

Cambodia

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1. Introduction

In order to ensure that Iridescent shark-catfish and fish products in Cambodia are free from contamination by chemicals such as heavy metals (mercury, cadmium and lead) in fish farms, Cambodia carried out the survey under the Japanese Trust Fund II project to examine heavy metals contamination. The fish species targeted for the survey was *Pangasianodon hypophthalmus* cultured in the ponds of Kandal province. The survey started in March 2006 and was completed in May 2008.

2. Objectives And Goals

The objective of the survey was to obtain information on heavy metals (mercury, cadmium and lead) contamination in Iridescent shark-catfish.

3. Survey Methodologies

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

Fish samples of Iridescent shark-catfish, *Pangasianodon hypophthalmus*, were collected from the fish farm in Kandal province since 2006. The sampling times were as follows:

Species surveyed	Year	Month	Number of samples collect
Iridescent shark-catfish (<i>Pangasianodon hypophthalmus</i>)	2006	March	6
		June	7
		December	10
	2007	August	9
		December	5
	2008	April	7

Each sample weighed at least 500 g/fish. The physical parameters were recorded. The samples were packed in plastic bags filled with ice and sent to the laboratory. The samples were stored at -18°C for 1 to 2 days before transporting to Vietnam for analysis. Only the edible part of the fish was used for analysis.

b. Method of Analysis

All samples were analyzed at National Agriculture, Forestry and Fisheries Quality Assurance Department-Branch 4 (NAFIQAD-BRANCH 4) in Ho Chi Minh City with certificate No: 105

SN	Analyte	Test Method	Method References
1.	Mercury (Hg)	Atomic Absorption Spectrophotometry (AAS-Hydride)	AOAC No. 974.14-1990 and 971.21-1990
2.	Cadmium (Cd)	Atomic Absorption Spectrophotometry (AAS-Graphite Furnace)	NMKL No 139.1991
3.	Lead (Pb)	Atomic Absorption Spectrophotometry (AAS-Graphite Furnace)	NMKL No 139.1991

AOAC: Association of Official Analytical Chemists

c. Limit of Detection and Limit of Quantification

The Limit of Detection (LOD) is as shown:

Analyte	LOD (µg/kg)
Mercury	10
Lead	5
Cadmium	1

d. National Regulatory Limits

The maximum levels for heavy metals is set based on commission regulation (EC) No 1881/2006 of 19 December.

Analyte	Maximum levels (mg/kg wet weight)
Mercury	0.50
Lead	0.30
Cadmium	0.050

Chemical standard specification maximum permitted level in fish & fish products. Enforced by EU, USA, Canada and Japan

SN.	Type of Chemical Hazardous	Product Types	EU	USA	Canada	Japan
1.	<u>Contaminants</u> Mercury (Hg)	All Fish & Shell Fish Products	1.0 ppm	1.0 ppm	0.5 ppm	0.4 (Total) 0.3 (Organic)
2.	Lead (Pb)		0.4-1.0 ppm	1.5-1.7 ppm	0.5 ppm	Not Set
3.	Cadmium (Cd)		0.1-1.0 ppm	3-4.0 ppm	–	Not Set

4. Results And Discussion

a. Participation in Inter-laboratory Proficiency Testing and Results

Cambodia did not participate in any Inter-laboratory Proficiency Testing Program.

b. Survey Results and Discussion

Thirty-five fish samples were analyzed for Mercury (Hg), Lead (Pb) and Cadmium (Cd). Mercury (Hg) was detected in 15 samples but the level was not quantifiable. Lead (Pb) and Cadmium (Cd) were not detected.

These results indicated Catfish *P. hypophthalmus* cultured in the ponds of Kandal province are safe for direct consumption and processing.

Year of analysis & Sampling location	Analyte	Fish sample analysed		No. of samples analysed	Min. value of results (ppm) – wet weight basis	Max. value of results (ppm) – wet weight basis	Average value of results (ppm) – wet weight basis	Remarks
		Common name	Scientific name					
2006 fish farm in Kandal province	Total mercury	Iridescent shark-catfish	<i>Pangasianodon hypophthalmus</i>	15	0.011	0.047	0.026	Detected but not quantifiable
2007 fish farm in Kandal province				13	0.006	0.024	0.017	Detected but not quantifiable
2008 fish farm in Kandal province				7	0.016	0.027	0.021	Detected but not quantifiable

Year of analysis & Sampling location	Analyte	Fish sample analysed		No. of samples analysed	Min. value of results (ppm) – wet weight basis	Max. value of results (ppm) – wet weight basis	Average value of results (ppm) – wet weight basis	Remarks
		Common name	Scientific name					
2006 fish farm in Kandal province	Lead	Iridescent shark-catfish	<i>Pangasianodon hypophthalmus</i>	15	0	0.004	0.002	Not Detected
2007 fish farm in Kandal province				13	0	0.004	0.002	Not Detected
2008 fish farm in Kandal province				7	0	0.004	0.002	Not Detected

Year of analysis & Sampling location	Analyte	Fish sample analysed		No. of samples analysed	Min. value of results (ppm) – wet weight basis	Max. value of results (ppm) – wet weight basis	Average value of results (ppm) – wet weight basis	Remarks
		Common name	Scientific name					
2006 fish farm in Kandal province	Cadmium	Iridescent shark-catfish	<i>Pangasianodon hypophthalmus</i>	15	0.005	0.009	0.007	Detected but not quantifiable
2007 fish farm in Kandal province				13	0	0	0	Not Detected
2008 fish farm in Kandal province				7	0	0	0	Not Detected

c. Corrective Actions

The results above indicated that cultured catfish *P. hypophthalmus* are safe for Cambodian consumption and export.

5. Problems and Challenges Encountered

The main problem encountered was that Cambodia's National Laboratory could not analyse heavy metals (Mercury, Lead and Cadmium) and the fish samples had to be sent to Vietnam for analysis.

6. Recommendations and Suggestions for Future Follow up Action

Due to limited budget, collected data is not sufficient to reflect the actual situation of chemical contaminants in aquacultured fish in Cambodia. There is a need to train laboratory personal on sampling and analysis of heavy metals.