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Molecular cytogenetic identification of a wheat (*Triticum aestivum*)-American dune grass (*Leymus mollis*) translocation line resistant to stripe rust

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ABSTRACT. *Leymus mollis*, a perennial allotetraploid (2n = 4x = 28), known as American dune grass, is a wild relative of wheat that could be useful for cultivar improvement. Shannong0096, developed from interspecific hybridization between common wheat cv. Yannong15 and *L. mollis*, was analyzed with cytological procedures, genomic *in situ* hybridization, stripe-rust resistance screening and molecular marker analysis. We found that Shannong0096 has 42 chromosomes in the root-tip cells at mitotic metaphase and 21 bivalents in the pollen mother cells at meiotic metaphase I, demonstrating cytogenetic stability. Genomic *in situ* hybridization probed with total genomic DNA from *L. mollis* gave strong hybridization signals in the distal

region of two wheat chromosome arms. A single dominant *Yr* gene, derived from *L. mollis* and temporarily designated as *YrSn0096*, was found on the long arm of chromosome 4A of Shannong0096. *YrSn0096* should be a novel *Yr* gene because none of the previously reported *Yr* genes on chromosome 4A are related to *L. mollis*. This gene was found to be closely linked to the loci *Xbarc236* and *Xksum134* with genetic distances of 5.0 and 4.8 cM, respectively. Based on data from 267 F_2 plants of Yannong15/Huixianhong, the linkage map of *YrSn0096*, using the two molecular markers, was established in the order *Xbarc236-YrSn0096-Xksum134*. Shannong0096 appeared to be a unique wheat-*L. mollis* translocation with cryptic alien introgression. Cytogenetic stability, a high level of stripe-rust resistance, the common wheat background, and other positive agronomic traits make it a desirable donor for introducing novel alien resistance genes in wheat breeding programs, with the advantage of molecular markers that can be used to confirm introgression.

Key words: Genomic *in situ* hybridization; *Leymus mollis*; Stripe rust; Translocation

