Jae Sung Shim, Ph.D.

Professor of Crop Biotechnology

School of Biological Sciences and Technology, Chonnam National University, Republic of Korea

RESEARCH & COLLABORATION PROFILE |

KEY WORDS: Plant-environment interaction, Nutritional control of Plant development, Biotech crop



Research Snapshot. Prof. Shim's research interests are in plant molecular biology and biotechnology broadly. Recent research topics include application of genome editing technologies to improve quantity and quality of tomato fruits through optimizing nutrient use efficiency, metabolic flow, as well as growth-defense trade-offs.

RESEARCH EXPERTISE

- **Plant-environment interaction:** Response of plants to changes occurred in their habitat especially related to abiotic conditions.
- **Nutritional control of plant development:** Elucidation of molecular mechanism linking endogenous developmental regulation with external nutrient status.
- **Biotech Crop development:** Transgenic and genome editing based crop improvement
- **Biosensor development:** Development of conditional specific biosensor system, optimization of their sensitivity

RECENT RESEARCH HIGHLIGHTS

- **Metabolic control of stress tolerance (Plant Physiol 2023):** Based on metabolic changes occurred during drought, we isolate potential protective metabolite candidates. Further physiological approaches and molecular analysis, we confirmed BCAA driven drought tolerance mechanism in plants.
- **Nitrogen utilization in plants (Plant Physiol 2023):** elucidation of nitrogen driven transcriptional and post-transcriptional regulation of nitrogen uptake and source to sink allocation.
- **Lignin based stress tolerance (Front Plant Sci. 2023):** Utilization of lignin biosynthetic pathway to improve drought tolerance in plants.
- **Source to sink allocation (Appl Biol Chem. 2026):** Regulation of mobilization of photosynthetic assimilate.

POTENTIAL COLLABORATION RESEARCH

Best-fit collaborator areas: Plant-environment interaction | synthetic design of gene expression cassette | Genome editing | Woody plant biotech

- **1. Plant-environment interaction:** Collaborative research project aimed to understanding the molecular mechanisms underlying plant responses to environmental factors with the goal of identifying key regulatory pathway involved in plant immune responses and disease resistance
- **2. Synthetic design:** Collaborative research project focused on designing synthetic expression circuits in plants to enable both rational redesign of metabolic pathways and development of plant-based biosensor.
- **3. Genome engineering:** Application of genome editing technologies to enhance environmental adaptability of plants with focus on gene stacking and organellar editing.
- **4. Woody plant biotech:** Utilization of key plant developmental regulatory factors in wood plant biotechnology, aiming to enhance biomass production.

SELECTED RECENT PUBLICATIONS

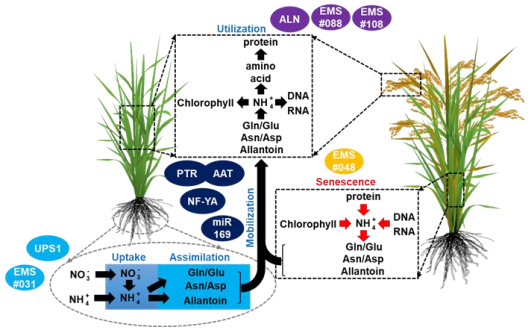
- **Plant Physiol. 2023. 194:491-510 —** The rice NUCLEAR FACTOR-YA5 and MICRORNA169a module promotes nitrogen utilization during nitrogen deficiency.
- **Plant Physiol. 2023. 191:1435-1447 —** DROUGHT-INDUCED BRANCHED-CHAIN AMINO ACID AMINOTRANSFERASE enhances drought tolerance in rice.
- **Front Plant Sci. 2023. 14:1116426 —** Modulation of lignin biosynthesis for drought tolerance in plants.

CONTACT

jsshim@chonnam.ac.kr | +82-62-530-0507

REPRESENTATIVE RESEARCH FIGURES / SCHEMES

Utilization of nutrient in plants



Nondestructive bio-sensor development

