

Comparative seed strike of temperate, sub-tropical and native grasses and herb species under contrasting environments in southern Australia

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Introduction The role of deep-rooted perennials in reducing recharge to mitigate dryland salinity has been recognised widely in Australia recently. Poor seedling establishment is a key limiting factor for the expression of genetic merit for some perennial pasture species. Nie *et al.* (2004) investigated seedling establishment, and its relationship with rainfall and temperature, of a range of perennial grass and herb species in southern Australia. This paper reports seed strike of a range of perennial pasture species in 2 contrasting environments. There was significant interaction between species and site on seed strike. Environmental conditions caused different establishment outcomes within a diverse set of perennial forage species.

Materials and methods Seed of 24 grass and herb varieties was sown at Yatchaw (142°01'E, 37°50'S) and Warrak (143°07'E, 37°14'S) in Victoria, Australia in Aug-Sep 2002. The soil was a duplex clay loam (Olsen P = 29 mg/kg) at Yatchaw, and a sedimentary sandy loam (Olsen P = 17 mg/kg) at Warrak. The rainfall from sowing to seedling counts was 124 and 90mm for Yatchaw and Warrak, respectively. The sown species included 6 temperate grasses, 5 sub-tropical grasses, 3 native grasses and 2 herbs. Seedlings were counted 6-9 weeks after sowing. Seed strike was calculated as the proportion of established seedlings from the number of viable seed sown. The analysis was performed using the method of residual maximum likelihood in Genstat.

Results There was an interaction ($P < 0.01$) in seed strike between species and site (Table 1). Most temperate grasses had a higher seed strike at Warrak than at Yatchaw whereas the seed strike of sub-tropical and native grasses and the 2 herb species was higher at Yatchaw than at Warrak. This was attributed to quicker responses of temperate grasses to 17mm of rain immediately after sowing at Warrak. Overall, most temperate grasses and the 2 herb species at Yatchaw appeared to have higher seed strike than the herbs at Warrak, which were higher than the native and sub-tropical grasses. The number of viable seed, based on recommended rates, varied with species from 75-884 seeds/m². Mean seedling density varied from 13-242 seedlings/m².

Table 1 Viable seed sown (VS, seeds/m²), mean seedling density (MSD, seedlings/m²), and seed strike (%) of some grass and herb species 6-9 weeks after sowing in spring 2002. Data for seed strike were transformed (T) and back transformed data are presented as percentages

| Species | Variety | VS | MSD | Seed strike (T) | | Seed strike (%) | |
|--------------------------------|------------|-----|-----|-----------------|--------|-----------------|--------|
| | | | | Yatchaw | Warrak | Yatchaw | Warrak |
| <i>Phalaris aquatica</i> | Australian | 278 | 124 | 3.8 | 3.8 | 44 | 44 |
| <i>Dactylis glomerata</i> | Porto | 405 | 72 | 2.3 | 2.2 | 16 | 15 |
| <i>Festuca arundinacea</i> | Fraydo | 884 | 242 | 2.7 | 3.1 | 22 | 30 |
| <i>Lolium perenne</i> | Avalon | 422 | 197 | 3.6 | 3.8 | 39 | 45 |
| <i>Lothopyron ponticum</i> | Dundas | 304 | 123 | 3.4 | 3.8 | 36 | 45 |
| <i>Bromus stamineus</i> | Gala | 240 | 141 | 3.8 | 4.5 | 44 | 62 |
| <i>Microlaena stipoides</i> | Wakefield | 381 | 70 | 2.3 | 1.9 | 16 | 11 |
| <i>Pennisetum clandestinum</i> | Whittet | 75 | 13 | 1.7 | 1.6 | 8 | 8 |
| <i>Plantago lanceolata</i> | Tonic | 247 | 75 | 3.5 | 2.8 | 36 | 24 |
| <i>Chichorium intybus</i> | Grouse | 370 | 99 | 3.2 | 2.6 | 32 | 20 |
| <i>s.e.d.</i> | | | | 0.52** | | | |

Conclusions Because of the strong interaction in seed strike between species and site, special attention should be given to variations in environmental conditions while establishing the perennial species. Sub-tropical grass, native grass and herbs generally had a poorer seed strike under the more stressful environment at Warrak.

References

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