Productive Potential of Floating Wetland Islands for Sustainable Agriculture

Floating wetland islands (FWIs) are artificial platforms designed to float on water bodies while supporting plant growth, representing a promising integration of ecological engineering and crop production. Originally developed for water quality improvement, FWIs have evolved into multifunctional systems capable of cultivating edible crops, such as lettuce, spinach, and rice, within nutrient-rich aquatic environments. Their dual role in environmental remediation and food production positions FWIs as innovative nature-based solutions (NbSs) aligned with sustainable development goals. This study identifies and discusses the key components, challenges and future opportunities for the application of FWIs in agricultural contexts. Design parameters, such as crop selection, substrate type and platform buoyancy, play a crucial role in system stability and productivity. Operational aspects, such as maintenance, cost-effectiveness and social acceptance, determine the feasibility of large-scale application. From an agronomic point of view, FWIs enable biomass production, nutrient uptake and safe food cultivation, although potential toxicity must be taken into account. Beyond agriculture, FWIs contribute to water treatment through nutrient removal, pollutant reduction and water reuse, reinforcing their role as low-impact, decentralized systems for polluted water bodies. They also offer important environmental benefits, such as carbon sequestration, nutrient cycling and improved landscape aesthetics. Looking ahead, FWIs present great potential for integration into the circular economy, technological innovation and climate adaptation strategies, especially in regions facing water scarcity, land degradation or urban sprawl. Their multifunctionality and adaptability highlight that FWIs are resilient systems that link food production with environmental sustainability. This study contributes to the growing knowledge gap on FWIs and supports their application as sustainable alternatives for integrated agriculture and water management.