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Category	: International Rice Research Conference
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Title of Entry	: Rice Lodging Resistance: Measuring it by Blaster, Explaining it with Component Traits, Simulating it with SAMARA model
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Select only one type of presentation	: 15 minute oral presentation
Abstract	: Lodging is a frequent yield-reducing factor in irrigated rice. We studied lodging resistance of 20 transplanted genotypes in the Philippines in 2014 and 2015 using a specifically developed Blaster, a mobile system subjecting plots to a wind channel (30, 45 and 60 km/h) and artificial rain at dough grain stage (ca. 15 days after flowering). Morphological, anatomical, biochemical and mechanical component traits of rice stem were measured. Strong genotypic differences in lodging could be related to plant height or stem length, biomass, stem vigor (dry weight/length), stem and leaf sheath thickness, stem bending moment and stem biochemical composition. The crop model SAMARA was adapted to simulate lodging resistance and weather-dependent actual lodging. The simulated traits predicting lodging resistance were crop fresh weight, mean stem length and dry weight, as well as an arbitrary, genotypic, lodging parameter capturing residual (unexplained) genotypic variation in lodging resistance. SAMARA predicted correctly that lodging resistance is lowest at mid-grain filling. The model calibrated for morphological traits alone predicted about 50% of genotype differences in lodging incidence (2014), and this result was validated for 2015 with similar results using independent data. Fitting the arbitrary lodging parameter for 2014 data improved lodging predictions for 2015 slightly (validation). A posterior analysis showed that the fitted lodging resistance parameter was correlated with the measured concentration of stem cell wall compounds (positive) and non-structural compounds (negative). The results showed that (1) lodging of transplanted rice can be reproducibly studied with Blaster technology, (2) lodging resistance is composed of numerous component traits, and (3) the new version of SAMARA is able to predict varietal differences in lodging resistance from a subset of component traits. Next steps will be to include stem chemistry more explicitly in SAMARA, and to validate the model’s capability to predict natural lodging in variable environments. Read Less

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