EVALUATION OF THE WATER QUALITY AND UTILIZATION EFFICIENCY OF A RECIRCULATING AQUACULTURE SYSTEM (RAS) USING A SAND VETIVER BIOFILTER

P. G. Home, D. M. Wambua and B. K. Thiong'o
Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya
Email: *bonifacekinyanjui81@yahoo.com*

Abstract
The process of urbanization, increase in world population and the need for diversified food production has caused a strain in the available water resources. This therefore calls the practice of water-conserving approaches. Recirculating Aquaculture system is a potential solution towards dealing with water shortage problem. This is because it promotes the treatment and reuse of water in production. Moreover, different species of aquatic organisms such as oysters, clams, seaweed, shrimp and eels can be raised in the recirculating aquaculture system. This study was undertaken to evaluate the water quality and utilization efficiency of a recirculating aquaculture system that combines sand and vetiver grass for bio-filtration. The flow of water through the bio-filter was varied and the water quality parameters (NH_4^+, DO, and pH, temperature, EC and TDS) determined for different flow rates. The system was designed for a capacity was designed for a capacity of nine (9) mature fish of 300 g average mass each. This design was done taking the ammonia level as the limiting factor. This is because oxygen, the other critical parameter, was supplied through aeration. The EC, TDS and pH were read directly from an EC meter. Temperature and dissolved oxygen (DO) were read from the DO meter. Ammonia levels were tested through a volumetric analysis that uses a micro kjeldhal distillation assembly. Data was analyzed using descriptive and inferential statistical methods. Charts and tables were used to present the data and show the correlation between the variables. From the analysis, it was observed that the ammonia levels decreased as flow rates decreased while the pH increased slightly. The dissolved oxygen increased with increase in the flow rate. For optimal performance of the recirculating aquaculture system utilizing the sand-vetiver bio-filter, it was recommended that the flow rate be set at 2.4L/min. this provided good purification efficiency while not compromising the dissolved oxygen in the system.

Key words: RAS, bio-filter, ammonia, dissolved oxygen, vetiver, water