

Zaragoza institute offers intensive courses in **fisheries and aquaculture**

State-of-the-art content and international contacts

The International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) is an intergovernmental organisation owned by 13 Mediterranean countries in Europe and North Africa. The centre focuses on the Mediterranean and the challenges that exist there looking in particular at issues of environmental protection, food security and nutrition, and sustainable development.

CIHEAM is comprised of a network of four institutes located in Italy, France, Spain, and Greece, and a headquarters in Paris. Activities in the four institutes are within the areas of education, research, technical assistance, and policy development and aim broadly to secure a prosperous and sustainable future for the Mediterranean region and its citizens.

Programme duration can be two weeks or two years

Training is a core activity at the institutes. The institute in Spain, the Mediterranean Agronomic Institute in Zaragoza (IAMZ), offers training at the master's level as well as short courses for professionals in several disciplines. The master's degree takes two years to complete and is equivalent to a master's degree offered by the Spanish university system and recognised by the Spanish state. Currently, master's degrees are offered in sustainable fisheries management (in collaboration with the University of Alicante, and the Spanish Ministry of Agriculture, Food, and Environment) and in marine aquaculture (in collaboration with the University of Las Palmas de Gran Canaria and the Canary Institute of Marine Science).



Thierry Chopin, professor of marine biology at the University of New Brunswick in Canada, and one of the lecturers on the course is an expert in Integrated Multi-Trophic Aquaculture (IMTA).

The short courses for professionals last one to two weeks and combine the latest information on the subject of the course with the opportunity to network with other students and the instructors. The courses are usually organised together with other national or international organisations among which the FAO is perhaps the most important with different departments having contributed

to about half the courses held. The European Commission, Spanish Ministry of Agriculture, Food and Environment, the Spanish Institute of Oceanography (IEO), the French Research Institute for Exploitation of the Sea (IFREMER), and the Spanish National Research Council (CSIC) are among the other institutions that have collaborated on these courses.

High degree of international collaboration

Apart from the technical content of these courses they are also designed to promote cooperative research among the member countries of CIHEAM within the fields of agriculture, food, and rural development. The training is conducted by staff at IAMZ as

well as by some 250 guest lecturers from 80 countries, and the actual teaching may be at the IAMZ campus or at the facilities of partner institutions.

At IAMZ the areas of expertise are plant production; animal production; environment; food science, technology and marketing; and fisheries and aquaculture. The institute is the only one under CIHEAM that specialises in fisheries and aquaculture. Annually, about 400 students participate in the eight master's programmes (four a year) and roughly 12 short courses that are held each year. Within this portfolio two master's programmes and three short courses (2016) are dedicated to fisheries and aquaculture subjects.

This year IAMZ organised a course on the culturing techniques, uses, and prospects for marine algae that was taught



Lynn Cornish, Acadian Seaplants, Canada, found it exceedingly useful to learn about other cultivation techniques, to see what new innovations were being explored and implemented, and to further her understanding of algae in general.

and students. Lynn Cornish, seed stock manager at a Canadian company that harvests, cultivates, and processes marine plants for a variety of uses, was

topics, and some from very different perspectives.

IMTA demonstrates the benefits of polyculture

Perhaps most importantly the programme was not just abstract theory, but concepts that could be applied. Some of the research presented by university staff could easily lead to ideas that have practical applications. For example, one of the areas where marine algae show a lot of potential is in Integrated Multi-Trophic

where seaweeds/aquatic plants and animals recover nutrients from uneaten feed and by-products from the fish. Seaweeds, for example, can extract nutrients, such as nitrogen and phosphorus that are dissolved in the water; other organisms, such as mussels and oysters, recover the small organic particles suspended in the water, while yet others, such as sea urchins, sea cucumbers, and sea worms, feed on the larger organic particles that accumulate on the seabed. These interactions are examples of "services"

“Really good for networking and to learn more about the potential of algae”

Beatriz Garcia Sanchez, Centro de Experimentacion Pesquera, Depto. de Algas, Principado de Asturias, Spain

in collaboration with the University of Las Palmas on Grand Canaria. The course was truly international with participants from 13 countries and lecturers from five, a mix that contributed to animated discussions during the week-long programme. The students too were a diverse group ranging from post doc and doctoral candidates to younger students as well as working professionals. For all the participants the course was also an opportunity to network and to meet different stakeholders - administrators, researchers, employees of commercial companies,

both an instructor and a student on the course. She found that the organisers actively encouraged networking not only during the course, but, by making contact details of the participants available to all, also when the students returned home. While expanding contacts was an important element the course was also designed to further knowledge and understanding about marine algae and to introduce students to the latest innovations in the field. According to Ms Cornish, the presentations were “extremely comprehensive,” covering a wide range of

“I learned a lot about the cultivation of seaweed and microalgae both from a theoretical and practical point of view”

Dr Leila Ktari, National Institute of Marine Science, Tunisia

Aquaculture or IMTA. Thierry Chopin, professor of marine biology at the University of New Brunswick in Canada, and one of the lecturers on the course is an expert on IMTA. He describes it as a way of mimicking nature,

provided by these organisms for the benefit of the ecosystem.

IMTA is thus a system combining organisms at different trophic levels, where some provide nutrients and others recover them. Moreover,



Ahmed Fawzi Ali Alamrousi, who is working on his Ph.D at the University of La Coruna, Spain, benefited greatly from the information on cultivation techniques and from meeting other course participants with similar interests.

Professor Chopin emphasises the importance of using species that are of commercial value if IMTA is to become widespread. In Asia, for cultural and historical reasons, the concept is well known, particularly in east and southeast Asia, where people are used to eating seaweeds and different invertebrates in addition to fish. In China, Korea and Japan, for example, there is a major seaweed industry based on the cultivation of several species - in particular kombu, wakame and nori - which are consumed in a variety of forms. Seaweeds are not only a source of nutritious products, they also offer many people with a livelihood in coastal regions. In the west, says Thierry Chopin, consumers need to be educated about seaweeds and invertebrates as food items, an exercise that will take time and effort. He feels that there are two factors in particular that can have an impact on the spread of IMTA. Firstly, a strong economic case in its favour will do much to boost its use. To make this case, however, it is necessary to reach a certain scale, and to value appropriately the ecosystem

services rendered by the extractive species. Secondly, regulations will have to be adapted that will enable this scale to be reached. In much of the USA, Canada and Europe regulations are aimed at the cultivation of single species, while IMTA is a balanced ecosystem-based management approach for the cultivation of several species, taking advantage of their interactions for long-term sustainability and resilience.

Seaweeds have potential as carbon sinks

The cultivation of seaweeds has also been mooted as a sink to absorb carbon emissions and thus play a role in slowing global warming. Ik Kyo Chung, director of the Marine Research Institute, Pusan National University, Republic of

Korea, and another of the course instructors, was for the five years to 2011 the principle investigator in a government-supported project exploring the potential of using seaweed as a carbon dioxide sink. At a pilot farm the researchers measured seaweed biomass and carried out chemical analyses of the seawater discovering that about 10 tonnes of CO_{2eq} could be sequestered in seaweeds (*Ecklonia cava*). According to Dr Chung, growing seaweed in the ocean can thereby serve both as an income generator (by exploiting the biomass) and, by reducing the amount of carbon in the atmosphere, as an ecosystem service.

Learning about the commercial potential of algae was highly interesting for students from the

Mediterranean region too. Beatriz Garcia Sanchez works for the local government in Asturias in north west Spain, where she monitors locally growing algae as part of a project that provides information and advice to companies and others that are interested in seaweed cultivation. She participated in the course to learn more about different kinds of algae, their potential, and to find out what other people were doing in the field. At a laboratory in the National Institute of Marine Science in Tunisia, Dr Leila Ktari is developing natural anti-foulants that are less toxic for the environment than currently available synthetic alternatives. Her work involves looking at seaweed as a source of compounds that may have anti-fouling properties. The Mediterranean Sea does not have a lot of seaweed biomass, and therefore seaweed has to be cultivated if it is needed for commercial purposes. Learning about seaweed cultivation techniques was the main reason for her to attend the course and in that respect she found it was very useful and interesting.

The marine algae course seems to have found the right balance between theoretical knowledge and fieldwork. The format brings together people from many parts of the world fostering collaboration and a valuable exchange of ideas and experience between lecturers and students to the mutual benefit of both.

For more information visit www.ciheam.org

CIHEAM fisheries and aquaculture course calendar

	Date	Place	Organisation
Technological solutions for reduction of discards in fisheries	20-24 Feb. 17	Zaragoza, Spain	IAMZ/EU-MINOUW project
Safety assessment of seafood products	24-28 Apr. 17	Derio, Spain	IAMZ/AZTI-Tecnalia/FAO