Entry No. 8RGS-0080

Category	: 8th Rice Genetics Symposium
Select Theme	: Genetic improvement
Endorsement email	:
Keyword 1	: Genetic gain
Keyword 2	: Genomic selection
Keyword 3	: Hybrid rice
Title of Entry	: Whole Genome Prediction (WGP) - a promising new tool for accelerated genetic gains in Hybrid Rice
Presenting author	: Raman Babu
Presenting author email	: raman.babu@pioneer.com
Co author 1	: Mahantesh Patil, Sayan Das, Vinod Sharma, Dindo Tabanao, Chandrashekhar Somanagoudra, Mahantesh Gangashetti, Anand Pandravada
Co author 2	:
Affiliation presenting author	: Corteva Agrisciences P Ltd
Affiliation 1	: Corteva Agrisciences P Ltd
Affiliation 2	:
Select only one type of presentation	: 15 minute oral presentation
Abstract	: The success of hybrid rice technology is crucial for ensuring food security in the Asia-Pacific (AP region. However, outside of China, hybrid rice is currently cultivated in less than 10% of the rice growing area owing to a variety of technical as well as market and policy constraints. The commercialisation of hybrid rice in the region is promising but the progress of continued development of superior hybrids and their adoption is painfully slow. Narrow genetic diversity, inadequate yield gains over existing popular rice varieties under well-managed conditions and sub-optimal grain quality are some of the technical challenges that need to be overcome to make the hybrid rice option more attractive to the rice farmers and consumers. Whole Genome Prediction (WGP) is an exciting new tool that promises to accelerate genetic gains by aiding heterotic pool formation, predicting high yielding newer combinations and improving grain quality and stress tolerance with enhanced precision. WGP involves establishing training and test populations in a dynamic manner using germplasm that is representative of the target breeding programs and evaluating them in appropriate target environments on a continuous basis. Corteva Agriscience, an agriculture division of DowDuPont business has successfully optimized several WGP strategies, which is resulting in resource-efficient identification of high yielding combinations, tailored to mee the requirements of prevailing hybrid rice market segments in the region. The marker-trait heritability and prediction accuracies were relatively high (0.6 to 0.9) for grain quality and biotic

stress tolerance traits as compared to grain yield under optimal conditions (0.3 to 0.6). The WGP strategy that we have optimized allows for fixing the known large effect alleles while simultaneously selecting for multiple unknown loci of cumulative effects for a range of traits. When implemented along with a number of other tools in the breeding pipeline such as Rapid Generation Advancement (RGA), Accelerated Trait Introgression (ATI) and precision phenotyping for biotic and abiotic stress tolerance, WGP promises to amplify the genetic gains manifold.

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