Interactions between grazing practices and bellyache bush

(Jatropha gossypiifolia): preliminary results

F. Bebawi1,2, R. Mayer3, J. Vitelli1,2, and K. Davis1

1 Queensland Department of Natural Resources, Mines and Water, Tropical Weeds Research Centre, PO Box 187, Charters Towers, Queensland 4820, Australia
2 CRC for Australian Weed Management, PMB 1, Glen Osmond, South Australia 5064, Australia
3 Department of Primary Industries and Fisheries, PO Box 1085, Townsville, Queensland 4810, Australia

Summary

A competition trial was established to determine the impact of five simulated grazing pressure regimes [nil (control), low (pasture cut at 40 cm height), medium (pasture cut at 20 cm height), high (pasture cut at 10 cm height) and extreme grazing (pasture completely removed)] and four bellyache bush densities [control (nil plants m⁻²), low (2 plants m⁻²), medium (6 plants m⁻²), and high (12 plants m⁻²)] on pasture yield and bellyache bush mortality. No significant differences in pasture yield were observed in plots dominated by buffel grass (Cenchrus ciliaris), although pasture yield tended to be up to 11% lower in plots infested with bellyache bush compared to plots without bellyache bush. Bellyache bush mortality differed significantly between grazing pressure regimes, irrespective of the density of bellyache bush. In plots void of pasture (extreme grazing treatment) less than 1% of bellyache bush plants died. In contrast, an average of 53% mortality occurred in nil, low, medium and high grazing pressure treatments. The results suggest that bellyache bush is likely to dominate areas faster if they are void of pasture.

Keywords

Bellyache bush, competition, Jatropha gossypiifolia.

INTRODUCTION

Bellyache bush (Jatropha gossypiifolia L.) is one of the most poisonous and aggressive weeds in the dry tropics of north Queensland (Parsons and Cuthbertson 2001). Its economic impact on the livestock industry has been reported in Australia (Tothill et al. 1982). However, little is known about the impact of grazing practices on pastures infested with bellyache bush. The relevant management question here is: can we affect competitive relationships by adopting different grazing practices to disadvantage bellyache bush and improve the prospects of productivity of pasture species? To answer this question a competition trial was conducted in north Queensland to determine outcomes of simulated grazing practices and bellyache bush densities on both pasture yield and bellyache bush mortality.

MATERIALS AND METHODS

A two-factor experiment involving five simulated grazing pressures and four densities of bellyache bush was implemented using a completely randomised ‘additive’ design with 10 replications. The trial was established at ‘Southern Cross Creek’ (20°01′06″S, 146°10′05″E), a property located 13 km north-west of Charters Towers, north Queensland. The ‘additive’ design assumed that one of the species (the standard – pasture species) was maintained at constant density and the other species (bellyache bush) was subsequently added at a range of densities. The experimental unit area was 1 m², and was separated from adjacent units within the site by 1 m paths, free of pasture.

Buffel grass (Cenchrus ciliaris L.) dominated the pasture species within the experimental site. The three most common species, buffel grass, Indian couch (Bothrichloa pertusa (L.) A.Camus) and sabi grass (Urochloa mosambicensis (Hack.) Dandy), were found in 100%, 38% and 28% of the plots, respectively. The pasture was subjected to five simulated grazing pressure regimes that included nil (control), low (pasture cut at 40 cm height), medium (pasture cut at 20 cm height), high grazing (pasture cut at 10 cm height) and extreme grazing (pasture completely removed). Frequency of cutting depended on season and how rapidly the pasture was growing at that time, with cuts normally averaging three per year. Pasture dry weights were determined after oven drying at 80°C for four days.

Prior to the commencement of the trial, bellyache bush was grown from seed in plastic pots (5 cm × 5 cm × 12 cm) filled with garden soil. Bellyache bush seedlings were later transplanted within the site in spring (September 2002) at four densities: control (nil plants m⁻²), low (2 plants m⁻²), medium (6 plants m⁻²), and high (12 plants m⁻²). At the time of transplanting the plants were approximately 20 cm high. In the simulated grazing treatments the bellyache plants were left uncut. This paper reports preliminary results of pasture yield and bellyache bush mortality 36 months after transplanting.
RESULTS AND DISCUSSION
There were no significant individual or interaction effects of grazing pressure and bellyache bush density (P >0.05) on pasture yield 36 months after implementation of treatments. However, irrespective of grazing pressure, pasture yield reductions of up to 11% were detected in infested bellyache bush plots compared with the nil bellyache bush plots (Figure 1).

The limited impact of imposed treatments on pasture yield may be associated with the competitiveness of buffel grass, the dominant species in this trial. Other weed species such as parthenium weed (Parthenium hysterophorus L.) have also failed to take over paddocks dominated by buffel grass (O’Donnell and Adkins 2005). Whether native grass species would display a similar response as buffel grass to the grazing pressure regimes and densities of bellyache bush implemented in this trial is unclear and warrants investigation.

Though valued highly as a pasture species by pastoralists, buffel grass is being regarded by some as one of Australia’s most serious environmental weeds (Humphreys 1967, Humphries et al. 1991, McIvor 2003, Clarke et al. 2005, Jackson 2005). For example, in a study by Jackson (2005) paddocks dominated by buffel grass had fewer herbaceous species than non-buffel grass sites.

The aggressiveness of the pasture dominated by buffel grass at low, medium and high simulated grazing pressures is demonstrated by the significantly high (P ≤0.05) average mortality (53%) of bellyache bush plants across all densities compared with less than 1% mortality in plots void of pasture (i.e. extreme grazing treatment) (Figure 2).

These results have highlighted the importance of maintaining a competitive pasture that can compete with bellyache bush seedlings. Areas void of pasture are likely to be overrun with bellyache bush relatively faster than those that have been grazed at a level that maintains good pasture cover. While the buffel grass dominant pasture was able to adversely affect bellyache bush even under high simulated grazing pressures, native pastures may require lower grazing pressures in order for them to remain competitive against weeds such as bellyache bush.

ACKNOWLEDGMENTS
Special thanks are extended to The Queensland Department of Natural Resources, Mines and Water and the CRC for Australian Weed Management for providing financial support and to Ralph Woodard and family (Branmore Station) for allowing us to use their property for research purposes. We also thank Dr S.D. Campbell for reviewing the manuscript. The technical assistance of R. Stevenson, K. Risdale, and C. Andersen is also acknowledged.

REFERENCES
Humphreys, L.R. (1967). Buffel grass (Cenchrus ciliaris) in Australia. *Tropical Grasslands* 1, 123-34.


