

SINGAPORE

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I. Introduction

As Singapore is a small city state, much (about 90%) of its food is imported, including seafood / shellfish. There is a monitoring programme in place for the screening of imported shellfish for biotoxins.

On local production, Singapore has several coastal floating mussel farms. A biotoxin monitoring programme is also in place as an early alert strategy, to ensure that contaminated products are not harvested and sold for human consumption.

II. Objectives and Goals

This biotoxin monitoring programme is part of the AVA's shellfish sanitation monitoring programme. The objective of the programme is to monitor Singapore coastal mussels for biotoxins as an early alert strategy and to ensure that any contaminated mussels are not harvested and sold for human consumption.

III. Survey Methodologies

a. Sampling Method, Sampling Site, Target Species, Number of Samples & Sampling Size

For sampling method, one sample was taken from each farm and three samples were taken every month. Samples were collected from the

Singapore coastal farms. The target species used for this survey were Green Mussels (*Perna viridis*). Each time, the sampling size as per sample used was about 1.5 to 2kg of Green Mussels.

b. Method of Analysis

Mussel samples were taken from selected aquaculture farms off the coasts of Singapore. The samples were de-shelled and homogenized and the whole shellfish was analyzed. The extraction was carried out as in accordance to the laboratory's protocol for the various biotoxins – Paralytic Shellfish Poisoning (PSP), Diarrhetic Shellfish Poisoning (DSP) and Amnesic Shellfish Poisoning (ASP).

Various techniques were used. For PSP, samples were screened using an ELISA test kit and suspect the samples confirmed by High Performance Liquid Chromatography Tandem Mass Spectrometry (LC/MS/MS). DSP test is carried out using the LC/MS/MS and ASP is by High Performance Liquid Chromatography (HPLC) method. As the use of animals for laboratory testing / experiments is controlled in Singapore, the MBA technique is not used as a routine testing method.

c. Limit of Detection & Limit of Quantification

Biotoxin	Limit of Detection (LOD)	Limit of Quantification (LOQ)
PSP	50ppb	-
ASP	5ppm	10ppm
DSP	5ppb	10ppb

Table S1: LOD and LOQ for various biotoxins

d. National Regulatory Limits

Guidelines applied:

PSP: 80µg/100g flesh

ASP: 20ppm

DSP: 0.2ppm

IV. Results and Discussions

a. Participation in Inter-Laboratory Proficiency Testing & Results

The laboratory took part in one round of inter-laboratory proficiency testing programme organized under Asia Pacific Laboratory Accreditation Cooperation (APLAC) on PSP using the MBA method. Report of results has not been received at the point of the submission of this technical compilation.

b. Survey Results & Discussion

Sampling Location	Month & Year of Sampling (MM/YYYY)	Analyte Tested	No. of Samples Analysed	Minimum Concentration (ug/100g of meat)	Maximum Concentration (ug/100g of meat)	Average Concentration (ug/100g of meat)
Local farms off the shores of Singapore	January – June 2011	PSP, DSP & ASP	24	Not Detected	Not Detected	Not Detected
Local farms off the shores of Singapore	July – December 2011	PSP, DSP & ASP	14	Not Detected	Not Detected	Not Detected
Local farms off the shores of Singapore	January – June 2012	PSP, DSP & ASP	18	Not Detected	Not Detected	Not Detected

Table S2: Survey results – mussel samples from coastal farms of Singapore

On average, two to three samples were tested for PSP, DSP and ASP each month. The samples were taken randomly from Green Mussel farms located off the shores of Singapore. No biotoxins (PSP, DSP and ASP) were detected in the 56 Green Mussel (*Perna viridis*) samples surveyed during the period January 2011 - June 2012.

c. Corrective Actions

V. Problems and Challenges Encountered

VI. Recommendations and Suggestions for Future Follow-Up Action