Series Seminar:
Frontiers in plant environmental response research

Exploring Novel Regulators in Nitrate Signaling

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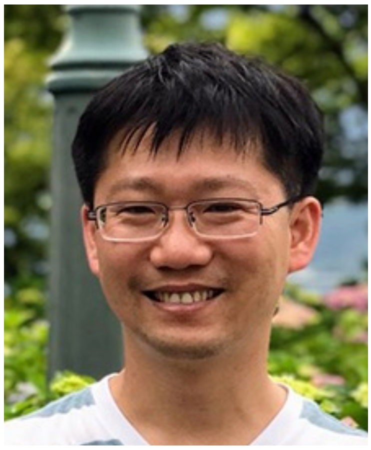

Date：January 19 (Thr), 2023
15:00 ～16:30

Place：Sci Agr build. （理農館）SA329

Most higher plants prefer to utilize nitrate as their primary form of nitrogen source. Besides being a macronutrient, nitrate also serves as a signal molecule. Nitrate induces nitrate responsive gene expression and promotes root elongation and leaf development. However, it is still not clear how plants sense nitrate and what is the molecular mechanisms of nitrate signaling. In our previous study, we found that nitrate triggers unique calcium waves and that calcium-dependent protein kinases (CPKs) act as calcium sensors to transduce nitrate signals. Furthermore, the key transcription factor NLP7 can be directly phosphorylated by CPK10/30/32 and retained in the nucleus to activate primary nitrate-responsive gene expression. Recently, we demonstrated that NLP transcription factors are the master regulators in nitrate signaling. From NLP-NIN chimera analysis, the N-terminus of NLP7 acts as a repressive domain in full-length NLP7 and is derepressed by nitrate. Additionally, we further show that NLP7 can bind to nitrate and act as a nitrate sensor. To visualize nitrate binding, we generated a genetically encoded fluorescent biosensor (sCiNiS) to detect nitrate binding in plants. The nitrate sensor domain of NLP7 is similar to the bacterial nitrate sensor NreA. Substitution of conserved residues in the ligand-binding pocket impairs the nitrate-triggered ability of NLP7 function.

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