

Plants X Cycle Division

Toward a Sustainable Circular Society

Building a sustainable circular society requires the effective use of the diverse functions and capabilities of plants. To achieve this goal, it is essential to explore not only well-studied model species but also the rich diversity of non-model and previously unexplored plants. Leveraging the University of Tsukuba's strengths in cutting-edge research on wildlife and non-model organisms, we seek to uncover the unique functions and capabilities of a wide range of plant species. Through these efforts, we aim to contribute to the realization of a sustainable, safe, and resilient circular society for the future.

Overview

We aim to establish a carbon-regenerative society that supports both human well-being and climate change mitigation by harnessing the power of photosynthetic organisms, including terrestrial plants, macroalgae, and microalgae (phytoplankton). Beyond converting carbon dioxide (CO₂) into valuable products through carbon transformation, we promote the conversion and long-term storage of naturally released organic compounds as recalcitrant organic matter, creating durable carbon sinks. Through this integrated approach, we seek to regenerate carbon while advancing a sustainable and prosperous society.

Regenerative Carbon

Plants, the photosynthetic foundation of life on Earth, sustain the global cycles of water, oxygen, and nutrients that support all living organisms. We seek to uncover the scientific mechanisms underlying these life-supporting cycles and make the value of food resources visible through science. By integrating advanced gene function analysis with field-based research, we elucidate the mechanisms that enable plants to thrive under environmental change and develop resilient plant varieties. Through these efforts, we aim to establish sustainable food production systems that enhance human well-being.

Circular Forest

Sustainable Circular Society

Everlasting Food

Forests are essential infrastructure for a sustainable society. We aim to make the values and functions of forest ecosystems visible through science, from the soil environment to the diverse communities of organisms they support. Based on this knowledge, we design and implement management strategies that enhance forest value while preventing ecosystem degradation. We also investigate how forest ecosystems respond to increasingly severe environmental change and envision the forests of the future through science-based prediction.

Mission

- We lead research to uncover the ecology of diverse wild plants and their roles in natural ecosystems.
- By discovering plant functions with the potential to benefit future society, we create innovations that contribute to building a sustainable circular society.

Members

- **Circular Forest**
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- **Regenerative Carbon**
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Recent Press Release



Uncovered the molecular evolution of the master factor regulating the root nodule symbiosis between plants and nitrogen-fixing bacteria



Succeeded to develop tomatoes with high sugar content, high GABA, and high vitamin C through genome editing



Discovery of a eukaryotic genome rich in "introns", non-coding DNA sequences



Ethanol spraying improves tomatoes' heat tolerance and sugar content



Revealed the differences in scaling relationships between individual respiration and weight in woody and herbaceous plants



Established a method to increase the expression level of recombinant proteins in lettuce