

PRACTICE ABSTRACT n° 25

Recirculating Aquaculture and Integration with Agricultural Practices

Recirculation Aquaculture Systems (RAS) are one of the new areas of innovation in aquaculture farming. It gains significant importance, as it requires limited resource for greater production and provides environmental sustainability. RAS is used for fish production in indoor tank-based systems where water exchange is limited and the use of biofiltration is required to reduce ionized and unionized ammonia level (Timmons et al., 2010). The basic principle behind the RAS is to re-circulate the water through flow-through fish farm by diverting the water supply through ponds or tanks. However, recirculation implies treatment of some or all of the discharge water and returning this to the fish rearing system. In RAS, a key design parameter is the ratio of recycled water to wastewater (i.e., percentage of recycled water in the fish tank inflow water). A RAS hatchery for tilapia was developed in Kisumu, Kenya through the European Union Funded project for fish production (VicInAqua), using treated municipal wastewater through a technology called Membrane Bio Reactor (MBR) as the main source of water to the system.

The hatchery has a capacity to produce 30,000 monosex tilapia fingerlings per month. The system is designed as a flexible, scalable and modular system which can be adapted to the needs of the client, and it has the following sections: Broodstock and Egg incubation, Larval rearing and Nursery section. It also has a filtration system composed of a drum filter of 20-40micron in mesh size and a bio filter with moving bio-media. The plant combines multiple technologies from different sectors i.e., energy (solar photovoltaic with a capacity of 14.3 kWp (kilo watt peak)) and online monitoring system for monitoring water quality parameters in the RAS.

FoodLAND project promotes innovating technologies that deal with food security in the selected African countries and therefore Kisumu food hub being one of the many food hubs, specializes in aquaculture production in RAS (wastewater reuse). As a result, an experiment is being carried out in the RAS to describe the management schemes of the newly developed aquaculture methods including the aspects related to feeding (using the locally available macrophytes together with other raw materials), hygienic conditions and integration with other agriculture techniques.

Integration of the RAS with vegetables was done on a small kitchen garden of 8m x 10m where, traditional vegetables (Spider plant, Black Night shade) and kales were planted at the recommended spacing. The vegetables were watered twice a day for 30 days, using the drip irrigation system with wastewater from the RAS. At the end of the 30-day period, the vegetables were harvested and taken to the Kenya Plant Health Inspectorate Service (KEPHIS) Laboratory for analysis of the content, to determine the suitability and its nutrient content, as well as the measures to contain or eradicate possible contamination within the food hub. Results will be shared when available.