Submergence tolerant rice varieties development and impact

High-yielding varieties developed during the "Green Revolution" have played a major role in increasing rice production, consequently improving food-security and reducing poverty, especially in Asia. These varieties were mostly vulnerable to abiotic stresses that limited their adoption and potential in rainfed areas. Submergence tolerant rice is an example of a successful development and dissemination of abiotic-stress resistant varieties. A major gene conferring tolerance was identified in a traditional Indian land race. The *SUB1* gene was introgressed through marker assisted backcrossing into widely grown Asian cultivars. Because the gene did not have negative effects on yield or quality, these new varieties could be rapidly released and widely disseminated. The seminar discusses the impact these cultivars have had and the research needed to make improvements in the technology.

David Mackill was Director for Genetics and Breeding, Cocoa R&D, Mars Wrigley until his retirement in 2022. He is currently an Adjunct Professor in the Plant Sciences Department at the University of California, Davis. He was Principal Scientist, Rainfed Lowlands Program Leader and Head of the Plant Breeding Genetics and Biotechnology Division at the International Rice Research Institute (IRRI) during 2001 to 2011. He and his colleagues identified the *Sub1* gene from traditional rice varieties that conferred tolerance to 2 weeks or more submergence. Using a marker assisted backcrossing approach, submergence-tolerant varieties were developed and have been adopted by several million farmers since 2009. He is Fellow of the American Society of Agronomy, Crop Science Society of America, American Association for the Advancement of Sciences, and Honorary Fellow of the Crop Science Society of the Philippines. He is recipient of the Innovation Prize for Agricultural Technology of the American Society of Plant Biologists, and the Award of Distinction from the UC Davis College of Agriculture and Environmental Sciences; and is a Tech Award Laureate for International Development.