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Rehabilitation of grasslands through perennial grass recruitment within existing swards

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Key words : recruitment, phalaris, seeds, herbage mass, bare ground

Introduction Phalaris (*P. aquatica*) is an introduced C3 grass species, widely sown in southern Australian temperate regions. Phalaris is drought tolerant, can withstand extended periods of heavy grazing, performs well in poorly drained and waterlogged soils, and provides good quality grazing for all types of livestock. Phalaris is known to produce large quantities of seed, but little recruitment within phalaris stands has been reported (Lodge, 2004). When stands thin, encouraging natural recruitment could be more cost-effective than reseeding grasslands. The low natural recruitment of phalaris has been attributed to competition from annual grasses and legumes, preventing the weak phalaris seedling from establishing, and to a high level of seed harvesting by ants. The ideal microsites for recruitment are poorly understood. It is often noted that phalaris spreads naturally along roadsides in south-eastern Australia though the mechanisms are not understood. This paper presents findings on the recruitment of phalaris within existing pastures.

Materials and methods A factorial combination of seed delivery mechanisms (A1: uncut, A2: cut & remove, A3: slash & leave), seed addition (B1: nil, B2: + seed, B3: + insecticide) and site preparation (C1: nil, C2: light scarifying, C3: + herbicide) were used. Seedling numbers were recorded 2 weeks after a significant rainfall event (50mm over 2-3 days) and monitored for survival 6, 24 and 48 weeks after first emergence.

Results and discussion Highest seedling numbers resulted from the nil intervention control, where phalaris was allowed to flower, set seed and to remain standing (Figure 1). Cutting the tall grass and either removing the cut material or leaving it on the soil surface failed to achieve as many seedlings. The uncut treatment could result in slightly lower vapour pressure deficits compared with cutting and leaving the herbage mass on the surface. This suggests that the microclimate at micro-sites where seedlings establish may be initially more important than competition for soil moisture and nutrients, for this species under dry conditions. That view was supported by regression analysis (assuming Poisson distribution) which showed that less bare ground and greater herbage mass resulted in more seedlings (Figure 2). Seedling survival was though poor due to drought conditions over the next year.

Conclusions Leaving swards undisturbed may be preferable to slashing and building up a layer of litter on the ground for recruitment of new phalaris plants. This affect may arise from subtle changes in humidity at ground level; changes that are very difficult to measure. Conditions for ideal seedling emergence may differ from those for seedling survival.

Reference

Lodge, G. M., (2004). Seed dormancy, germination, seedling emergence, and survival of some temperate perennial pasture grasses in northern New South Wales. *Australian Journal of Agricultural Research*. 55, 345-355.

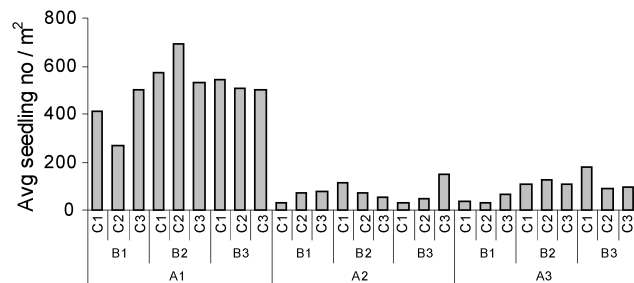


Figure 1 Initial emergence of phalaris seedling across treatment combinations in March 2007.

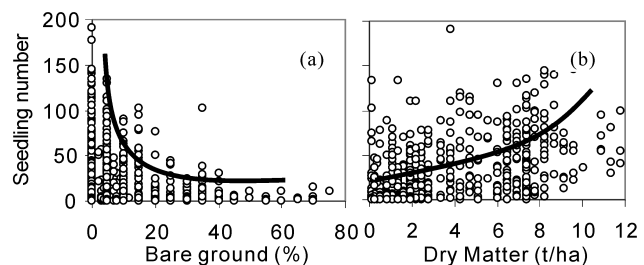


Figure 2 Effect of (a) bare ground and (b) dry matter on seedling numbers/m². Lines of best fit using all treatments were significant.