

Circular Economy in Agricultural Production: the Cycle of Nutrition Between Plants, Fish and Insects as a New System of Food Production with Low Environmental Footprint

¹Levizou Efi, ¹Athanasίου Christos, ²Karapanagiotidis Ioannis, ²Kormas Konstantinos, ³Mente Eleni and ¹Katsoulas Nikolaos

¹Department of Agriculture Crop Production and Rural Environment, University of Thessaly, Volos 384 46, Greece

²Department of Ichthyology and Aquatic Environment, University of Thessaly, Volos 384 46, Greece

³School of Veterinary Medicine, Aristotle University of Thessaloniki, Thessaloniki 54124, Greece

Abstract

Circular economy is a multi-level concept and in this presentation we focus it on primary production. We present a pioneering circular tri-trophic model that includes three types of organisms (plants, fish and insects) that feed each other. The aim of the project is to apply the principles of the circular economy to the agricultural production, through the reuse of nutrient-rich materials that have so far been considered waste. By joining the cycle of nutrition, the residues or by-products of the metabolism of one organism will become food for the next, turning them from waste into a resource. Insects will be reared as a source of protein/vitamins/minerals and feed the fish through the production of insect meal which is a significant substitute for commercial feed. Fish will be linked to plants through a water recirculation system where they excrete metabolic products rich in nitrogen and other elements necessary for plant nutrition (this system is called aquaponics). Plant residues resulting from the high-wire farming system (e.g., pruning residues, cut fruits) will provide food for insects. The objectives of the project are two-fold: a) to create new knowledge through research on the implementation of the circular production system, the completeness of which will provide the roadmap for its introduction in the primary sector and b) to transfer knowledge/technology, to inform and raise awareness among producers, primary sector enterprises and citizens about the new model which is contrary to the current linear model of development.

Keywords: nutrient recovery, greenhouse crops, wastewater re-use

Acknowledgments: The project is funded by the Green Fund, under the Programme "Natural

ACCEPTED