

**Background:** Seed weight is a key fitness-related trait associated with plant adaptation and is commonly targeted in plant breeding.

**Aims:** We evaluated seed weight variation within and between *Trichloris crinita* and *Trichloris pluriflora* across their geographical ranges in Argentina.

**Methods:** Genetic variation in seed weight was evaluated through a common garden experiment. To examine the possible role of such variation in local adaptation, we compared the seed weight of plants of populations raised in the common garden with seed weight variation and ecogeographical variables across their original habitats. We also evaluated experimentally the effects of seed weight variation upon osmotic stress tolerance at germination.

**Results:** Variation in seed weight existed in both species. Such variation had a genetic basis in *T. crinita* related to several ecogeographical variables. Larger seeds of *T. crinita* were associated with more stressful environments and produced larger seedlings under both osmotic stress and non-stress conditions.

**Conclusions:** Our results suggest that seed weight variation in *T. crinita* is likely adaptive, with large seed having an advantage during early developmental stages, particularly under stressful conditions. Such knowledge should prove helpful in selecting the most suitable populations for restoration and plant breeding.

