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ABSTRACT



82-6: Endogenous Root Auxin Accumulation Drives the Expression of Daytime and Nighttime Water-Saving Traits in a Wheat Mapping Population.

Monday, November 5, 2018

03:05 PM - 03:20 PM

Baltimore Convention Center - Room 313

In wheat, restricted transpiration rate (TR) under high vapor pressure deficit (VPD) has been shown to increase yields under terminal drought conditions. Furthermore, new evidence indicates that such behaviour is amplified by reducing nocturnal transpiration (TR_N). We have shown that such limitation involves a decrease in root hydraulic conductivity, xylem vasculature size and a lack of mercury-sensitive aquaporin (AQP) population. In this work, we examined the hypothesis of involvement of root auxins to explain the link between root hydraulics and canopy TR. This was motivated by the discovery of root-specific genes involved in auxin synthesis and xylem differentiation underneath a major QTL controlling TR responses to VPD in a wheat mapping population descending from parents that exhibited contrasted levels of drought tolerance, root hydraulic conductivities and TR restriction under high VPD.

We selected eight lines which spanned the entire range of nighttime and daytime TR responses to VPD in this population. On those lines, we examined auxin and ABA contents in the roots and the leaves during both times of the day, in relation to hydraulic traits including whole-plant TR, plant hydraulic conductance (K_{Plant}), slopes of TR responses to VPD and several leaf anatomical traits. Leaf auxin and ABA concentrations during daytime and nighttime were not correlated with any of the examined traits. In sharp contrast, daytime root auxin concentrations were found to be strongly and negatively correlated with daytime TR, K_{Plant} and the slopes of TR response to VPD. Similarly, nighttime root auxin levels significantly and negatively correlated with TR_N . The findings provide a 'hormonal link' between root hydraulic restrictions and canopy TR and reveal for the first time a potential role for root auxins accumulation in regulating daytime and nighttime water use, thereby modulating the expression of a water-saving trait that has been associated with enhanced yields under drought.

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