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DETECTION OF PESTICIDES RESIDUES AND METALS IN WATER AND SOIL SYSTEMS FROM CERTAIN INDUSTRIAL AND AGRICULTURE AREAS AT KALUBIA GOVERNORATE, EGYPT

[29]

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ABSTRACT

The pesticide residues in drainage water, ground water, sediment and agriculture soil samples collected from different locations through four different seasons at Kalubia governortae were monitored within the year 2000/2001. The obtained results showed that the detected pesticide residues were varied in their types and structures between the five sites. The positive frequencies of pesticides contamination in summer reached 44.44, 40.74, 48.15, 48.15 and 51.85 % as total monitored compounds at El-esmalia, El Kanater, El-sanafen, El-mazallate and El-happy land waters, respectively. On the contrary, winter water samples were found contained the lower number of compounds. As for ground water, organochlorine insecticides were detected in very small amounts in some areas and seasons. In water sediment, few pesticides were detected, especially in autumn. On the contrary, agriculture soil samples recorded high pesticide residues than that detected in sediment. The seasonal distribution of pesticide residues was varied from site to site. In general, pesticide residues were found in more numbers and amounts in summer, while winter samples were contained the lowest values. In general, it was found that the detected amounts of pesticides residues were always under the permissible levels of pesticide residues. In case of the detected metals in the samples of drainage water and/or gorund water, the obtained results indicate the negligible existence of metals, i.e. Co, Ni, Cr and Pb, while Mn was the only exception which exhibited the high amounts in water samples at the three selected sites.

Key words: Pesticides, Metals, Residues, Water, Soil, Monitoring, Sediment, Egypt.

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INTRODUCTION

The contamination of ground and surface water with pesticide residues can on the one hand be attributed to improper handling of these environmentally significant chemicals and accidents in agriculture. industry and trade. On the other hand. pesticides can also reach ground water and surface water even with good agricultural practices. From the viewpoint of agriculture, the following pathways are of special importance (**Abdel Ghany 2000**): 1- Transport in the soil profile with leaching by rainwater through the unsaturated zone to the ground water. 2- Drain flow into water bodies and probably reservoirs and runoffs from treated crops and soils entering water bodies and probably reservoirs. 3- Furthermore. attention has to be given to: direct contamination of surface water by drift and deposition of pesticides by rainfall and other kinds of emissions from atmosphere.

There are two concerns relating to pesticide in water, namely possible public health risks from the presence of residues in drinking water and the potential effects of pesticides on the aquatic environment. During the last thirty years, contamination of water with pesticides has been investigated in several studies which reported their fate and presence in surface and ground water (**Richard *et al* 1987 and Barrett *et al* 1996**). The risks of the leaching of pesticides and their metabolites or degradation products into ground water are discussed together with approaches to the evaluation of such risks (**Beitz, 1994**). The presence or absence of particular organic matter, soluble salts. etc. in water should be reported when measuring pesticide residues in water since adsorption and other factors may have a greater effect on the measurement than solubility of the pesticide in water (**Mansour *et al* 1999**). In case of the contamination of the river Nile by metals. several investigators were detected a significant amounts of metals in the water of Nile river (**Zayed *et al* 1994; Abdel Naser *et al* 1996; Seddek *et al* 1996**).

The present investigation aimed to study the seasonal contamination of drainage water, ground water, sediment and surrounding agriculture soil from industrial and agricultural areas at Kalubia governorate by pesticides and metals during the year 2000/2001.

MATERIAL AND METHODS

1- Method of collecting water and sediment samples

River water-composite sample of two liters was taken. The sample was composed from grab samples at 0.5m. depths of a river. Commercial sampler allows deep water samples to be taken. It consists of a tube-like device with removable stoppers on either end. As the device drops through the water, the water flows through the device. This insures collecting a sample which is representative of the water at the collection depth. At the desired depth, the plugs are opened. thus collecting the sample. A sample device can be fashioned using 1 or 2 long cord and a stoppered glass bottle. A tug on the cord opens the stopper allowing the sample to flow in with these samples , it is possible to collect composite sample without anyone being in attendance. They can provided by battery for portability.

Samples transportation and collection should be made using clean glass or metal device.

1.2- Loamy (mucky) sediment

Depending on the depth of the river or body of water it may be possible to dig with a paddle or shovel to obtain a sample.

2- Extraction, clean-up of pesticide residues in water and sediment

Extraction and clean-up of pesticide residues from water samples were done according to the method adopted by **Mann, (1981).** Samples of sediment were extracted and cleaned-up according to the method adopted by **AOAC (1990a).**

3- Determination of pesticides residues

About 2.5 to 3.5 mg from all tested pesticides were weighed into 5 ml volumetric flask, dissolved and diluted with acetone to the end volume of 5 ml. A suitable aliquot of standard solution was injected in Gas- Chromatography GC (Shimadzu 12A), at the suitable conditions. The retention time (R.T.), area under peak , the weight of studied compounds and separation factors (R) were established as presented in Table (1). Amount recovered ranged between 75-85 percent for considered pesticides.

The operating conditions for the GC were as follows:

Sixteen organochlorine insecticides were separated on GC column packed with 2% dexile on sumikasorb Q.

- Detector : ECD
- Temperature :
  Inj./Det.Temp. 250°C
  Oven temp. prog. 180-250°C (2°C/min)
- Gas pressures :
  Carrier gas N_2 1.5 kg/cm^2
  Burner gas H_2 1.0 kg / cm^2
  Air 1.0 kg / cm^2
- Attenuation : 10 x 5

Eleven pesticides belongs to fungicides, herbicides and insecticides were separated on GC column packed with 3% silicon OV-101 on Chromosorb Q.

- Detector : FID
- Temperature :
  Inj./Det.Temp. 250°C
  Oven temp. prog. 180-250°C (2°C/min)
- Gas pressures :
  Carrier gas N_2 1.5 kg/cm^2
  Burner gas H_2 1.0 kg / cm^2
  Air 1.0 kg / cm^2
- Attenuation : 10 x 5

4- Metal analysis

Drainage water and ground water samples collected from the selected sites during 2000/2001 were taken after preparation for trace metals analysis of Mn, Cr, Co, Pb and Ni by using Atomic Absorption Flame Emission Spectrophotometer (Shimadzu, AA-6200) (**AOAC, 1990b).**

RESULTS AND DISCUSSION

Data concerning the detection of pesticides residues belongs to different functional groups in drainage water, ground water, sediment and soil samples collected from certain agricultural and industrial areas at Kalubia governorate during the year 2000/2001 are tabulated in Tables (2, 3, 4 and 5) and graphically illustrated in Figures (1 A & B and 2 A& B).

Table 1. Separation of certain pesticides on gas liquid chromatography GLC.

Compound	Rt.*	Area/10000	The weight (µg)	Separation factor (R)
α-HCH	4.942	9.3	0.495	2.55
β-HCH	6.455	9.5	0.521	2.66
Delta-HCH	7.648	12.7	0.717	1.79
Heptachlor	8.427	33.2	1.43	1.12
Aldrin	10.433	21.5	0.686	2.45
Heptachlor-epoxide	12.82	12.1	0.498	2.89
o.p'-DDE	14.87	36.2	0.873	2.59
cis-Chlordane	15.69	6.7	0.323	0.95
p,p'-DDE	17.575	46.3	1.069	2.59
o,p'-DDD	18.485	35.3	0.868	1.11
Endrin	19.282	32.8	2.028	1.08
o.p'-DDT	20.633	34.7	0.887	1.65
p.p'-DDD	22.1	111.7	2.648	1.4
p.p'-DDT	24.545	19.4	0.496	0.98
Mirex	28.903	34.8	1.931	5.58
Endrin-keton	29.918	18.7	0.569	1.04
Thiram	2.513	12.86	1.82	2.14
Benefin	2.898	16.26	0.42	1.03
Fenitrothion	5.677	22.60	3.0	6.35
Parathion	6.32	13.98	0.27	1.84
Profenofos	8.975	17.32	2.58	4.39
Benalaxyl	11.287	25.29	0.83	4.0
Fenpropathrin	13.892	26.77	0.73	4.12
Pyridaben	15.955	16.55	1.17	3.88
Alpha-methrin	17.335	26.89	0.83	2.30
Etofenprox	21.0	13.27	2.17	3.72
S-fenvalerate	24.7	47.98	1.83	1.68

* Rt = Retention time

Table 2. Monitoring of some pesticide residues (ppb) in drainage water samples collected from different locations of Kalubia governorate during 7/2000-6/2001.

Pesticides	Site B				Sit E				Site G			
	Summer	Winter	Autumn	Spring	Summer	Winter	Autumn	Spring	Summer	Winter	Autumn	Spring
α-HCH	0.76 ±1.3	1.13±1.9	11.93± 7.9	9.73±3.4		2.23±3.8	1.50±2.5	19.80±26.8	1.93±2.1	1.30±2.2	3.80±6.8	4.50±3.9
β-HCH	1.63 ±1.5	ND	2.90±5.02	2.43±4.2	0.76±1.2	ND	ND	1.43±2.4	0.80±1.8	ND	7.46±12.9	ND
δ-HCH	0.86±1.5	ND	ND	6.70±11.6	0.46±0.8	12.88±16.5	ND	ND	ND	11.26±19.5	ND	ND
Heptachlor	0.66±0.6	3.26±5.6	7.26±12.5	ND	ND	ND	5.2±9.0	ND	ND	ND	ND	ND
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	2.03±3.5	ND	6.26±6.3	ND
Hept-epoxide	ND	5.76±9.9	2.70±3.6	6.70 ±6.6	ND	17.10±29.6	ND	ND	ND	5.86±10.4	ND	ND
o,p'-DDE	0.43±0.7	ND	ND	ND	1.5±2.5	ND	1.53+2.6	ND	ND	ND	ND	ND
cis-chlordane	1.30±1.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.76±3.5
p,p'-DDE	ND	ND	ND	ND	1.10±1.9	6.40±11.0	ND	ND	ND	ND	ND	ND
o,p'-DDD	ND	ND	ND	ND	ND	ND	1.4±2.4	1.96±3.0	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	1.36±2.3	ND	4.56±4.8	ND
o,p'-DDT	ND	4.06±7.0	ND	ND	ND	ND	ND	ND	2.10±1.8	ND	ND	ND
p,p'-DDD	ND	ND	ND	ND	3.40±4.9	ND	ND	ND	ND	ND	ND	1.06±1.8
p,p'-DDT	0.167+0.02	ND	19.16±21.4	2.9±5.0	ND	ND	ND	ND	ND	ND	ND	ND
Mirex	ND	ND	ND	ND	ND	1.03±1.7	ND	3.13±5.2	ND	1.03±1.7	ND	ND
Endrin-keton	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thiram	0.06± 0.1	ND	ND	0.96±1.7	ND	ND	ND	ND	2.6±4.5	ND	2.60±4.5	ND
Benefin	ND	ND	ND	ND	ND	ND	30.63+53.0	ND	ND	ND	ND	ND
Fenitrothion	1.10±1.0	7.76±13.4	17.03±25.1	ND	ND	13.9±24.0	ND	ND	0.76±1.3	ND	ND	ND
Parathion	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.73±11.6	5.03±8.7
Profenofos	0.93±1.6	ND	ND	ND	ND	1.16±2.0	ND	ND	ND	ND	ND	ND
Benolaxyl	0.63±1.0	ND	ND	ND	ND	ND	37.43±64.8	ND	ND	ND	ND	ND
Fenpropathrin	0.73±1.2	10.40±18.1	35.16±33.8	17.16±29.7	ND	ND	ND	10.40±18.0	ND	ND	ND	ND
Pyridaben	ND	ND	ND	ND	1.06±1.8	ND	ND	ND	ND	ND	ND	ND
Alphamethrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.36±11.2	ND
Etefenprox	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S-fenvalerate	ND	ND	4.33±7.5	ND	ND	ND	ND	ND	ND	ND	ND	ND

Each value represent the mean ± STD. Dev. ND, Not Detected under the limite of detection (1 ppb)., Site B: El-Esmalia (El Khanka). Site E: El Kanater (El Kanater), Site G: El-Sanafin (Benha) Summer date: 20/6-21/9 (7-8-9/2000), Winter: 20/12-21/3 (1-2-3/2001), Autumn : 21/9-20/12 (10-11-12/2000) and Spring : 21/3-20/6 (4-5-6/2001).

Table 2. Cont.

Pesticides	Site E				Site M			
	Summer	Winter	Autumn	Spring	Summer	Winter	Autumn	Spring
α-HCH	0.70±1.2	3.23± 3.3	5.60± 3.3	ND	ND	ND	ND	ND
β-HCH	ND	ND	ND	9.8±10.8	0.7±1.21	2.43±4.2	2.16±3.7	ND
δ-HCH	1.16±2.0	ND	ND	ND	1.43±2.4	ND	1.23±2.13	5.10±8.8
Heptachlor	ND	ND	6.43±11.1	ND	ND	ND	ND	ND
Aldrin	ND	ND	ND	ND	ND	ND	ND	3.73±6.46
Hept-epoxide	ND	ND	ND	ND	ND	ND	ND	ND
o,p'-DDE	ND	ND	ND	ND	0.6+1.0	ND	18.33±30.0	ND
cis-chlordane	5.00±8.6	ND	ND	4.6±7.9	ND	ND	ND	ND
p,p'-DDE	5.70±9.8	ND	ND	ND	ND	ND	ND	ND
o,p'-DDD	ND	ND	4.76±8.2	ND	0.3±0.5	ND	ND	ND
Endrin	2.03±3.5	ND	ND	ND	ND	ND	ND	ND
o,p'-DDT	ND	ND	ND	ND	ND	ND	ND	ND
p,p'-DDD	ND	ND	ND	ND	ND	ND	ND	4.56±7.9
p,p'-DDT	ND	ND	ND	ND	ND	ND	ND	ND
Mirex	ND	ND	0.20±0.3	ND	ND	10.36±17.9	5.36±9.9	ND
Endrin-keton	ND	ND	ND	ND	ND	ND	ND	ND
Thiram	3.03±5.2	ND	ND	ND	ND	ND	ND	ND
Benefin	ND	ND	ND	ND	1.06±1.8	ND	ND	ND
Fenitrothion	ND	ND	1.06±1.8	ND	ND	ND	ND	ND
Parathion	ND	ND	ND	ND	ND	ND	6.83±11.8	ND
Profenofos	ND	ND	4.7±8.1	ND	ND	ND	ND	2.76±4.7
Benolaxyl	ND	ND	ND	ND	0.500±0.8	ND	ND	ND
Fenpropathrin	7.66±13.2	13.83±23.9	ND	5.86±10.1	ND	ND	ND	ND
Pyridaben	0.3±0.5	ND	ND	13.76±23.8	ND	28.46±49.3	ND	1.96±3.4
Alphamethrin	ND	ND	ND	ND	5.00±8.6	ND	ND	ND
Etefenprox	ND	ND	ND	ND	ND	ND	ND	ND
S-fenvalerate	ND	ND		ND	ND	ND	ND	ND

Each value represent the mean ± STD. Dev. ND; Not Detected under the limite of detection (1 ppb)., Site L: El-Mazallate Site M: El-Happy land. Summer date: 20/6-21/9 (7-8-9/2000), Winter: 20/12-21/3 (1-2-3/2001), Autumn : 21/9-20/12 (10-11-12/2000) and Spring : 21/3-20/6 (4-5-6/2001).

Table 3. Monitoring of some pesticide residues (ppb) in ground water samples collected from different locations of Kalubia governorate during 7/2000-6/2001.

Pesticides	Site B				Site E				Site G			
	Summer	Winter	Autumn	Spring	Summer	Winter	Autumn	Spring	Summer	Winter	Autumn	Spring
α-HCH	1.80 ±3.1	3.03 ±2.9	ND	0.90 ±1.5	1.63 ±2.8	2.73 ±2.4	1.50 ±2.6	3.10 ±5.3	3.27 ±5.6	ND	0.30±0.5	ND
β-HCH	ND	ND	0.90 ±1.5	ND	0.43 ±0.7	0.70 ±1.2	ND	ND	1.50 +2.6	ND	1.83±3.1	2.43±1.2
δ-HCH	0.27 ±0.4	1.27 ±1.1	0.70 ±1.2	ND	ND	0.53 ±0.9	1.37 ±1.6	ND	ND	2.40 ±4.1	ND	ND
Heptachlor	ND	ND	ND	ND	1.97 ±3.4	ND	ND	ND	ND	ND	1.03±1.9	ND
Aldrin	ND	ND	ND	ND	ND	ND	0.80 ±1.3	ND	ND	ND	ND	ND
Hept-epoxide	3.33 ±5.7	ND	1.50 ±2.6	0.50 ±0.8	ND	1.27 ±1.1	ND	ND	0.10 ±0.1	ND	ND	6.10± 2.3
O,p'-DDE	ND	ND	ND	ND	7.33 ±12.7	ND	1.40 ±1.2	4.20 ±7.2	0.30 ±0.5	ND	0.60±1.0	ND
cis-chlordane	2.37 ±4.1	ND	0.30 ±0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND
p,p'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o,p'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	14.00+2.4	ND
Endrin	ND	ND	ND	1.20 ±2.0	ND	ND	ND	ND	ND	2.10 ±3.6	0.87±1.5	ND
o,p'-DDT	2.60 ±2.2	1.30 ±2.2	ND	ND	1.03 ±1.7	2.07 ±3.5	ND	ND	ND	ND	ND	ND
p,p'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p,p'-DDT	4.33 ±7.5	ND	8.53 ±10.3	0.70 ±1.2	ND	ND	ND	0.27 ±0.4	ND	ND	ND	ND
Chlorfenvinphos	ND	ND	ND	ND	ND	ND	ND	ND	1.03 ±1.7	ND	ND	ND
Endrin-keton	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thiram	ND	ND	ND	ND	ND	ND	1.60 ±2.7	ND	ND	0.50 +0.8	ND	ND
Benefin	ND	ND	ND	ND	ND	ND	ND	ND	7.67 ±13.2	ND	0.10±0.17	ND
Fenitrothion	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Parathion	ND	ND	ND	ND	1.50 ±2.6	ND	ND	ND	ND	ND	ND	1.73±3.0
Profenofos	1.10 ±1.9	ND	ND	1.43 ±2.4	ND	ND	ND	ND	ND	ND	0.27±0.4	ND
Benolaxyl	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fenpropathrin	5.00 ±8.6	2.03 ±3.5	3.63 ±3.7	ND	ND	ND	ND	ND	19.67 ±34.0	0.73 ±1.2	ND	ND
Pyridaben	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Alphamethrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Etefenprox	ND	ND	ND	0.77 ±1.3	ND	ND	ND	ND	ND	ND	ND	ND
S-fenvalerate	ND	ND	1.30 ±2.2	ND	ND	ND	23.67 ±40.9	ND	ND	ND	ND	ND

Each value represent the mean + STD. Dev. ND; Not Detected under the limite of detection (1 ppb)., Site B: El-Esmalia (El Khanka), Site E: El Kanater (El Kanater), Site G: El-Sanafin (Benha).Summer date: 20/6-21/9 (7-8-9/2000), Winter: 20/12-21/3 (1-2-3/2001), Autumn : 21/9-20/12 (10-11-12/2000) and Spring : 21/3-20/6 (4-5-6/2001).

Table 3. Cont.

Pesticides	Site L				Site M			
	Summer	Winter	Autumn	Spring	Summer	Winter	Autumn	Spring
α-HCH	ND	ND	ND	ND	0.77 ±1.33	ND	ND	ND
β-HCH	1.30 ±1.50	ND	1.87 ±3.23	ND	ND	ND	0.50 ±0.87	ND
δ-HCH	0.90 ±0.79	ND	ND	ND	1.57 ±2.06	ND	ND	ND
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND
Hept-epoxide	7.45 ±4.90	ND	ND	ND	ND	ND	ND	ND
o,p'-DDE	6.50 ±7.51	ND	ND	ND	ND	ND	ND	ND
cis-chlordane	5.50 ±6.35	ND	0,23 ±0.40	ND	1.83 ±1.96	ND	ND	ND
p,p'-DDE	ND	ND	ND	ND	ND	ND	ND	ND
o,p'-DDD	ND	ND	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	16.20 ±25.01	ND	ND	ND
o,p'-DDT	ND	ND	ND	ND	ND	ND	ND	ND
p,p'-DDD	ND	ND	ND	ND	ND	ND	ND	ND
p,p'-DDT	ND	ND	ND	ND	ND	ND	ND	ND
Mirex	ND	ND	ND	ND	ND	ND	1.70 ±2.94	ND
Endrin-keton	ND	ND	ND	ND	ND	ND	ND	ND
Thiram	13.75 ±10.10	ND	ND	ND	17.00 ±14.93	ND	ND	ND
Benefin	ND	ND	ND	ND	ND	ND	ND	ND
Fenitrothion	7.50 ±8.66	ND	2.27 ±3.93	ND	ND	ND	ND	ND
Parathion	ND	ND	ND	ND	ND	ND	ND	ND
Profenofos	ND	ND	ND	ND	ND	ND	ND	ND
Benolaxyl	ND	ND	ND	ND	ND	ND	ND	ND
Fenpropathrin	ND	ND	ND	ND	2.77 ±4.79	ND	ND	ND
Pyridaben	ND	ND	ND	ND	3.23 ±5.60	ND	ND	ND
Alphamethrin	3.45 ±3.98	ND	ND	ND	ND	ND	ND	ND
Etefenprox	7.00 ±8.08	ND	ND	ND	ND	ND	ND	ND
S-fenvalerate	10.00 ±11.55	ND	ND	ND	40.67 ±45.62	ND	ND	ND

Each value represent the mean ± STD. Dev. ND; Not Detected under the limite of detection (1 ppb)., Site L: El-Mazallate Site M: El-Happy land. Summer date: 20/6-21/9 (7-8-9/2000), Winter: 20/12-21/3 (1-2-3/2001), Autumn : 21/9-20/12 (10-11-12/2000) and Spring : 21/3-20/6 (4-5-6/2001).

Table 4. Monitoring of some pesticide residues (ppb) in sediment samples collected from different locations of Kalubia governorate during 7/2000-6/2001.

Pesticides	Site B				Sit E				Site G			
	Summer	Winter	Autumn	Spring	Summer	Winter	Autumn	Spring	Summer	Winter	Autumn	Spring
α-HCH	ND	13.83+23.9	16.73+28.9	4.07+7. 4	85.00+147.	7.10+12.3	4.13+7.1	4.07+7.04	43.67+75.6	13.87+24.0	ND	4.03+6.9
β-HCH	179.33+211.1	6.37+11.0	ND	0.63+1.10	ND	10.83+18.7	ND	ND	10.33+17.9	18.33+16.3	130.1+121	ND
δ-HCH	306.00+530.0	ND	180.8+293.	ND	177.00+306	3.43+5.95	4.13+7.1	0.83+1.44	ND	3.80+6.5	ND	0.50+0.8
Heptachlor	38.33+66.4	ND	ND	1.63+2.83	37.00+64.0	3.20+5.54	6.33+10.9	ND	53.67+92.9	ND	ND	ND
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.03+5.2	ND	0.83+1.4
Hept-epoxide	ND	ND	10.17+17.6	2.50+4.33	ND	3.57+6.18	ND	0.50+0.87	ND	31.30+36.1	3.37+5.83	ND
o,p'-DDE	879.33+963.1	ND	ND	ND	ND	ND	0.43+0.7	ND	ND	ND	ND	ND
cis-chlordane	ND	2.17+3.7	ND	ND	ND	ND	ND	ND	ND	7.07+12.2	ND	ND
p,p'-DDE	137.67+238.1	ND	ND	ND	ND	1.50+2.60	0.83+1.4	ND	ND	ND	ND	ND
o,p'-DDD	ND	ND	ND	ND	ND	ND	6.67+11.5	16.90+29.2	ND	ND	ND	ND
Endrin	ND	ND	ND	0.40+0.6	ND	ND	3.53+6.1	ND	ND	2.53+4.3	ND	0.50+0.8
o,p'-DDT	ND	3.80+6.58	8.77+15.1	ND	ND	3.43+5.95	3.23+5.6	ND	ND	3.70+6.4	6.43+11.1	ND
p,p'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.47+0.8	ND	ND
p,p'-DDT	ND	ND	15.23+26.3	ND	325.00+562	20.50+35 .5	5.80+10.0	ND	ND	ND	ND	ND
Mirex	ND	ND	ND	3.17+5.48	ND	ND	ND	ND	ND	7.43+12.8	0.30+0.5	ND
Endrin-keton	ND	ND	ND	ND	ND	ND	ND	10.47+18.1	ND	ND	ND	10.73+18
Thiram	ND	ND	ND	ND	ND	ND	38.57+66.8	ND	ND	11.93+20.6	23.47+40.	ND
Benefin	ND	ND	ND	ND	314.00+264	1.50+2.60	ND	ND	ND	ND	ND	ND
Fenitrothion	ND	ND	ND	ND	ND	ND	ND	ND	411.33+712	ND	ND	ND
Parathion	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	276.0+478	ND
Profenofos	ND	ND	ND	ND	ND	ND	10.57+18.3	ND	ND	1.70+2.9	ND	ND
Benolaxyl	ND	ND	ND	0.43+0.75	ND	ND	ND	ND	ND	ND	ND	ND
Fenpropathrin	243.33+421.1	13.70+23.7	5.17+8.95	ND	273.33+473	30.10+52.1	70.50+122	ND	ND	ND	ND	ND
Pyridaben	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.17+2.2	ND	ND
Alphamethrin	ND	0.83+1.44	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Etefenprox	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.77+6.52	ND
S-fenvalerate	ND	ND	ND	ND	ND	ND	ND	ND	ND	26.80+46.4	ND	ND

Each value represent the mean ± STD. Dev. ND; Not Detected under the limite of detection (1 ppb)., Site B: El-Esmalia (El Khanka), Site E: El Kanater (El Kanater), Site G: El-Sanafin (Benha).Summer date: 20/6-21/9 (7-8-9/2000), Winter: 20/12-21/3 (1-2-3/2001), Autumn : 21/9-20/12 (10-11-12/2000) and Spring : 21/3-20/6 (4-5-6/2001).

Table 4.Cont.

Pesticides	Site L				Site M			
	Summer	Winter	Autumn	Spring	Summer	Winter	Autumn	Spring
α-HCH	304.00 ±526.5	7.43 ±12.87	4.47 ±7.7	ND	240.77 ±415.0	ND	ND	ND
β-HCH	ND	ND	ND	1.50 ±0.61	ND	ND	10.43 ±18.7	1.25 ±1.4
δ-HCH	ND	52.00 ±50.25	13.87 ±24.02	0.35 ±0.31	ND	7.55 ±8.7	ND	ND
Heptachlor	ND	ND	ND	ND	26.67 ±46.1	ND	ND	ND
Aldrin	ND	ND	0.77 ±1.33	ND	ND	ND	137.67 ±238.4	0.75 ±0.8
Hept-epoxide	ND	3.67 ±3.33	ND	ND	ND	ND	ND	ND
o,p'-DDE	ND	ND	ND	ND	ND	ND	38.33 ±66.4	ND
cis-chlordane	173.67 ±300.8	ND	71.23 ±123.3	ND	ND	ND	ND	ND
p,p'-DDE	ND	ND	143.67 ±248.8	ND	317.00 ±549.0	11.05 ±12.7	ND	ND
o,p'-DDD	ND	ND	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	0.63 ±1.1	16.20 ±25.0	ND	ND	ND
o,p'-DDT	ND	ND	ND	ND	ND	ND	ND	ND
p,p'-DDD	ND	ND	25.00 ±43.3	ND	ND	ND	ND	ND
p,p'-DDT	ND	ND	ND	ND	10.67 ±18.4	ND	ND	ND
Mirex	ND	ND	4.77 ±8.2	ND	ND	ND	41.87 ±68.1	ND
Endrin-keton	23.67 ±40.9	ND	ND	ND	ND	0.95 ±1.1	6.33 ±10.9	ND
Thiram	ND	5.73 ±9.93	304.33 ±527.1	ND	ND	ND	ND	ND
Benefin	ND	ND	ND	ND	ND	ND	ND	1.45 ±1.6
Fenitrothion	ND	ND	ND	ND	23.33 ±40.4	10.05 ±11.6	ND	ND
Parathion	ND	ND	ND	0.83 ±0.7	ND	ND	ND	ND
Profenofos	5.33 ±9.2	ND	ND	ND	57.67 ±99.8	ND	ND	ND
Benolaxyl	ND	ND	3.03 ±5.2	ND	ND	ND	0.50 ±0.8	ND
Fenpropathrin	ND	ND	ND	ND	ND	ND	ND	ND
Pyridaben	ND	ND	ND	ND	ND	ND	ND	ND
Alphamethrin	ND	ND	ND	ND	ND	ND	ND	ND
Etefenprox	ND	ND	ND	ND	ND	ND	ND	ND
S-fenvalerate	ND	ND	ND	ND	ND	109.50 ±126	ND	ND

Each value represent the mean ± STD. Dev. ND; Not Detected under the limite of detection (1 ppb)., Site L: El-Mazallate Site M: El-Happy land. Summer date: 20/6-21/9 (7-8-9/2000), Winter: 20/12-21/3 (1-2-3/2001), Autumn : 21/9-20/12 (10-11-12/2000), and Spring : 21/3-20/6 (4-5-6/2001).

Table 5. Monitoring of some pesticide residues (ppb) in soil samples collected from different locations of Kalubia governorate during 7/2000-6/2001.

Pesticides	Site B				Site E				Site G			
	Summer	Winter	Autumn	Spring	Summer	Winter	Autumn	Spring	Summer	Winter	Autumn	Spring
α-HCH	544.33±484.4	1.83±1.8	2.43±4.2	16.23±16.5	416.00±464.3	31.47+27.5	254.10±413.3	3.70±6.4	237.67±411.6	6.43±11.1	10.00±17.2	1.47±2.5
β-HCH	71.67±124.1	ND	ND	1.50±2.6	ND	1.07+1.8	ND	ND	ND	10.50±18.1	ND	17.10±29.6
δ-HCH	ND	ND	73.00±126.4	11.30± 2.3	ND	ND	3.97±6.8	ND	3.07±5.3	ND	ND	ND
Heptachlor	202.67±176.0	ND	67.67±117.2	ND	660.33±220.0	43.83+75.9	31.00±536.0	ND	30.33±52.5	ND	ND	ND
Aldrin	ND	1.87±3.2	ND	11.07±19.1	510.33±883	ND	ND	ND	ND	ND	ND	ND
H- epoxide	326.67±565.8	11.73±20.3	125.50±204.1	1.43±2.4	ND	ND	ND	4.17±7.2	103.67±179.5	ND	ND	ND
o,p -DDE	306.00±530.0	ND	ND	ND	96.67±167.4	ND	7.07±12.2	10.17±17.6	ND	ND	ND	3.03±5.2
cis- chlor	ND	ND	12.53±21.71	ND	ND	ND	296.67±513.8	ND	ND	ND	ND	ND
p,p -DDE	ND	ND	ND	30.67±30.9	ND	ND	ND	ND	ND	ND	ND	ND
o,p -DDD	83.33±144.3	ND	ND	ND	ND	ND	ND	10.63±18.4	ND	ND	1.50±2.0	ND
Endrine	ND	14.83±25.6	ND	ND	174.33±301.9	0.73±1.2	ND	17.73±30.7	38.00±65.8	ND	ND	ND
o,p -DDT	637.00±125.0	ND	ND	17.80±30.8	ND	21.50±37.24	23.77±41.1	ND	ND	ND	ND	ND
p,p -DDD	ND	10.70±18.5	ND	ND	ND	ND	ND	ND	306.00±530.0	ND	ND	10.67±16.5
p,p -DDT	ND	13.50±23.3	ND	ND	ND	30.40±52.6	ND	ND	ND	0.77+1.3	83.67±144.9	ND
Mirex	ND	ND	1.30±2.25	ND	ND	ND	ND	ND	ND	7.43±12.8	ND	ND
End-Keton	ND	ND	ND	ND	ND	ND	6.57±11.37	ND	ND	ND	ND	ND
Thuram	ND	ND	304.33±527.1	ND	ND	ND	ND	ND	10.33±17.9	ND	ND	ND
Benefin	ND	ND	ND	ND	324.33±561.7	ND	38.00±65.8	ND		ND	ND	ND
Fenitrothion	ND	ND	ND	35.93+34.0	ND	ND	ND	16.07±27.8	20.03±34.7	ND	374.33±648	ND
Paration	ND	2.47+4.2	ND	ND	447.00±774.2	ND	ND	ND	ND	ND	ND	ND
Profenofos	ND	ND	ND	ND	ND	ND	ND	10.50±18.1	ND	ND	ND	ND
Benalxyl	ND	ND	ND	ND	473.33±819	ND	ND	ND	ND	ND	ND	ND
Fenpropathrine	437.33±757.4	40.67±36.87	71.03±123.0	ND	ND	ND	ND	31.73±54.9	ND	ND	ND	ND
Pyridaben	ND	ND	ND	ND	843.67±125.0	ND	ND	ND	ND	ND	ND	ND
Alpha meth	ND	ND	10.50±18.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Etefenprox	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S-fenvalerate	ND	ND	50.23±87.1	ND	ND	ND	ND	ND	ND	23.50±40.7	ND	ND

Each value represent the mean ± STD. Dev. ND; Not Detected under the limite of detection (1 ppb), Site B: El-Esmalia (El Khanka), Site E: El Karater (El Karater), Site G: El-Sarafin (Benha).Summer date: 20/6-21/9 (7-8-9/2000), Winter: 20/12-21/3 (1-2-3/2001), Autumn : 21/9-20/12 (10-11-12/2000) and Spring : 21/3-20/6 (4-5-6/2001).

Table 5. Cont.

Pesticides	Site L				Site M			
	Summer	Winter	Autmn	Spring	Summer	Winter	Autmn	Spring
α-HCH	437.33 ±757.4	ND	238.67 ±413.8	ND	383.33 ±663.9	ND	311.33 ±539.2	ND
β-HCH	ND	ND	ND	ND	ND	ND	ND	ND
δ-HCH	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor	23.67 ±40.9	ND	ND	ND	206.33 ±357.3	ND	ND	ND
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND
Hept- epoxide	ND	ND	ND	ND	ND	ND	ND	ND
o,p-DDE	104.67 ±181.2	ND	ND	ND	137.33 ±237.8	ND	ND	ND
cis- chlor	ND	ND	ND	ND	ND	ND	ND	ND
p,p-DDE	ND	ND	ND	ND	ND	ND	ND	ND
o,p-DDD	ND	ND	ND	ND	104.00 ±180.1	ND	ND	ND
Endrine	ND	ND	ND	ND	ND	ND	ND	ND
o,p-DDT	ND	ND	ND	ND	ND	ND	ND	ND
p,p-DDD	ND	ND	73.00 ±126.4	ND	ND	ND	ND	ND
p,p-DDT	237.67 ±411.6	ND	ND	ND	27.00 ±46.7	ND	ND	ND
Mirex	ND	ND	ND	ND	ND	ND	ND	ND
Endrin-Keton	ND	ND	ND	ND	ND	ND	ND	ND
Thiram	ND	ND	ND	ND	ND	ND	ND	ND
Benefin	ND	ND	ND	ND	ND	ND	ND	ND
Fenitrothion	ND	ND	ND	ND	ND	ND	ND	ND
Paration	71.67 ±124.1	ND	ND	ND	ND	ND	ND	ND
Profenofos	27.33 ±47.34	ND	ND	ND	ND	ND	ND	ND
Benalxyl	ND	ND	ND	ND	ND	ND	ND	ND
Fenpropathrine	ND	ND	ND	ND	373.33 ±646.6	ND	ND	ND
Pyridaben	ND	ND	ND	ND	ND	ND	ND	ND
Alpha meth	106.33 ±184.1	ND	ND	ND	ND	ND	ND	ND
Etefenprox	ND	ND	ND	ND	ND	ND	ND	ND
S-fenvalerate	ND	ND	ND	ND	ND	ND	ND	ND

Each value represent the mean ± STD. Dev. ND. Not Detected under the limite of detection (1 ppb), Site L: El-Mazallate Site M: El-Happy land. Summer date: 20/6-21/9 (7-8-9/2000), Winter: 20/12-21/3 (1-2-3/2001), Autumn : 21/9-20/12 (10-11-12/2000) and Spring : 21/3-20/6 (4-5-6/2001).

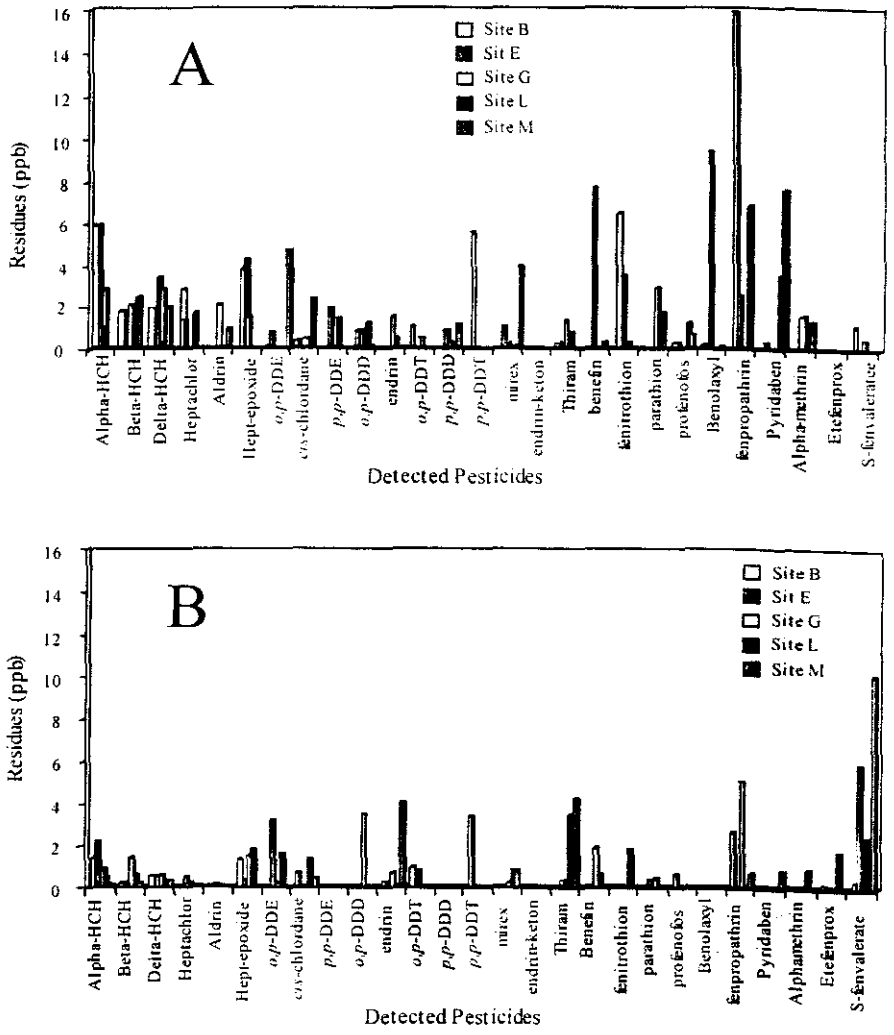

Fig. 1: Average levels of the detected pesticides residues (ppb) in samples of drainage water (A) and ground water (B) collected from different location of Kalubia governorate during 7/2000-6/2001.

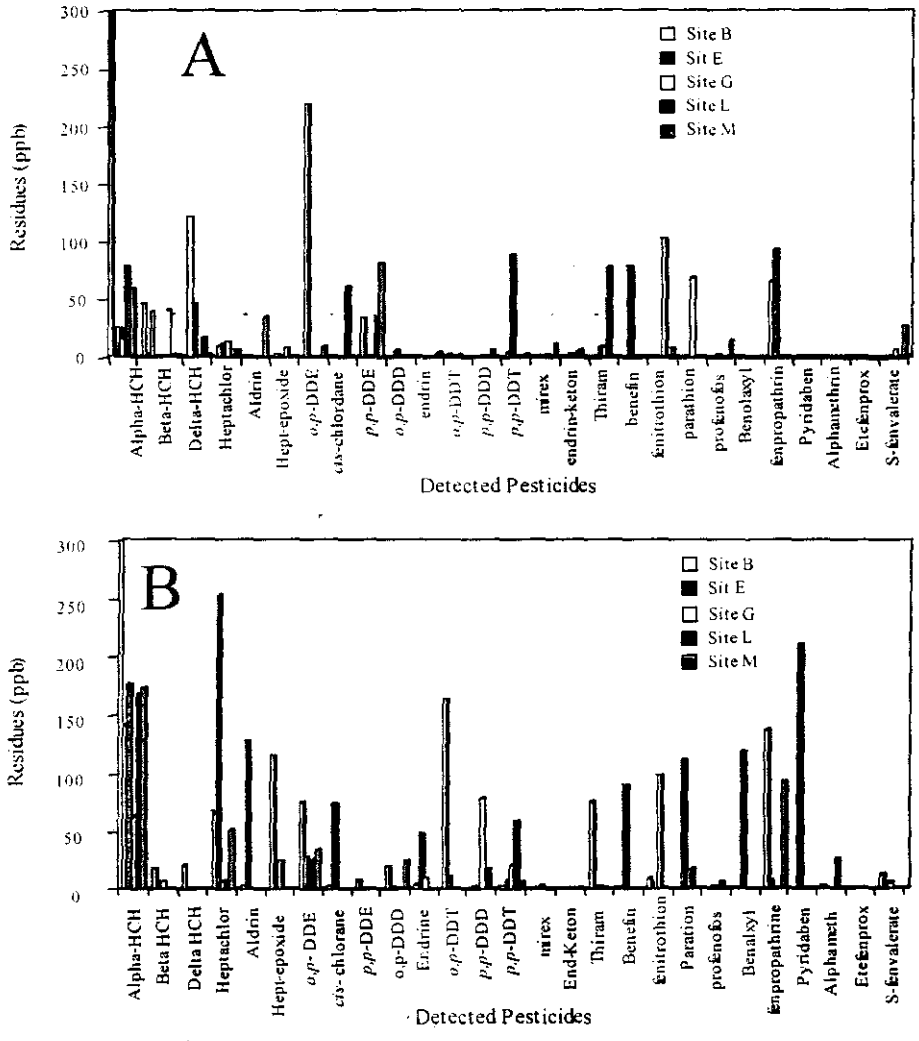

Fig. 2: Average levels of the detected pesticides residues (ppb) in samples of sediment (A) and agriculture soil (B) collected from different location of Kalubia governorate during 7/2000-6/2001.

Pesticides residues in drainage water

Data in Table (2) and Fig. (1-A), indicate the detection of pesticide residues in drainage water of the five selected sites, but in different values from site to site. The positive frequencies of pesticides contamination reached 44.44, 40.74, 48.15, 48.15 and 51.85 % as total monitored compounds at El-Esmalia, El Kanater, El-Sanafen, El-Mazallat and El-Happy land waters, respectively. Among the analyzed 27 pesticides, the number of absent ones from checked sites reached 12.11, 13, 13, and 14, respectively. Water samples collected during Summer were found contained, in general, the higher numbers of pesticides. The contrary was recorded with Winter water samples. Autumn and Spring samples were contained different numbers of pesticides according to location and site. The detection of high numbers of pesticides in Summer water may due to the extensive and wide use of pesticides in controlling pest complexes in cotton, rice, orchards and vegetable fields.

Data also indicate that the majority of detected pesticides was found belongs to organochlorines, representing 50 – 90 % as positive unexpected. The pyrethroid, fenpropathrin found in amount, (15.87 ppb as average) in El-Esmalia water distributed as 0.73, 10.40, 35.16 and 17.16 ppb at summer, winter, autumn and spring, respectively. Alpha-HCH and *p,p'*-DDT came next in the same water source, reached 5.89 and 5.56 ppb, respectively. Our findings are in harmony with that obtained by **Abdel Hamid *et al* (1992); Abdel Razik *et al* (1988); Dogheim *et al* (1992); El-Dib and Badawy (1985); Hassan *et al* (1996) and Ragab *et al* (1997).**

2- Pesticides residues in ground water

Data in Table (3) and in Fig. (1-B), indicate that pesticide residues were not detected during winter and spring in water collected from El-Mazallate and El-Happy land. Also, these sites were found to contain minute residues, mainly organochlorine during Summer and Autumn. It is quite interesting to notice the existence of high amount of the pyrethroid S-fenvalerate reached 10.0 and 40.67 ppb in water from El-Mazallate and El-Happy land, respectively. Alpha-methrin was found in small amounts, (3.45 ppb) during Summer at El-Mazallate. The organophosphorus, fenitrothion was detected in water of El-Mazallate at 7.5 and 2.27 ppb in Summer and Autumn. The fungicide thiram was detected in summer at two sites, El-Mazallate and El-Happy land, i.e., 13.75 and 17.00 ppb, respectively.

Organochlorine insecticides were detected in very small amounts at some areas and seasons.

The other sites showed the presence of pesticide residues during the four seasons in very small amounts and numbers. S-fenvalerate was found in Autumn water samples from the El-Esmalia (1.3 ppb) and El-Kanater (23.67 ppb). Alpha-methtrin was not detected at these sites. Fenpropathrin was found in El-Esmalia water (5.0, 2.03, 3.63 ppb & ND) and El-Sanafin (19.67, 0.73 ppb, ND & ND) at Summer, Winter, Autumn and Spring, respectively. The organophosphorus profenofos was detected in Summer and Spring (El-Esmalia) and in autumn (El-Sanafin). Parathion was found in two sites, El-Kanater and El-Sanafin, but in very small amounts (1.5 and 1.73 ppb), while the widely used

OP's fenitrothion was not detected in any samples of water from these sites. Our findings are in harmony with that obtained by **Brunetto *et al* (1992); Borner (1994) and Barrett *et al* (1996).**

3- Pesticides residues in water sediment

Data in Table (4) and Fig. (2-A), indicate the detection of few pesticides in low numbers and levels in sediment samples collected from El-Mazallate and El-Happy land sites, especially at autumn. A remarkable trend of contamination was occurred with El-Happy land samples, where the lowest incidence of pesticides was recorded in spring (3/27), followed by Winter (5/27), Autumn (6/27) and Summer samples (7/27).

It is quite interesting to notice that some compounds were found in unexpected high amounts, i.e. α-HCH in summer (304.0 and 240.7 ppb) at El-Mazallate and El-Happy land, respectively. The same was found in winter samples of El-Mazallate, i.e. δ-HCH (52.0 ppb), *cis*-chlorane (173.67 ppb) in summer, *p,p'*-DDE (143.67 ppb) in Autumn, *cis*-chlordane (71.23 ppb) in Autumn, thiram (304.33 ppb) in Autumn. El-Happy land samples showed high amounts of *p,p'*-DDE (317.0 ppb, Summer), mirex (41.87 ppb, autumn), profenofos (57.67 ppb, Summer) and S-fenvalerate (109.50 ppb, Winter). The other three sites, showed different trends of contamination. Sediments from El-Esmalia were found contained few numbers (6-7/27) of pesticides during the studied seasons. The detected pesticides in sediments from El-Esmalia at Summer were found in higher amounts than the other seasons, i.e. 179.33, ppb (β-HCH), 306.0 ppb (δ-HCH), 879.33 ppb (*o,p*-DDE), 137.67 ppb (*p,p'*-DDE) and 243.33 ppb (fenpropathrin). Delta-HCH was found in 180.83 ppb in Autumn samples.

Sediment from El-Kanater was found contained 18.5 % of the monitored compounds belongs to the organo-chlorines (0.5 – 16.90 ppb) in spring. Autumn samples were contained 44.44 % but in very small amounts, except thiram (38.57 ppb) and fenpropathrin (70.50 ppb). Summer samples were found contained high values of α-HCH (85.0 ppb), δ-HCH (177.0 ppb), *p,p'*-DDT (325.0 ppb), benefin (314.0 ppb) and fenpropathrin (273.33 ppb), while the other pesticides in Benha sector were found contained high amounts of α-HCH (43.67 ppb), heptachlor (53.67 ppb) and fenitrothion (411.33 ppb) in summer. Spring samples were contained 18.5 %, compounds in very minute amounts (0.50-10.73 ppb), while Autumn samples contained high amounts as β-HCH (130 ppb) and parathion (276.0 ppb) even it was banned since 1985 in Egypt. Winter samples were contained 51.85 % of monitored pesticides, most of them belongs to organochlorine (10/27). Our findings are in harmony with that obtained by **Abdel Razik *et al* (1991); Abu-Elmayem *et al* (1979); Iwata *et al* (1995) and Osfor *et al* (1998).**

4- Pesticides residues in agriculture soil

Data in Table (5) and Fig. (2-B), indicate that no pesticides residues were detected in Winter and Spring soil samples from El-Happy land, while α-HCH was found in El-Happy land at Autumn (311.33 ppb). Summer soil were contained high amounts of six com-

pounds, i.e. α-HCH (383.33 ppb), heptachlor (206.33 ppb), *o,p'*-DDE (137.33 ppb), *o,p'*-DDD (104.0 ppb), *p,p'*-DDT (27.0 ppb) and fenpropathrin (373.33 ppb). El-Mazallate soil was found free of pesticide residues during winter and spring, while contained: α-HCH (238.67 ppb) and *p,p'*-DDD (73.0 ppb). Summer samples showed the same trend of El-Mazallate site, showing the existence of α-HCH (437.33 ppb), heptachlor (23.67 ppb), *o,p'*-DDE (104.67 ppb), *p,p'*-DDT (237.67 ppb). Parathion (71.67 ppb), profenofos (27.33 ppb) and alphametrhrin (106.33 ppb).

The other three sites showed the presence of greatest numbers of pesticides, representing 81.48, 81.46 and 51.85% as total at El-Esmailia, El-Kanater and El-Sanafin, respectively. Soil of summer collection was found contained high amounts of pesticides, reached 237.67 ppb (α-HCH), heptachlor-epoxide (103.67 ppb) and *p,p'*-DDD (306.0 ppb) in El-Sanafin.

A different trend of contamination was found in El-Esmailia and El-Kanater sites, where 22 compounds were detected among the analyzed 27 pesticides. The seasonal existence of pesticides were 8/27, 8/27, 10/27 and 8/27 with samples collected at Summer, Winter, Autumn and Spring, respectively. Again, pesticides residues were found in high amounts in Summer soil of El-Esmailia site, i.e. α-HCH (544.33 ppb), β-HCH (71.67 ppb), heptachlor (202.67 ppb), heptachlor-epoxide (326.67), *o,p'*-DDE (306.0 ppb), *o,p'*-DDD (83.33 ppb), *o,p'*-DDT (637.0 ppb) and fenpropathrin (437.33 ppb).

The same trend of pesticides distribution was found in soil from El-Kanater site, showing the existence of 9/27, 6/27, 8/27 and 8/27 compounds during Summer, Winter, Autumn and Spring, respectively. Samples of spring season were contained low amounts of the eight compounds. Autumn samples contained α-HCH (254.1 ppb), heptachlor (31.0 ppb), *cis*-chlordane (296.67 ppb) and other five compounds in low values. Winter soil was found contained six compounds in small amounts of organochlorine pesticides.

It is interesting to notice that the detected pesticides in soil samples collected from El-Kanater at Summer which were found in high amounts, i.e. α-HCH (416.0 ppb), heptachlor (660.33 ppb), aldrin (510.33 ppb), *o,p'*-DDE (96.67 ppb), endrin (174.33 ppb) benefin (324.33 ppb), pararthion (447.0 ppb), benalxyl (473.33 ppb) and pyridaben (843.67 ppb).

Our findings are in agreement with that obtained by **Askar (1980); Cogger & Connell (1991); Iwata *et al* (1995) and Osfor *et al* (1998).**

Reviewing the aforementioned results, it could be concluded the detection of some pesticides belongs to different functional groups in drainage water, ground water , sediment and agriculture soil samples collected from selected sites at Kalubia governorate. The seasonal distribution of pesticide residues was varied from site to site. In general, pesticides residues were found in more numbers and amounts in summer samples. Winter samples were contained the lowest numbers and amounts of pesticides residues.

However, the existence of the detected pesticide residues may be explained by the extensive use of pesticides of various groups, especially insecticides and fungicides in summer

Table 6. Detection of some metals (ppb) in the drainage water and ground samples collected from different markets of Kalnbia governorate during 7/2000-6/2001.

Location	Season	Metals (ppb)									
		Drainage water					Ground water				
		Mn	Pb	Co	Ni	Cr	Mn	Pb	Co	Ni	Cr
Esmailia (B) (Sector-Elkhanka	Summer	ND	4.33+7.51	1.33+2.31	ND	ND	8.33+14.43	ND	ND	ND	ND
	Winter	ND	ND	ND	ND	2.67+4.62	ND	ND	10.33+17.90	ND	3.00+5.20
	Autumn	23.67+40.99	ND	ND	3+5.20	ND	ND	0.67+1.15	ND	ND	ND
	Spring	ND	0.67+1.15	ND	1.33+2.31	ND	88.00+77.31	ND	ND	ND	ND
	Average/year	5.92	1.25	0.33	1.08	0.67	24.08	0.17	2.58	0	0.75
El-Kanater (E) (Sector-ElKanater	Summer	50.00+86.60	2.67+4.62	ND	ND	ND	15.00+25.98	ND	ND	ND	ND
	Winter	23.67+40.99	1.67+2.89	ND	1.67+2.89	ND	50.00+86.60	1.67+2.89	4.33+7.51	ND	ND
	Autumn	ND	ND	ND	ND	ND	ND	3.00+5.20	ND	ND	ND
	Spring	6.67+11.55	6.33+10.97	ND	ND	ND	4.33+7.51	ND	ND	ND	ND
	Average/year	20.08	2.67	0	0.42	0	17.33	1.16	1.08	0	0
El-Sanafin (G) (Sector-Banha)	Summer	1.00+1.73	ND	ND	ND	ND	ND	1.00+1.73	ND	ND	ND
	Winter	3.00+5.20	ND	ND	ND	ND	ND	ND	1.67+2.89	ND	ND
	Autumn	ND	4.33+7.51	ND	0.33+0.58	ND	ND	ND	ND	ND	ND
	Spring	ND	ND	ND	ND	ND	3.00+1.00	ND	ND	ND	ND
	Average/year	1	1.08	0	0.083	0	0.75	0.25	0.42	0	0

ND; Not Detected under the limite of detection (1 ppb)., Summer date: 20/6-21/9 (7-8-9/2000), Winter date. 20/12-21/3 (1-2-3/2001), Autumn date : 21/9-20/12 (10-11-12/2000), and Spring date: 21/3-20/6 (4-5-6/2001)

crops while the contrarily was occurred in winter. In addition, transfer and movement of pesticides from treated area to water resources are greatly responsible for such contamination with low levels of pesticides. Moreover, it is quite strange and interesting to detect mirex which was never imported and/or applied in Egypt for agriculture as well as health purposes. This may be attributed to the fact that mirex was derived from the conversion of some long lasting organochlorine pesticides remained from 1960's.

On the other hand, considering the permissible levels and maximum residue limits of pesticides in water, it could be mentioned that such levels are available only for drinking water **(WHO, 1984),** while not available for drainage and ground water. Accordingly, the high levels in the aforementioned Tables and finding should be considered for risk and hazards assessments.

5- Metals in water samples

Data in Table (6) indicate that minute amounts of metals were occasionally detected in drainage water during some seasons. Most samples were found free of metals contamination. The number of positive samples reached one (Cr, 2.67 ppb), four (Ni, 3.00, 1.33, 1.67, 0.33), six (Pb, 4.33, 0.67, 2.67, 1.67, 6.33, and 4.33 ppb) and six (Mn, 23.67, 50.00, 23.67, 6.67, 1.00 & 3.00 ppb).

As for ground water, data in the same Table indicate that Nickel was not detected in any of the collected and analyzed samples. Chromium was found in winter samples from El-Esmailia only (3.00 ppb). Cobalt was detected in three samples during winter, reached 10.33, 4.33 and 1.67 ppb with El-Esmailia, El-Kanater and Benha, respectively. Lead was found in four samples compared with six ones with manganese. Manganese was detected in high amount during spring at El-Esmailia (88.00 ppb) and winter at EL-Kanater (50.0 ppb). Our findings are in harmony with that obtained by **Zayed *et al* (1994); Abdel Naser *et al* (1996) and Seddek *et al* (1996).**

In general, the detected metals in abnormal high concentrations in water may be attributed to the aggregate amounts of these metals from different sources, i.e. pesticides, fertilizers and waste water from different industries.

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REFERENCES

Abdel-Ghany, B.S. (2000). ***Behaviour of Certain Pesticide Residues in Water and Soil.*** M.Sc. Thesis Pesticide Dept. Fac. Agric. Ain Shams Univ., Cairo, ***pp. 110-115.***

Abdel-Hamid, M.I.; S.A. Shaaban-Dessouki and O.M. Skulberg (1992). Water quality of the River Nile in Egypt. I. Physical and chemical characteristics. ***Archiv fur Hydrobiologie 90 (3): 283-310.***

Abdel-Nasser, M.; A.A. Shaaban; M.A. Seham and M.M. Sayed (1996). Levels of some heavy metals in fish caught from river nile at Assiut Governorate, Egypt. ***Assiut Veterinary Medical Journal 34: 68-84.***

Abd-El-Razik, M.; M.A.H. Marzouk; L.E. Mowafy and M.A. Abdel-Kader (1988). Pesticide residues in the river Nile water, Egypt. ***Pakistan Journal of Scientific and Industrial Research 31(11): 795-797.***

Abd-El-Razik, M.; R.M. Abd-El-Metwally; M.A.H. Marzouk and M.A. Abd-El-Kader (1991). Organochlorine pesticide residues in the sediments of some river Nile distributaries and drains, Egypt. ***Pakistan Journal of Scientific and Industrial Research 34(11):436-438.***

Abu-Elamayem, S.; M.K. El-Sheamy and E. AbdEl-Razek (1979). Determination levels of chlorinated pesticides in both water and sediment in lake Mariut and Nozha during 1978 to 1979. ***J. Environ. Sci. Health.15 :1091-1096.***

AOAC (1990a). Multi residues methods: Feneral Methods for organochlorine and organophosphorous pesticides. ***Assoc. Official Anal chem.13: 466-472.***

AOAC (1990b). Waters and salts, In: ***Official Methods of Analysis, 15th, pp. 312-336.*** Arlington, Virginia, USA.

Askar, M. (1980). Monitoring levels of 15 chlorinated insecticides residues. ***Egypt. J. Appl. Sci., 6 (1): 94-102.***

Barrett, M.R.; M.T. Meyer and E.M. Thurman (1996). The environmental impact of pesticide degradates in groundwater. Herbicide metabolites in surface water and groundwater. Developed from the 209th national meeting of the American Chemical Society, Anaheim, California, April 2-7, 1995. ***ACS Symposium Series 630. pp. 200-225.***

Beitz, H. (1994). ***Occurrence, Toxicological and Ecotoxicological Significance of Pesticides, p. 56.*** Elsevier Applied Science, London and New York.

Borner, H. (1994). Pesticides in ground and surface water. ***Chemistry of Plant Protection Volume 10, p. 297.***

Brunetto, R.; M. Burguera and J.L. Burguera (1992). Organophosphorus pesticide residues in some watercourses from Merida, Venezuela. ***The Science of the Total Environment, 114: 195-204.***

Cogger, C.G. and C. MacConnell (1991). ***Why the concern about agricultural contamination in groundwater. Extension Bulletin No. EB1632, p. 4.*** Cooperative Extension, College of Agriculture and Home Economics, Washington State University. 1991,

Dogheim, S.; M. El-Moattassem; F. Macklad; N. Shaker and S. Hassan (1992). Pesticide residues in the Rosetta Branch of the River Nile during the winter closure period (December 1990 - May 1991). Nile 2000. ***Proceedings International Conference on Protection and Development of the Nile and other Major Rivers. Volume 2. p. 14.***

El-Dib, M.A. and M.I. Badawy (1985). Organo-chlorine insecticides and PCBs in River Nile water, Egypt. ***Bulletin of Environmental Contamination and Toxicology. 34(1): 126 133.***

Hassan, I.M.; M.F. Khallaf; Y.A. Abd-El-Daim and M.T. Ibrahim (1996). Organochlorine pesticides residues in water and fish from the River Nile. Proceedings: Sixth conference of agricultural development research 17-19 December 1996, Cairo. ***Annals of Agricultural Science, Cairo, Special Issue: 149-161.***

Iwata, H.; S. Tanabe; K. Ueda and R. Tatsukawa (1995). Persistent organochlorine residues in air, water, sediments, and soils from the Lake Baikal

Region, Russia. *Environmental Science and Technology 29 (3): 792-801.*

Mann, B.J. (1981). *Manual for Training of Pesticides Analysis, Section 11,B, E pp. 2-5.* USA.

Mansour, M.; E.A. Feicht; A. Behechti; K.W. Schramm; A. Kettrup; D. Bienienk and I. Scheunert (1999). Determination of photostability of selected agrochemicals in water and soil. Advances in ecological chemistry. *Chemosphere. 39(4): 575-585.*

Osfor, M.H.; A.M. El-Wahab and S.A. El-Dessouki (1998). Occurence of pesticides in fish tissue, water and soil sediment from Manzala lake and River Nile. *Nahrung 42 (1): 39-41.*

Ragab, A.A.; A.M.A. Ibrahim and C. J. Smith (1997). Quantification by ELISA of aldrin/dieldrin in river Nile water and tap water samples collected in Egypt. *Food and Agricultural Immunology. 9 (1): 51-55.*

Richard R.P.; J.W. Kramer; D.B. Baker and K.A. Krieger (1987). Pesticides in rainwater in the north-eastern United states. *Nature 327: 129-131.*

Seddek, A.L.; D.A. Salem; M.E. Nagwa and Z.M. Zaky (1996). Cadmium, lead, nickle, copper, manganese and flourtine levels in river Nile fish in Assiut Governorate. Egypt. **Wiener-***Tierarztliche Monatsschrift 83 (12): 374-377.*

World Health Organization (WHO) (1984). *Guidelines For Drinking Water Quality. Vol. 1, p. 63.* Recommendations, Geneva, 1984.

Zayed, M.A.; F.A. Nour Eldien and K.A. Rabie (1994). Comparative study of seasonal variation in metal concentrations in river Nile sediment, fish and water by atomic absorption spectrometry. *Microchemical J. 49 (1): 27-35.*

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الكشف عن متبقيات المبيدات والمعادن فى الماء وأنظمة التربة من بعض المناطق الصناعية والزراعية فى محافظة القليوبية- مصر

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يهدف هذا البحث إلى دراسة متبقيات المبيدات فى عينات من مياه المصارف والماء الأرضى والتربة الرسوبية والتربة الزراعية التى تم تجميعها من مواقع مختلفة خلال أربعة مواسم فى محافظة القليوبية خلال العام ٢٠٠٠/٢٠٠١. وقد أوضحت

نتائج الكشف عن إختلاف معدلات متبقيات المبيدات فى مياه المصارف التى تم تجميعها من الخمسة مواقع المختارة. وقد وجد أن أعلى معدل للمتبقيات فى موسم الصيف قد وصل إلى ٤٤,٤٤، ٤٠,٧٤، ٤٨,١٥، ٤٨,١٥، ٥١,٨٥ % للمركبات المقدرة فى مناطق الإسماعيلية والقناطر والصنافين والمظلات والهابى لاند على التوالى. وعلى العكس، فى الشتاء كان عدد المبيدات التى تم الكشف عنها أقل فى عينات المياه. وبالنسبة للماء الأرضى، فقد تم الكشف عن وجود كميات صغيرة جداً للمركبات الكلورينية العضوية فى بعض المناطق والمواسم. وفى حالة التربة الرسوبية، فقد تم الكشف عن العديد من المبيدات خاصة فى موسم الخريف.

وعلى العكس فى عينات التربة الزراعية، حيث وجد أن متبقيات المبيدات كانت أعلى من مثيلتها فى عينات التربة الرسوبية.

ويمكن القول من النتائج المتحصل عليها أن متبقيات المبيدات التى تم الكشف عنها أنها تنتمى إلى أنواع مختلفة من المبيدات الحشرية فى عينات مياه المصارف والماء الأرضى والتربة الرسوبية والتربة الزراعية التى تم جمعها من محافظة القليوبية. وقد وجد أن هناك إختلاف فى التوزيع الموسمى لهذه المتبقيات من موقع إلى آخر. وبصفة عامة، فإن متبقيات المبيدات يزداد عددها وكميتها فى فصل الصيف عن فصل الشتاء. وفى النهاية، فإن كميات متبقيات المبيدات التى تم الكشف عنها كانت دائماً فى مستوى أقل من المستويات المسموح بها من المتبقيات. أما بالنسبة للمعادن فى العينات سالفة الذكر، فلم توجد متبقيات من المعادن بمعدلات جديرة بالإهتمام خاصة الكروم والنيكل والكوبلت والرصاص. أما المنجنيز، فهو الإستثناء الوحيد الذى وجد بكميات عالية فى كل المواقع المختارة التى تم جمع العينات منها.

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