

Experiment report from China interim trip

理学研究科・生命理学専攻 植物生理学グループ

博士後期課程 2年 Ding Ming

Destination: Nanjing Agricultural University, China

Travel period:2020.6.1~2020.11.26

Purpose: Investigation of H⁺ efflux rate and influx rates of PO₄³⁻, K⁺, and NH₄⁺ in rice roots regulated by plasma membrane(PM) H⁺-ATPase

Abstract: Plasma membrane (PM) H⁺-ATPase generates a membrane potential and H⁺ gradient across PM, and energizes multiple ion channels and various H⁺-coupled transporters for diverse physiological processes, such as nutrient uptakes in roots, stomatal opening, and phloem loading. In order to illustrate the function of PM H⁺-ATPase in regulating H⁺ and other ions uptake, we used MIFE system (College of biology, NAU) to determine the ions efflux or influx rate of rice roots. Here, I found that the nutrient uptakes, PO₄³⁻, K⁺, and NH₄⁺, and H⁺ efflux rate in rice roots were enhanced by PM H⁺-ATPase overexpression and decreased in knockout mutants. Furthermore, to change the expression level of PM H⁺-ATPase in plants, I performed modification of promoter regions of *OSA1* and *AHA2* genes, which are major PM H⁺-ATPase in rice and Arabidopsis, respectively, by CRISPR/Cas9 method. Now we have got 14 mutants of Arabidopsis plants. The CRISPR/Cas9 editing rate is 70% under all T0 plants.



Impressions: During the period of working in NAU, I have a deep understanding of MIFE system with the help of teaching assistant Yu Wang, and understand the current frontiers of plant nutrient research. At that time, I discussed with Prof. Yifeng xu and his students from school of Bio-Science and they gave me a lot of suggestions of my work which is helpful for my research in the future. In my co-supervisor's lab, I performed some experiments with his students, and we shared our ideas and technics with each other. I gained much experience from that. Totally, I think it's very meaningful for GTR student to Learn self-inexperienced area when go abroad.