



Investigación e Innovación en Nutrición Acuícola

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Flocponics: The Integration of Biofloc Technology with Plant Production And The Possibility to Reduce the Protein Level of Tilapia Juveniles' Diet

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FLOCponics is defined as the integration of biofloc-based (BFT) aquaculture with hydroponics. The technology is an alternative type of aquaponics system where recirculation aquaculture system (RAS) is replaced by a system based on BFT. The term "FLOCponics" was recently proposed to identify and unify the systems that have been previously called "BFT+hydroponics", "BFT+aquaponics" or "BFT+plant production". Aquaponics and biofloc-based aquaculture are considered environment-friendly approaches to food production, as both are intensive aquaculture systems with a strong focus on nutrient recycling and water saving. FLOCponics shares these characteristics. By adopting the principles of aquaponics and biofloc, FLOCponics can become an additional means to reduce the challenges of the global sustainable food supply. This new technology has been recently reviewed by our group of investigators which highlighted that FLOCponics is still in its initial research stage and inconsistent results were found regarding animal and plant yields in FLOCponics. Some investigations presented better or similar yield results in this system compared to traditional cultures, while others found the opposite. The further commercial application of FLOCponics requires research that provides a solid database, originating from experimental setups with characteristics similar to those of commercial production. One of the key challenges of using FLOCponics is the effective control of solids mainly in permanently coupled layouts, that may reach the hydroponic compartment and clog the plant's roots affecting the nutrients absorption. Recently, our group of investigators refined the system's design using an on-demand coupled layout and reported reduction of the critical issues related to FLOCponics systems and nutritional benefits of biofloc for tilapia production in FLOCponics. Nile tilapia juveniles fed with diets containing 24 and 28% of

crude protein (CP) grew similarly to those in RAS-based aquaponics fed with a 32% CP diet, allowing an 8% reduction in the Nile tilapia dietary CP compared to on-demand coupled aquaponics using RAS. Lettuce growth was similar in FLOCponics, RAS-based aquaponics and hydroponics. The integration of BFT with plant production fits with the circular economy concept and might contribute to social licenses and farm diversity. In terms of applicability, the FLOCponics system is likely to be applied in the short-term by farmers who already operate BFT in freshwater, adapting their structures to receive the hydroponics subsystem. For BFT production, FLOCponics seems to primarily increase the sustainable character of biofloc-based monocultures by recovering nutrients and expanding product diversity, rather than promoting higher animal growth performance.