

# IMTA IN FULL GEAR

The year 2006–2007 has been a pivotal year for the Integrated Multi-Trophic Aquaculture (IMTA) project as it shifted from being supported by AquaNet, a Canadian Network of Centres of Excellence for Aquaculture, to being supported by the Atlantic Innovation Fund of the Atlantic Canada Opportunities Agency. The transition, as we move along the continuum R&D&C (C for commercialization), has been remarkably smooth thanks to our industrial partners Cooke Aquaculture Inc. and Acadian Seaplants Limited.

The five modules of the project (inorganic extraction with seaweeds, organic extraction with mussels, health and food safety, environment and socio-economics) have all been very busy and interacting with each other in a truly interdisciplinary approach. A lot of practical progress has been achieved at the sites and the IMTA concept continues to gain acceptance through publications and presentations at conferences and workshops.

To maximize the collection of mussel juveniles (known as seed) from the natural annual spawning cycles of wild mussels, different types of salmon cage nets were tested. Not surprisingly, untreated nets (those with no copper antifoulant) collected the most seed compared to new and old-treated nets, but there is the possibility that old-treated nets might stop the settlement of some species while still allowing mussels to settle, an interesting aspect which remains to be further investigated. Some locations are also better collection sites than others and all these results will be put to good use this coming summer to organize the seed collection operations for next year's grow-out.

The seaweed rafts have been modified to provide more flexibility to the structures, while reducing their construction costs and easing the deployment of the inoculated ropes, when they are transferred from the laboratory to the aquaculture sites. The design of the raft is also being tested in terms of productivity, functionality and nutrient removal efficiency. We are now ready to harvest this year's crop and several technical and practical improvements will be made regarding the harvesting and processing techniques. This year, the late, but very cold, winter accentuated the differences between the two species we are cultivating, *Saccharina latissima* (the common one-bladed kelp) and *Alaria esculenta* (the kelp with a midrib in the middle of its blade), and we are learning more about their biology and what it will mean in terms of their cultivation cycles.

We are investigating the biochemical composition (lipids, and particularly omega-3 fatty acids, amino acids, proteins, and carbohydrates), quality and value of the mussels and kelps grown in proximity to the salmon sites in comparison to wild mussels and kelps to see if we can differentiate them easily. This would have definite marketing and food traceability implications. The early results indicate that we can see differences in IMTA mussels compared to wild mussels and that we can even see differences between different areas along the coast. With the seaweeds, we are first developing a reliable technique for their amino acid analysis.

In July 2006, Gregor Reid joined the team as a postdoctoral fellow. Gregor has been developing computer models to evaluate the amount of nutrient recovery we are getting at this stage of development of our IMTA system. It would appear that by adding kelps to the sites, we can recapture up to 40% of the nutrients available during their growing season, while mussels can recapture up to 50% of the fine particulates released from the salmon cages. This extra food and energy these species receive results in growth rates about 46 and 50% faster than normal, respectively. This has obvious financial implications: production of two other high quality/high value crops by recapturing a significant amount of the salmon feed budget, partial biomitigation of the sites, and generation of a lot of interest for products resulting from the implementation of better aquaculture management practices with increased societal acceptance. We are already thinking about cultivating other complementary species, with different functions and cycles, for an even more efficient balanced ecosystem approach.

A substantial amount of effort has gone into working with the various provincial and federal regulatory agencies to permit the harvest and distribution of IMTA products. Success was reached this winter when we got the green light from the Department of Fisheries and Oceans, Environment Canada and the Canadian Food Inspection Agency, based on our convincing health and food safety data accumulated over the last six years. The first crop of commercially-grown IMTA mussels was soon sold to a New Brunswick processor. Kelp samples have been presented to Japanese distributors for evaluation. We are continuing to work with various regional and national managers to promote and evolve the IMTA concept. There is now a significant degree of awareness and support for the IMTA concept in Ottawa as a national initiative. We held a workshop there in March to help educate the senior managers and to review the various pieces of legislation that could impact the further development of IMTA, now considered a promising, environmentally responsible, aquaculture practice.



Experimental mussel (*Mytilus edulis*) seed collector (photo: Jim Martin)

# THE INTEGRATED MULTI-TROPHIC AQUACULTURE IMTA PROJECT

True to our commitment to reach different audiences through the dissemination of the IMTA knowledge by different media, the socio-economic module published a paper in an aquaculture magazine (Global Aquaculture Advocate), another one in a scientific journal (Aquaculture Economics and Management) and a chapter in a book (Ocean Management). The key message is that the preliminary bio-economic model shows that the addition of seaweed and mussel to salmon farming is profitable and helps reduce risks.

We have continued to present our work, and promote the IMTA concept, by participating in radio interviews, television documentaries, and national and international meetings (Aquaculture Today in Scotland, Aquaculture Association of Canada in Halifax, World Aquaculture Society in Italy and the USA, Phycological Society of America in Alaska, workshop in Chile, International Seaweed Symposium in Japan). The response has been very favourable and we have generated a lot of interest from the aquaculture industry, food distributors and restaurateurs, resource managers, environmental NGOs and academia. With the enthusiasm of the research team and of our industrial partners, we believe that we are contributing significantly to the evolution of diversified aquaculture practices in Canada and beyond.

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MSC student Ryan Shea holding a line of kelps (*Saccharina latissima*) at Crow Island IMTA site (photo: Thierry Chopin)



Box of first commercially-harvested IMTA mussels (*Mytilus edulis*; photo: Shawn Robinson)



Drying of IMTA kelps (*Saccharina latissima*) at UNBSJ to prepare samples for evaluation in Japan (photo: Thierry Chopin)