INTRAPOPULATION VARIABILITIES OF *BROMUS DIANDRUS* ROTH. AND *BROMUS RIGIDUS* ROTH.

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Abstract. We have some knowledge of genetic variability between populations of the *Bromus* spp. across southern Australia but little information on variability within populations and their genetic controls. The genetic basis of this variability will determine the rate of evolution of the populations resulting from selection pressures due to farm practices, such as herbicide application and cultural practices.

Seeds were collected from thirty sites in Western Australia between 1982 and 1987. Polymorphism within populations was observed for the trait ± hairs on the lemmas and paleas. Reciprocal crosses established that palea pubescence was controlled by a single dominant gene. This polymorph was used to study the frequencies of outcrossing in field and experimental populations.

The type of polyploidy in the two species was determined by examination of chromosome configurations and chiasmata at metaphase I of pollen mother cells (1). Chromosome counts in cells of root tips confirmed (2) that *Bromus diandrus* was an octaploid (2n=8x=56) and *Bromus rigidus* was a hexaploid (2n=6x=42). Both species are, probably, alloploids with simple disomic inheritance.

Self-compatibility was investigated by bagging inflorescences during anthesis. Although *Bromus diandrus* was self-compatible, 57-61% of bagged florets set seed, estimates of the frequency of outcrossing in the sampled populations were less than 1% in 1986 and 1987. This anomaly was explained by the observation that florets were cleistogamous, or when chasmogamy was observed the anthers had dehisced prior to exsertion. No species-hybrids were observed in the field and attempts at artificial hybridization were unsuccessful.

Seedlings from eight populations of *Bromus diandrus* and five of *Bromus rigidus* were sown into a sandy soil with 40µg chlorsulfuron/kg soil or 500µg simazine/kg soil. A leaf bioassay based on the inhibition of leaf lengths of seedlings at 15°C established that there were differences between populations in responses to the two herbicides and that heritabilities for the trait were 0.13 to 0.23 for chlorsulfuron and 0.14 to 0.56 for simazine. The leaf bioassay for simazine was correlated with seedling survival. There is potential for shifts towards herbicide tolerance although we did not observe tolerant populations among those sampled, perhaps due to limited selection pressures in the sampled populations.

1. Jackson R C and Casey J. 1983. Cytogenetic analyses of autopolyploids: Models and methods for triploids to octaploids. American J Bot. 69, 487-501.
2. Moore D M. 1982. Flora Europaea checklist and chromosome index. CUP.