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**Characterization of *Ae. uniaristata* chromosomes and
the transfer of aluminium tolerance to wheat by
induced recombination**

A thesis submitted by

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ABSTRACT

Aluminium tolerance in wheat and characterization of *Ae. uniaristata* chromosomes. 1998. Nayyer Iqbal.

Chromosome 3N of *Ae. uniaristata* ($2n=2x=14$, NN) was reported as a source of tolerance to high levels of aluminium for wheat but also as carrying an undesirable brittle rachis gene (Miller *et al.*, 1993).

Restriction fragment length polymorphism (RFLP) analyses were performed on wheat-*Ae. uniaristata* addition lines to identify the homoeology of the added chromosomes. Homoeologous groups were assigned to the added *Ae. uniaristata* chromosomes and chromosomal rearrangements were also studied. The morphology of chromosome 3N was shown to be the result of an asymmetric pericentric inversion. No wheat like 4/5 or 4/7 translocations were identified in *Ae. uniaristata*. Random amplified polymorphic DNA (RAPD) and microsatellite markers were also identified for individual *Ae. uniaristata* chromosomes.

Fluorescent *in situ* hybridization (FISH) with repetitive sequences and genomic DNA (GISH) were used to confirm the morphologies of individual *Ae. uniaristata* chromosomes and to establish the physical locations of the repetitive sequences. An ideogram was produced which shows the locations of probes pSc119, pAs1 and pTa71 on *Ae. uniaristata* chromosomes. Both RFLP and *in situ* studies indicated a close relationship between the N genome of *Ae. uniaristata* and the D genome of wheat.

The homoeologous pairing control in wheat was manipulated to induce recombination between chromosome 3N of *Ae. uniaristata* and chromosome 3A of wheat. Six recombinants carrying different size fragments from both chromosomes were identified and characterized by RFLP analysis. Brittle rachis gene was present in three of these recombinants and all three also carried *Xpsr598* and *Xpsr1196* homoeoloci from *Ae. uniaristata*. Further study is required to assess the aluminium tolerance of these recombinants