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Increasing the performance of aquaponic systems in the light of taxonomic and functional microbiota characterization

Aquaponics is an integrated farming concept that combines elements of a recirculating aquaculture system (RAS) and hydroponics. This food production system promises a reduced environmental footprint when compared to conventional separated farming systems. Encouraging results could be obtained when running PAFF Box, a pilot system. Furthermore, one of our recent studies has demonstrated that aquaponic systems could surpass the plant growth rates found in conventional hydroponic systems. Microorganisms and dissolved organic matter are suspected to play an important role in RAS water for promoting plant roots and shoots growth. In that context, we first focused on the molecular characterization of the bacterial communities hosted in eight European aquaponics and aquaculture systems, including our PAFF Box system (Eck et al., in press). At the phylum level, the bacterial communities from all systems are relatively similar with a predominance of Proteobacteria and Bacteroidetes. At the genus level, however, the communities present in the sampled systems are more heterogeneous. Additional results will be presented concerning taxa identified in the systems that could have beneficial functions for plant growth. We also studied the potential protective action of the microbial aquaponics communities against plants diseases. In vitro and in vivo experimentations indicated the inhibitory effect of such community against Pythium aphanidermatum (Edson) Fitzp, an important oomycetes pathogen on lettuces (unpublished results). These results highlight that aquaculture and aquaponic waters are novel sources of biostimulant and biocontrol microorganisms. Their deep characterization and possible manipulations will contribute to a better performance of aquaponic systems.

Biography

M Haissam Jijakli is the professor and he develops a new axis of research on urban agriculture at the University of Liege, Campus Gembloux Agro-Bio Tech since 7 years. He received several national and international research projects are underway in the area, with a view of results transfer. Since the beginning of his career, he has to his credit more than 125 refereed articles; 7 patents, 3 spin-offs). He created the Research Centre in Urban Agriculture (www.agriculture-urbaine.be) which studies in and outdoor production systems for urban communities and professionals (gardens, modules of indoor vertical production, aquaponics systems like PAFF BOX). The Centre is also coordinating a European project named Smart Aquaponics (http://www.smart-aquaponics.com/) dedicated to model the systems in order to facilitate education and management of aquaponics.

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