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Harnessing Plant Physiology and Nanotechnology to Transform Agriculture and Urban Green spaces: Pathways to Net-Zero

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Abstract

Achieving sustainable and climate-resilient systems requires innovative approaches that bridge scientific discovery with practical application. Plants, as the cornerstone of both agriculture and urban ecosystems, have a profound role in carbon sequestration, climate regulation, and ecosystem services. Yet, their potential is often limited by environmental stresses, nutrient inefficiencies, and suboptimal management practices.

This presentation explores cutting-edge strategies combining plant physiological insights and nanotechnology-based interventions to enhance crop resilience, optimize yield, and improve urban green space performance. Recent research demonstrates that foliar application of micronutrients (Zn, Fe, B), biostimulants such as *Ascophyllum nodosum* seaweed extract, and silicon nanoparticles can significantly increase stress tolerance, nutrient efficiency, and productivity in major crop species.

Beyond agriculture, these strategies inform sustainable urban landscaping practices, enabling cities to maximize ecological benefits, improve carbon capture, and create greener, healthier environments. By showcasing concrete examples and measurable outcomes, this talk aims to inspire participants—from researchers to urban planners—to adopt science-driven, practical approaches that simultaneously advance plant performance, urban sustainability, and global net-zero goals.

Participants will leave with actionable insights, highlighting how integrating physiology, nanotechnology, and thoughtful green space management can transform both farms and cities into resilient, carbon-smart ecosystems.