***Aus* sub-population of *Oryza sativa* L.: a unique source for improving rice sustainability and climate resiliency related traits in elite US rice varieties**

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With the goals of improving sustainability of rice production and reducing its environmental impacts, conventional season-long flood irrigation practice is being replaced by water-saving technologies such as alternate wetting and drying (AWD) and furrow irrigation. However, current US elite varieties have limited genetic variation for traits that allow growers to go beyond safe-AWD soil moisture levels without penalizing yield and quality. Relative to global rice diversity, US rice varieties and breeding lines have a very narrow genetic pool. Thus, to fill this critical gap, we assembled the *Aus* Diversity Panels (ADP), one comprised of non-colored pericarp accessions (ADP1) and the other colored pericarp accessions (ADP2). The ADP1 was evaluated for several agronomic and physiological traits under soil moisture levels up to -80 kPa over multiple years. Marker-trait associations were identified using genomic variation data from the 3000 rice genomes project and high-performance computational resources provided by the USDA ARS SCINet system. Photosynthetically active biomass at early and late stages of growth and development, which is an important trait for seedling vigor and associated with weed suppression under AWD, was comprehensively studied and will be presented. We demonstrate that the ADP1 is a unique genetic resource which has great potential for identifying genetic variations (novel genes/alleles) associated with traits that improve water sustainability while increasing yields and grain quality. Also, we present several candidate genes for future validation of their dynamic roles in water sustainability and climate resiliency of rice and their potential for deployment in US breeding programs.