



The EU Aquaponics Hub is a four year networking Action that unites a heterogeneous group of scientists, researchers and SMEs from across the EU and around the globe to better understand the state of knowledge in aquaponics in Europe and around the world and to facilitate innovation and education in this field of sustainable fish and vegetal food production.

COST FA1305 Training School 4
Microbia-ponics : Microbial roles and dynamics in aquaponics
25–28 April 2016
University of Liège, Gembloux Agro-Bio Tech Faculty, Belgium

Background

Aquaponics is an emerging method of local food production in the EU and worldwide, using closed integrated production systems to grow vegetables and fish in a variety of contexts including urban environments. The EU Aquaponics Hub aims to lead the research agenda through the creation of a networking group of expert researchers, industry scientists, engineers, economists, aquaculturists and horticulturalists, and contribute to the training of young aquaponic scientists. Despite the recent growth and interest in aquaponics, considerable efforts are still required in order to characterize the aquaponics microbiota, their roles and dynamics.

Since microorganisms are present ubiquitously, they also play an important part in all stages of aquaponic production. They can be unwanted contaminants (e.g. pathogens or opportunists for plants), or promoted to perform specific tasks (e.g. nitrification, sludge mineralization, plant growth promoters, biocontrol of plant pathogens etc.) The effects of microbes in aquaponics need to be evaluated to optimize systems performance. However, microbial communities are very complex and depend on many different aspects, which make them difficult to predict, characterize and control.

In this context, the training school will consist of a set of lectures and practical classes on the basic knowledge to understand aquaponics, the principles of diagnostic techniques of pathogenic/beneficial micro-organisms, techniques able to characterize microbial communities and their role regarding plants, water and solid waste in aquaponic environments. Attendees will learn the methodology to identify causal agents of plant diseases and they will be trained to reach a successful disease diagnostic and to select control methods compatible with aquaponics. They will be encouraged to come with diseased plants (or pictures of them) from their aquaponic systems. Those

plants will be used as case studies during practical training sessions. Attendees will also practice methods for water and sludge analysis.

Trainees will actively participate in workshops dedicated to the analysis of micro-organisms and their roles on plants, water, biofilters, and sludge. It is expected to generate a series of key points that will help to define issues and topics for future innovative research. The training will end with visits to two aquaponic systems in Belgium: (1) Aqua4C - One of the most important commercial decoupled aquaponic system in Europe, and (2) PGC – Demonstrative aquaponics system with Dr. Tom Beyers.

The training school will be delivered by Prof. Haïssam Jijakli (Plant Pathology and Urban Agriculture, University of Liège, Belgium), Prof. Amit Gross (Environmental Hydrology & Microbiology, Zuckerberg Institute for Water Research, Israel), Dr. Peter Dapprich (Plant Pathology, South Westphalia University of Applied Sciences, Germany) and Prof. Sébastien Massart (Plant Pathology and Metagenomics, University of Liège, Belgium). The lectures and practical classes will be held mainly at Gembloux Agro-Bio Tech Faculty, University of Liège where the microbiology laboratory, PAFF BOX (Plant and Fishing Farming Container) and a small RAS system are located.

Programme

Sunday 24th of April 2016

Arrival of trainers and trainees to Gembloux

Monday 25th of April 2016

08:30-09:00	Registration
09:00-10:00	Welcome and introduction to the program of the training school <i>Prof. Haïssam Jijakli (Local Organizer)</i> <i>Prof. Philippe Lepoivre (Dean of Gembloux Agro-Bio Tech Faculty)</i> The trainees will present themselves, their background and their research interests
10:00-10:30	Refreshments
10:30-12:00	Introduction to aquaponics <ul style="list-style-type: none">- Presentation of the different aquaponic systems- Presentation of aquaponic compartments- Location and potential roles of micro-organisms in aquaponics : a review <i>Prof. Haïssam Jijakli (University of Liège)</i>
12:00-13:00	Lunch
13:00-14:00	Diagnostic and detection tools <ul style="list-style-type: none">- Koch's postulates- Principle of ELISA and PCR tests <i>Prof. Peter Dapprich (South Westphalia University of Applied Science)</i>
14:00-15:30	Plant pathogens in aquaponics <ul style="list-style-type: none">- - Main plant pathogens in tomatoes- - Main plant pathogens in lettuces <i>Prof. Peter Dapprich (South Westphalia University of Applied Sciences)</i>
15:30-16:00	Refreshments
16:00-18:00	Study of aquaponics microbial population by High Throughput Sequencing <ul style="list-style-type: none">- Presentation of the existing technologies and methodologies- Advantages and drawbacks of each methodology for aquaponics- Analysis of critical points for setting up a NGS experiment in aquaponics <i>Prof. Sébastien Massart (University of Liège)</i>
19:00	Dinner

Tuesday 26th of April 2016

08:00-08:30	Breakfast
08:30-11:00	Diagnostic training <ul style="list-style-type: none">- Analysis of symptoms- Isolation and cultivation of pathogens- Diagnostic of cases of study <i>Prof. Haïssam Jijakli (University of Liège), Prof. Peter Dapprich (South Westphalia University of Applied Sciences)</i>
11:00-11:30	Refreshments
11:30-12:30	Practical analysis of the NGS results <ul style="list-style-type: none">- How to link with biological hypotheses and questions <i>Prof. Sébastien Massart (University of Liège)</i>
12:30-13:30	Lunch
13:30-14:00	Visit of PAFF BOX and RAS system in Local organizer laboratory <i>Prof. Haïssam Jijakli (University of Liège)</i>
14:00-16:00	Biocontrol of Plant pathogens and biostimulation <ul style="list-style-type: none">- Definition- Biocontrol agent and biostimulant characteristics- Compatibility in Aquaponic systems <i>Prof. Haïssam Jijakli (University of Liège)</i>
16:00-16:30	Refreshments
16:30-18:00	Training on biocontrol selection and application <i>Prof. Haïssam Jijakli, Prof. Peter Dapprich</i>
19:00	Dinner

Wednesday 27th of April 2016

08:00-09:00	Breakfast
09:00-10:30	Water and solid quality, treatment and reuse in aquaponics systems Solid removal and treatment principles (Aerobic and anaerobic): <ul style="list-style-type: none">- Water quality in aquaculture aiming at aquaponics systems- Analyses of fish waste and nutrients <i>Prof. Amit Gross, Zuckerberg Institute for Water Research</i>
10:30-11:00	Refreshments
11:00-12:30	Water and solid quality, treatment and reuse in aquaponics systems Solid removal and treatment principles (Aerobic and anaerobic): <ul style="list-style-type: none">- Biological water treatment principles and reuse in recirculating aquaculture systems (RAS)- Biological Solid waste, removal and treatment (aerobic/anaerobic) <i>Prof. Amit Gross, Zuckerberg Institute for Water Research</i>
12:30-13:30	Lunch
13:00-16:00	<i>Workshop, Demonstration and hands on practice of major laboratory methods for water and sludge analyses used in aquaculture</i> <ul style="list-style-type: none">- N forms, alkalinity, Redox, Dissolved oxygen, pH, turbidity,- Ammonia oxidation potential- Denitrification potential- Sludge properties: TSS, settleable solids, sludge volume index, volatile suspended solids, organic carbon. <i>Prof. Amit Gross, Zuckerberg Institute for Water Research</i>
16:00-16:30	Refreshments
16:30-18:00	Interpretation of lab results and Summary <i>Prof. Amit Gross, Zuckerberg Institute for Water Research</i>
19:00	Dinner

Thursday 28th of April 2016

08:00-09:00	Breakfast
09:00	Departure for Kruishoutem <ul style="list-style-type: none">- Visit of AQUA4C- Visit of PCG
12:00-13:00	Lunch at Kruishoutem
13:00-15:00	Departure for Gembloux
15:00-15:30	Refreshments
15:30-18:00	Conclusion Workshop Definition of issues and topics for future innovative research
19:00	Dinner

Friday 29th of April 2016

Trainees depart

Eligibility

Applicants must be resident in a COST country: Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Malta, The Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom and the former Yugoslav Republic of Macedonia. The nationality of the applicant is not a bar to eligibility. Preference will be given to postgraduate students and postdoctoral researchers. Students from different research backgrounds (agriculture, horticulture, aquaculture, sanitary engineering,...) who are interested to move into aquaponics are welcome to apply.

Financial support

COST Action FA1305 is offering **12 places** on the training school on a competitive basis. Successful applicants will be offered a maximum grant of € 1200 as a contribution towards the costs of travel, accommodation and meals. The exact award offered will depend on the cost of travel as this differs considerably across eligible countries. Please note that the grant will be paid by bank-to-bank transfer **after** the course has been completed.

Logistics

Trainees will be responsible for making their own travel arrangements, and for providing adequate insurance cover (personal, travel and medical) for the whole duration of the training course and travel period.

Hotel rooms have been reserved at a cost of €73 per night (breakfast included) for 5 nights (April 24th to 28th 2016). Trainees must pay for their own rooms upon arrival. (This payment will be reimbursed as part of the financial support package).

How to apply

Send a letter of application stating your reasons for wanting to take part in this Training School to Haïssam Jijakli (mh.jijakli@ulg.ac.be) and Sarah Milliken (S.Milliken@greenwich.ac.uk) by **29th February 2016**. The letter should be accompanied by a 1-2 page CV which should include your personal details, education background, current university address (if applicable), training/work experience, publications (if applicable), email address and Skype name.