Molecular Diversity of *Elymus trachycaulus* Complex Species and Their Relationships to Other *Elymus* Species

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Abstract: *Elymus trachycaulus* complex species are known for their morphological variability, but little is known about the genetic basis of this variability. The delimitation of taxa within the complex has been controversial and difficult. *Elymus trachycaulus* is predominantly self-pollinating, and lacks clear morphological boundaries between it and *E. alaskanus*. Another controversial taxonomic issue of *E. trachycaulus* is the relationships of this complex species to non-North America *E. caninus.* The phylogenetic relationships among the *E. trachycaulus* complex, and their systematic relation to other *Elymus* species remain unknown. Genetic diversity of *E. trachycaulus* complex and the systematic relationships among the *E. trachycaulus* complex species, and their relationships with *E. caninus*, *E. alaskanus* and *E. mutabilis* was studied using random amplified polymorphic DNA method. The phylogenetic relationships among the *E. trachycaulus* complex, and their systematic relation to other *Elymus* species were characterized using rbcL and ITS sequences. The results indicated that higher genetic variation was detected within *E. trachycaulus* complex species. Eurasian accessions are as variable as the North American ones. The RAPD data support the treatment of *E. caninus* and *E. trachycaulus* as distinct taxa. *Elymus trachycaulus* complex are more related to each other than to other *Elymus* species.