Poster 17. Molecular mapping of the stem rust resistance gene Sr6 on chromosome 2DS in wheat.

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The stem rust resistance gene *Sr6* confers a high level of resistance against a wide range of stem rust races in North America. The expression of *Sr6* resistance is influenced by temperature, light intensity, and genetic background of the recipient genotype. Here, we report the identification of molecular markers linked to *Sr6* on the short arm of chromosome 2D in two mapping populations. One population of 136 F_2s and their $F_{2:3}$ families from the cross 'Chinese Spring/ISr6-Ra' and 140 recombinant-inbred lines from the cross 'MN98550/MN99394' were screened for stem rust reaction in the seedling stage. In both populations, resistance to stem rust was conferred by a single gene that was postulated to be *Sr6* based on parental reaction to *Puccinia graminis* f. sp. *tritici* races. In the Chinese Spring population, a bulked segregant analysis was used to screen 418 SSR markers that covered the entire genome of wheat. Four markers, *Xwmc453*, *Xcfd43*, *Xcfd77*, and *Xgwm484*, were mapped within a chromosome region that spanned 9.7 cM. The closest markers, *Xwmc453* and *Xcfd43,* were linked to *Sr6* at distances of 1.1 cM and 1.5 cM, respectively. In the 'MN99394/MN98550' population, these four markers spanned 6.4 cM, and the closest markers, *Xcfd43* and *Xwmc453*, were 1.3 cM and 1.7 cM away from *Sr6*, respectively. The closest markers identified in both populations proved to be useful for marker-assisted selection of *Sr6*.

Poster 18. Leaf epicuticular wax improves heat tolerance in wheat.

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We are investigating the role of leaf epicuticular wax as a heat-avoidance mechanism in wheat. Higher epicuticular wax deposition in the leaf increases reflectance and may help to reduce leaf temperature, stomatal conductance, and improve water-use efficiency. Thirteen adapted cultivars of wheat were grown in the greenhouse. The wheat lines were subjected to a heat treatment under well-watered conditions at 10 DAP for 2 days at 38°C/20°C day/night temperatures. Leaf reflectance was measured with a Unispec spectral analysis system and leaf epicuticular wax was quantified at 10 DAP, 12 DAP, and 15 DAP. Leaf temperatures and stomatal conductance were recorded at midday during the heat treatment. Yield data from the wheat cultivars also were recorded. Statistical analyses indicate that the leaf epicuticular wax content is correlated significantly to improved temperature depression, reduced stomatal conductance, and yield stability parameters. Although some cultivars increase wax deposition and reflectance during heat treatment, no statistically significant increase in reflectance was observed nor were the two traits correlated. Continued statistical analysis may resolve this issue. Although stomatal conductance was negatively correlated with epicuticular wax content, like wax, it too also is positively correlated with temperature. From the correlation studies conducted so far, we may conclude that leaf epicuticular waxes may play a more efficient role in reducing leaf temperatures and improving heat tolerance in terms of yield stability in wheat, as apposed to increasing stomatal conductance and water loss. On going studies will identify QTL regulating leaf epicuticular wax accumulation in wheat and integrate this map with ongoing mapping studies that are defining QTL regulating reproductive-stage heat tolerance in terms of yield and end-use quality stability.