



eco-innovation
WHEN BUSINESS MEETS THE ENVIRONMENT

**CIP Eco-innovation
Pilot and market replication projects
Call 2012**

Call Identifier: CIP-EIP-Eco-Innovation-2012

Report on on technical advancement and difficulties met D3.1

Ecoponics

Contract ECO/12/332783/SI2.656985

Covering the reporting period from

18/07/2013 to 17/02/2015

Reporting Date

28/02/2015

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Decision on technology and system choice

For IGFF it was important that its aquaponic production system was a solution to various constraints already existing within present day aquaponics.

This goes in regards to:

- Aquaponics cannot acquire an organic certification
- Due to combining two production systems fixed costs are high compared to investments in either aqua- or horticulture production
- Often high labor costs as a trade-off to high fixed cost in modern technology equipment
- Higher risks due to the dependency among the fish and horticulture production

The IGFF aquaponic test system has addressed these constraints by innovating a system that:

- 1) Introduces soil to the aquaponic system. To make this feasible the horticulture production is done on plant mobile tables where pots with soil are growing. The plants are then fed by applying the fish nutrients using 'flood and ebb' twice a day. The mobile tables are in the same time the most applied system in Danish Horticulture, hence making it more feasible to introduce aquaponics to the existing commercial oriented horticultural sector. By introducing soil into the IGFF aquaponic system the horticultural production is now eligible for organic certification. The fish can due to present EU organic law prohibiting recirculating aquaculture systems only be sold organic if they are sold as fingerlings for growing up in open ponds certified as organic.
- 2) The fish tanks are placed under the mobile plant tables so 'economies of space' are introduced saving a large amount of money on fixed costs since the fish production will only occupy a limited amount of extra greenhouse space.
- 3) Is applying modern industrial technology equipment in both the aqua- horticulture section hence move aquaponics forward lowering the high labor cost normally following traditional small-scale aquaponic systems. The next challenge is to move beyond the threshold of finding a market demand that can lower the risk of investing in modern industrial labor saving technologies, and make the existing test plant of IGFF an interesting showcase for up-scaling aquaponics
- 4) IGFF has introduced two loops in its aquaponic production system so they can run independently if a biological failure should occur in either the fish or plant production. Hence the dependency risk normally inherent within aquaponics has been removed.



Figure 1. Special legs invented to secure mobility of the plant tables above the fish tanks, and so secure high savings on space and fixed cost.

Decision on production site

IGFF is introducing aquaponic production in relation to urban or peri-urban farming, and has so far targeted the urban roof-tops as a potential empty space for this purpose. Agreement was first made with Ballerup municipality back in 2013 who had offered to supply their 800 m² flat roof of their library in mid-town. Engineer was paid by Ballerup to make analyses on the strength and weaknesses of the building to carry a 600 m² aquaponic production. The costs for securing the building were set to 6-700.000 Euro, and IGFF offered to pay these costs if Ballerup municipality would consider lowering the cost of energy and electricity or free of charge in a period of 3 years. Likewise, they were also asked if it was possible to have the aquaponic production become part of the educational system of the municipality, hence pay IGFF over a three year period for taking part in applied teaching be it in math, physics, biology, social science. Unfortunately, Ballerup municipality did not want to consider any of these proposals, and so it was too risky to establish such a costly production based only on IGFF capital contribution, and unknown market demand.

However, during the negotiations with Ballerup municipality in the autumn of 2013 parallel discussions were made with Copenhagen municipality. They were willing to pay 280.000 Euro to introduce a roof platform to carry an aquaponic roof top farm, which was confirmed at a city council meeting in the beginning of February 2014. A suitable house was found with 1.200 m² of flat roof, and engineers paid by the municipality started to analyze the statics of the building and potential costs of making a platform. Unfortunately, the house was not able to carry a platform on the roof, and so a new phase of finding another potential building commenced. Two buildings were found during spring/early summer and negotiations started with the owners if they were interested in having an aquaponic production on their roof. One owner declined while another confirmed their interest in September 2014.

Parallel to this IGFF and the municipality decided to go for a roof-top construction like a table placed outside the building so the weight of the aquaponic production is not placed directly on the house, but the forces are going outside and directly to the ground. Engineers were then asked to design such a construction and analyze the costs. A report on this is to be delivered in March 2015 for further decision on actually starting up, and at what size the aquaponic production should be etc.



Figure 2. Fish being fed applying feed on the 24-hour automatic feeder.

This publication has been produced with the assistance of the European Union. The contents of this publication are the sole responsibility of Svinna, Breen, IGFF and HI and can in no way be taken to reflect the views of the European Union.



Co-funded by the Eco-innovation
Initiative of the European Union