

THE EFFECTS OF HERBICIDES ON IN VITRO SEED GERMINATION OF NATIVE KANGAROO GRASS (*THEMEDA TRIANDRA*) AND INTRODUCED WEED SPECIES, SERRATED TUSSOCK (*NASSELLA TRICHOTOMA*) AND CHILEAN NEEDLE GRASS (*STIPA NEESIANA*)

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Abstract Serrated tussock has been identified by the Department of Natural Resources and Environment as one of Victoria's and Australia's major weed problems. Chilean needle grass has been identified as a serious emerging weed threat. Both weeds present problems in arable land, non-arable land and native grasslands, where land has been partially degraded.

Invasion by serrated tussock has affected a kangaroo grass dominated grassland remnant located on the Victoria University of Technology (VUT) St. Albans campus. Chilean needle grass has also begun to invade the site. Procedures for the removal of serrated tussock using herbicides and replacement by kangaroo grass using seed-bearing hay have been developed on this site (Phillips and Hocking 1995). However, the effects of herbicides on the germination and early growth of these native and exotic grasses remains unclear. Winter spraying of herbicides kills mature plants and prevents re-establishment of weeds for several months (Phillips and Hocking 1995), but the reasons for this are unknown. There is little information on the germination of serrated tussock (Healy 1945—quoted in Campbell 1982) and recent attempts to germinate serrated tussock in vitro have been largely unsuccessful (Patterson 1994).

Studies at VUT have found that serrated tussock seeds under growth cabinet conditions do not all germinate together, but undergo progressive germination over a 16 week period. Maximum germination achieved was approximately 80% in all replicates of several trials.

Initial germination attempts for Chilean needle grass were largely unsuccessful. Tetrazolium staining showed a high viability for both serrated tussock and Chilean needle grass seeds (between 80–95%). Subsequent tests indicated that Chilean needle grass seeds were dormant and that this dormancy can be broken through scarification and de-hulling techniques. This suggests a hull imposed dormancy. In vitro toxicity tests using seeds of kangaroo grass, serrated tussock and Chilean needle grass are also underway at VUT, to investigate the effects of

herbicides on seed germination and seedling growth. Recently drafted OECD guidelines (Burchett and Pulkownik 1994) for terrestrial plant toxicology testing state that wild type species are not preferred as test species because the broad genetic variation in germination rates can lead to undue increases in the time required to run tests. The VUT studies are attempting to compensate for this by increasing the initial germination rates of wild type seeds using methods designed to increase initial germination rates and break dormancy. Furthermore, a comparison of seed viability using tetrazolium chloride staining before and after exposure of seeds to herbicides, may determine whether ungerminated seeds have been killed by the herbicides, or whether germination has only been inhibited by exposure to herbicides.

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