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A new concept for aquaponic systems to improve sustainability, increase productivity, and reduce environmental impacts

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Aquaculture is globally the fastest growing sector of agriculture that needs to be sustainable and to meet also bio economical demands concerning productivity and environmental impacts. In principle, aquaponics, the combination of aquaculture and horticulture within a single aquaponic recirculation system provides a sustainable approach but the productivity of both fish and vegetables is lower compared to separate production sites. The aim of our new concept for aquaponic systems is to improve sustainability and productivity and to reduce environmental impacts in comparison with conventional aquaculture. ASTAF-PRO (aquaponic system for the (nearly) emission-free tomato and fish production in greenhouses) is a new combination of systemic parts and constitutes of two independent recirculating units, a recirculating aquaculture system (RAS) for rearing fish and a recirculating hydroponic unit producing vegetables. Both systems are connected by a one-way-valve to launch nutrient containing fish water into the hydroponic reservoir for optimization as fertilizer. Additionally the air-conditioning of the greenhouse is regaining evaporated water by condensation. The first experimental trial of the ASTAF-PRO prototype demonstrates successfully the proof of principle using a combination of tilapia and tomato production. The tilapia production revealed an optimum productivity and feed conversion ratio as in single RAS while the tomato production at least demonstrates the potential for similar efficiency as by conventional hydroponics. Thus ASTAF-PRO as a new concept reveals an improvement of sustainability, productivity and resource efficiency with reduction of environmental impacts and might promote future application of aquaponics for food security.

Biography

Werner Kloas has completed his PhD in 1990 and after a Postdoctoral stay in France his habilitation in 1995 at the University of Karlsruhe, Germany. He is since 1999 Head of the Department of Ecophysiology and Aquaculture at the Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB) and he is also since 2002 distinguished Professor of Endocrinology at the Humboldt University, Berlin.

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