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Production of Freshwater Mussels with Nile Tilapia in an Integrated Multi-Trophic Aquaculture (IMTA) System

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Abstract

Improved management and technological innovation in African tilapia farms and hatcheries (ITACA) is a project implemented by the National Institute of Oceanography and Fisheries (NIOF, Egypt, coordinator), the Institut Sénégalaise de Recherche Agricole — Centre de Recherches Oceanographiques de Dakar-Thiaroye (ISRA-CRODT, Senegal, partner) and the Institut de Recerca i Tecnologia Agroalimentaries (IRTA, Spain, partner). The action was grant under the African Union Research Grants programme 2012, which is financed by the Financing Agreement between the European Commission and the ACP Group of States (Agreement No REG/FED/2009/021/-575) under the ACP Research for Sustainable Development Program RPR/011/09, of the 10th EDF Intra-ACP Envelop. The ITACA project, which has an overall duration of 36 months, aims to enhance the sustainability of African tilapia farms and hatcheries through improved management and technological innovation. The present study aims to investigate the potential utilisation of Nile tilapia feed waste by freshwater mussels, *Aspatharia chaiziana* cultured in an integrated multi-trophic aquaculture (IMTA) system, if co-cultured freshwater mussels enhanced their IMTA system and evaluate the physical properties of several cooked processing forms of freshwater mussels. The results showed that the combination of Nile tilapia with thin-lipped grey mullet and prawn as detritivorous fish, increases dietary nitrogen (N) and phosphorous (P) utilisation efficiency to 17.49 and 24.44 %, respectively. By added freshwater mussels in the system as herbivore consumption, increased dietary efficiency of N and P by 12.67 and 19.89 %, respectively. Finally, dietary N and P efficiency increased by addition hydroponic systems (HS) by 35.76 and 44.31 %, respectively. Metals bioaccumulation in the flesh mussels did not exceed the permissible limits set for heavy metals. Concerning the effect of applied cooking methods (boiled, fried, steaming and France sauce), on mussels values of Trimethylamine-nitrogen (TMA-N), total volatile basic nitrogen (TVB-N) and thiobarbituric acid (TBA) were decreased. The odor and tenderness of the boiled and steaming mussel samples received a lower score than other cooked methods. This result indicates that IMTA system is not only a successful method for biomass production as food crops, but also a useful system to recycle aquaculture wastewater and it is applicable to desert, rural and urban area.

Keywords: Freshwater mussels, integrated multi-trophic aquaculture (IMTA) system, processing, production

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