[O11] Direct-seeded Rice in Asia-Oceania Region

Chair: Yoichiro Kato (The University of Tokyo, Japan)
Chair: Virender Kumar (International Rice Research Institute, Philippines)
Thu. Sep 9, 2021 9:45 AM - 11:45 AM Room 1 (Oral) (Field Crop Production)

10:55 AM - 11:10 AM

[O11-05]Marker-Assisted Breeding for Improving Seedling Establishment under Flooded Conditions in Direct-Seeded Rice

(Invited Speaker)

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Direct-seeded rice helps meet the challenges caused by water and labor shortages, and time and cropping area conflicts. Here, we discuss our discoveries of two quantitative trait loci (QTLs) in studies aimed at improving seedling establishment under flooded conditions in direct-seeded rice. Low oxygen concentrations in flooded paddy fields cause poor seedling establishment in direct-seeded rice. *qACE3.1* is a novel QTL for coleoptile elongation under anaerobic conditions that we detected on chromosome 3 of a chromosome segment substitution line substituted with Koshihikari in the IR64 genetic background. Subsequent examination of the expression levels of genes encoding enzymes involved in starch degradation and fermentation revealed that *qACE3.1* may be involved in fermentative metabolism. In high-latitude areas in East Asia, rice seedling establishment is inhibited by low temperatures and anaerobic stress. *qESS11* is a novel QTL for seedling establishment in soil at low temperatures that we detected on chromosome 11 in a cross between Koshihikari and Awa-akamai. Although introduction of *qESS11* into a near-isogenic line improved seedling establishment in soil at low temperatures, pre-harvest sprouting was observed and grain productivity and quality were reduced. The pre-harvest sprouting was addressed by introducing QTLs for seed dormancy into the near-isogenic line. Thus, by using a gene pyramiding strategy and molecular markers, we have successfully developed breeding materials with improved seedling establishment in direct-seeded rice.