

Durable Leaf Rust Resistance in Wheat

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Spring and winter wheat cultivars that have been highly resistant to leaf rust or have been resistant after many years of cultivation were crossed and backcrossed to the leaf rust susceptible spring wheat Thatcher. Backcross (BC₁) F₂ families were tested for segregation of leaf rust resistance in seedling plants and in adult plants with specific leaf rust races. BC₁F₂ plants with resistant infection types were advanced to BC₁F₃ and BC₁F₄ generations and tested for infection type as seedlings or as adult plants. The leaf rust resistance genes in the BC₁ lines were identified by comparison of infection types to different races with the near-isogenic Thatcher lines and by a PCR based marker diagnostic for *Lr34*. The spring wheat cultivars Norm (*Lr1*, *Lr10*, *Lr13*, *Lr16*, *Lr23*, *Lr34*) and Wheaton (*Lr10*, *Lr13*, *Lr23*, *Lr34*) developed at University of Minnesota have been highly resistant for over 15 years. The spring wheat Knudson (*Lr3*, *Lr10*, *Lr13*, *Lr16*, *Lr23*, *Lr34*) developed by Agri-Pro has been highly resistant since release in 2002. The highly resistant spring wheat Briggs from South Dakota had genes *Lr13*, *Lr16*, *Lr30*, and *Lr34*. Genes *Lr16*, *Lr23*, and *Lr34* are common in U.S. spring wheat cultivars and combinations of these genes condition high levels of leaf rust resistance. Americano 25e, a landrace derived cultivar from Uruguay, was determined to have *Lr3*, *Lr16*, an unidentified seedling resistance that was ineffective to most leaf rust races, and an unidentified adult plant resistance gene that provided effective resistance in rust inoculated field plot tests. Cultivar Americano 44d had at least one unidentified adult plant resistance gene that provided effective resistance in field plots. Leaf rust resistance genes were also identified in the soft red winter wheat cultivars Coker 9663 (*Lr9*, *Lr10*, *Lr14a*) and Pioneer 26R61 (*Lr13*, *Lr14b*, *Lr26*).