

Biological filtration properties of selected herbs in an aquaponic system

ABSTRACT

This study was conducted to determine the biological filtration capabilities of some culinary herbs co-cultured with lemon fin barb hybrid in a nutrient film technique (NFT) recirculating aquaponic system. Lemon fin barb hybrid (*Hypsibarbus wetmorei* ♂ × *Barbonymus gonionotus* ♀) fingerlings were stocked in twelve 2-tonne fibreglass tanks at 25 fish per tank and co-cultured with Chinese celery (*Apium graveolens* var. *secalinum* Alef.), coriander (*Coriandrum sativum*) and peppermint (*Mentha* × *piperita*) for seven weeks. The impacts of the waste generated by the fish on the water quality, the filtration capability of the herbs and the ability of fish and herbs to retain nutrients (NPK) were also estimated. All the herbs showed water purifying potentials to varying degrees as significantly lower levels of nitrogenous compounds ($\text{NH}_3\text{-N}$, $\text{NO}_3\text{-N}$, $\text{NO}_2\text{-N}$) were observed after the herbal filtration. The plant growth seemed to be affected by their ability to absorb nutrients and consequently purify the culture medium. Interestingly, the lemon fin barb hybrid also showed significant differences in terms of weight gain, but the nutrient retention among fish treatments was not statistically different. The plants absorbed less phosphorus and potassium than the fish. After computing for the total system percentage of NPK recovered, nitrogen was the most retained nutrient. The peppermint showed superiority in terms of gross biomass and water purifying potential compared to the Chi.

Keyword: Aquaponics; Biological filtration; Celery; Coriander; Lemon fin barb hybrid; NPK removal; Peppermint