Floral trait variation for cold tolerance in a rice population at booting and flowering stages

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Abstract

A major constraint facing the temperate rice industry in Australia and elsewhere is the occurrence of low temperature events particularly during the reproductive stage (booting and flowering), leading to reduced fertility and yield. Improved understanding of cold tolerance in terms of underlying floral traits will lead to increased efficiency in breeding for cold tolerance. Two controlled temperature glasshouse experiments compared 120 genotypes from F6 Kyeema//Kyeema/NorinPL8 (KKN) population when exposed to cold air temperature (21/14°C day/night) at the booting and flowering stages. The aim was to identify key components of floral architecture particularly anther dehiscence and their associations with spikelet sterility (SS) across the two reproductive stages.
A highly significant genotypic difference existed in SS in both booting and flowering, with flowering stage having higher average SS. A significant positive association existed between SS of flowering and booting (r=0.47**) with 11 genotypes performing consistently well and genotypes identified with greater cold tolerance than currently available commercial varieties. Highly significant negative correlations existed in both flowering and booting stage between SS and all the floral traits determined. The number of dehisced anthers had the highest correlation coefficient with SS in both stages, which accounted for 58 and 44% of variation in SS on a genotype mean basis at booting and flowering stage cold respectively. At booting stage, pollen number in anther as well as possibly their quality further differentiated cold tolerant and susceptible genotypes

Keywords
spikelet sterility, early microspore, pollen in anther, anther dehiscence,