The economic consequences of prickly acacia (*Acacia nilotica* subsp. *indica*) control for a beef business in the northern downs region of Queensland

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The exotic woody weed, prickly acacia (*Acacia nilotica* subsp. *indica;* PA) is spread over millions of ha of Mitchell grasslands in the central west and north west of Queensland. It is having an ongoing negative effect on livestock carrying capacity and the associated productivity and profitability of affected properties (Carter *et al.* 1989). There has been a lack of economic analysis at the property-level to determine the most economically advantageous approach to PA control for a private landholder.

Economic consequences of managing PA were examined for an example grazing business (16,000 ha, 2,000 AE) in the northern Mitchell grass downs. The property was assumed to have the following areas of infestation severity: (1) 5%, high (2) 15%, moderate; (3) 60%, low; and (4) 20%, very low infestation. The corresponding pasture production within each of these categories, expressed as % of potential production without prickly acacia infestation, was: (1) 10%, (2) 50%, (3) 75%, (4) 100%. Firstly, the value of controlling PA at a rapid rate over the entire property was investigated (property-level treatment in Year 1, plus ongoing maintenance over 30 years). Secondly, the best investment of an initial $10,000 in Year 1, plus ongoing maintenance costs over 30 years, was examined. Beef cattle herd models incorporated in a farm-level, partial discounted, cash-flow framework (Holmes *et al.* 2017) were used to evaluate the strategies.

Property-level control resulted in positive returns of 8-13% (Table 1). However, the value of treatment was negatively related to the number of years prior to the onset of a series of wet years capable of causing the rapid increase in PA. Additionally, more than $1.3 million cash deficit over the first 4 years of treatment would be beyond the capacity of many managers to fund and hence prevent them from adopting a rapid approach to property-level control.

Table 1. Returns over 30 years for investment in the property-level control of prickly acacia in Year 1 plus maintenance

Factor	5 years to wet years	10 years to wet years	20 years to wet years
Annualised net present value	$129,300	$92,000	$44,600
Peak deficit (with interest)	-$1,328,300	-$1,328,300	-$1,328,300
Year of peak deficit	4	4	4
Payback period (years)	13	17	not calculable
Internal rate of return (%)	13	11	8

An alternative approach of targeting a set expenditure ($10,000 in this example) in Year 1 to PA control with ongoing maintenance over 30 years, showed positive returns of 6-20%, dependent on infestation level and number of years prior to the onset of wet years (Table 2 gives data for 5 years before the onset of a series of wet years).

Table 2. Returns over 30 years for control of prickly acacia (PA) at different densities, and assuming a series of wet years occurs 5 years after treatment, by investment of $10,000 in Year 1 plus maintenance

Density of PA	Area treated (ha)	Annualised net present value	Internal rate of return (%)
High density	40	$1,900	6
Moderate density	100	$25,500	16
Low density	200	$50,600	20
Very low density	4,000	$130,100	18

These analyses indicate that the most economically efficient approach is to treat and maintain areas with minimal PA infestation first, moving on to the increasingly higher levels of infestation as funds allow. The critical criteria would be that (1) each treated area needs to be effectively maintained with follow-up treatment, and (2) re-infestation from the more heavily infested paddocks on the property must be strictly prevented.

References

Carter JO, Bolton MP, Cowan DC (1989) *Queensland Agricultural Journal.* **115**, 121-126.
Holmes WE, Chudleigh F, Simpson G (2017) 'Breedcow and Dynama herd budgeting software package.' (DAF: Qld)

The study was funded by the Queensland Government Drought and Climate Adaptation Program.