

DNA Polymorphism and Quantitative Trait Variation in *Elymus* Squirreltail Grasses of Western North America

S. R. Larson and T. A. Jones

USDA-ARS Forage and Range Research Laboratory, Logan, Utah

Taxonomists generally recognize two species and four subspecies of *Elymus* squirreltails. These short-lived perennial grasses are distributed across diverse environments of western North America. The disarticulating rachis and long diverging awns promote wind dispersal across open landscapes. Prolific seed production via self-pollination enables proliferation of squirreltail colonies. Naturally adapted to disturbed or barren sites, squirreltail grasses are increasingly used for rangeland revegetation. Objectives were (1) to compare DNA polymorphism and quantitative trait variation among natural and commercial germplasm sources and (2) to identify and circumscribe natural germplasm groups. Twelve traits were measured for 5 *E. elymoides* ssp. *brevifolius*, 17 *E. elymoides* ssp. *elymoides*, and 4 *E. multisetus* accessions. Nine traits were measured for another 21 *E. elymoides* ssp. *brevifolius*, 10 *E. elymoides* ssp. *elymoides*, and 16 *E. multisetus* accessions. Amplified DNA fragment length polymorphism was evaluated within and among 22 *E. elymoides* ssp. *elymoides*, 24 *E. elymoides* ssp. *brevifolius*, and 13 *E. multisetus* accessions, including selected accessions from trait evaluations. The *E. multisetus* taxon was genetically well defined and distinct from other squirreltail grasses. Both DNA fingerprinting and quantitative trait evaluations classified all *E. elymoides* accessions into ssp. *elymoides* and four discrete subgroups of ssp. *brevifolius*. DNA polymorphism, quantitative trait variation, and geographic distances were correlated within *E. elymoides* over a wide amplitude of landscapes. However, more than one taxon or subgroup may occur in the same geographic region or site. Well-characterized cultivars of these squirreltail taxa and subgroups will provide abundant, affordable, and appropriate sources of high-quality seed needed for rangeland revegetation.