
**INTERNATIONAL WORKSHOP ON
INNOVATIVE TECHNOLOGIES FOR ECO-FRIENDLY FISH FARM
MANAGEMENT AND PRODUCTION OF SAFE AQUACULTURE FOODS**

DENPASAR, BALI, INDONESIA, DECEMBER 04-08, 2006

Venue:	Sari Segara Beach Hotel and Spa, Denpasar, Bali, Indonesia
Countries represented:	Indonesia, Japan, Korea, Malaysia, Philippines, Taiwan ROC, Thailand, and Vietnam (8)
Papers presented:	14 papers presented
Participants:	40 (14 speakers and about 26 guests/local participants)
Sponsors:	Food and Fertilizer Technology Center (FFTC) for the Asian and Pacific Region Research Center for Aquaculture (RCA), Indonesia

Workshop Highlights

In the Asian and Pacific region, there is an increasing demand among consumers for high-quality, eco-friendly, and safe aquaculture products. Hence, it has become more important than ever to adopt innovative technologies and management schemes that will ensure the preservation of the aquaculture environments, and which will guarantee food safety or the protection of the aquaculture products from any form of hazard or contamination. Meeting safety requirements [e.g. Hazard Analysis and Critical Control Point (HACCP), Good Aquaculture Practice (GAP), etc.] in all stages of the production and handling process has now become an uncompromising condition in most countries. However, complying with these rigid safety requirements has been difficult for small-scale farmers, who have been producing mostly unqualified and contaminated aquaculture commodities, owing to their little knowledge about sustainable aquaculture management as well as some policy/regulation and structural constraints.

This international workshop served as a venue for the sharing of knowledge and experiences on improved aquaculture technologies and management system to address the need for eco-friendly production processes and food safety concerns. It covered major issues, recent technological advancements, and more detailed topics such as environmentally sound poly-eco-aquaculture, organic aquaculture, integrated fish farming system, safety though monitoring for the presence of pathogenic bacteria, chemical contaminants, and drug residues in aquaculture products, all toward addressing the long-term viability and sustainability of aquaculture development, particularly in respect to commercial aquaculture by small-scale fish farmers. Case studies on institutional resources and critical factors to facilitate small-scale farmers' adoption of technologies and management schemes were also exchanged.

A field observation tour of an aquaculture research and development institute in northern Bali provided the participants an opportunity to get an insight into the technological advancements in aquaculture of the island.

During the two-day paper presentations and discussions, 14 speakers representing eight countries in Asia (composed of 6 resource papers and 8 country papers) shared and exchanged information, knowledge and experiences on such key issues as: environmental and social concerns in production; technologies to improve the quality and safety of

aquaculture food that is placed in the market; and marketing, institutional support, government policies, and other critical factors for the development of small-scale aquaculture farming in Asia.

Highlights of Presentation/Discussion

1. Aquaculture is now considered as a major player in the national economy, specifically in terms of producing high nutritional value food for human consumption, and contributing to rural income and employment through farming and related activities. However, the long-term viability and sustainability of both fresh water and marine aquaculture, particularly in respect to commercial small-scale fish farming, has now become a critical factor in aquaculture development, in view of the increasing environmental and social concerns associated with the industry.
2. There is now an increasing demand among consumers in Asia for high-quality, eco-friendly, and safe aquaculture products. However, in becoming an important contributor to the markets for seafood, the aquaculture industry has become increasingly subject to rigid food safety and eco-friendly production and processing requirements (e.g. HACCP, GAP). In the light of these recent trends, small-scale Asian fish farmers, especially in developing countries and countries in transition, have encountered difficulties in meeting such requirements. Therefore, empowering them through technological innovations, guidelines and standards on food safety/traceability, and policy and support services has become necessary to enable them to continue to participate in the network of fisheries and aquaculture production, marketing and trade.

Eco-friendly Production Practices

3. Awareness of environmental conservation, food safety, and responsible aquaculture production are the key factors shaping the development of the aquaculture and seafood industries worldwide. To meet this trend, the aquaculture industry must prepare to enter an era of restructuring and increasing concern for sustainability. Hence, aquaculture development must be based on: socially acceptable and responsible practices; potentially competitive species; industry development through alliances among producers, suppliers, processors, scientists/researchers; and extension/education and credit support to farmers.
4. In some developing countries in Asia, aquaculture or fish farming significantly contribute to food security, livelihood, and the economy. Eco-friendly and good management practices have been implemented through such schemes as: improved management systems like environmentally sound poly-eco-aquaculture and organic aquaculture; genetic improvement for growth and resistance; improved water management system; development of environmentally sound and high quality feeds; practical use of fish disease vaccine; regulations and control for quality of seeds, rearing procedure, chemicals/antibiotics, etc.

Food Safety and Traceability

5. Some countries in the region are more advanced in terms of implementing food safety protocols, while others are still in the level of consolidating a mix of best practices in aquaculture production aimed at sustainability of the aquaculture environment, and preventing/minimizing contamination and chemical hazards. Hence, countries within the Asian region need to harmonize food safety/traceability procedures suitable to the

region's aquaculture conditions, and considering the differences in the level of socio-economic and technological development among countries.

6. What information is required by aquaculture producers in implementing safe and reliable production? The basic answer to this question is for each country to develop standards relevant to aquaculture (water, bacteria, residue, feed and other product standards etc.) based on promulgated laws and regulations, and the promotion of an efficient implementation and information/extension system among fish farmers.
7. Process improvement must emphasize on GAP/GMP/HACCP in all sectors of the food supply chain (hatchery and farm; feed, drug, and chemicals; harvesting and marketing; GMP and HACCP in processing plants; import and export control). GAP certification procedures must be developed, to include examination certification system, and an electronic traceability in the supply chain management system. Improved traceability of fishery product satisfies the demand for information transparency in the supply chain management.

Government/Policy and Support Services

8. Many types of organization play an important role in the successful development of the aquaculture sector in each country, such as policy-making institutions, scientific and technological/research and development agencies, extension and promotion/technology dissemination services, fish-farmer cooperatives/associations, and service-providing institutions (financing, processing, marketing, peer-group associations related to the fisheries sector and others). All these must have a good interplay, toward the development and sustainability of the aquaculture industry, and for the benefit of small-scale fish farmers in Asia.
9. Regulations in the form of legislation directed towards the implementation of the aquaculture development, with priority given to regulating the management of activities which involve all stakeholders, must be in place in each country.

Recommendations

10. International, regional and national guidelines for responsible and eco-friendly aquaculture through codes of conduct and fisheries policies must be fully observed and implemented in each country to ensure the preservation of the aquaculture environments, as well as the quality and safety of aquaculture foods and other products.
11. With sustainability and food quality/safety as the core components, there is a critical need for countries within the region to forge international collaboration, harmonization and transborder policies to develop standards and mechanisms for HACCP and/or GAP/GHP/GMP implementation. These standards must not only be accessible to large commercial/industrial production, but must also be beneficial to small-scale fish farmers. While many crossover points between the EUREP GAP and the US GAP can be incorporated to facilitate trading for exporting countries, the Asian system/standard must be unique to Asia, particularly to the region's aquaculture environments and conditions, as well as to the interests of its small-scale farmers and consumers.
12. Given the importance of attaining sustainable aquaculture with no or limited negative externalities, exporting countries must adopt more sustainable production practices, such as eco-labeling schemes and safety assessments. Risk assessment and other precautionary approaches must be observed, especially before entry into production of new or exotic species, including the potential use of products from modern biotechnology.

13. Each country must advocate strong government support, political will and legislation in support of food safety and eco-friendly technologies, particularly in terms of standardization/certification, fish farmers' education and training, research and development on quality management systems, and credit and other financial support, and marketing management strategies. Compliance by the fish farmers must also be considered, through intensified extension/promotional and educational activities.
14. Exchange and sharing of information and technology among researchers and scientists within the region must be sustained and enhanced toward the attainment of economic, social, and environmental sustainability in aquaculture, and in providing safe aquaculture food supply and gaining consumer confidence in aquaculture products.