



Climate-Smart Technologies for Urban Farming

**Speaker: Dr. Ritu Bhalla, Assistant Director,
AGRI Centre, Republic Polytechnic**

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WIPO GREEN Technology Showcase Webinar

Climate-Smart Technologies for Urban Farming

**Dr Ritu Bhalla
Assistant Director**

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Agriculture Research and Innovation (AGRI) Centre

Driving Research & Development (R&D) and innovation partnerships across the urban agriculture value chain

Research and Development



Consultancy and Test-bedding



Education and Training



Agri-tech Programmes at AGRI Centre

Climate-resilient high performance, nutrient dense crops as healthy choice for consumer

SUPERIOR CROP



A composite image for the 'SUPERIOR CROP' programme. It features two circular portraits of women: one with grey hair and a red top, and another with long black hair and a blue top. The background is a close-up of a tomato plant with several red and green tomatoes. A person's hands are visible, one holding a green tomato.

RESOURCE AND WASTE MANAGEMENT

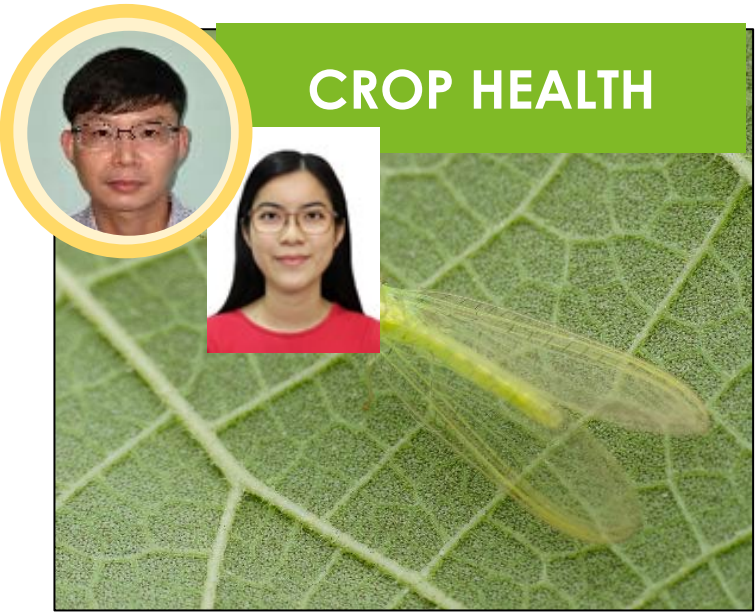


A composite image for the 'RESOURCE AND WASTE MANAGEMENT' programme. It features two circular portraits: a woman with long black hair and a man with short black hair. The background shows a hydroponic system with green plants in blue trays. Overlaid on the image are various icons: a leaf with a lightbulb, a water drop, a pH meter, and a person wearing a hard hat.

zero waste farming system to produce high value farm produce sustainably

Integrated Pest Management, Pesticide free, disease resilient crops

CROP HEALTH



A composite image for the 'CROP HEALTH' programme. It features two circular portraits: a man with glasses and a woman with glasses. The background is a close-up of a green leaf with a dragonfly resting on it.

SMART FARMING



A composite image for the 'SMART FARMING' programme. It features three circular portraits of men. The background shows a hydroponic system with rows of green plants in a greenhouse setting.

Real-time farm monitoring and precise control in illumination, fertigation, automation to enhance crop health and farm productivity

Intelligent Photosynthetically Active Radiation (PAR) Monitoring and Control System

Project lead Mr. Wang Wenwei, Research Engineer, RP

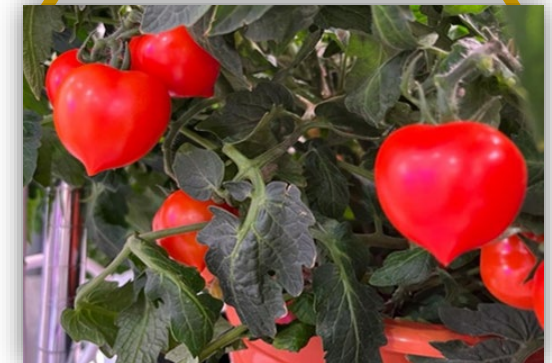
- ❑ AIoT system makes use of sensors, algorithms, and intelligent LED lighting control technology to adjust light intensity, spectrum, and duration based on plant needs, promoting optimal photosynthesis with consistent light quantity
- ❑ AI can analyze environmental conditions and plant growth stages to customize lighting cycles for maximum efficiency
- ❑ Different wavelengths of light (e.g., red, blue) can be fine-tuned for different crops and growth phases
- ❑ Allows consistent produce with minimal effect of climate changes



Dwarf tomato variety for CEA farming

Project lead Dr. Deivanai Subramanian,
Research Scientist, RP

- ❑ Cultivation of premium quality tomatoes requires a relatively cool and dry climate. Controlled Environment Agriculture (CEA) can produce high quality tomatoes throughout the year.
- ❑ Majority of commercial tomato varieties have a tall stature and a long life-cycle making it difficult to grow in CEA or vertical farms
- ❑ RP has identified and developed a new cultivar through plant breeding and selection that will be suitable for greenhouse/indoor cultivation and potted culture.
 - A shorter life cycle
 - Lower plant height
 - Tolerance to low light
 - Higher fruit yield



Smart IoT System with Electrolysed Water for Healthier Plants

Project lead Dr. Huang Jingfeng, Senior Lecturer, RP

- ❑ The Pulsed Electrolysed Water generation system dynamically modulates water pH levels from acidic to alkaline ranges without chemicals, based on real-time measurements and predefined bands.
- ❑ Experimental results demonstrate enhanced germination and plant height of leafy greens and microgreens, together with significant suppression of algae proliferation in a hydroponic system.
- ❑ The system is supported by an integrated IoT control network enabling continuous sensing, closed-loop regulation, and operational robustness.
- ❑ Further work includes scaling the system for larger cultivation volumes and improving long-term stability.





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