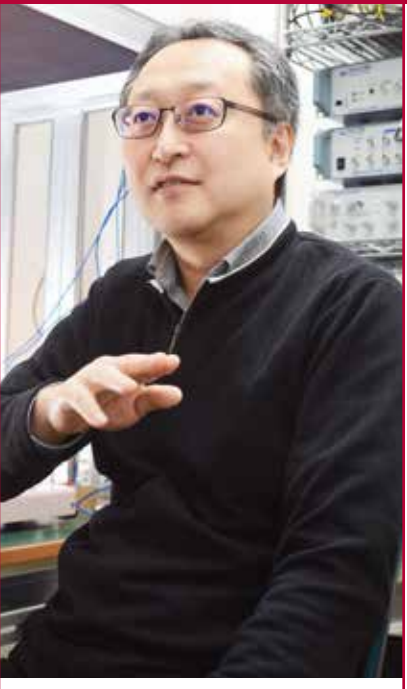
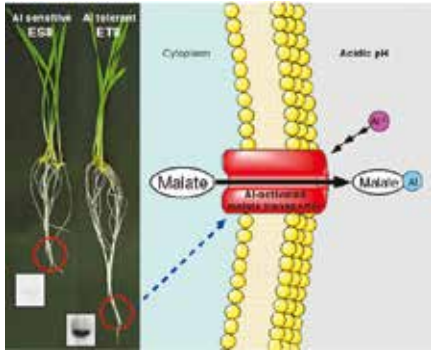


Assoc. Prof.
SASAKI Takayuki

Research on function and structure of plant-specific malate transporters

Aluminum (Al) ion is a major inhibitory factor of plant growth in acidic soils which comprise almost 40% of the world arable land. Toxic Al cations (Al^{3+}) rapidly inhibit root growth and prevent subsequent uptake of water and nutrients. The mechanisms of Al toxicity and tolerance are analyzing using a cultured cell system and whole plants. Especially Al-tolerance mechanism, wheat *ALMT1* gene encoding Al-activated malate transporter was found by our group, and demonstrated as Al-tolerant as well as acidic-soil tolerant gene, for the first time in crops. In addition, since the *ALMT* gene and its homologues have been found only in plants, the diversity of physiological functions for individual *ALMT* genes was elucidated as recent studies. The molecular details of the structure and functions and the expression mechanisms of these transporters are now studied.



A gene encoding aluminum (Al)-activated malate transporter (*ALMT1*) regulates Al tolerance of wheat.

It was previously shown that Al tolerance in wheat (*Triticum aestivum* L.) is correlated with the Al-activated efflux of malate which chelates and detoxifies Al cations around root apices. To isolate the gene involved in this mechanism, Sasaki et al. (2004, Plant J.) examined a pair of near-isogenic wheat lines that differed in Al tolerance at a single genetic locus, and found a gene which shows greater expression in the root apices of ET8 (the Al-tolerant line) than that of ES8 (the sensitive line), as depicted in the photograph. The gene is named *ALMT1* which encodes a novel transporter protein facilitating the Al-activated efflux of malate and is a major Al-tolerant gene of wheat.