Studies on the Spatiotemporal Regulation of Plant Cell Dynamics・Research and Development of Biostimulants

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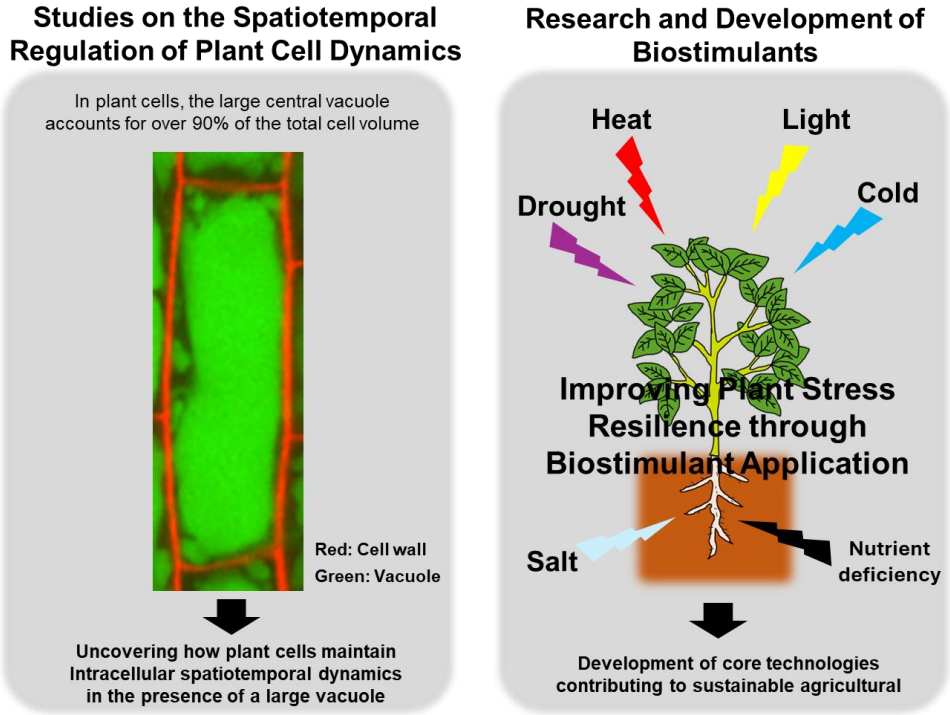

In contrast to animal cells, which exhibit minimal changes in size after cell division ceases, plant cells can expand their volume more than 100-fold following the cessation of cell division. This remarkable cellular growth is a major driver of plants' exceptional biomass productivity, which accounts for over 80% of the total biomass produced on Earth. Such vigorous cell expansion in plants is driven by the development of an organelle known as the **large central vacuole**. However, as this vacuole can grow to occupy more than 90% of the total cell volume, it also acts as a physical constraint that may hinder intracellular spatiotemporal dynamics. How plant cells regulate the dynamics of such a "double-edged sword" — the large central vacuole — and thereby optimize their intracellular architecture remains poorly understood. To address this question, we are employing cutting edge imaging technologies to investigate the dynamic behavior of vacuoles and their impact on cellular organization.

We are also engaged in the development of **biostimulant compounds** that enhance plant tolerance to environmental stress through interdisciplinary collaboration with researchers in chemistry. Through these efforts, we aim to contribute to society by advancing plant science for sustainable agriculture and environmental resilience.

Keywords： Cell growth, Cytoskeleton, Vacuole, 4D imaging, Biostimulant