



Beyond Monoculture

IDREEM project discusses progress in IMTA in a special session at Aquaculture Europe 2014



A day-long event “**Beyond Monoculture**” will be held on 15 October 2014 at Aquaculture Europe 2014 in San Sebastián, Spain, with oral presentations on Integrated Multi-trophic Aquaculture from the IDREEM partners and from distinguished IMTA researchers from Europe and worldwide. A parallel poster session of the most interesting research regarding IMTA will

complement the speeches all throughout the event.

IDREEM – Increasing Industrial Resource Efficiency in Europe Mariculture

IDREEM is a project coordinated by the Scottish Association for Marine Science (SAMS) and delivered in collaboration with fourteen industrial and research partners from across Europe. The project was launched in 2012 and co-funded by the EU 7th Framework Program with the mission to protect the long-term sustainability of European aquaculture. This will be achieved by developing tools and methods to help the European aquaculture industry adopt more environmentally and economically efficient practices using IMTA on a commercial scale.

Integrated Multi-trophic Aquaculture, or IMTA, takes the waste streams from one aquaculture product, which would otherwise be lost in the environment, and recycles it as a nutrient source for another. Growing species together has the potential attraction of improving the growth rates of the lower trophic species while mitigating the nutrient losses to the environment. Despite the large benefit of recycling one and growing the other, IMTA is not yet adopted by the aquaculture industry in the Western hemisphere. There are many possible reasons for the lack of IMTA usage and they can be put in three broad categories: social, environmental and economic.

IDREEM examines the obstacles and risks of the use of IMTA systems and aims to demonstrate the benefits of IMTA through pilot commercial-scale testing, field research and modeling. IDREEM pairs aquaculture businesses and research institutions in strategic partnerships to promote rapid implementation, allowing instant transfer between research findings and commercial applications. These tools and methods will also help aquaculture enterprises and policy makers to gain a better understanding of the risk and benefits associated with IMTA.

At “Beyond Monoculture”, IDREEM project coordinator Adam Hughes - SAMS, will give a thorough overview of the project’s rationale, its current and future activities and its achievements so far.

Implementing IMTA in different habitats



The IDREEM project is carried out in six different countries. In all these countries, the environmental conditions and pre-existing commercial aquaculture set-ups are different therefore finding the best way to implement various IMTA schemes for different habitats is an important research component of the project.

Experimental protocols were developed to allow for the standardised testing of each IMTA site across all partners involved. These protocols included methods for assessing; experimental set-up; sampling methods; standard operational procedures; production parameters; effect of co-cultivation on organisms; practicality of implementing IMTA; data recording; data storage; and data analysis.

More details on the ongoing activities and plans at the different pilot IMTA sites are described in this previous post, [IDREEM SMEs starting up IMTA pilot operations across Europe](#).

To date all partners have either completed an IMTA trial and are on a second one or are beginning their first. By the end of the project this work will allow to quantify effects of IMTA systems at a wide range of sites in Europe and evaluate the practicality of the systems.

During the IDREEM session at Aquaculture Europe 2014, researcher D. Gunning, Daithi O' Murchu Marine Research Station, Ireland will illustrate the status of the current research activities at the different pilot sites with a speech titled "Implementation of IMTA systems for different habitats in Europe".

Modelling growth in European cultured fish species



Models used in aquaculture have become increasingly sophisticated in estimating fish growth based on bioenergetics, thermal growth coefficient and other forms. Understanding the factors affecting growth supports aquaculture producers to increase efficiency and control over the production process. IMTA offers one solution to improving overall efficiency, through the co-cultivation of fed (i.e. fish) and extractive species (i.e. shellfish and algae). To understand the inter-relationships between fed and extractive species being grown together we must first fully understand production culture practices and model growth in fed species that add nutrients to the environment.

Richard A. Corner, Longline Environment Ltd., a partner in the IDREEM project, is evaluating different culture practices among salmon and seabass/bream producing companies within the consortium and how this affects how the species are modelled. Data was collected including weight, stocking density, feed quantity and compositions, production cycles and a range of other factors. These were compared for, to assess differences in factors that are input to a bioenergetic model of fish growth developed previously.

Results showed that differences in culture practices among the same fish species grown within Europe can have subtle differences in modelling outcomes. Bioenergetics models can integrate small changes and are able to provide overall mass balance estimates, therefore they can be used to some extent as a quantitative indicator of performance of monoculture species, to increase our understanding of their impacts within an IMTA system. R.A. Corner will share the www.idreem.eu info@idreem.eu

method used for this research, as well as the outcome of the research in the IDREEM session at Aquaculture Europe 2014.

Growing grey mullets as bio-remediators in sea bream culture



The grey mullet (*mugil cephalus*) was described by some authors as a bio-remediator, removing microorganisms and particulate organic matter including detritus from the upper layers of the sediment underneath net pens. Research demonstrated that grey mullets are able to grow and thrive when exposed to organically-enriched sediments under fish cages. This way they help to reduce organic matter and nutrients from these sediments. For this reason they could represent an interesting species to grow in IMTA systems.

Researcher **Dafna Israel**, from the Leon Recanati Institute for Maritime Studies examined if the grey mullet could be placed under net pens growing gilthead seabream, in order to take up and incorporate farm wastes feeding on seabream feces, to see how the two species grow together in the IMTA model. A digestibility trial was conducted with particulate effluents of seabream, in order to quantify the extent to which grey mullets can utilize seabream wastes. Results showed that that 'freshly' produced waste material does not possess any nutritional value for mullets, however, "aged" material that has accumulated over time on the seafloor, thus becoming enriched in microbes and undergoing chemical alteration, can be available to grey mullets. This indicates that mullets could be used as bioremediators in an IMTA system, provided that their cages are moored directly on the sediment where particulate organic matter can accumulate and be pre-digested by microbes.

D. Israel will present the results of her research during the IDREEM session at Aquaculture Europe 2014.

The combined economic and environmental benefits of IMTA



The major reason for interest in promoting IMTA production systems, is the double-divided potential of improved profitability and environmental performance. In addition to the improved profitability for the fish farmers and the investors, IMTA can bring other important economic benefits associated with improving environmental performance.

In this context, researchers from University of Haifa and SAMS are analyzing the economic dimensions of multiple IMTA production systems from the perspective of fish farmers, markets, consumers and environmental stakeholders. In their work, they are applying the concept of Total Economic Value (TEV) in a comparison of IMTA and monoculture methods developed in the seven pilot projects in IDREEM. TEV refers to all benefits accruing to humans from a natural resource, in this case, the marine and coastal environments in which mariculture takes place. These include market and non-market based benefits resulting from direct and indirect uses as well as intrinsic values. A combination of financial analysis, market analysis, conjoint valuation methods and ecosystem assessment is used to estimate the monetary value of these benefit flows.

The financial analysis is at the level of the firm and focuses on benefits and constraints of implementing different types of IMTA production methods and co-product mixes under different environmental conditions. The market analysis reviews price and sales trends and assesses

market receptiveness and risk factors for the products of IMTA the domestic and export markets for each SME. The conjoint analysis is part of a public survey being conducted in six countries. Its results will be used to estimate the premium that consumers are willing to pay for fish and seafood products with different levels of sustainability. The ecosystem service assessment focuses on benefits that accrue to a wider public (i.e. beyond fish farmers and consumers). It will provide a baseline assessment of services for six marine sites.

At Aquaculture Europe 2014, **Shirra Freeman**, University of Haifa, will present a review of the preliminary results of this economic assessment during the IDREEM session “Beyond monoculture”.

Social criteria and public acceptance of IMTA

Broadscale public perceptions of IMTA are important to drive the industry forward and support policy and legislative reform.



Critically IMTA must be socially acceptable, particularly in light of emerging markets for non-traditional products, food safety and for the environmental image of the aquaculture industry that is increasingly filling the gap between wild capture seafood and increasing public demand.

In order to find out what the attitude is towards IMTA, a large scale public survey in Europe is being conducted by SAMS exploring a range of social criteria and questions in six different producing countries– the UK, Ireland, Italy, Norway, Cyprus, Israel.

A parallel survey explores the public response to IMTA products via economic choice modelling. The survey will present new and important data on broad societal perspectives that will inform industry and policy about the extent of awareness of IMTA and the opportunities for development and promotion. Since IMTA is a relatively new industry in Europe, the survey will provide an important baseline to understand societal perceptions and awareness.

At Aquaculture Europe 2014, **K.A. Alexander** will talk about the status of the surveys and more during the IDREEM session “Beyond Monoculture”.

Events

24-25 September, Terneuzen, the Netherlands

Seagriculture - 3rd International Seaweed Conference 2014

14-17 October 2014, San Sebastián - Spain

Aquaculture Europe 2014

IDREEM PARTNERS



IDREEM is supported by the European Commission within the 7th Framework Programme

