Understanding the mechanism behind invasion of African lovegrass

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Introduction

African lovegrass (*Eragrostis curvula*) is a C4 perennial grass, native to southern Africa, that was accidentally introduced into Australia in the late 1900s as a contaminant of pasture seed. Its utility for pasture improvement and soil conservation was explored because of its recognised ability to grow in areas of low rainfall and on nutrient-poor sandy loams. Several different agronomic types have now been intentionally introduced across Australia.

African lovegrass is now found in all Australian states and territories. It is a declared weed in 33 council areas of New South Wales, a declared pest plant in the ACT and Tasmania and a Regionally Prohibited Weed in 5 out of 11 regions in Victoria. Victoria has also placed it in the very serious threat category (Carr *et al*. 1992). In Queensland, it has yet to be declared except under local law in the Eidsvold shire (Leigh and Walton, in press).

The problem

African lovegrass is unpalatable for stock once mature tissue develops, which happens soon after seeds are produced. Stock forced to feed on this species through intensive management have shown poor weight gain as the crude protein content is less than 3%. It is very difficult to control once present, as it accumulates a large seed bank quickly (Voight *et al*. 1968), as it can produce seed at any time of the year in response to even small rainfall events. Lovegrass seed is also easily dispersed, being less than 5mm in size.

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Large-scale field trial

In an endeavour to unravel the mechanisms responsible for the invasion of African lovegrass, a factorial field trial has been established in a grazed secondary pasture that has been dominated by this species since 1998. The following treatments will be compared to allow us to isolate the contributing mechanisms responsible for this recent dominance: (1) grazing and non-grazing; (2) fertiliser application; (3) spraying with herbicide (glyphosate-ipa application rate of 10mL/L); (4) slashing; and (5) introducing seed of other grasses [pitted bluegrass (*Bothriochloa decipiens*) and kangaroo grass (*Themeda triandra*)]. The treatments are arranged in a randomised, split-plot design with grazing at the block level.

Over the next 2 years, changes in species composition in response to the treatments will be observed, as well as changes in soil and biomass nutrient levels, soil water availability, soil respiration rate and the establishment frequency of the sown species. Photosynthetic rates and stomatal conductance of African lovegrass will be compared with those of other more desirable grass species in response to rainfall events and low and high soil nutrient levels.

Glasshouse trial

In a glasshouse study, the competitive ability of African lovegrass will be compared with those of 2 other grass species. In addition, the effect of water (pulsed or continuous supply) and soil nutrient (high or low) availability on the competitive ability of African lovegrass will be assessed. Preliminary results have shown that African lovegrass has an 80% germination rate after 2 days of coming into contact with only small amounts of water.

Expected outcomes

These studies should increase our understanding of how mechanisms such as disturbance, competition and seed dispersal limitations contribute to the dominance of an invasive weed. This should allow the development of practical recommendations on how to more effectively manage an introduced grass, like African lovegrass, to restore more desirable pasture species.

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References

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