

Category	: International Rice Research Conference
Select Theme	: Systems physiology
Keyword 1	: Phenomics
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Title of Entry	: Genetic improvement of rice seedling vigour for dry direct-seeded conditions
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Select only one type of presentation	: 15 minute oral presentation
Abstract	: Rice is the most important staple crop in South and Southeast Asia. Some farmers in these regions are switching their cultivation method from puddled transplanted rice to dry direct seeded rice (DSR), primarily because the availability of labour and water is in decline and their associated costs are rising. Agronomists have identified several traits that are necessary for rice to perform well in dry direct-seeded conditions and among these is seed/seedling vigour. For DSR, seeds must be able to germinate rapidly at deeper soil depth using available soil moisture and mesocotyl elongation must be sufficiently strong in both rate and duration to break through strong soil. Rapid development of a long and thick root system is also important for DSR to promote water and mineral uptake under the variable soil moisture conditions. Modern semi-dwarf varieties of rice have been bred for transplanting and there has been relatively little selection for seed/seedling vigour. Through a collaborative project between researchers at Rothamsted Research and the John Innes Centre in the UK and the International Rice Research Institute (IRRI) in the Philippines, we have used new lab-based high-throughput live-imaging phenotyping platforms to measure germination rate and skotomorphogenic seedling growth and morphology of >700 accessions from the 3000 Rice Genomes Project. The performance of these accessions under dry direct-seeded conditions has also been assessed in parallel in field experiments, where seed has been drilled to different depths. The new phenotyping platforms will be described and the results of the data analysis (inc. GWAS) will be presented. This comprehensive phenomic analysis of seed/seedling vigour will identify useful germplasm and molecular markers to accelerate breeding of DSR varieties.

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