

## **COST ACTION FA 1305**

### **FIRST TRAINING SCHOOL**

#### **GRAN CANARIA-TS (25-29 MAY 2015)**

### **COURSE RESUME**

Theoretical and practical classes were developed according to the schedule.

A lot of discussion/opinion from the trainees really help the trainers to enrich and complements the classes.

A net group was implemented for future collaborations.

### **1) Theoretical/practical**

#### **1.1. Review of the main commercial AP problems and their possible solutions (filled up between all trainees)**

<b>PROBLEMS</b>	<b>SOLUTION</b>
Problems of production of different crops between winter and summer	Winter plants cultivation Change fish and plants from summer to winter for small scale AP Need to know about winter plants Different areas prototypes
Temperature& light control	
Try to difference in between hobbies and commercial systems	
Pathogens both ways	Mainly plants Decoupled system design
Decouple versus coupled?	Fish antibiotic testing effects on plants?
Access to city lands	
Market competence with normal agricultures	Keep the history; brands; distribution
Fish Feeding strategy	Maintain constant nutrient levels? For the plants or for the bacteria?
Technical issues regarding scalability	I+D Consortiums
Trained personnel	Adapted courses; Horticulture aquaculture + microbiologist.

Solids	Improve the nitrification; speedy up the mineralization of solids; recover the minerals in any manner; alternative use of solids.
Increase the nitrification in the water column	Maintain the greenest of the water (R&D)
Same culture species (i.e. same species in different environmental conditions in North & South UE)	R&D with alternative warm water & cold water species
System balance at different scale levels	R&D Document all information on RAS and hydroponic.
Better knowledge on plant growth effects from aquaculture systems	Technical issues regarded aquaculture water quality
What kind of available feeds? Aquaponic feeds in the EU?	How existent feeds need to be used in aquaponic. How this fish feed need to be adapted (N/P) ratios.
Specific feed? Feeds & different aquaponic scale?	R&D; Feeds and alternative ingredients. Nutrient balance (N, P, microelements)
Fish pathology & plant microbiology control? Toxicology of the commercial pesticides of plants on fish and vies versa?	More quality studies (R&D) Avoid cross contamination. Diets-microorganism. Microbial determinations.
Fish feeding timing	Fish feeding regarded plants requirement (R&D)
Coupled or decoupled systems?	Decoupled as increased production scale
Hybridation	Genetic manipulation
Fish seed availability	Increase producers

Waste water	Reuse Studies
Energy cost	Green energies
Commercialization. Market acceptance and product quality	Market research for aquaponic product. Education

## 1.2. Explained matters and discussion about:

- a) Feeds and feed ingredients
 

The role of proteins and non-digested N and carbohydrates still unclear for AP; Influence of carbohydrates in feeds influence gut passage time, digesta viscosity & faeces stability (soluble/insoluble fibres); Dry matter digestibility in tilapia feeds.
- b) Feed processing influence on AP water quality
- c) Optimal fish feeding regime and water stability
- d) Feeding tilapia and feed conversion (growth & metabolism) & uneaten feeds.
- e) Influence of fish digestion anatomy in AP
- f) Waste & sludge composition (Licamele 2009); 0.2-0.5 kg dry faecal wastes per kg feed (Amirklaide A.K. 2011)
- g) Wastes with P in different manner and particle size affect P remineralisation
- h) Fish stress and welfare: effects of solids and ammonia in the system.
- i) Particle classification (Lawson 1995): Settled solids = suspended in 1 h; non-settled solids= non suspended in 1h (difficult to remove)
- j) Out put systems of setttable solids: Clarified; Sedimentation chamber; Hydroclone/swirl separator; Silos
- k) Fertilizing & non-fertilization in AP systems (Ca, K and Fe)
- l) Mineral in AP circulating water. Chelated versus non-chelated minerals.
- m) Aeroponic system and root fertilization.
- n) New gravel developments: Turf, Coco fibre; mycorrhizum (Prof Morel INRA)
- o) Advances Food Technology Seminar in Landscape and Urbanism (have a look)
- p) Factors affecting AP stability:
  - 1) Fish species
  - 2) Plant species
  - 3) System design (view Endut 2014)
    - The role of O<sub>2</sub>
    - Component ratio principles: Aquaculture–Hydroponic
    - Fish Feed ratio  $FFR = \text{feed (g)}/\text{plant grow area (m}^2\text{)}/\text{day}$
    - pH level: optimums for different plants (Partridge S.K. 2013)
  - 4) Nutrient dynamics:
    - Light

- 5) Nutritional parameters
- 6) Pathological parameters
  - AP needs a very compressive health management: prevent better than medicate.

r) AP growing strategies

Different plants growth types:

- A) Batch = same batch, size (1 age class)
- B) Staggered = same crops, different size
- C) Inter-cropping = different crops, different size

Different fish growth types: Avoiding cannibalism in carnivorous while increasing feeding frequency.

- D) Herbivorous species = mixed fish size in same tanks
- E) Carnivorous species = different tanks & different fish size

s) Main AP cultured fish & plants (Love et al., 2015)

t) Aquaculture feed formulation: actual state and future.

## 2) Specific practices in the labs

2.1. Different ingredients, formula feeds and final pellets.

2.2 Visit to a feed ingredient and feed processing pilot plant.

2.3. Training with a tilapia and an aquarium aquaponic system: fish and plants management.

## 3) Final round table

INTERESTED MATTERS OF RESEARCH/DISCUSSION	COUNTRIES/TRAINEES INVOLVED
New gravel media opportunities	Norway, Malta, Slovenia, Spain
Pheromones in the system	UK
Cortisol delivered in water & plants effects	All
Bio filter designs	All
Problems with already existent feeds	Excessive floating feeds? -France Sustainability means expensive – UK Price – Slovenia; Serbia; UK Marketing for sustainable feeds – UK

New feeds development	All Insects different species opportunities
AP producers feed preferences	AP hobby persons = like aquarium hobbies person; non real preferences AP producers = 100% sustainable although increasing some the FCR- UK
Use of fertilization	Controversial (non accorded)
Main AP end product	Plants by now, so feeds still oriented to plants grow
Participants preparing an AP course or having in mind for near future?	From 7 countries: UK, France, Spain, Norway, Slovenia, Sweden, Malta  Opportunity for exchanging professors for informal courses among participants was discussed

### 3) Field trip

According to the schedule we all visited the ITC (Canaries Institute of Technology) where responsible of Alternative Energies Research and the Algae Biotechnology Centre informed the participants during the visit.

The tour ends with a quick visit to the Maspalomas sand dunes and the village of Mogan Fisheries Port before to return back to the hotel in the evening.

In Las Palmas de Gran Canaria, 2015 June 15<sup>th</sup>

Local Organizer

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