

# Re-using the drainage of cucumbers in a cascade hydroponic system

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Vegetable production in hydroponics requires large amounts of water and fertilizers, especially in open systems, where a large fraction of the applied fertigation solution is discarded. A reduction of this waste is beneficial both from an economic and ecologic point of view. Thus, producers of vegetables aim at re-using the drained nutrient solution for other crops such as culinary herbs. It was thus tested whether rocket, basil and mint can be cultivated with the drainage solution of cucumbers grown in rockwool in hydroponics. In order to establish a cascade system with additional use of the drainage of these herbs, their percolate was further supplied to *Salicornia* plants which are known to be salt-tolerant crops.

The experiments were performed in a greenhouse in spring and summer 2020. Two sets of cucumbers were grown in parallel with the herbs (five sets for basil and rocket, two sets for mint) and *Salicornia*. The cucumber plants were supplied with water and nutrients by drip irrigation. The herbs received either the original nutrient solution or the drainage solution of the cucumbers, and the *Salicornia* plants were supplied with the drainage of the herbs. The plants were harvested when they reached marketable size. Besides the marketable yield of the herbs and *Salicornia*, the contents of mineral elements in the above-ground biomass were assessed.

The drainage solution of the cucumbers was enriched with most mineral elements, but had significantly lower phosphorus (P) concentrations than the original nutrient solution. Basil supplied with the drainage of the cucumbers had less fresh mass, as compared to the plants that received the original nutrient solution. In contrast, rocket plants showed very little effects of the fertigation solution on above-ground fresh mass.

Most herbs had lower P content in the leaves as a consequence of the P depletion in the cucumber drainage. However, with exception of mint, most herbs showed higher contents of zinc and iron in their aboveground biomass, which was as well assessed in the *Salicornia* plants grown with either rocket or basil drainage. Thus, re-using the cucumber drainage may enrich these nutritionally relevant minerals in the leaves of rocket and basil.

Mint turned out not to be suitable for use in the cascade hydroponic system, as it had significantly lower biomass when grown with cucumber drainage and as the mint drainage was detrimental for growth of the *Salicornia* plants.

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