

## PRESENCE OF PESTICIDE RESIDUES IN IMPORTED FROZEN FISH

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### ABSTRACT

45 random samples of imported frozen fish were collected from Al-Gharbiah markets, Egypt. The collected samples were represented by *Synodus Saurus* (*Saurus*), *Trachurus trachurus* (*Atlantic-Horse Mackerel*) and *Scomber scombrus* (*Mackerel*) fish, (15 of each). The collected samples (fish flesh) were examined for determination of pesticide residues (aldrin and malathion) on the basis of wet weight (ppb) by High Performance Liquid Chromatography (HPLC) apparatus. The obtained results revealed that the mean concentrations of aldrin in the examined samples of imported frozen *Saurus*, *Atlantic-Horse Mackerel* and *Mackerel* fish were  $59.75 \pm 2.53$  ppb,  $124.1 \pm 4.92$  ppb and  $150.86 \pm 6.38$  ppb, respectively. However The mean concentrations of malathion in the examined samples of imported frozen *Saurus*, *Atlantic-Horse Mackerel* and *Mackerel* fish were  $110.80 \pm 4.47$  ppb,  $181.80 \pm 5.22$  ppb and  $243.60 \pm 8.95$  ppb, respectively. Comparing the results to the maximum permissible limits stated by the Egyptian Organization of Standardization "EOS" (2005), found that the examined frozen mackerel fish contained the highest residual concentrations of pesticides (aldrin and malathion) followed by *Atlantic-Horse Mackerel* and *Saurus* fish.

## INTRODUCTION

Fish is a traditional and important food in the Egyptian's diet. The quantity of imported fish was increased to fulfill the demand of animal protein. There are expectations of increased fish demand for consumption not only due to population growth, but also due to increasing price gap between fish and alternatives animal protein such as meat. (*Hassan et al., 2011*).

Pesticides can be defined as any substance or mixture of substances intended for prevention, destroying or controlling any pest act as vectors of human or animal diseases and unwanted species of plants (*Goldman et al., 1990*). The problem of pesticide residues in food has been addressed at international level through several committee sponsored by some United Nations organizations (FAO/WHO). Contamination of food of animal origin by organochlorine and organophosphorus compounds and their metabolites has been reported in various countries. Generally, most of pesticides are toxic to all forms of life and vary widely in their degree of possible hazards (*Neumann, 1988*).

Aldrin and dieldrin are organochlorine insecticides with similar chemical structures. Aldrin rapidly changed to dieldrin in plants and animals, dieldrin is stored in the fat and leaves the body very slowly, aldrin and dieldrin found in food like fish or shellfish from contaminated lakes or streams, or contaminated root crops, dairy products, or meat (*ATSDR, 2002*).

Malathion is a broad spectrum, non-systemic Organophosphorus insecticide that is highly toxic to fish and aquatic invertebrates, but does not appear to be toxic to plants. Some residential and agricultural uses have rather high application rates and resulting exposure (*Jeannette and Jennifer, 2004*).

**Therefore, this study was planned to:**

Detection of pesticide pollutants of (Aldrin and Malathion) in imported frozen fish from different countries.

## **MATERIALS AND METHODS**

### **1- Collection of samples:**

A total of 45 random samples of imported frozen fish were collected from Al-Gharbiah markets, Egypt, the collected samples were represented by Saurus, Atlantic-Horse Mackerel and Mackerel fish (15 of each) The collected samples (fish flesh) were examined for determination of pesticide residues (aldrin and malathion) on the basis of wet weight (ppb).

### **2-Determination of pesticides (aldrin and malathion):**

**2-1- Extraction and purification according to (*Bonsir et al., 2007*).**

**2-2- Partitioning according to (*AOAC, 1990*).**

**2-3- Clean-up according to (*Serrano et al., 2008*).**

**2-4- Preparation of stock standards.**

**2-5- Preparation of chromatographic working standards.**

**2-6- Preparation of the extracted sample.**

### **2-7- Chromatography:**

The prepared samples were examined for determination of pesticide residues (aldrin and malathion) on the basis of wet weight (ppb) by High Performance Liquid Chromatography (HPLC) apparatus.

## RESULTS

**Table (1):** Statistical analytical results of aldrin concentrations in the examined samples of imported frozen fish (n=15).

Types of imported fish	NO. of positive samples	Percentage of positive samples	Concentrations (PPb)		
			Min	Max	Mean $\pm$ S.E
Saurus	2	13.33	23.70	95.80	59.75 $\pm$ 2.53
Atlantic-Horse Mackerel	2	13.33	41.30	206.90	124.10 $\pm$ 4.92
Mackerel	5	33.33	58.70	263.10	150.86 $\pm$ 6.38

**Table (2):** Acceptability of the examined imported frozen fish samples based on their concentrations of aldrin.

Types of imported fish	NO. of samples	NO. of samples above MRL	% of samples above MRL (Unaccepted)	MRL (PPb)*
Saurus	15	0	0	200
Atlantic-Horse Mackerel	15	1	6.67	200
Mackerel	15	2	13.33	200

\* Egyptian Organization of Standardization "EOS" (2005)

**Table (3):** Statistical analytical results of Malathion concentrations in the examined samples of imported frozen fish (n=15).

Types of imported fish	NO. of positive samples	Percentage of positive samples	Concentrations (PPb)		
			Min	Max	Mean $\pm$ S.E
Saurus	2	13.33	48.50	173.10	110.80 $\pm$ 4.47
Atlantic-Horse Mackerel	3	20.00	64.10	329.60	181.80 $\pm$ 5.22
Mackerel	5	33.33	92.50	356.40	243.60 $\pm$ 8.95

**Table (4):** Acceptability of the examined imported frozen fish samples based on their concentrations of malathion.

Types of imported fish	NO. of samples	NO. of samples above MRL	% of samples above MRL (Unaccepted)	MRL (PPb)*
Saurus	15	0	0	300
Atlantic-Horse Mackerel	15	1	6.67	300
Mackerel	15	3	20.00	300

\* Egyptian Organization of Standardization "EOS" (2005)

## DISCUSSION

It is evident from the results recorded in table (1) that the concentration of aldrin in the examined samples of imported frozen fish ranged from 23.70 to 95.80 ppb with a mean of  $59.75 \pm 2.53$  ppb, 41.30 to 206.90 ppb with a mean of  $124.1 \pm 4.92$  ppb and 58.70 to 263.10 ppb with a mean of  $150.86 \pm 6.38$  ppb for imported frozen Saurus, Atlantic-Horse Mackerel and Mackerel fish, respectively. The above mentioned concentrations nearly similar to those obtained by *Henry et al. (1998)* and *Verma et al. (2006)*, while lower concentrations were recorded by *Shailaja and Singhal (1994)* and *Shailaja and Nair (1997)*.

According to the permissible limits of aldrin stipulated by (*EOS, 2005*), results in table (2) showed that 6.67% and 13.33% of examined imported frozen Atlantic-Horse Mackerel and Mackerel fish, respectively, were unfit for human consumption where they exceed this permissible limits.

Concerning to the results recorded in table (3) the concentration of malathion in the examined samples of imported frozen fish ranged from 48.50 to 173.10 ppb with a mean of  $110.80 \pm 4.47$  ppb, 64.10 to 329.60 ppb with a mean of  $181.80 \pm 5.22$  ppb and 92.50 to 356.40 ppb with a mean of  $243.60 \pm 8.95$  ppb for imported frozen Saurus, Atlantic-Horse Mackerel and Mackerel fish, respectively.

Many authors referred to the presence of organophosphorus pesticides in fish, water and sediments such as *Hanazato (1991)* and *Soumis et al. (2003)*. Malathion contamination has a bad effect on the aquatic communities despite the fact that it is globally applied and can be legally applied directly over water (*Kiely, 2004*).

Regarding to the permissible limits of aldrin stipulated by (*EOS*, 2005), results in table (4) declared that 6.67% and 20% of the examined imported frozen Atlantic-Horse Mackerel and Mackerel fish were unfit for human consumption, respectively, where they exceed this permissible limits.

The obtained results in the present study indicated that the examined imported frozen Mackerel fish contained the highest residual levels of pesticides (aldrin and malathion) followed by Atlantic-Horse Mackerel and Saurus fish.

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تواجد متبقيات المبيدات الحشرية فى الأسماك المجمدة المستوردة

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أجريت هذه الدراسة التحليلية لمعرفة مدى تواجد بعض الملوثات البيئية من متبقيات المبيدات الحشرية (الالدرين والملاثيون) فى الأسماك المستوردة. وقد تم إجراء الدراسة على عدد 45 عينة عشوائية من الأسماك المجمدة المستوردة والتي تم جمعها من أسواق محافظة الغربية، مصر. متمثلة فى أسماك (المكرونه والمبروك والماكريل) وذلك بواقع 15 عينة من كل نوع من هذه الأسماك.

وقد أشارت نتائج هذه الدراسة الي أن متوسط تركيز الألدرين فى الأسماك المستوردة المكرونه والمبروك والماكريل هى  $59.75 \pm 2.53$  ،  $124.10 \pm 4.92$  و  $150.86 \pm 6.38$  جزء فى البليون ،على التوالي.

وطبقا للمواصفات القياسية المصرية فان أسماك المكرونه المستوردة مقبولة. الا ان  $6.67\%$  ،  $13.33\%$  من الأسماك المستوردة المبروك والماكريل على التوالي، غير صالحة وتتجاوز الحد الأقصى المسموح به للألدرين.

و كذلك متوسط التركيزات من الملاثيون فى الأسماك المستوردة المكرونه والمبروك والماكريل هى  $110.80 \pm 4.47$  ،  $181.80 \pm 5.22$  و  $243.60 \pm 8.95$  جزء فى البليون، على التوالي.

وطبقا للمواصفات القياسية المصرية فان أسماك المكرونه المستوردة مقبولة. الا ان  $6.67\%$  ،  $20\%$  من الأسماك المستوردة المبروك والماكريل، على التوالي، غير صالحة وتتجاوز الحد الأقصى المسموح به للملاثيون.

كما أشارت النتائج التي تم الحصول عليها من هذه الدراسة أن أسماك الماكريل المستوردة المجمدة تحتوي على أعلى المستويات من متبقيات المبيدات الحشرية (الالدرين والملاثيون) يليها المبروك وان أسماك المكرونه المستوردة صالحة ولا تتجاوز الحد الأقصى المسموح به للالدرين والملاثيون.