

Cambodia

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1. Introduction

Cambodia has small-scale aquaculture. Some species of fresh water fish with economic value were selected to be cultured in cage in Tonle Sap Great Lake. They were *Micronema micronema* in 2006 and *Oxyeleotris marmorata* in 2007-2008. Most fish species are easily contaminated by the pesticide residues present in the water runoff from agricultural fields or water discharged from nearby industrial areas. The contaminants can affect the health of consumers who consume fish as food everyday. This survey under the Japanese Trust Fund II Project was started in March 2006 and completed in May 2008.

2. Objectives And Goals

Survey of pesticide residues was carried out to provide information on the contamination levels in aquacultured fish.

3. Survey Methodologies

a. Sampling Method, Location, Species, Number of Samples and Sampling Size

Fish samples of Trey kes (*Micronema micronema*) were collected from the fishing lots store in Kompong Chnang province in 2006 according to the sampling schedule as follows:

Sampling in 2006

- 2 specimens on 17 March
- 2 specimens on 12 June
- 4 specimens on 11 December

Each selected specimen had a body weight of 300-450g.

Fish samples of Marbled Sleeper (*Oxyeleotris marmorata*) were also collected from pond in Kompong Thom Province in 2007 and 2008 as shown:

Sampling in 2007

- 4 specimens on 10 July
- 4 specimens in August

Sampling in 2008

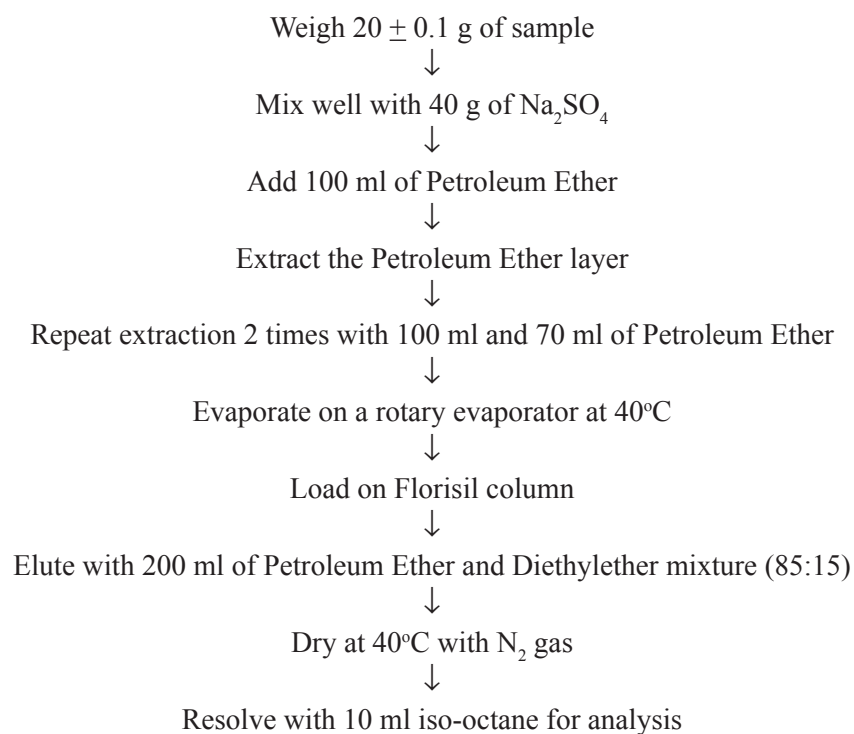
- 4 specimens on 27 March

Each specimen had a weight of 450-650 g and the physical parameters of the specimen was measured and recorded. After sampling, samples were frozen and packed in a plastic bag. The bags were placed in an icebox and sent to the Inland Fisheries Research and Development Institute (IFReDI) Laboratory. The samples were kept in a freezer at -18°C for a few days until transportation to the National Agriculture, Forestry and Fisheries Quality Assurance Department (NAFIQAD)-Branch 4 in Ho Chi Minh City. 8 compounds (Lindane, HCB, Heptachlor, Aldrin, Dieldrin, Endrin, DDT, Chordane) were analysed. Only the edible part of the fish was used for analysis.

b. Method of Analysis

All samples analyzed in laboratories of the National Agriculture, Forestry and Fisheries Quality Assurance Department (NAFIQAD) -Branch 4 in Ho Chi Minh City have certificate number: 105. Instrument used: GC-ECD 6890N, Agilent.

Analytical method used: Manual of Chemical analysis method AOAC 983.21.1995 (chapter 10, 12-13)



c. Limit of Detection and Limit of Quantification

Limit of Detection (LOD) are as follows:

- Aldrine, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene and Lindane: 2 µg/kg
- Chordane: 5 µg/kg
- DDT: 10 µg/kg.

d. National Regulatory Limits

Based on Commission Regulation (EC) No. 1881/2006 of 19 December, Setting Maximum Levels for Certain Contaminants in Foodstuff.

Hexachlorobenzene	2.0 µg/kg
Lindane	2.0 µg/kg
Heptachlor	2.0 µg/kg
Aldrin	2.0 µg/kg
Dieldrin	2.0 µg/kg
Endrin	2.0 µg/kg
Chlordane	5.0 µg/kg
DDT	5.0 µg/kg

Maximum permitted levels of hazardous chemicals in fish & fish products enforced by Canada, EU and FDA

Contaminants	Product Type	Action Level
Aldrin/ Dieldrin	All Fish	0.3 ppm
Benzene Hexachloride, BHC (HCH)	Frog legs	0.3 ppm
Chlordane	All Fish	0.3 ppm
Chlordecone	All Fish/ Crab meat	0.3 ppm
DDT, DDD, DDE	All Fish	5.0 ppm
Diquat	All Fish	0.1 ppm
Fluridone	Fin Fish and Crayfish	0.5 ppm
Glyphosate	Fin Fish/ Shell fish	0.25 ppm
Heptachlor/ Heptachor Epoxide	All Fish	0.3 ppm
Mirex	All Fish	0.1 ppm
Polychlorinated Biphenyls (PCB's)	All Fish	0.2 ppm
Simazine	Fin Fish	12 ppm
2,4-D	All Fish	1.0 ppm

4. Results And Discussion

a. Participation in Inter-laboratory Proficiency Testing and Results

Cambodia did not participate in any inter-laboratory proficiency testing.

b. Survey Results and Discussion

After 3 years of pesticide residues monitoring in fish and fish products, the results showed that though some samples contained pesticide residues, the level of contamination does not exceed the MRLs.

These results indicated that fish species *Mircronema micronema* and *Oxyeleotris marmorata* cultured in ponds and cages around the Tonle Sap Lake in Kompong Chnang and Kompong Thom Provinces are safe for consumption and export.

Year of analysis & Sampling location	Analyte	Fish sample analysed		No. of samples analysed	Min. value of results (ppm)	Max. value of result (ppm)	Average value of result (ppm)	Average Recovery (%)	Remarks
		Common name	Scientific name						
2006, Tonle Sap River in Kompong Chnang Province	Lindane, HCB, Heptachlor, Aldrin, Dieldrin, Endrin,	Trey kes	<i>Micronema micronema</i>	8	-	-	-	-	Not detected
2007, Pond in Kompong Thom Province	DDT and Chlordane	Marbled sleeper	<i>Oxyeleotris marmorata</i>	8	-	-	-	-	Not detected
2008, Tonle Sap Lake in Kompong Chnang Province		Marbled sleeper	<i>Oxyeleotris marmorata</i>	3	-	-	-	-	Not detected

Results for *Micronema micronema*

No.	Pesticide Name	Maximum value of results based on wet weight ($\mu\text{g}/\text{kg}$)
1	Lindane	0.7
2	HCB	4.5
3	Heptachlor	1.0
4	Aldrin	1.5
5	Dieldrin	2.5
6	Endrin	5.0
7	DDT	1.5
8	Chlordane	1.0

c. Corrective Actions (if applicable)

The results indicated that the *Oxyeleotris marmorata* and *Micronema micronema* cultured in the Tonle Sap Great Lake are safe for consumption in Cambodia and for export.

5. Problems and Challenges Encountered

As Cambodia's National Laboratory does not have the facilities to analyze the 8 targetted pesticide residues,

the fish samples must be transported to the laboratory in Ho Chi Minh City, Vietnam, which is very expensive.

6. Recommendations and Suggestions for Future Follow up Action

Due to limited budget for each activity, the amount of collected data does not reflect the real impact of chemical and contaminants on the fish natural in Tonle Sap Great Lake and aquacultured fish.