CONCLUSIONS

The only aquatic species artificially feed was the tilapia. Feeding rate based on tilapia biomass was corrected every three weeks by taking a random sample of at least 25% introduced in the third and fourth aquatic pond (sedimentation pond), respectively to avoid the proliferation of algae.

Evaluating the production of other crop species (e.g. tomato and broccoli); and (iii) determining critical water quality parameters in the system to achieve optimal conditions for both fish and plants.

Production system (crop & aquatic species) of 1017.30 kg.

RESULTS

WATER USE EFFICIENCY (WUE): The water consumed in the system is mainly due to two processes: (i) water consumed due to evaporation from the water ponds (around 39 cm/week in winter and 33 cm/week in summer) and (ii) water consumed due to plants' transpiration (3.22 cm/week) and 1.5 cm/week).

NUTRIENT CYCLING: The main input of N and P in the system is the fish feed. Once the fish feed is added to the system, a substantial part of it is eaten by the tilapia and either excreted as total solids or assimilated, and the remainder is consumed by the subsequent extractive aquatic species (i.e. mullet, crayfish, clams and silver carp) which use them as nourishment, acting as living filters. Besides, the last ponds act as a mechanical filter where a significant part of the solid wastes is captured. The water from the sedimentation pond is pumped to a large biological filter of 6 m² acting as biofilter) whose goal is to reduce the total amount of organic matter through sedimentation and to reduce, if any, the remaining ammonia group.

Pumps can work simultaneously, to provide a continuous water flow in the water recycling system (Aquatic Ponds – NFT & FRS units of Greenhouses – Aquatic Ponds). Within the hydraulic system, the water moves by gravity through the FRS & NFT units. The water ends in a sump pond (3 m³) pumped for sedimentation and for indirectly acting as biofilter) whose goal is to reduce the total amount of organic matter through sedimentation and to reduce, if any, the remaining ammonia group.

Inside the greenhouse, the water flow is diverted to the FRS or to the Traditional Soil Culture (TSC) units via manual valves, and finally goes to an external pond of 200 m³ through an outlet drain.

A closed aeration network distributes air through an air diffuser and nanobubble discs to the different units of the system. The system is powered by combining grid power and solar energy.

MATERIALS & METHODS

SYSTEM SETUP & OPERATION: The fresh water is pumped from the well water source by a self-priming pump to two water tanks at a flow rate of 30 m³/h. Then it flows by gravity to the greenhouse to fill in the Nile tilapia pond (first pond), and moves to the remaining aquaculture ponds by means of a series of monks. The other inlet manual valves of greenhouse 1 are only for emergency use. The sedimentation pond acts as a mechanical filter where a significant part of the solid wastes is captured. The water from the sedimentation pond is pumped to a large biological filter of 6 m² (acting as biofilter) whose goal is to reduce the total amount of organic matter through sedimentation and to reduce, if any, the remaining ammonia group.

The aspect of the aquatic species artificially feed was a crucial factor. Feeding rate based on tilapia biomass was corrected every three weeks by taking a random sample of at least 25% introduced in the third and fourth aquatic pond (sedimentation pond), respectively, to avoid the proliferation of algae.

The system is only partially fertilized to prevent micronutrient deficiencies. The total inputs of N and P in the system are projected to decline in many greenhouse crops. The system is only partially fertilized to prevent micronutrient deficiencies. The total inputs of N and P in the system are.

In HortiMED, the WUE -aquaponics system significant improvements have been recorded in NUE and WUE, not aquatic biomass production and FCR, compared to traditional horticulture or aquaculture monoculture systems. These results indicate that MFA aquaponics is a bio-integrated food production system not only a successful method for the simultaneous crop and aquatic biomass production, but also a suitable strategy for cycling nutrients and water.

HortiMED will continue with the BTA-aquaponics research in the experimental site during the last two production cycles, including: (i) the H & P balance for fish-culture ponds and different experimental hydraulic systems, (ii) optimizing plant-crop yields for greenhouse vegetables and evaluating the production of other crop species (e.g. tomato and broccoli), and (iii) determining critical water quality parameters in the system to achieve optimal conditions for both fish and plants.

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