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TEMASEK LIFESCIENCES LABORATORY

29 January 2018 (Monday), 4pm

The Auditorium (Level 1)

Hosted by: Dr Yin Zhongchao

Iron uptake, translocation and its regulation in crops

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I am a daughter of a reviewer in Japanese TV program “Iron chef” and have been working on iron nutrition in plants.

For living organisms, iron (Fe) is an essential metal element that plays a critical role in various biological processes. Plants take up Fe from the soil, where Fe is abundant but present predominantly as insoluble ferric hydroxides, thus Fe is scarcely available to plants. Plants utilize various chelators and transporters for Fe uptake and translocation. Mugineic acids family phytosiderophores (PS) are known to play a major role in Fe uptake in graminaceous plants. PS are secreted from the roots to chelate and solve ferric hydroxides in the soil. Efflux transporters, Transporter of Mugineic acids 1 (TOM1) family are involved in secretion of PS. PS are also involved in metal translocation in graminaceous plants. Nicotianamine (NA), a biosynthetic precursor of PS, is essential for safe and efficient metal translocation in both graminaceous and non-graminaceous plants. Yellow Stripe1-Like (YSL) family transporters are responsible for transport of metal-PS and structurally similar metal-NA complexes in plants.

To avoid a deficit of Fe, plants transcriptionally induce various genes involved in Fe uptake and translocation in response to low iron availability. Although the presence of intracellular Fe sensors that trigger or suppress the Fe deficiency response is predicted, their identity has not been clarified in plants. To identify these Fe sensors, we previously searched for Fe-binding regulators from rice, and found two Fe-and zinc-binding RING ubiquitin ligases, OsHRZ1 and OsHRZ2.

Recent Publications:

1. Senoura T, Emi Sakashita E, Kobayashi T, Takahashi M, May sann A, Masuda H, Nakanishi H, **Nishizawa NK**. The iron-chelate transporter OsYSL9 plays a role in iron distribution in developing rice grains. *Plant Molecular Biology*, in press (2017)
2. Yamauchi T, Yoshioka M, Fukazawa A, Mori H, **Nishizawa NK**, Tsutsumi N, Yoshioka H, Nakazono, M. An NADPH Oxidase RBOH Functions in Rice Roots during Lysigenous Aerenchyma Formation under Oxygen-Deficient Conditions. *Plant Cell*, 29: 775-790 (2017)
3. Bashir K, Nozoye T, Nagasaka S, Rasheed S, Miyauchi N, Seki M, Nakanishi H, **Nishizawa NK**. Paralogs and mutants show that one DMA synthase functions in Fe homeostasis in rice. *Journal of Experimental Botany*, 68: 1785-1795 (2017)