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Editorial on Sustainable Aquaculture: New Challenges and Strategies

Adriana Giangrande
Università del Salento, Lecce, Italy

Shifting from agriculture to marine aquaculture is an important step to cope with food supply in an era of global climate change, habitat destruction and severe shortage of freshwater. Cultivation of seaweeds is of particular interest because of the seaweed's multifunctional attributes: very productive and easy to grow, highly nutritional and contain high quantities of proteins, essential fatty acids, polysaccharides, dietary fibers, minerals, and vitamins. In the Far East, seaweeds have been utilized for centuries, today following the rising public awareness for natural and healthier food sources, there is a worldwide demand for seaweeds biomass. Seaweeds are key components of Integrated Multi-Trophic Aquaculture (IMTA). Currently, most marine aquaculture activities discharge surplus harmful nutrients into the environment. Excessive nutrients and their vast consequences can be minimized through IMTA, thus reducing the impact of aquaculture, and enabling long-term sustainability. In nature, seaweeds adjust their intracellular chemical composition in response to the surrounding environment. Our study focused on developing a unique IMTA system design of finfish and seaweed, dedicated to mimic environmental stressors, to control and stimulate the content of high-value proteins, starches, and minerals in the seaweeds. The seaweeds in our system exhibited fast growth rates (25% d-1), removed about 95% of the harmful nutrients, and produced high tissue protein starch and mineral levels. The attained biomass can be used as functional foods and nutritional supplements. This multidisciplinary research is expected to lead a breakthrough in the aquaculture, food, and biotechnology industries, furthermore, can create a common cause bridging cultures and societies.

Sustainable aquaculture could be the key to feeding our growing population. Currently, 42% of the seafood we consume is farmed, but there are no regulations that constitute what "good" aquaculture is yet. Unfortunately, there are many unsustainable aquaculture practices, like taking too many wild fish out of the ocean in order to feed farmed fish. This initiative is meant to help fund projects that will expand and improve aquaculture. This could be the key to food security, but first, aquaculture needs to become safer, cleaner, and more sustainable.