

# SPECIAL REPORT

## “Japanese Trust Fund II: Chemical and Drug Residues in Fish and Fish Products in Southeast Asia – Biotoxins Monitoring in ASEAN Region” Project

By SEAFDEC/MFRD

Consumption of a variety of shellfish and fish has led to an increasing number of human intoxications around the world. Around 400 poisonous fish species exist and, by definition, the substances responsible for the toxicity of these species are biotoxins. Marine biotoxins represent a significant and expanding threat to human health in many parts of the world. The impact is visible in terms of human poisoning or even death following the consumption of contaminated shellfish or fish, as well as mass killings of fish and shellfish, and death of marine animals and birds. The Codex Alimentarius Code of Practice for Fish and Fishery Products (CAC/RCP 52-2003) defined biotoxins as poisonous substances naturally present in fish and fishery products or accumulated by animals feeding on toxin producing algae, or in water containing toxins produced by such organisms.

Monitoring seafood for toxicity is essential to manage the risks. However, there are several limitations in monitoring for toxicity such as variation in toxin content between individual shellfish, different detection and even extraction methods for

the various toxins requiring a decision on which toxins should be tested for, and the frequency of sampling to ensure that toxicity does not rise to dangerous levels in temporal or spatial gap between sampling times and locations. Furthermore, the growing harvest of non-traditional shellfish (such as moon snails, whelks, barnacles, etc.) may increase human health problems and management responsibilities.

In an effort to address the issue of marine biotoxins threat to human health in the ASEAN countries, the Marine Fisheries Research Department (MFRD) implemented a project on “Chemical and Drug Residues in Fish and Fish Products in Southeast Asia – Biotoxins Monitoring in ASEAN Region” under the Japanese Trust Fund II program to increase the attention in expanding and improving initiatives to monitor, detect and share information on marine biotoxins in order to reduce the public health risks associated with the consumption of contaminated shellfish and fish in the region.

The objectives of this project are to:

- (1) Upgrade regional laboratory capabilities and credibility for testing of DSP, PSP and TTX biotoxins through conduct of a regional training course on methodologies for Member Countries and 1-year survey in Member Countries;
- (2) Establish biotoxins monitoring programs in Member Countries for routine surveillance testing of fish and fisheries products especially in those countries that do not have such programs; and
- (3) Improve knowledge and understanding on levels of biotoxins occurrences and incidences in fish and fisheries products in the ASEAN region and facilitate exchange of information among Member Countries by establishing a directory of biotoxins experts and responsible persons/national authorities in each Member Country.

The project commenced in 2009 and was envisaged to be completed in 2012. A Regional Technical Consultation meeting was held in Singapore to initiate the 4-year project. The three-day meeting on 26-28 August 2009 provided an overview of biotoxins monitoring in the ASEAN Member Countries. The meeting deliberated on the project scope and planned for all the project activities and time schedule. In total, 19 participants from the ASEAN Member Countries (except Brunei Darussalam) and eight MFRD officers participated in

The project is in line with the following resolution and plan of action as endorsed at the ASEAN-SEAFDEC Conference of 2011:

**Resolution 21:** *Improve technologies and facilities to ensure fish quality assurance and safety management systems, taking into account the importance of traditional fishery products and food security requirements, and promote the development of fishery products as an alternative supplementary livelihood for fisheries communities.*

**Plan of Action D61:** *Strengthen fish quality and safety management systems that support the competitive position of ASEAN fish products on world markets, including moving towards ISO/IEC 17025 accreditation of national fish inspection laboratories, strengthening capacity and acknowledging the recognized national laboratories, risk analysis and equivalence agreement such as the Mutual Recognition Agreement (MRA) and promote the implementation of the quality and safety management systems among small and medium enterprises in the ASEAN region.*

**Plan of Action D63:** *Promote and conduct training programs and develop training materials to upgrade the technical skills and competencies of personnel in the public and private sectors on fisheries post-harvest technology and food safety management system.*

the meeting together with Dr. Toshiyuki Suzuki, a Japanese expert from the National Research Institute of Fisheries Science, who served as the resource person for the project.

A Regional Training Course on Biotoxins Analyses was conducted the following year on 28 June - 7 July 2010 at the Veterinary Public Health Centre of the Agri-Food & Veterinary Authority of Singapore (AVA) to build up Member Countries' technical capability. Under the guidance of the lead trainers, Dr. Toshiyuki Suzuki and Dr. Ryuichi Watanabe from the National Research Institute of Fisheries Science, Japan, as well as Dr. Yasukatsu Oshima from Kitasato University, the course participants learnt 5 methods for biotoxins analyses which included:

- Multi-component testing of Diarrhetic Shellfish Poisoning (DSP) and lipophilic toxins Yessotoxin (YTX), Pectenotoxins (PTX) by High Performance Liquid Chromatography Tandem Mass Spectrometry (LC/MS/MS);
- Paralytic Shellfish Poisoning (PSP) by High Performance Liquid Chromatography (HPLC); and
- Tetrodotoxin (TTX) by LC/MS/MS.

In addition, two commercial companies were invited to conduct the training on rapid methods testing for DSP and PSP.

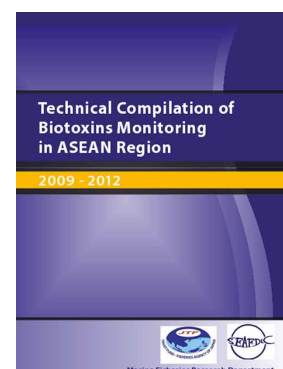


*Participants in End-of-Project Seminar in Singapore in 2012*

Following the training, nine Member Countries (Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam) participated in a one-year biotoxins monitoring survey in their respective countries from 2011 to 2012. Cambodia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore and Thailand conducted PSP monitoring in Green Mussel (*Perna viridis*), Indonesia and Vietnam conducted PSP monitoring in Baby Clam (*Meretrix* spp.). Myanmar and Singapore also conducted ASP and DSP in Green Mussel (*Perna viridis*) in their surveys. The surveys found mostly negative results for PSP in the species monitored.

The survey results and reports from the participating countries were collated and published into a Technical Compilation, which also included Member Countries' survey methodologies and recommendations, as well as a discussion on the problems and challenges encountered during the surveys and a directory of biotoxins experts and responsible persons/national authorities in each Member Country. The publication will serve as a useful reference and resource tool for Member Countries in their efforts to implement biotoxins monitoring. The project concluded with an End-of-Project (EOP) Seminar held on 20-21 November 2012 in Singapore.

The successful completion of the project saw the upgrading of regional laboratory capabilities and credibility in DSP, PSP and TTX biotoxins testing as well as the establishment of biotoxins monitoring program for fish and fisheries products' routine surveillance, which was particularly beneficial for countries which originally do not have such programs in place. The project also helped to increase general knowledge and understanding on the levels of biotoxins occurrences and incidences in the ASEAN countries through the biotoxins monitoring surveys and the sharing of information among the Member Countries. ☒



*Participants in the 2010 Regional Training Course on Biotoxin Analyses in Singapore*



*Participants observing the methodologies for biotoxin analysis*