

## Nutrient removal from aquaculture wastewater by vegetable production in aquaponics recirculation system

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### ABSTRACT

Nutrient removal is essential for aquaculture wastewater treatment to protect receiving water from eutrophication and for potential reuse of the treated water. The integration of aquaculture with agriculture appears to be an excellent way of saving water, disposing aquaculture wastewater and providing fertilizer to the agricultural crop. The study was conducted to evaluate aquaponics recirculation system (ARS) performance in removing inorganic nitrogen and phosphate from aquaculture wastewater using water spinach (*Ipomoea aquatica*) and mustard green (*Brassica juncea*). The results showed that water spinach was able to significantly reduce the total ammonia nitrogen, nitrite-N, nitrate-N and orthophosphate with efficiencies of 78.32–85.48%, 82.93–92.22%, 79.17–87.10%, and 75.36–84.94%, respectively, compared to mustard green that removed the nutrients in the range of 69.0–75.85% for total ammonia nitrogen, 72.49–79.34% for nitrite-N, 66.67–80.65% for nitrate-N, and 66.79–77.87% for orthophosphate. Overall results suggest that water spinach is better than mustard green in nutrient removal in the aquaponics system used due to its root structures provided more microbial attachment sites, sufficient wastewater residence time, trapping and settlement of suspended particles, surface area for pollutant adsorption, uptake, and assimilation in plant tissues.

**Keywords:** Aquaponics recirculation system; Aquaculture wastewater; Nutrient removal; Mustard green; Water spinach

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