Unravelling the mechanisms behind the invasion of an introduced and now undesirable grass species

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Introduction The introduction of *Eragrostis curvula* (African Lovegrass, hereafter Lovegrass) for pasture improvement across Australia has not been successful. Instead Lovegrass, a C_4 perennial grass originating from Southern African, has proven unpalatable to stock and to have low nutritional value if stocks do eat it. It has spread prolifically along roadsides, stream banks, conservation areas and pastures. Because control efforts have not been effective, our aim was to determine the putative mechanisms responsible for the dominance of Lovegrass, specifically disturbance (selective grazing) and competition.

Methods To achieve this aim, we established a factorial field trial with a split-plot design in a secondary pasture grazed by cattle and dominated by Lovegrass. The pasture is located in the Millmerran region, Queensland, Australia. The average rainfall of this area is 600 mm/year in summer (October to April) and the soil is classified as yellow sodosols. Four large blocks (50m by 50m) were established, with two fenced and two unfenced to create grazing/no grazing treatments. In each of these blocks, 48 smaller plots (5m by 5m) were established. The following treatments in all combinations (four replicates per block) were applied: (1) fertilizer (N-P-K), (2) herbicide and slashing and (3) seed addition (two native species *Bothriochloa decipiens* (Pitted bluegrass) and *Themeda australis* (Kangaroo grass)). From October 2006 to April 2008, we are monitoring changes in plant community composition and abundance (point intercept method) in response to these treatments.

Results Results from the first year of measurements (October 2006 to April 2007) have shown that simply preventing grazing does not encourage the re-establishment of native species [Figure 1(b)], but instead increases Lovegrass abundance particularly when fertiliser is applied [Figure 1(a)]. The herbicide treatment was the most effective at reducing the abundance of Lovegrass [Figure 1(a)] and when grazing was prevented was also the most effective treatment at encouraging native species to re-establish [Figure 1(b)]. The slashing treatment was also effective at reducing Lovegrass abundance, but did not encourage native species establishment. The seed addition treatment was not successful so the established native species emerged from the seed bank or dispersed into the plots naturally.

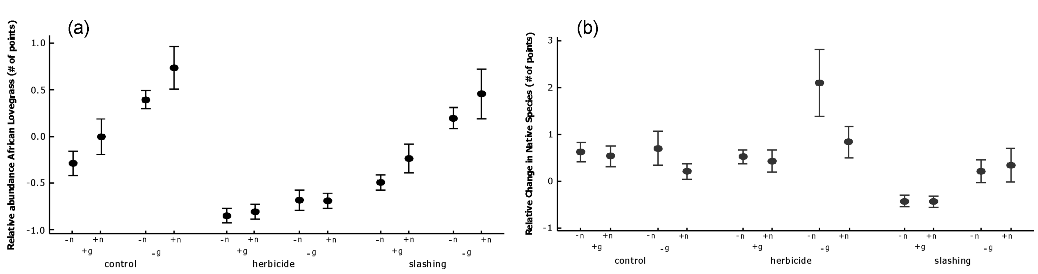

Figure 1 *(a) and (b): the relative change in abundance (a) Lovegrass and (b) native species one growing season after the grazing, nutrients, herbicide and slashing treatments were established. + n= fertiliser, − n= no fertiliser, + g= grazing permitted, − g= grazing not permitted, control= no treatment and bars indicate one standard error.*

Discussion Several recent studies have proposed that invasion is facilitated by either disturbance or competition (MacDougall and Turkington, 2005, Seabloom et al., 2003). Our preliminary results (although this may change after second year measurements) suggest that the invasion of Lovegrass may be explained by both disturbance and competition. We found that only when the pressures of selective grazing were removed (disturbance) and Lovegrass killed (competition removed), did native plants re-establish. The addition of nutrients to the soil did not favour native species, but instead favoured Lovegrass establishment.

References

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