

SEMINAR

NUS – IRRI Seminar Series



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The Sub1 story and beyond: breeding flood tolerant rice towards 2025

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Hosted by Prof Prakash Kumar

Submergence is an important major abiotic stress causing major yield losses in the rainfed lowlands affecting about 10–15 million ha of rice fields in South and South East Asia. Yield losses and damages caused by submergence have been estimated to be around US \$1B every year. Therefore developing new varieties that are tolerant to submergence is a high priority at the International Rice Research Institute (IRRI). Considerable progress in breeding new tolerant rice varieties has been made during the last decade due to the identification of a major quantitative trait locus (QTL) controlling this trait which was named SUB1. Using marker assisted backcrossing, this gene was subsequently incorporated into many extremely popular Asian mega-varieties with a high level of precision and in a much shorter time compared to using conventional methods. However despite the successful adoption of Sub1 varieties, there are still many challenges ahead for breeders to develop improved varieties for flood prone areas including improving tolerances to other types of flooding, combining multiple abiotic stresses together such as salinity and drought, disease and insect resistances, agronomic traits, grain quality and yield. Identifying and validating QTLs for these traits will provide essential information for molecular breeding activities. Exploiting new germplasm and the use of new technologies especially DNA markers and improved phenotyping methods will be essential to complement conventional breeding efforts. International collaboration to co-ordinate, evaluate and develop new breeding material targeted to key regions will also be critical. Given the number and frequency of flooding events may increase in the future due to climate change, an effective and efficient co-ordinated global plan is required to develop new varieties for the 21st century.

Dr. B. C. Y. Collard is a Scientist at the International Rice Research Institute (IRRI) responsible for developing new rice varieties for flood-prone areas in Asia.

Since completing his PhD degree in crop molecular genetics at the University of Melbourne, he has over 12 years research experience in plant breeding and molecular genetics research in cereal and grain legume crops in Australia. He was a postdoctoral research fellow at the International Rice Research Institute (IRRI) from 2005 to 2006. He returned to Australia to lead the National Durum Wheat Improvement Program from 2009 to 2011, before returning to IRRI in 2011, as the rice breeder for flood-prone environments. He has published many research articles regarding the application of DNA markers in plant breeding, including several widely-read review articles on this topic. He has been invited as a guest lecturer for several courses in Genetics, Molecular Biology and Crop Genetics at several institutions in Australia and in Asia, and currently co-ordinates IRRI's annual rice breeding training course.

