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Selection of suitable aquaponics system for empurau (*Tor tambroides*) fries nursery in polyculture method

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Abstract
Long-term use of the recirculated water for fish and crop production in the aquaponics system that is the major concern in sustainable aquaculture for reduction of the water quality led to explore the alternative way of short-time use of recirculated water in the aquaponics system that can be in nursery management. Three individual aquaponics (nutrient film "NFT," deep water "DWC," media bed "MBD") along with a new combined aquaponics system (CAS) were used to explore the most suitable aquaponics system for empurau fries nursery. It was done by determining the comparison of growth performance and survivability of fish fries and plants along with the cost–benefit analysis among 4 aquaponics systems. The study was conducted in two phases. Phase 1 comprised of determining the effectiveness test of filters in newly designed CAS and the selection of suitable plant for the second phase. The suitability test for the selection of an aquaponics system for empurau fries nursery was done in the second phase. The polyculture method was adopted in both phases. The newly designed CAS with filter and the leafy vegetables (*Apium graveolens* var. *secalinum*) were selected from the first phase for further study in phase 2. The suitability results in the second phase exhibited that the NFT aquaponics system was significantly ($P < 0.05$) better compared to other aquaponics systems for empurau fry nursery. The performance trend in all studied factors was NFT > DWC ≥ CAS > MDB. Therefore, the study suggests using the NFT aquaponics system for empurau (*Tor tambroides*) fries' nursery in short term.

Keywords Combined aquaponics system · Nutrient film technique · Deep water system · Media bed raft · Polyculture · Leafy celery

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