

## Development and Automation of Medium-Scale NFT Hydroponic Systems: Design Methodology and State of the Art Review

**Authors :** Oscar Armando González-Marin, Jhon F. Rodríguez-León, Oscar Mota-Pérez, Jorge Pineda-Piñón, Roberto S. Velázquez-González., Julio C. Sosa-Savedra

**Abstract :** Over the past six years, the World Meteorological Organization (WMO) has recorded the warmest years since 1880, primarily attributed to climate change. In addition, the overexploitation of agricultural lands, combined with food and water scarcity, has highlighted the urgent need for sustainable cultivation methods. Hydroponics has emerged as a sustainable farming technique, which enables plant cultivation using nutrient solutions, without the requirement for traditional soil. Among hydroponic methods, the Nutrient Film Technique (NFT) facilitates plant growth by circulating a nutrient solution continuously. This approach allows the monitoring and precise control of nutritional parameters, with potential for automation and technological integration. This study aims to present the state of the art of automated NFT hydroponic systems, discussing their design methodologies and considerations for implementation. Moreover, a medium-scale NFT system developed at CICATA-QRO is introduced, detailing its current manual management and progress toward automation.

**Keywords :** automation, hydroponics, nutrient film technique (NFT), sustainability

**Conference Title :** ICACCA 2024 : International Conference on Agriculture and Climate Change Adaptation

**Conference Location :** Lisbon, Portugal

**Conference Dates :** October 28-29, 2024