

## **Production efficiency of green beans integrated with tilapia in a circular farming system of media-filled aquaponics**

### **ABSTRACT**

Aim of study: To evaluate the biomass production of green bean (*Phaseolus vulgaris*) in a media-filled aquaponics system together with Genetically Improved Farmed Tilapia, GIFT (*Oreochromis niloticus*). Area of study: Kota Kinabalu, Sabah (Malaysia). Material and methods: The experiment involved modulating and optimizing the density of extractive species (plants) in the hydroponic tank (55 cm × 35 cm). Five treatments were carried out: T0 (control-without plant), T2 (2 plants), T4 (4 plants), T8 (8 plants), T12 (12 plants) where the stocking density of GIFT was 30 tails (identical in all the treatments). Water volume in each treatment was 800 L and the experimental set up was closed recirculating type. The trials were carried out over a period of 90 days. Main results: Growth of the GIFT was not affected by the presence of green bean or by manipulation of the stocking density. Treatment T4 yielded significantly higher biomass production of green beans (1556.4 ± 88.9 g), compared to T2 (1083.6 ± 86.9 g), T8 (404.6 ± 47.9 g), and T12 (401.8 ± 98.1 g). There were noticeable fluctuations in the concentrations of NH<sub>3</sub>-N (ammonia), NO<sub>2</sub>-N (nitrite), NO<sub>3</sub>-N (nitrate) and PO<sub>4</sub>-P (phosphate) over the experimental period that indicated the process of nitrification and absorption of nutrients. Research highlights: The nitrogenous waste produced by the fish supported the biomass of the green beans in the aquaponics system and the waste uptake of this extractive species is effective enough for reuse of the water for rearing of GIFT.