits according to kind and king (1954) as modified by Belfield and Goldberg (1971) by kits.

Total protein was determined by Diamond diagnostics kits. The colorimetric method carried out by Henry and Row (1964). The albumin was determined by Biocon Diagnostik, Germany kits were used. The calorimetric methods of Doumas and Watson (1971) as modified by Webster (1974) was used for assaying albumin using bromcresol green (BCG) at pH 4.2. Cholesterol concentration was determined by Diamond kits. The calorimetric methods of Watson (1960). Uric acid concentration determined by Diamond diagnostic kits. The colorimetric methods of Barham and Trinder (1972) as modified by Fossatr, prencipe and Berti (1980).

## **RESULTS AND DISCUSSION**

### **1- Toxicity of tested pesticides against cockroache, *Periplaneta americana***

Results in table (1) showed that, after 10 min. of contact treatment the Gokilaht pesticides had the most rapid toxic effect against *Periplaneta americana* followed by Solfac and Delta fog pesticides. The mortality percent were 73%, 53% and 33% respectively, while for Neocidol pesticide was not effective. After 30 min. the mortality percent was increased to 100%, 100%, 67% and 67% for Solfac, Gokilaht, Neocidol and Delta fog respectively. Also the mortality percent reached to 100% for all insecticides after 24 hours. Table (2) illustrated the contact toxicity of the tested pesticides, Gokilaht, Solfac, Delta-fog and Neocidol against the male American cockroaches' adult, *Periplaneta Americana* under laboratory conditions. Solfac pesticide had the highest toxicity against *Periplaneta americana* followed by Neocidol, Gokilaht and Delta-fog pesticides, the  $LC_{50}$  values were 0.066, 0.8, 0.92 and  $0.95 \mu\text{g}/\text{cm}^2$  respectively. These results are in agreement with that of Rust



et.al., 1990 and Abd Elgaher et.al., 1990, who reported that pyrethroid insecticides were more toxic against American cockroach than organophosphorus insecticides.

Table (1): Toxicity test of different pesticides\* against American cockroaches adult, *Periplaneta americana* under laboratory condition at intervals with time of treatments.

Total Mortality	Time (hours)	PESTICIDES			
		Solfac <sup>a</sup>	Delta Fog <sup>b</sup>	Gokilaht <sup>c</sup>	Neocidol <sup>d</sup>
	10 min	53%	33%	73%	0%
	30 min.	100%	67%	100%	67%
	1 hour	100%	100%	100%	100%
	24 hours	100%	100%	100%	100%

\*Concentration used were: a)= 52 µg/cm<sup>2</sup> b)= 1.3 µg/cm<sup>2</sup>  
c)= 3.37 µg/cm<sup>2</sup> d)= 158 µg/cm<sup>2</sup>

Table (2): Toxic effects of some pesticides against the susceptible strain of American cockroaches' adults, *Periplaneta americana* after 24 hours of treatment.

Pesticides	LC50 µg/cm <sup>2</sup>	Confidence limits	Slop value
Solfac	0.066	0.0462 - 0.0941	2.31
Neocidol	0.8	0.431 - 1.48	1.33
Gokilaht	0.92	0.789 - 1.072	5.32
Delta Fog	0.95	0.648 - 1.030	3.11

The residues of Neocidol (diazinon) insecticide in wall ceramic, Floor ceramic and thermal tiles using the organic solvents (acetone and chloroform) under field condition at intervals with time of treatment are presented in table (3). Data revealed that, the residues were 1.68x10<sup>-4</sup>, 12.6x10<sup>-4</sup> and 9.5x10<sup>-4</sup> ng/cm<sup>2</sup> on wall ceramic, Floor ceramic and thermal tiles respectively, after one hour of direct treatment using Mesto sprayer. While residues of these insecticides were below the detection limits after 14 days of treatment.

Table (3): Residues of the organophosphorous insecticide, Neocidol (diazinon) on treated Ceramic\*\* and Thermal tiles at intervals using Gas-Liquid chromatographic method.

Time intervals (Days)	Residues ng/cm <sup>2</sup>					
	Using of organic solvent			Using water		
	Wall ceramic	Floor ceramic	Thermal tiles	Wall ceramic	Floor ceramic	Thermal tiles
Zero time*	1.68x10 <sup>-4</sup>	12.6x10 <sup>-4</sup>	9.5x10 <sup>-4</sup>	N.D	N.D	N.D
14	N.D	N.D	N.D	N.D	N.D	N.D
30	N.D	N.D	N.D	N.D	N.D	N.D

\* One hours after application

\*\* Two type were used: - 1) Wall ceramic 2) Floor ceramic  
N.D = Non detected (below the detection limits).

**2- Determination of Neocidol and Solfac residues on some materials types**

The residues of Solfac (cyfluthrin) insecticides in different samples of textures (cotton, thick wool and thin wool) at intervals with time of treatment using ULV applicator (Hurricane) are presented in Table (4). The determination of initial residues after one hour of treatments were  $11 \times 10^{-4}$ ,  $26 \times 10^{-4}$  and  $0.46 \times 10^{-4}$  ng/cm<sup>2</sup> respectively. While after 7 days of treatment these residues were decreased in cotton, thick wool and thin wool Texture to  $5.8 \times 10^{-4}$ ,  $8.4 \times 10^{-4}$  ng/cm<sup>2</sup> and N.D (below the detection limit) respectively, while after 14 days these residues were dropped to  $0.3 \times 10^{-4}$ ,  $6.3 \times 10^{-4}$  ng/cm<sup>2</sup> and N.D in cotton, thick wool and thin wool texture respectively. The concentration of this insecticide in cotton samples after washing with distilled water were below the detection limits.

**Table (4): Residues of Solfac (cyfluthrin) insecticide in different type of textures using Gas-Liquid Chromatographic method.**

Time Intervals (Days)	Residues							
	Cotton				Thick wool		Thin wool	
	Before washing		After washing		ng/cm <sup>2</sup>	%Loss	ng/cm <sup>2</sup>	%Loss
ng/cm <sup>2</sup>	%Loss	ng/cm <sup>2</sup>	%Loss					
Zero time*	$11 \times 10^{-4}$	0.00	N.D	—	$26 \times 10^{-4}$	0.00	$0.46 \times 10^{-4}$	—
7	$5.8 \times 10^{-4}$	47.27	N.D	—	$8.4 \times 10^{-4}$	67.69	N.D	—
14	$0.3 \times 10^{-4}$	97.27	N.D	—	$6.3 \times 10^{-4}$	75.76	N.D	—

\*One hours after application

\*\*Washing with distilled water.

N.D = Non detected (below the detection limits).

Also, these data indicated that, the percent losses in this pesticide residue was found to be continued on prolonging the time after application for Solfac (cyfluthrin) where the percent loss rates amounted to 47.27, 97.27% and 67.69, 75.76% for cyfluthrin in cotton and thick wool respectively after 7, 14 days. But the concentration in cotton after washing and thin wool was below the detection limit during the experimental period.

Data in Table (5) showed the concentration of Solfac (cyfluthrin) insecticide residues in unpainted wood, glass before and after wiping at different intervals after application. The initial residues at the zero time of direct treatment using ULV application were  $2.8 \times 10^{-4}$ ,  $5.2 \times 10^{-4}$ , and  $1.4 \times 10^{-4}$  ng/cm<sup>2</sup> respectively. These concentrations were decreased after 9 days to  $0.5 \times 10^{-4}$  ng/cm<sup>2</sup> in unpainted wood and N.D (below the detection limits) in glass before and after wiping respectively. At the end of the experimental period (16 days) the residues were below the detection limits for all tested samples. Also, these data indicated that, the percent losses in this pesticide residue was found to be continued on prolonging the time after application for wood where, the percent loss rates amounted to 82.14% for cyfluthrin in wood after 9 days. While after 16 days of treatment the concentration was below the detected limits. Also For glass before and after wiping was below the detection limit during the experimental period.



**Table (5): Determination residues of the pyrethroids insecticides, Solfac (cyfluthrin) in wood and glass using Gas-Liquid Chromatographic method.**

Time intervals (Days)	Residues			
	Wood		Glass	
	ng/cm <sup>2</sup>	%Loss	ng/cm <sup>2</sup>	%Loss
Zero time*	2.8x10 <sup>-4</sup>	0.00	5.2x10 <sup>-4</sup>	1.4x10 <sup>-4</sup>
9	0.5x10 <sup>-4</sup>	82.14	N.D	N.D
16	N.D	—	N.D	N.D

\*One hours after application

\*\*Wiping with a small portion of cotton texture.

N.D = Non detected (below the detection limits).

**Biochemical studies:**

Table (6) show the effect of some insecticides (Gokilaht, Solfac, Delta Fog and Neocidol) on different enzymes. The effect of Gokilaht after 24 hours and 21 days of treatment on ALT, alkaline phosphatase activities, uric acid and cholesterol concentrations were significantly increased to percent, 136.8%, 164.2%, 174% and 123.2% respectively in all treated rats (the % percentage were calculated from table 6). On the other hand AST and ChE activities, total protein and albumin concentrations were decreased to 73.1%, 91.8%, 84.3% and 36.4% respectively. While after 21 days of treatment alkaline phosphatase activity and total protein concentration were increased, the percent of increasing were 115.9% and 114.5% respectively. On the other hand ALT, AST, ChE activities and cholesterol concentration were significantly decreased to 40.6%, 31.4%, 26.1% and 77.8% but uric acid and albumin were negligible decreased to 93.1% and 93.9% respectively in all treated rats, compared with control.

The effects of Solfac (cyfluthrin) insecticide on some enzymes. After 24 hours of treatment ALT, AST activities, uric acid and total protein concentration were significantly increased to percent, 115.7%, 182%, 350.2% and 144.1% respectively in all treated rats. On the other hand ChE, alkaline phosphatase activities, albumin and cholesterol concentrations were decreased to 89.4%, 93.1%, 90.2% and 82.78% respectively. While after 21 days of treatment AST, ALT, ChE activities, total protein, and albumin concentrations were significantly decreased, the percent of decreasing were 39.3%, 53.1%, 6.5%, 89.8%, and 50.8% respectively. On the other hand alkaline phosphatase activities and cholesterol concentration were increased to 120.2% and 101.6% respectively, in all treated rats, compared with control. Concerning to the effects of Delta Fog insecticide on different enzymes after 24 hours of treatment ALT, AST, alkaline phosphatase activities, uric acid, albumin and total protein concentrations were significantly increased to percent, 205.2%, 189.5%, 118.2%, 305.8%, 151.6% and 207.9% respectively in all treated rats. On the other hand ChE activity and cholesterol concentration were decreased to 57.1% and 85.2% respectively, in all treated rats, compared with that of control. Mortality was occurred during the intervals of 21 days. These results are in agreement with that of Mohamed and El-Sheamy (1988) studied the effect of a single oral doses of some pyrethroid insecticides (deltamethrin, fenvalerate) on enzymes activity and reported that,

there were significant increases in the activities of aminotransferases and alkaline phosphatase in the serum and liver, especially in the early days after administration. There was a highly significant fall in liver cholinesterase, indicating liver damage, at the end of experimental period. Also Shakoori et al. (1992) reported that, the GOT (AST) and GPT (ALT) increased after 15 days from treatment. ALT activity increased 119% and 60% after 15 and 30 days respectively. Cholesterol decreased 40% and 66% after 15 and 30 days respectively.

The effect of Neocidol (diazinon) insecticide on different enzymes. After 24 hours of treatment ALT, AST activities, uric acid and cholesterol concentrations were significantly increased to 110.5%, 150.7%, 296.2% and 144.8% respectively in all treated rats. On the other hand alkaline phosphatase, ChE activities total protein and albumin concentrations were decreased to percent, 64.8%, 67.8%, 87.1% and 77.2 % respectively. While after 21 days of treatment alkaline phosphatase activity, total protein and cholesterol concentrations were increased to 187%, 140.6% and 117.1% respectively. On the other hand ALT, AST, ChE activities, uric acid, albumin concentrations were significantly decreased to percent 37.5%, 32.5%, 30.5%, 80.3%, and 97.8% respectively in all treated rats, compared with that of control. These results are in agreement with that of Perez et al. (1987) who reported that, Depression of total cholinesterase activity was insignificant; highest inhibition was 22% 7 days after the first application and 30% 24 hours after the second in younger animals. No clinical or toxic side effects were observed after application 10 days apart with 57% diazinon. Also Kamal et al. (1990) who examined the long term effect of exposure to organophosphorus pesticides (OPs.) in a cohort of 100 Egyptian spraymen and reported that, the duration of exposure to OPs was 3-15 years. Spraymen showed significantly higher levels of SGPT and AP, but lower levels of ChE and proteins than in control.

## REFERENCES

- Abbot, W.S. (1925). Method of computing the effectiveness of an insecticides. *J. Econ. Entomol.*, 18: (265-267).
- Abd-Elgaher S.F.; A.G. Appel; T.P. Mack and S.F. Elghafar (1990). Toxicity of several insecticide formulations against adult German cockroaches, (Dictyoptera:Blattellidae). *J.of Econo. Entomology*, 83, 6: 2290-2294.
- Akland G. G.; E. D. Pellizzari; Y. Hu; M. Roberds; C.A Rohrer; J. O. Leckie and M. R. Berry (2000). Factors influencing total dietary exposures of young children. *J. of Exposure Anal. and Environ. Epidemiology*, 10: 6(2) (710-722).
- Association of official Analytical Chemists (AOAC), 1990 15<sup>th</sup> ed.
- Barham, D. and P. Trinder (1972). A colorimetric methods for the determination of uric acid in serum. *Analyst* 97 (142:145).
- Belfield, A. and D.M. Goldberg (1971). Revised assay for serum phenylphosphatase activity using 4 -amino antipyrine Enzyme. 12 – 16.



- Colts J.S.; Zahm S.H.; Camann D.E. and Hartge P. (1998). Comparison of pesticides and other compounds in carpet dust samples collected from used vacuum cleaner bags and from a high-volume surface sampler. *Environ. Health Perspect*, 106: 721 - 724.
- Doumas, B. and W. Waston (1971). *Clin. Chim. Acta*, 31:87. (In: Colorimetric methods for determination of albumin in serum Bicon Diagnostik Co., Germany).
- Ellman, G. L.; K. O. Courteny; V. Andree and R. M. Featherstone (1961). A new and rapid colorimetric determination of a cetyl - cholinesterase activity. *Biochem pharmacol*, 7: 88-95.
- Fenske R. A. and C. S. Lu (1994). Determination of handwash removal efficiency: incomplete removal of the pesticide chlorpyrifos from skin by standard handwash techniques. *American Indus. Hygiene Associ., J.*, 55: 5 (425-432).
- Finny, D.J (1952). *Probit analysis*, one edition. Cambridge University Press. 162 pp.
- Henry, R. G. and Row (1964). A colorimetric methods for the determination of Total protein in serum. *New York P.* 181.
- Kamal A. A. M.; M.T. Elgarhy; F. Maklady; M. A Mostafa and A. Massoud (1990). Serum cholinesterase and liver function among a group of organophosphorus pesticides sprayers in Egypt. *J. de Toxicologie Clinique et Experimentale*, 10: 7-8 (427-435).
- Kind, P. R. N. and E. G. King (1954). The determination of serum acid and alkaline phosphatase activity with 4 - amino - antipyrine. *J. Clin. Patho.*, 7:332.
- Leidy R. B.; C. G. Wright and H. E. Dupree (1987). A sampling method to determine insecticide residues on surfaces and its application to food-handling establishments. *Environ. Monit. and Assessment*, 9: 1 (47-55).
- Lemley, A.; A. Hedge; SK. Obendorf; S. Hong; S. Kim; J. Muss and Cj. Verner (2002). Selected pesticide residues in house dust from farmers'homes in center New York State. *Bull. Environ. Contam. And Tox.* (in Press).
- Lexsen K. and Stefan S. (1993). Textile floor covering as sinks indoor air pollutants. *Proceedings of Indoor Air*, 2: 395 - 400.
- Lewis, R.G. (1989). Human exposure to pesticides used in and around the household, The effect of pesticides on human health (Baker SR. Wilkinson CF, eds). Princeton Scientific Publishing.
- Lu Chensheng and R. A. Fenske (1988). Air and surface chlorpyrifos residues following residential broadcast and aerosol pesticide applications.
- Lu Chensheng; R. A.Fenske; C. S. Lu (1999). Dermal transfer of chlorpyrifos residues from residential surfaces: comparison of hand press, hand drag, wipe, and polyurethane foam roller measurements after broadcast and aerosol pesticide applications. *Environ. Health Perspectives*, 107: 6 (463-467).

- Mohamed Z. A. and M. K. El-Sheamy (1988). Aminotransferases, alkaline phosphatase and cholinesterase of hen tissues administered a single oral dose of alpha-cyano pyrethroids. Egypt. J. of Food Science, 16: 1-2 (105-109).
- Perez O. A.; J. J. Brem; J. P. Roux and O. A. De-Perez (1987). Biochemical and clinical evaluation of cattle given therapeutic applications of a diazinon preparation. Veterinaria Argentina, 4: 37 (629-630), (632-640).
- Prencipe, L. and G. Berti (1980). A colorimetric methods for the determination of uric acid in serum. Clin. Chem. 26/2(227-273).
- Reitman, A. and S. Frankel (1957). A Colorimetric method for the determination of serum glutamic oxaloacetate and glutamic pyruvic transaminase. Am. J. Clin. Path. 28:(56-63).
- Roinestad K.S., (1993). Determination of pesticides in indoor and dust. J AOAC Internat, 76: 1121 – 1126.
- Ross J. (1990). Measuring potential dermal transfer of surface pesticide residue generated from indoor fogger use an interim report. Chemosphere, 20: 349 – 360.
- Ross J. (1991). Measuring potential transfer of surface pesticide residue generated from indoor fogger using the CDFA roller method intrim report II. Chemosphere, e 22: 975 – 984.
- Rust M.K. and D.A. Reiersen (1990). Performance of pyrethroids against German cockroaches *Blattella germanica* (L). Bull. Soc. For Vector Ecology, 13, 2: 343-349.
- Shakoori A. R.; F. Aslam; M. Sabir and S. S. Ali (1992). Effect of prolonged administration of insecticide (cyhalothrin/Karate). Folia Biologica Warszawa, 40: 1-2 (91-99).
- Stout D. M.; C. G. Wright; R. B. Leidy (1995). Methods to detect cyfluthrin in ambient air and on surfaces following its application for the control of pests. Food Contaminants and Agric.Wastes.30: 6 (765-777).



تأثير متبقيات بعض المبيدات المستخدمة في الأماكن الاهله بالسكان على ذكور  
الصرصور الأمريكى وعلى نشاط بعض الانزيمات فى الفئران البيضاء  
عثمان شكرى بيومى ، اسماعيل ابراهيم الفخرانى ، محمد محمد فتحى النجار،  
احمد ابراهيم الطوخى

قسم المبيدات - كلية الزراعة بكفر الشيخ - جامعة طنطا

إن تزايد استخدام المبيدات فى السنوات الاخيرة وخاصة فى مجال مكافحة آفات الصحة العامة  
والتي تعتبر مصدرا لنقل العديد من الامراض للإنسان أدى الى الاهتمام بدراسة متبقياتها الموجودة فى كل سل  
يحيط بالإنسان من المواد المختلفة والتي يتعامل معها مباشرة وتؤثر على صحته وتلوث بيئته .  
لذا اهتمت هذه الدراسة باظهار سرعة تأثير بعض المبيدات البيروثرويدية (جوكيلات - سولفاك  
- دلتا فوج ) والمبيدات الفوسفورية (نيوسيدول ) المستخدمة فى مكافحة حشرات الصحة العامة والموجودة  
بالمناطق الاهله بالسكان مثل الصرصور الأمريكى على فترات زمنية (١٠ دقائق - ٣٠ دقيقة - ٢٤ ساعة)  
وأظهرت النتائج الاتي :-

بعد ١٠ دقائق من المعاملة بالمعاملة كان أسرع المبيدات تأثيرا هو مبيد الجوكيلات ثم السولفاك  
ثم الدلتا فوج وكانت نسب الموت ٧٣% ، ٥٣% ، ٣٣% على التوالي بينما كانت لمبيد النيوسيدول لم يحدث  
أى تأثير الا بعد مرور ٣٠ دقيقة حيث ارتفعت منها نسب الموت لكل المبيدات المختبرة الى ١٠٠% لكل من  
السولفاك والجوكيلات ، ٦٧% لكل من النيوسيدول والدلتا فوج وبعد ٢٤ ساعة وصلت نسب الموت الى  
١٠٠%.

وعلى الجانب الاخر من هذه الدراسة تم وضع طريقة تحليل دقيقة وسريعة لتقدير متبقيات  
المبيدات فى بعض العينات المختلفة التي لها احتكاك مباشر مع الإنسان مثل سيراميك الارضيات وسيراميك  
الحوائط والبلاط الحرارى والاكشمشة القطنية والخشب غير المدهون والزجاج على فترات زمنية مختلفة  
وذلك باستخدام الكروماتوجرافى الغازى GLC بعد استخدام طرق المكافحة المختلفة وكانت النتائج المتحصل  
عليها كالتالى:-

(أ) متوسط نسبة الاسترجاع لمبيدات جوكيلات - السولفاك - الدلتا فوج - نيوسيدول كانت ٨٢,٨٤، ٩١,٣٨ ،  
٧١,٢٣، ٨٧,٠٧% على التوالي

(ب) متبقيات مبيد النيوسيدول (الديازينون ) فى سيراميك الحوائط وسيراميك الارضيات والبلاط الحرارى  
باستخدام المذيبات العضوية اسيتون وكلورفورم كانت  $1.18 \times 10^{-1}$  ،  $1.26 \times 10^{-1}$  ،  $9.05 \times 10^{-1}$   
نانوجرام /سم<sup>٢</sup> على التوالي وذلك بعد مرور ساعة واحدة من المعاملة المباشرة أما متبقيات مبيد  
السولفاك فى العينات الصلبة (خشب غير مدهون - زجاج ) بعد مرور ساعة واحدة من المعاملة كانت  
 $1.0 \times 0.2$  ،  $1.0 \times 2.8$  على التوالي ثم تناقصت هذه التركيزات بعد مرور ٩ ايام فكانت  $1.0 \times 0.5$   
نانوجرام /سم<sup>٢</sup> فى الخشب غير المدهون بينما كان تركيز المتبقيات اقل من حدود الكشف فى الزجاج  
ومتبقيات مبيد السولفاك فى عينات الاكشمشة المختلفة (اقمشة قطنية - صوف سميك - صوف خفيف ) بعد  
مرور ساعة واحدة من المعاملة كانت  $1.0 \times 11$  ،  $1.0 \times 26$  ،  $1.0 \times 46$  نانوجرام/سم<sup>٢</sup> على  
التوالي وتركيز اقل من حدود الكشف فى اقمشة الصوف الخفيف - وبعد ١٤ يوم من المعاملة تناقص  
المتبقى فى الاكشمشة القطنية والصوف السميك الى  $1.0 \times 0.3$  ،  $1.0 \times 6.3$  على التوالي .

وكذلك تم دراسة التأثيرات الجانبية لهذه المبيدات المختبرة على بعض الانزيمات المختلفة مثل الكولين  
استراز (ACHE) والاسبارتات امينو ترانس فيراز (AST) والالانين امينو ترانس فيراز (ALT)  
والفوسفاتيز القلوى (AP) والبروتين الكلى والاليومين وحمض اليوريك والكلوستيروول وذلك فى الفئران  
البيضاء على فترات زمنية مختلفة (٢٤ ساعة - ٢١ يوم) بعد المعاملة واظهرت النتائج الاتية :

(١) لم تظهر أى اعراض إكلينيكية مع مبيدات الجوكيلات والسولفاك والنيوسيدول وظهر احمرار فى الاعين  
مع مبيد الدلتا فوج وحدوث بعض الاضطرابات وذلك بعد مرور ساعة واحدة من المعاملة باستخدام  
١/٢٠ من قيمة LD50 وحدت موت لكل الفئران المعاملة بمبيد الدلتا فوج خلال فترة ال-٢١ يوم من  
المعاملة

(ب) حدث ارتفاع فى نشاط انزيم ALT والفوسفاتيز القلوى وحمض البوليك والكلستروول وذلك بعد مرور  
٢٤ ساعة من المعاملة. على الجانب الاخر حدث انخفاض فى نشاط انزيم AST والكولين استراز  
والبروتين الكلى والاليومين