



Integration of probiotics in aquaponic systems: an emerging alternative approach

Nasser Kasozi^{1,2} · Gerald Degu Iwe¹ · John Walakira¹ · Sandra Langi³

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Abstract

The increasing demand on water resources, reduced land for agriculture, and concerns over food and nutrition security have prompted the evolution of innovative and complex food production systems. In this context, efficient and sustainable food production systems such as aquaponics are viewed as an important and environmentally friendly technology for adaptation under resource-limited environments. Producing food in soilless systems is a promising strategy, as this method utilizes significantly less water than traditional agriculture. However, optimizing growing conditions to enhance crop and fish yields in aquaponics is frequently ambiguous and is often not economically feasible. One of the strategies to improve plant yields and supply of nutrients in aquaponics is the application of probiotics. With this strategy, the crop yields in aquaponics are improved via a variety of mechanisms, including nitrogen fixation, solubilization of mineral nutrients, organic matter mineralization, plant hormone modulation, and biocontrol. As a result, incorporating probiotics in aquaponic systems is a strategy for mitigating environmental effects and advancing sustainable agriculture. This review paper provides the current knowledge of the use of probiotics in aquaponics. Suggestions for further studies on the effects of probiotics in aquaponic systems are proposed. Through literature review, integrating probiotics into aquaponic systems has the potential to improve nutrient supply, modulation of water quality parameters, and microbial communities, which are key processes in enhancing the productivity of aquaponic systems.

Keywords Aquaponics · Probiotics · Sustainable · Soilless systems

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✉ Nasser Kasozi
kasonax@yahoo.com; nasser.kasozi@naro.go.ug

¹ Abi Zonal Agricultural Research and Development Institute, National Agricultural Research Organisation, P.O. Box 219, Arua, Uganda

² Aquaculture Research and Development Centre—Kajjansi, P.O. Box 530, Kampala, Uganda

³ Faculty of Agriculture and Environmental Sciences, Muni University, P.O. Box 725, Arua, Uganda