[O32] Drought Physiology

Chair: Junichi Kashiwagi (Hokkaido University, Japan)

Thu. Sep 9, 2021 2:30 PM - 4:30 PM Room 3 (Oral) (Abiotic Stress for Crop Production)

2:30 PM - 2:50 PM

[O32-01]Rice Drought Breeding Has Selected for Longer Flag Leaves and Lower Stomatal Density

(Invited Speaker)

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The breeding strategy of direct selection for yield under drought has resulted in the release of a number of drought-tolerant varieties in Asia. Characterizing the physiological mechanisms behind the improved yield under drought through that strategy will provide insight to mechanistic targets for complementing the existing drought tolerant breeding pool. In this study, we measured flag leaf dimensions in breeding trials in Bangladesh, India, and Nepal. The drought breeding lines and released drought-tolerant varieties showed consistently longer flag leaves and lower stomatal density than the drought-susceptible check IR64. The drought and well-watered treatments at each site showed stronger groupings than sites within treatments for these traits. In a principal component analysis (PCA), flag leaf length grouped with rainfall during reproductive stage and soil water status, whereas flag leaf width grouped with soil physical properties (% clay, bulk density, soil water retention). In detailed characterization at IRRI, flag leaf width was most affected by season (dry or wet season) and grouped with grain yield in the PCA. However, canopy temperature under drought and harvest index across treatments showed the strongest correlations with grain yield. These results reveal the physiological traits that have been most strongly selected upon while conducting direct selection for yield under drought, and suggest additional strategies for further improvement of drought tolerance in rice based on phenological progression of drought response in respect to environmental conditions.