



**Learning Journey**

**Agri–Open Innovation PARC**

**Happy Quality Farm**

**23rd Oct - 2nd Nov 2023**

# Agri-Open Innovation Forum

- Understanding the AOI ecosystem that encourages collaboration between Industry, Academia, and Government is crucial for nurturing innovative technologies.
- The ecosystem provides essential resources and expertise, facilitating the development of groundbreaking technologies, and subsequently, their successful commercialization.
- Visited the state-of-the-art technologies to support the Agri-tech industry (Sensors, Next Generation Fully Controlled Cultivation Unit and Cultivation cube).



# Agri-Open Innovation: Functional Food

The application of AOI technologies has played a key role in developing novel functional products which are approved by local authorities

Examples:

1. Soft Kale GABA (reduces blood pressure), Commercialized by Masuda Seed Co Ltd
2. In collaboration with the Shizuoka Prefectural Research Institute of Agriculture and Forestry, an Innovative Automatic Irrigation Control System with a unique weight sensor was developed. The system was commercialized to produce functional tomatoes (high sugar and GABA)
3. Mikkabi Mikan with high  $\beta$ - cryptoxanthin (stimulates bone metabolism)





# AOI Collaborative Innovative Projects

We learned about ongoing various collaborative projects:

- Keio University: AI-driven smart speed breeding for selection of Arabidopsis mutants capable of fertility at high temperature
- CULTA: Development of AI-driven breeding technologies using unique genomic and trait data
- RIKEN: Simple mapping-based quantification of a mock microbial community using total RNA-seq data, application of advanced photonics
- Innovative pot culture system coupled with plant growth data management system, high sugar content tomatoes were developed
- The Shizuoka Prefectural Research Institute of Agriculture and Forestry, an Innovative Supplemental Lighting with LED for functional tomatoes (high sugar and GABA) was developed



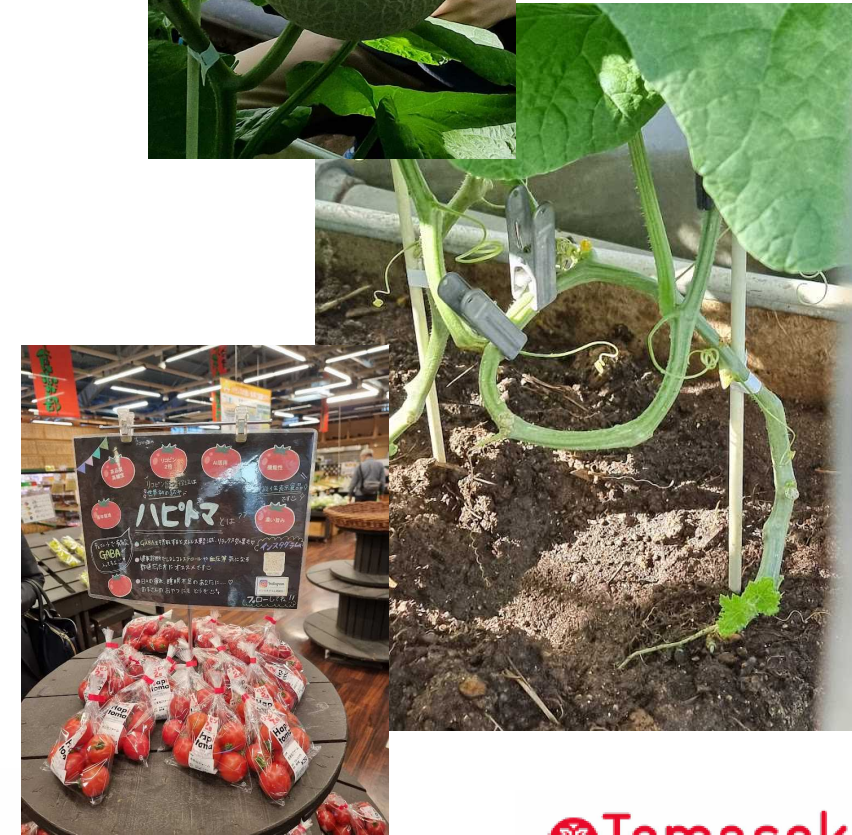
# Shizuoka Professional University of Agriculture

1. Visit to greenhouses:
  - Strawberry cultivation
  - Tomato cultivation
  - Flowers
2. Green Tea open farms
3. Tea processing facilities
4. Overview of specialised education in 2-year Junior College and 4-year Bachelor's degree curriculum in Agriculture



# Happy Quality Farm

- Marketing products with functional food label
  - GABA and Lycopene tomatoes
  - Brix value of tomato products
  - Dr Melon [Low potassium]
- Levels of these compounds are moderated with changes to
  - Environmental conditions
  - Irrigation Control
  - Creating water stress to increase sugar levels





# Happy Quality Farm

Our learning experiences in Happy Quality Farm:

- Method of seeding, transplanting, growing, harvesting and sorting tomatoes according to its sugar content
- Types of Control Systems in Greenhouse environment
- Ideal cultivation environment for Melons, Strawberries and Tomatoes



# Happy Quality Farm

Our learning experiences in Happy Quality Farm:

- Using Digital Twin and Virtual Reality (VR) as a training platform for crop harvesting
- Autonomous guided vehicles (AGV) for crop inspection, environmental monitoring
- AI Irrigation System utilizing camera vision, environmental sensor monitoring (Temp, humidity, Co2)
- Utilizing Innovative Devices for monitoring plant photosynthesis - Stomata Scope





## Other Farms We Visited

- Shiitake Mushrooms
- Kiwi and tea
- Melon
- Tomato
- Strawberry
- Flowers



## Areas of Collaboration

- **Research / Technology Sharing**

- Heat resistance/tolerant tomatoes to prevent loss in tomato production during summer
- Early detection of Yellow curl viral disease affecting tomato crops in Happy Quality
- Alternative growth medium for Melon (soil is laborious)
- Trial and optimising high-value Melon growth in Singapore
- Tested and proven technology adoption (AI Irrigation System, VR platform) for facility enhancement and learning engagement in SG IHLs

- **Academia**

- Staff and student exchange program to enhance research and technology capabilities
- Development of short courses for Singapore
- Articulation with university in Shizuoka for students from Singapore to further their higher/tertiary education in Agriculture



# Thank you for the opportunity!

We would like to express our deepest thanks to AOI-PARC and Happy Quality for hosting us these past two weeks. It has been a wonderful experience and we are very much looking forward to working together!

