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Cascade Hydroponic Systems as Means of Nutrient Re-use in Melon Cultivation

Efi Levizou, Yiannis Naounoulis, Zoe Karachaliou, Sofia Faliagka, Anastasia Mourantian and Nikolaos Katsoulas

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

Abstract

Cascade hydroponic systems represent a novel approach in fertilization management, aiming at nutrient recovery and waste minimization. In this system, the used nutrient solution drained from a primary crop is directed to a secondary one enhancing resource-use efficiency through nutrient re-use. Therefore, cascade systems represent the alternative of the current practice of discharging the drainage solution to the environment with the well-known negative environmental impacts. In a pilot-scale cascade hydroponic system unit we have implemented a comparative study of melon performance and yield under two treatments; a control one, where fresh nutrient solution is applied and the cascade one, where the crops are watered with the drainage solution of cucumber (primary crop), without any other nutrient amendments. The experiment lasted for 3 months, during which crop functional parameters (photosynthetic pigments and light use efficiency of the photosynthetic apparatus) and growth parameters (aerial biomass, fruit number and weight) were measured at regular intervals. Although the evaluation of crop performance is currently ongoing, the results are encouraging. Our findings suggest that the recycling of drainage water and the subsequent nutrient re-use is an efficient cultivation technique succeeding both high productivity and low environmental footprint.

Keywords: nutrient recovery, greenhouse crops, drainage management, salinity management

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