RTDI Synopsis: TA 2 – Technology and systems

Most of the EU research effort in FP6 and in FP7 on systems design/improvements was done under the 'SME measures' tool, where RTDI providers work with SMEs to achieve the project goals. This also implies that the SMEs then own the knowledge produced and in some cases this knowledge is protected and hence not disseminated to the wider sector. This synopsis provides an overview of the main outputs of EU projects under different production systems.

Hatchery systems

Although several EU projects included hatchery cycles in their outputs, very few projects have actually focused on systems in the hatchery. FP5 had several projects that looked to increase the efficiency of live food production – specifically for rotifers and artemia – from both a technological point of view and a nutritional one.

- **ALFA (FP6)** addressed variability in the hatchery production of algae and developed a fully automated algal production system. Manufacturing models for cold, temperate and tropic waters using a novel optical test based on colour image analysis techniques was used to continuously assess the growth rate and the quality of the culture. The models aid the design and predict the performance of a hatchery, its operating variability, costs and resources utilisation.

Semi-extensive systems

No specific EU project addressed freshwater extensive systems and technologies (but sea SUSTAINAQUA below), although

- **SEACASE (FP6)** looked at various aspects of extensive and semi-intensive coastal aquaculture in southern Europe. Using various case studies (sea bream, bass, sole, shrimp), SEACASE produced **environmentally friendly farming protocols** and looked at certification possibilities to enable the differentiation of aquaculture products farmed in extensive and semi-intensive systems from those produced in intensive systems. Codes of Good Practice in European extensive and semi-intensive aquaculture in coastal areas, including product safety, animal welfare and environmental issues were also proposed.

Land-based tank culture and RAS systems

In support of the 2002 EU aquaculture strategy, land-based and RAS systems have been the subjects for FP6 and FP7 projects.

- At a general level, **SUSTAINAQUA (FP6 SME)** provided **an integrated approach for a sustainable and healthy freshwater aquaculture**. Its main output was a 112 page handbook that covered many issues relating to freshwater production, including:
    - Technology and production of main freshwater aquaculture types in Europe
    - Regulatory framework and governance in European freshwater aquaculture
    - Product quality and diversification – Market opportunities for aquaculture farmers for their fish products and by-products
    - Water treatment of intensive aquaculture systems through wetlands and extensive fish ponds – case study in Hungary
    - Improved natural production in extensive fish ponds – Case study in Poland
    - New methods in trout farming to reduce the farm effluents – Case study from Denmark
    - Tilapia farming using Recirculating Aquaculture Systems (RAS) - Case study in the Netherlands
    - Tropical polyculture production with the integrated "Tropenhaus" concept – Case study in Switzerland

Several projects addressed issues relating to water quality issues in RAS and these are listed here, with their main outputs:

- **ADAPOND (FP6 SME)** looked at the reliability of bio filters - an Intelligent Biofilter Control system to detect the viability and metabolic activity of the bacteria culture. At healthy periods, excess bacteria can be separated from the biofilter and, in case of biofilter failure reintroduced for rapid recovery of the filter.

- **FISHTANKRECIRC (FP6 SME)** developed an electro-coagulation technique for optimal cleaning efficiency and maximum reuse of water.

- **INTELFISHTANK (FP6 SME)** developed an intelligent fish tank for cost effective aquaculture through control of water quality in each different fish tank.

- **OptiTEMPtank (FP7 SME)** developed an Integrated System for cost effective temperature control.

- **OptoCO2Fish (FP7 SME)** developed an opto-chemical carbon dioxide sensor dedicated to aquaculture.

Marine/Offshore systems

- **DESIGNACT (FP6)** offers large-scale infrastructure, including plants, sites and personnel, for research, development and testing of aquaculture technology, novel solutions and operational methods at sea. When ACE is completed it will consist of ten different experimental facilities for salmon, marine fish, shellfish and for testing new technology.
- **SUBFISHCAGE (FP6 SME)** looked to develop a cost effective submersible fish cage system. However, no results are available for this project.

Biofouling

The fouling of cage/long line infrastructure and nets was addressed by twoFP6 projects. AMBIO (FP6) developed new fouling-release coatings based upon amphiphilic blends of zonyl-acrylates and silicones (patent pending), as well as methods for "best practice" field testing of new coatings for use in the aquaculture industry.

CRAB (FP6 SME) - Collective research on aquaculture biofouling – also developed protocols for field testing of coatings, and also had some success with silicone based coatings, providing a spiky coating that greatly resisted fouling community development. Micanti (a Dutch company) is now commercialising this coating.

Escapes

ESCAPEPROOFNET (FP6) was looking to develop a cost-effective net filament with exact physical characteristics and incorporated impregnation and repulsive agents for the prevention of fouling, biting & snatching behavior and especially for especially for cod, bass and bream fish farming. No results are available at present. Similarly, ClosedFishCage (FP7 SME) is ongoing and seeking to produce an innovative, cost-effective environmentally friendly closed cage for sea-based fish farming.

Shellfish and other species culture

Finally, species- specific technology-based projects are ongoing or have produced results:

- Technology development for a **reliable supply of high quality seed in blue mussel** farming BLUE SEED (FP6 SME) assessed various methods for rope settlement and hatchery production of spat.
- LobsterPlant (FP7 SME) developed a fully integrated recirculation system **for lobster production**
- SHELLPLANT (FP7 SME) seeks to develop a novel production system **for intensive and cost effective bivalve farming**

- SUDEVAB (FP7 SME) is addressing several bottlenecks towards the sustainable development of **abalone culture**.

A full list of the projects undertaken in Thematic Area 2 – Technology and systems can be found in the Annex. More detailed information is provided in the Technical Leaflet (TL) describing the main outputs and deliverables of each project.

Thematic Area 2 – Technology and systems

F.P.	Acronym	Project Title
6	ADAPOND	Development of an automatic process of in-house collection, storage and application of adaptive bacteria culture for fish farms
6	ALFA	An innovative fully automated system for the continuous production of phytoplankton (algae) as live feed in aquaculture hatcheries.
6	DESIGNACT	Designing the aquaculture centre of technology - facing the unmet needs in European aquaculture
6	FISHTANKRECIRC	Development of electro-coagulation technique for optimal cleaning efficiency and maximum reuse of water in land based fish farming
6	INTELFISHTANK	Development of an intelligent fish tank for cost effective aquaculture through control of water quality in each different fish tank
7	OptiTEMPtank	Development of an Integrated System for Cost Effective Temperature Control in Aquaculture Tanks
7	OptoCO2fish	An Opto-chemical Carbon Dioxide Sensor dedicated to Aquaculture and Oceanography Applications.
6	SEACASE	Sustainable extensive and semi-intensive coastal aquaculture in southern Europe
6	SUSTAINAQUA	Integrated approach for a sustainable and healthy freshwater aquaculture