

## **Evaluation of aquatic moss used as innovative biofilter for aquaponics**

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The term aquaponics has been suggested for a system in which a RAS is combined with a hydroponic plant growth facility. Recirculating aquaculture systems (RAS) are land-based, closed-containment systems with water circulation. In RAS water is continuously cleaned and reused several times before being discharged.

In recent years this system has become more popular because of increasing scarcity of water resources as well as concerns over environmental pollution management. However, application of RAS is faced by several limitations, including high generation of nitrogen compounds that are toxic to fish. These compounds can be removed by processes that may be mechanical, physicochemical or biological. Among these, biological processes are more reliable, sustainable, economical and efficient. In this study we propose an innovative biofilter based on aquatic moss within an experimental aquaponics system. This material has been chosen thanks to his ability to absorb several pollutants, including nitrogen compounds, through his entire thallus. It also represents an effective mechanical filter for particles resuspended in water and can act as an optimal three-dimensional support for nitrifying bacteria, having a larger surface area than the solid supports normally used in biofilters. We showed its efficacy and evidenced that when the aquaponic system reaches saturation, the moss-based biofilter remains active becoming equivalent to a mature biofilter. Moreover, it resumes its specific activity with the decrease in fish concentration, since it metabolizes nitrogen compounds by regenerating itself. In conclusion, a moss-based biofilter shows a general superiority compared to a classic biofilter with inert media at relatively similar volumes.