Exploring regulators in nitrate signaling

Nitrogen is an essential element for plant growth. Among different nitrogen forms, nitrate is the critical nitrogen form in fertilizers that effectively enhance crop productivity. Plants can sense nitrate, and then induce gene expression, modulate root architecture, and regulate leaf expansion. However, the molecular mechanisms of nitrate signaling are unclear. To probe nitrate signaling, we have performed both genetic and functional genomics approaches to explore components. Previously, we connected a novel calcium-CPK (Calcium-dependent Protein Kinases) -NLP (NIN-like protein 7) signaling cascade to nitrate responses and revealed the function of Ca+2 sensor CPKs as master regulators. Lately, we demonstrated that NIN-like protein 7 transcription factor is a plant nitrate sensor. We also generated a genetically encoded fluorescent split-biosensor, mCitrine-NLP7, to enable visualization of single-cell nitrate dynamics in planta.