COST FA1305 Training School 7
Aquaponics: Ergonomics and economics

Final Report
30 October 2017 – 2 November 2017
Mosta, Malta
Introduction

This last COST training school was organised under COST Action FA1305 by the AquaBioTech Group in Malta from October 30 to November 2, 2017. The four-day training school titled “Aquaponics: Ergonomics and economics” covered the design of Recirculating Aquaculture System and hydroponic greenhouse ergonomics and economics.

The AquaBioTech Group is a leading marine and aquaculture research, development, consultancy and engineering company in Europe, with its own state of the art research facilities in Malta. The company designs and installs commercial scale and research specific RAS units in numerous countries. The team of the AquaBioTech Group has a diverse expertise ranging from aquaculture RAS engineering, nutrition, production technologies, fish health and aquaculture economics and marketing.

The first day the participants were introduced in to general concepts of aquaculture and the integration of hydroponics into aquaculture operations while Jose Cabello, the R&D Facility Manager of AquaBioTech guided them to the research facilities where they had the chance to view a number of RAS modules. The morning of the second day was on ergonomics. Peter Vermeulen, from Peter Vermeulen Research, Coaching and consultancy, provided a lecture and practical exercises on the topic. Ergonomics covers the best possible layout and setup of different parts of both systems with maximum functionality and productivity in mind. In the afternoon, the group visited the hydroponics farm of Malcolm Borg, Deputy Director of MCAST, Malta, where different species of lettuce, basil, tomatoes and strawberries are grown. On Wednesday morning, we started off by reflecting on the ergonomics of the hydroponics farm followed by presentations of four (4) PhD students (Simon Goddek, Boris Delaide, Sebastian Strauch and Karl Peebo). They discussed their research on aquaponics (see program below). The morning ended with an information session on VicInAqua, a H2020 project funded by the European Commission an innovation pilot system being developed in Lake Victoria which integrates the concepts of water treatment agriculture and aquaculture. In the afternoon, a lecture on the economics of the aquaponics was delivered by Dr. István Szűcs while George Mantas, the Business Development Director of the AquaBioTech Group focused on the business plan development, the importance of the market research and introduced them the Business plan canvas concept. The last day, the participants formed groups and worked on a business plan for some of their start-up ideas. The four groups pitched their ideas to all the participants and trainers and afterwards they had time for Q&A and discussions. All in all, it was an intensive and based on the participants feedback a successful and productive week. The participants and trainers interacted well, and interesting discussions were held. The group
was very diverse, and everyone got something out of the training course. The course was documented by Em Cooke of the University of Greenwich. The team of the AquaBioTech Group would like to thank all trainees and trainers for their active participation and effort shown during the course and the COST EU Aquaponics HUB for the opportunity offered to them to deliver the course.
## Program

### Monday 30 October

<table>
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<tr>
<th>Time</th>
<th>Activities</th>
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| 09:00-13:00 | • Welcome  
• Introduction of trainees and trainers  
• Course contents  
• The EU Aquaponics Hub COST Network  
• Introduction to aquaponics |

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<tr>
<th>Time</th>
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| 14:00-18:00 | • Aquaculture: RAS technology  
• Tour of facilities of the AquaBioTech group  
• Integration of hydroponics in aquaculture |

### Tuesday 31 October

<table>
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<th>Time</th>
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| 09:00-13:00 | • Introduction to Ergonomics  
• Exercise: Aquaculture ergonomics design |

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| 14:00-18:00 | • Tour of a hydroponics farm  
• Introduction to the use of greenhouses in Malta  
• Business case: hydroponics |

### Wednesday 1 November

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<th>Time</th>
<th>Activities</th>
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| 09:00-13:00 | • Exercise: Hydroponic greenhouse ergonomics design  
• Presentations: PhD projects in Aquaponics  
1) Sizing Multi-Loop Aquaponics Systems- Simon Goddek  
2) A study on the mineral elements available in aquaponics, their impact on lettuce productivity and the potential improvement of their availability- Boris Delaide  
3) Nutrient dynamics in RAS and implications for aquaponic systems- Sebastian Strauch  
• Climate KIC: Pioneer program- Karl Peebo  
• VicInAqua Project Information session: Integrated aquaculture based on sustainable water recirculation system for the Lake Victoria Basin |

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<tr>
<td>13:00-14:00</td>
<td>Lunch</td>
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| 14:00-18:00 | • Business concept of a commercial scale aquaponic system based on an Hungarian case study  
• Marketing and business development |

### Thursday 2 November

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<th>Time</th>
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<tr>
<td>09:00-13:00</td>
<td>• Workshop: Aquaponics business planning</td>
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| 14:00-18:00 | • Discussion and conclusion  
• Evaluation of the training school |
Trainers

Dr. István Szűcs - Professor on Agriculture Economics, University of Debrecen, Hungary
Peter Vermeulen – Coach & Consutancy, Netherlands
Malcom Borg – Deputy Director, MCAST- Centre for Agriculture, Aquatics & Animal Sciences, Malta
Matej Leskovec – Aquaponics Research and Consulting, AquaBioTech Group, Malta
George Mantas – Business Development Director, AquaBioTech Group, Malta
Kyra Hoevenaars – Senior Aquaculture Consultant, AquaBioTech Group, Malta
Jose Cabello- R&D Facilities Manager, AquaBioTech Group, Malta

Trainees

Boris Delaide- PhD graduate- University of Liege (Belgium)
Sebastian Strauch- PhD student- University of Rostock (Germany)
Faiqa Atique- MSc student- University of Jyväskylä (Finland)
Frank David- PhD student- Natural History Museum (France)
Catherine Lejolivet- Engineer Officer- Mission Animation Territories (France)
Lana Schmidt- MSc student- University of Zagreb (Croatia)
Asael Greenfield- PhD student- Tel-Hai Academic College (Israel)
Edoardo Trovato- Co-founder- Mangrovia (Italy)
Simon Goddek- PhD graduate- Wageningen University (The Netherlands)
Magdalene Jakubowska- Senior specialist- National Marine Fisheries Research Institute (Poland)
Daniel Jeronimo- PhD student- University of Aveiro (Portugal)
Kevin Hartman- MSc student- University of Ljubljana (Slovenia)
Gokhan Tuncelli- PhD student- Istanbul University (Turkey)
Sinead Fortune- Director- Urban catch (United Kingdom)
Karl Peebo- PhD student- Tallinn University of Technology (Estonia)
Em Cooke- Digital Film Producer- University of Greenwich (United Kingdom)
Evaluation

After the completion of the 4-day course, the participants were given a questionnaire in order to demonstrate the course's impact. Below the results of this questionnaire are provided. A total of 15 questionnaires were returned.

Content and structure of the training:

- The information received during the training is useful.
- The content was organized and easy to follow.
- The structure of the training session was adequate.
- Participation and interaction were encouraged.
- The topics covered were relevant to me.

The trainer(s)...
I would be interested in attending a follow-up, more advanced workshop on this same subject:

- Yes: 75%
- No: 25%

I will recommend this training to others:

- Yes: 92%
- No: 8%

In your opinion, was this workshop:

- Introductory: 25%
- Intermediate: 50%
- Advanced: 25%

Given the topic, was this workshop:

- Too short: 0%
- Right length: 33%
- Too long: 67%
The trainees were also asked to share their thoughts regarding the experience. Here are some of their comments:

❖ **What did you like most about this training?**

- “PhD students presenting their research & the opportunity to meet other people working in aquaponics.”
- “The trainers were really well prepared, ready to answer any questions. Trainees were from different (and not to different) areas and we all could exchange our experience.”
- “Experts in the field were prepared, all questions answered.”
- “Interaction between trainers and all participants”
- “Presentation on Business Planning by George Mantas”

❖ **What aspects of the training could be improved?**

- “The training wasn’t as well-planned as others I’ve attended- more in-depth detailed training on the topics could have been given. There were no working aquaponics models at host facility.”
- “Observe an actual aquaponic unit.”

❖ **Please share other comments or expand on previous responses here.**

- “I really learned, and I enjoyed the training. I would like to join more trainings.”
- “Thank you, it was a great experience”
Photo impression

Presentation from Julian Mamo (AquaBioTech group on the VicInAqua project).

Participants of the Training School

Presentation from George Mantas (AquaBioTech Group) on business planning and marketing.
Group projects - Business planning for an aquaponics start-up in Sicily, Italy

Group projects - Business planning for an aquaponics system at the University of Jyväskylä (Finland)

Group projects - Business planning in progress
Group exercises on Ergonomics

Group exercises on Ergonomics (with trainer Peter Vermeulen on the right)
Field visit to a hydroponic farm in San Gwann, Malta.

Explanations by Malcolm Borg of MCAST, Malta