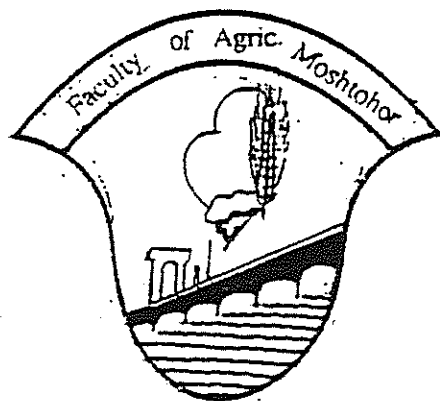


# *Annals Of Agricultural Science, Moshtohor*

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*Faculty of Agriculture, Moshtohor ,Zagazig University (Banha - Branch)*

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*أبحاث باللغة العربية*

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*Annals of Agric. sc., Moshtohor,*  
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**ORGANOCHLORINE AND ORGANOPHOSPHORUS PESTICIDE  
RESIDUES IN HOME-PRODUCED POTATOES USED FOR  
CONSUMPTION IN EGYPT  
BY**

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**ABSTRACT**

Residues of certain organochlorine pesticides namely; alpha + beta HCH, lindane, aldrine, dieldrin, endrin and DDT; and the organophosphorus pesticides (pirimiphos-methyl and malathion) were determined in home-produced potatoes used for consumption in Egypt.

The analyzed samples were collected during a whole year (1994) from the markets of various localities.

Results concerning potatoes consumed after its storage indicated that a great number of the tested samples contained amounts of alpha + beta HCH, lindane and DDT higher than the maximum residue limits of the FAO (MRL).

For potatoes consumed directly after its harvest, residues of the organochlorine pesticides were in levels under the acceptable limits.

Residues of pirimiphos methyl and malathion were in all tested samples in safety limits for consumption.

**INTRODUCTION**

The extensive use of insecticides for the protection of agricultural crops and public health programmes all over the world, have caused serious environmental problems. Toxic residues of organochlorine and organophosphorus insecticides in food products and human daily diet remain a major health and economic problems (Ennico *et al.*, 1982 and Zafar, 1984).

Potatoes is a widely grown crop in Egypt. The total cultivated area in the two seasons of 1993 was 113000 feddans.

Potatoes is one of the major Egyptian export crop, from the total production of 841000 tons in 1993, more than 15% were exported.

The purpose of the present work is to investigate the residues of chlorinated hydrocarbon pesticides and the most common organophosphorus insecticides, pirimiphos-methyl and malathion in potatoes used for consumption in Egypt.

## MATERIALS AND METHODS

### Samples:

Sixty six potato samples were randomly collected from various localities, Kalubia, Cairo and Alexandria, during the whole year of 1994. Samples were washed with tap water, left to dry at room temperature and kept at 5°C until analysis.

### Extraction and clean up:

Representative samples were chopped, blended and mixed. 25 g of the blended fraction were transferred into 500 ml flask containing 25 g anhydrous sodium sulfate, 50 ml acetone were added. Samples were shaken in a (Janke & Kunkel, KS 250) shaker for 30 minutes. Subsequently, 50 ml n-hexane were added and shaken again for 30 minutes, filtrated through a funnel fitted with shark skin paper (purified in acetone) equipped with 2 spoon  $\text{Na}_2\text{SO}_4$ , poured into 100 ml graduated cylinder. 50 ml filtrate were transferred into 250 ml flask containing 0.5 ml n-hexane. Volume was reduced in a rotary evaporator to 1 ml.

The analytic methods were performed according to the procedure of El-Lakwah *et al.* (1989 a & b). Samples were analyzed for the organochlorinated pesticides (alpha + beta HCH, lindane, aldrin, dieldrin, endrin and total DDT) and organophosphorus pesticides (malathion and pirimiphos-methyl).

### Gas-liquid chromatography (GLC) analysis:

Hewlett packard serie II gas chromatograph equipped with electron capture detector and nitrogen phosphorus detector, and provided with Hewlett organophosphorus insecticide residues.

Silanized pyrex glass column was used (1.8 m 2 mm ID) packed with 1.5% OV-17+1.95%OV 202 on chromosorb WHP, 80-100 mesh.

For chlorinated pesticides analysis, column, detector injector temperatures were 195°C, 300°C and 230°C, respectively, nitrogen flow rate was 25 ml/min.

For organophosphorus insecticides analysis, column, detector, injector,

## RESULTS AND DISCUSSION

Pesticide residues in home-produced potatoes, used for consumption after its storage are given in Table (1). Results indicated that alpha + beta HCH, lindane, and DDT were detected in all tested samples. Residues of alpha + beta HCH were in 90.9% of the tested samples in range from 0.03-2.4 mg/kg higher than the maximum residue limit (0.02 ppm).

Lindane residues were in 69.7% of the samples in levels from 0.2-1.8 mg/kg above the MRL (0.1 ppm). DDT residues were in 66.7% of the samples in range from 0.06-2.7 mg/kg higher than MRL (0.05 ppm). Aldrin residues were detected in 54.5% of the tested samples in range from 0.001-0.08 mg/kg, and exceeded the MRL (0.01 ppm) in 21.2% of the samples. None of the samples contained residues of dieldrin and endrine. For organophosphorus pesticide residues. Pirimiphos methyl was detected in 39.4% of the samples, in levels under the acceptable limit (0.05 ppm) as it ranged from 0.02-0.05 mg/kg and malathion in 60.6% of the samples, under the acceptable level (0.5 ppm), as it ranged from 0.02-0.5 mg/kg.

Table (2) presents the pesticide residues in the potatoes used for consumption directly after its harvest. Results showed that all samples contained alpha + beta HCH residues in range from 0.001-0.003 mg/kg, below the MRL.

All samples contained residues of lindane, under the acceptable limit, as it ranged from 0.002-0.04 mg/kg. DDT residues were detected in 39.4% of the samples in levels from 0.001-0.003 mg/kg, below the MRL. Aldrin residues were found in 15.2% of the tested samples with an average value of 0.001 mg/kg, under MRL. None of the samples contained detectable dieldrin or endrin residues.

Concerning organophosphorus pesticide residues, pirimiphos-methyl was found in 24.2% of the samples, in levels under the acceptable limit, as it ranged from 0.02-0.03 mg/kg, and malathion in 36.4% of the samples, under the MRL, as it ranged from 0.01-0.5 mg/kg.

The obtained results indicated that none of the potato samples, which were consumed directly after its harvest, contained residues of organochlorine and organophosphorus pesticides above the acceptable limits.

Contrarily, great ratios of the stored potato samples contained amounts of the organochlorine pesticides namely alpha + beta HCH, lindane and DDT higher than the acceptable limits. This result could be due to the fact that some

Table (1): Pesticide residues in home-produced potatoes used for consumption following storage.

Location of samples MRL	Organochlorine pesticides (ppm)						Organophosphorus pesticides (ppm)	
	$\alpha+\beta$ HCH	Lindane	Aldrin	Dieldrin	Endrin	Total DDT	Pirimi- phos methyl	Malath- ion
	0.02	0.1	0.01	0.01	0.01	0.05	0.05	0.5
<b>Kalubia Gov.:</b>								
Moshtohor	0.02	0.04	0.001	-	-	0.05	0.02	0.12
Moshtohor	0.10	0.05	-	-	-	0.03	0.02	0.20
Moshtohor	0.60	0.04	-	-	-	0.10	0.04	0.04
Tukh	2.40	1.80	-	-	-	0.01	0.03	0.02
Tukh	0.002	0.06	0.002	-	-	0.06	-	-
Tukh	1.30	0.90	0.001	-	-	0.10	-	-
Benha	0.40	0.30	-	-	-	0.03	-	-
Benha	1.20	1.00	0.001	-	-	0.06	0.05	0.10
Benha	0.80	1.10	-	-	-	0.10	-	-
Kalyub	0.10	0.01	0.010	-	-	0.10	0.03	0.15
Kalyub	0.10	0.20	-	-	-	0.90	-	-
Kalyub	0.20	0.05	0.001	-	-	0.40	0.04	0.10
El-Amar	0.10	0.30	0.003	-	-	0.03	-	-
El-Amar	0.10	0.08	-	-	-	0.04	0.03	0.10
El-Amar	0.70	0.60	-	-	-	1.20	-	-
<b>Average</b>	<b>0.54</b>	<b>0.44</b>	<b>0.003</b>	<b>-</b>	<b>-</b>	<b>0.21</b>	<b>0.03</b>	<b>0.10</b>
<b>Cairo Gov.:</b>								
Heliopolis	1.30	1.00	0.08	-	-	0.20	-	-
Heliopolis	0.30	0.70	0.06	-	-	2.70	-	-
Heliopolis	0.03	0.05	-	-	-	0.10	-	-
Mataria	0.30	0.20	-	-	-	0.03	0.04	0.14
Mataria	0.20	0.14	0.01	-	-	0.02	-	-
Mataria	1.20	0.90	0.01	-	-	1.10	0.02	0.04
Dokki	1.30	1.50	0.06	-	-	1.80	-	0.10
Dokki	0.90	0.80	0.02	-	-	0.02	-	0.50
Dokki	0.70	0.60	0.04	-	-	1.20	-	0.30
Shobra	0.60	0.80	0.001	-	-	0.02	-	0.50
Shobra	1.10	1.40	0.03	-	-	1.80	-	0.40
Shobra	1.30	1.20	0.02	-	-	1.30	0.02	0.03
<b>Average</b>	<b>0.77</b>	<b>0.77</b>	<b>0.03</b>	<b>-</b>	<b>-</b>	<b>0.86</b>	<b>0.03</b>	<b>0.25</b>
<b>Alexandria Gov.:</b>								
Cleopatra	0.002	0.10	-	-	-	0.02	0.03	0.50
Cleopatra	0.16	0.14	-	-	-	-	-	-
Cleopatra	0.20	0.16	-	-	-	1.10	-	-
El-Raml	0.30	0.06	0.01	-	-	0.08	0.02	0.10
El-Raml	0.05	0.30	-	-	-	0.20	-	0.10
El-Raml	0.20	0.14	-	-	-	2.10	-	0.05
<b>Average</b>	<b>0.152</b>	<b>0.15</b>	<b>0.01</b>	<b>-</b>	<b>-</b>	<b>0.70</b>	<b>0.025</b>	<b>0.19</b>

Table (2): Pesticide residues in home-produced potatoes used for consumption directly after its harvest.

Location of samples MRL	Organochlorine pesticides (ppm)						Organophosphorus pesticides (ppm)	
	$\alpha+\beta$ HCH	Lindane	Aldrin	Dieldrin	Endrin	Total DDT	Pirimi- phos methyl	Malath- ion
	0.02	0.1	0.01	0.01	0.01	0.05	0.05	0.5
<b>Kalubia Gov.:</b>								
Moshtohor	0.001	0.005	-	-	-	0.001	-	-
Moshtohor	0.002	0.04	0.001	-	-	0.001	0.02	0.50
Moshtohor	0.001	0.02	-	-	-	-	-	-
Tukh	0.001	0.02	-	-	-	-	-	-
Tukh	0.001	0.03	-	-	-	-	-	-
Tukh	1.002	0.03	0.001	-	-	-	-	-
Benha	0.002	0.02	-	-	-	-	-	-
Benha	0.001	0.04	-	-	-	0.003	0.03	0.10
Benha	0.001	0.02	-	-	-	0.001	-	-
Kalyub	0.002	0.01	-	-	-	-	0.02	-
Kalyub	0.001	0.03	-	-	-	-	-	-
Kalyub	0.002	0.02	-	-	-	0.001	0.03	0.40
El-Amar	0.002	0.01	-	-	-	-	-	-
El-Amar	0.001	0.01	-	-	-	-	0.02	0.10
El-Amar	0.001	0.03	-	-	-	-	-	-
<b>Average</b>	<b>0.068</b>	<b>0.02</b>	<b>0.001</b>	<b>-</b>	<b>-</b>	<b>0.001</b>	<b>0.02</b>	<b>0.275</b>
<b>Cairo Gov.:</b>								
Heliopolis	0.002	0.04	-	-	-	0.001	0.03	0.50
Heliopolis	0.002	0.03	-	-	-	-	-	-
Heliopolis	0.001	0.03	-	-	-	-	-	-
Mataria	0.002	0.02	-	-	-	-	-	-
Mataria	0.002	0.04	0.001	-	-	0.001	-	-
Mataria	0.002	0.03	-	-	-	0.001	-	-
Dokki	0.001	0.01	-	-	-	-	-	-
Dokki	0.001	0.03	-	-	-	-	-	0.40
Dokki	0.002	0.02	-	-	-	-	-	-
Shobra	0.001	0.04	-	-	-	-	-	0.30
Shobra	0.001	0.03	-	-	-	-	-	-
Shobra	0.00	0.02	-	-	-	0.001	-	0.50
<b>Average</b>	<b>0.002</b>	<b>0.03</b>	<b>0.001</b>	<b>-</b>	<b>-</b>	<b>0.001</b>	<b>0.03</b>	<b>0.43</b>
<b>Alexandria Gov.:</b>								
Cleopatra	0.001	0.002	-	-	-	0.002	0.03	0.02
Cleopatra	0.001	0.010	-	-	-	0.001	-	0.01
Cleopatra	0.001	0.003	0.001	-	-	0.003	-	0.02
El-Raml	0.002	0.005	-	-	-	-	0.02	0.50
El-Raml	0.003	0.002	-	-	-	-	-	-
El-Raml	0.001	0.003	0.001	-	-	0.001	-	-
<b>Average</b>	<b>0.002</b>	<b>0.004</b>	<b>0.001</b>	<b>-</b>	<b>-</b>	<b>0.002</b>	<b>0.025</b>	<b>0.14</b>

Concerning the organochlorine pesticide residues detected in harvested potatoes. This might be due to their persistence and accumulation in the soil or to the illegal use to protect crops from pests.

Generally, the obtained results are in harmony with the findings of El-Lakwah *et al.* (1989 b) and Khaled (1992).

The results revealed also that a high ratio of the analysed samples of stored potatoes, used for consumption, was contaminated with alpha and beta HCH, lindane and DDT.

The human consumption of such polluted potatoes could injure the health of the people. Storage pest management technique must be developed and advanced extension programs should take place to ensure suitable storage of potatoes with minimum health hazards.

It is worth noting, however that the highest level of pollution with isomers of HCH (alpha, beta and lindane) was detected in potatoes in the markets of Cairo city, whereas the average of alpha and beta isomers was 0.77 ppm compared to 0.54 ppm in Kalubia markets, while the lowest level was in Alexandria (0.15 ppm). As for the lindane, the same order of pollution could be noticed: 0.77, 0.44 and 0.15 ppm for Cairo, Kalubia and Alexandria, respectively. When total DDT was compared as average pollution in each of the three localities, comparison revealed that the highest level of contamination was found again in Cairo, 0.86 ppm, followed by Alexandria 0.7 ppm then Kalubia 0.21 ppm.

The above results may be taken as an indication that storage of potatoes needs attention as it was obviously the main reason for contamination of the samples collected, since it was evident that soil pollution and unrecommended pesticides, if used during the growing season did not cause any contamination above the level of MRL.

#### ACKNOWLEDGEMENT

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متبقيات بعض المبيدات الكلورينية والفوسفورية العضوية  
فى البطاطس المنتجة محليا والمقدمة للإستهلاك فى مصر

فارس أمين اللقوة - أمنية محمد خالد - على شمس الدين  
قسم وقاية النبات - كلية الزراعة بمشتهر - جامعة الزقازيق - مصر.

لقد تم فى هذه الدراسة تقدير متبقيات المبيدات الكلورينية العضوية (ألفا + بيتا  
هكسا كلوروسيكلو هكسان، اللندان، الألدرين، ديالدرين) والمبيدات الفوسفورية العضوية  
(الملاثيون، الأكتليك) فى البطاطس المنتجة محليا والمقدمة للإستهلاك فى جمهورية  
مصر العربية.

وجمعت العينات اللازمة لهذه الدراسة خلال عام كامل (١٩٩٤م) من الأسواق  
الموجودة فى مناطق مختلفة (القليوبية، القاهرة، الأسكندرية) وقد أظهرت النتائج  
المتحصل عليها ما يلى:

بالنسبة لعينات البطاطس المعروضة فى الأسواق بعد تخزينها فإن نتائج  
التحليل قد أظهرت أن نسبة كبيرة من هذه العينات تحتوى على متبقيات ألفا + بيتا  
هكسا كلوروسيكلو هكسان، اللندان، د.د.ت. بمقدار يفوق الحد المسموح به.

أما بالنسبة لعينات البطاطس المعروضة فى الأسواق مباشرة بعد حصادها فقد  
أظهرت نتائج التحليل أن متبقيات المبيدات الكلورينية العضوية التى تم إكتشافها كانت  
بمستويات أقل من الحد المسموح به فى جميع العينات.

كما وجد أن متبقيات المبيدات الفوسفورية العضوية (الملاثيون والأكتليك) التى  
تم إكتشافها كانت فى جميع عينات البطاطس بكميات تقل عن الحد المسموح به.

# حوليات العلوم الزراعية بمشتھر

كلية الزراعة بمشتھر      جامعة الزقازيق / فرع بنھا



AGRONOMY	1727-1790
ANIMAL PRODUCTION	1791-1810
BOTANY	1811-1916
DAIRY AND FOOD TECHNOLOGY	1917-2028
HORTICULTURE	2029-2096
PLANT PROTECTION	2097-2204
VETERINARY	2205-2232

أبحاث باللغة العربية

٣٦ - ١

ديسمبر ١٩٩٤

المجلد الثاني والثلاثون . العدد الرابع