Products

Handbook for HACCP on Filipino aquaculture farms (2010). BFAR-Cirad publication. 59 p. REGIDOR S., DABBADIE L..

Fish farming: the fish of the future ("Cahiers Agricultures" - Vol. 18, N°2/3, March-April/May-June 2009): special edition of "Cahiers Agricultures" on the challenges, techniques and sustainability of fish farming.

Guide to the joint construction of sustainable development indicators in aquaculture (2008): this guide proposes a generic approach to fostering implementation and uptake of sustainable development, through a joint construction process. Cirad, Ifremer, INRA, IRD, University of Montpellier

Aquatrop. The tropical aquaculture portal for a French-language site dedicated to aquaculture in Southern countries. It is primarily aimed at fish farmers and industry players, but also at anyone interested in tropical aquaculture. http://aquatrop.cirad.fr/

Patents

Title: New gene vaccination liposome

Inventors: Laurence Dedieu; Michael Mockey; Carolina Tafalla (INIA); Alberto Cuesta (INIA)

Training

Tropical aquaculture: Masters EPSED/BAEMT FMOE311

This course is open to crop scientists and vets performing training, research or supervision functions in the sectors of agricultural production, husbandry or irrigation and wishing to specialise in aquaculture production. It is also aimed at project managers, heads of NGOs, credit agencies and industrial companies wishing to acquire skills in this field. By the end of the course, participants are able to carry out the following actions: evaluate the potential for developing aquaculture in a given zone; identify the most appropriate farming systems for the zone and designing the corresponding appropriate technical route maps; contribute to structuring and strengthening the fish farming industry; provide an interface between research bodies and development bodies in the field of aquaculture.

Aquaculture company management (Degree course): Cnam-Intechmer

This course is organised in partnership with ARDAM (Mèze), ARDA (Reunion island), IFREMER, and CIRAD: a 3-year **multi-disciplinary** course for aquaculture company managers, to enable graduates to design and ensure the technical and scientific control of an aquaculture holding, commercially manage an efficient production unit, or execute any other activity related to aquaculture, whether working in France or abroad.

Aquaculture and Aquatic Resources Management: MSc and PhD, Asian Institute of Technology

This **English language** course, at Masters and Doctorate level, is taught at the Asian Institute of Technology, an international university based in Thailand, which has trained a high proportion of executives, managers and decision makers in Asian aquaculture over the past few decades. The courses are organised into three routes: aquaculture technologies; aquatic resources management; integrated coastal management.

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VIP
Technology Transfer and Development Newsletter

Rational and eco-friendly intensification of tropical aquaculture

In a context of over-exploitation of wild resources, aquaculture has often been presented as a panacea capable of satisfying the growing demand for aquatic products. Indeed, world aquaculture production has increased more than sixfold since the mid-1980s, and the animal production sector has seen the biggest growth over the last three decades. Yet for the past few years its perception among the public has deteriorated, primarily because of the environmental impact of certain practices such as using fishmeal, discharging organic material (faeces and unconsumed foods), the destruction of mangroves, etc.

However, most of the world's production is still obtained from sustainable semi-intensive systems, which even often have a positive impact on the environment by converting certain by-products or polluting residues into high nutritional value proteins. Meanwhile the other production methods are the subject of a wide range of research aimed at identifying new sustainable practices.

One of the most promising is Integrated Multi-Trophic Aquaculture (IMTA), which has developed over the past few years. It consists of combining on the same site polluting types of farming (e.g. fish farming) with pollution-controlling types of farming or crops (filtering shellfish, seaweed, sea cucumbers, etc.).

Such systems are part of an ecological intensification approach for tropical aquaculture, studied under the UMR Intrepid [Joint Research Unit] by Cirad and Ifremer. We are designing and developing research work ranging from domestication of new species (such as herbivore species) to studying adoption trends of innovations by farmers from tropical countries.

FOCUS

70% of the nitrogen intake from dietary proteins given to predatory fish (salmons, bass) or crustaceans is discharged. This waste causes pollution which can lead to massive seaweed development, eutrophication or silting up of sheltered coastal areas.

www.cirad.fr/en/innovation-expertise/

cirad
LA RECHERCHE AGRONOMIQUE POUR LE DÉVELOPPEMENT

Expertise, project and partnership

European sanitary standards and modernisation of aquaculture in the Philippines

After suffering a ban in 2004 on exporting their aquatic products to Europe, the Filipino authorities requested Cirad to help them bring their industry into line with EU requirements.

"This quick and effective reaction did raise some questions: why did the Filipino authorities dedicate so much energy to comply with the requirements of a market whose economic weight for the country could be considered negligible (apparently economically irrational)? Or, might exclusion of the majority of industry operators from exporting to the EU not risk creating a gap between the big operators and small family structures (risk of social unfairness)?

Indeed, the compliance processes was a unique opportunity for the central Filipino government to modernise this industry. Unlike other Asian countries, the high degree of administrative decentralisation of the Philippines favours the local authorities, which are often accommodating with manufacturers, at the expense of the central government. In this delicately balanced system, aquaculture innovation is driven by highly dynamic entrepreneurs, aimed at functional improvement of the companies (bottom-up process). The contribution of the central government to technological change generally goes unnoticed.

In 2004, when the crisis arose (ban on exports to the EU), the main players first tried to take advantage, with the private sector wanting to further exclude the central government, and the central government to assert its authority and modernise the industry. Ultimately, it was the government agency responsible for food safety of aquatic products, BFAR, which came out the big winner, leading to very rapid modernisation of an industry which had let itself lag behind its Asian competitors."

Lionel Dabbadie, Cirad

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RESEARCH issues

Fish and seaweed

Using seaweed produced by IMTA systems for feeding omnivorous fish with vegetarian tendencies is one of the lines of research of the UMR Intrepid [joint research unit], which in particular is studying "new species" for aquaculture, such as *siganidae*. The work concerns green ulva seaweed and filamentous seaweeds which are easy to produce, have a remarkable purification capacity and can have high protein contents (30 % of dry matter). This is an original choice, since these seaweeds are currently less exploited by agri-business than brown and red seaweeds, from which polysaccharides and other useful substances can be extracted, but which are not very efficient at recycling aquaculture effluents.

These works could firstly lead to innovations in coastal ponds, but also other sea farming structures, such as fish farming cages or intensive production ponds (pond hatchery with water recycling system).

See also **"Aquaponics: recycling fish excreta!"**

http://www.cirad.fr/actualites/toutes-les-actualites/communiques-de-presse/2012/aquaculture

Traceability of food products

The microbe communities present on foods are closely linked to their environment, and represent specific biological markers of their production locations. PCR-DGGE, a comprehensive molecular method developed by Cirad, is capable of simultaneously analysing bacteria, yeast or moulds present on foods. This method provides a specific biological barcode for the production location of the products in question.

Sex control via temperature and early sexing in the tilapia

Cirad has developed a heat treatment enabling production of tilapia populations with very high proportions of males. The UMR Intrepid [joint research unit] has also developed an early sexing technique, able to distinguish the sex of the fish from an age of two weeks. These approaches enable population sex control that is both consumer and environmentally friendly.

Select male tilapias very early

The tilapia is not only a major species for tropical aquaculture, but is also a model fish for research. The sequencing of its genome started in 2007 at the Washington University Genome Sequencing Center, with Cirad as a partner. Besides the scientific advances, determining the genome of this species would help develop rational aquaculture with low environmental impact, while guaranteeing sanitary quality and future food security.

Within the consortium, Cirad is responsible for aquaculture spin-offs, especially gene research relating to useful characters such as sex ratio (proportion of males and females). Tilapia farming must be carried out with entirely male populations to be profitable, yet the methods employed hitherto for producing such populations pose numerous disadvantages. So Cirad has for several years been developing a genetic approach for discovering how to select at a very early stage seed fish able to produce descendants containing a high proportion of males.

Diagnostic review of development of tropical aquaculture

The development of aquaculture is not just a technical issue. Governance, the environment, the legal framework, the local and worldwide social or economic conditions are all criteria affecting the strategies of the players, resulting in favourable or unfavourable development dynamics. Cirad has developed a range of holistic and participative diagnostic tools, enabling it to lend its expertise to the development of aquaculture in various tropical environments.

Support for setting up standards and sanitary legislation in aquaculture holdings

Aquaculture companies are increasingly faced with the difficulty of complying with standards, legislations, codes of conduct, commercial requirements etc. Cirad possesses expertise in terms of ensuring compliance of aquaculture holdings (prawns, fish) with various sanitary or quality reference systems, whether normative or legal.

Other expertise...

- Participative approach and joint construction of innovations

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