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RESEARCH & COLLABORATION PROFILE

KEY WORDS Plant environmental adaptation, Plant immunity and nutrient signaling, Stress-regulated growth and flowering, Natural variation and functional genomics



Research Snapshot. Prof. Park investigates the molecular and cellular mechanisms by which plants sense environmental signals and coordinate stress adaptation, immunity, and growth and development. Her research integrates ion transport and nutrient signaling, flowering and circadian regulation, post-translational and epigenetic control, and genetic variation with expanding applications in *Arabidopsis*, *Solanum*, and other experimental systems.

RESEARCH EXPERTISE

- **Plant environmental stress adaptation :** Molecular and physiological mechanisms underlying plant responses to flooding, salinity, drought, low light, and other environmental stresses.
- **Stress-regulated growth and flowering :** Environmental regulation of plant growth, circadian signaling, and flowering transitions, with particular focus on flooding and hypoxia responses.

RECENT RESEARCH HIGHLIGHTS

- **K^+ nutrition and plant immunity:** Investigating how potassium availability and K^+ transport systems regulate ROS signaling and immune responses, with the goal of understanding the integration of mineral nutrition and pathogen defense.
- **Environmental stress and developmental adaptation:** Exploring how environmental stresses such as flooding and hypoxia regulate plant growth and flowering, with particular emphasis on the integration of stress signals with GIGANTEA (GI) and developmental pathways.
- **Mixotrophic dinoflagellate adaptation:** Investigating how mixotrophic dinoflagellates adjust photosynthetic and heterotrophic nutrition in response to environmental changes such as light and nutrient availability. Recent work highlights the nutritional plasticity that enables dinoflagellates to adapt to fluctuating marine environments

POTENTIAL COLLABORATION RESEARCH

Best-fit collaborator areas: crop physiology | AI-enabled plant phenotyping | NGS and bioinformatics | plant metabolomics | synthetic biology and environmental adaptation

- **1. Climate-resilient crop biology:** Identification and functional validation of genes controlling tolerance to salinity, drought, low light, temperature, and flooding by integrating physiological phenotyping, GWAS, transcriptomics, metabolomics, and genome editing.
- **2. AI-enabled plant phenotyping:** Development and application of AI- and image-based approaches for quantitative analysis of plant growth, morphology, stress symptoms, and developmental responses under diverse environmental conditions.
- **3. NGS and bioinformatics:** Collaborative analysis of genome- and transcriptome-scale datasets to identify stress-responsive genes, regulatory networks, and genetic variation associated with environmental adaptation.
- **4. Plant metabolomics and synthetic biology:** Metabolite profiling and identification of stress- and environment-responsive compounds, combined with metabolic engineering and synthetic biology to develop valuable-metabolite production platforms and investigate metabolic plasticity.

SELECTED RECENT PUBLICATIONS

- Inverse regulation of SOS1 and HKT1 protein localization and stability by SOS3/CBL4 in *Arabidopsis thaliana* (PNAS, 2024, 121, e2320657121.first author)
- S-acylated and nucleus-localized SOS3/CBL4 stabilizes GIGANTEA to regulate Arabidopsis flowering time under salt stress (Plant Cell, 2023, 35, 298–31, first author)

CONTACT

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REPRESENTATIVE RESEARCH FIGURES / SCHEMES

