
Case studies—property management approaches



Section 3

Case studies—property management approaches

Prickly acacia management on Zara

Peter Spies with Charles Reddie

Background

Charles and Brenda Reddie purchased their property, Zara, in 1991. The 21 340-hectare property (with an additional 1300 ha of stock route) is located on the upper Landsborough Creek, south of Hughenden. Zara is mainly Mitchell Grass Downs, with some gidyea and boree country bordering the downs and running up to low escarpments. There are no bore drains on the property—water is piped from two bores on Landsborough Creek.

The Reddies purchased Zara knowing that it was infested with prickly acacia—about 8900

ha of low density, about 1600 ha of medium density, and a further 800 ha of high density infestations. The latter severely hindered mustering and greatly reduced pasture production.

According to Charles, ‘Prickly acacia was thickest along the creek... with big trees.’ Lighter, more open infestations were found further away from the creek, on the Mitchell Grass Downs, and to the edge of the escarpment. The weed was not restricted to the heavier clay soils—there were some heavier infestations on the lighter, loamy soils



Peter Spies

▲ Recently treated prickly acacia seedlings in Gidyea country



of the gidyea and boree country on top of small rises. 'It loves that sort of country. It doesn't go into the scrub that much but does go into the scattered scrub', he said.

The Reddies run approximately 800 cattle and 4000 sheep on the property, with about one third of the income currently derived from sheep. 'Before we bought this place it was nearly all sheep... they spread the seed, but not as well as cattle. Cattle are worse ...they pass most of the seeds—you notice six to eight prickly acacias come up from the one cowpat. They don't digest a great lot... they pass most of it', Charles said.

When asked how prickly acacia was introduced to Zara, Charles said he believed it had originally been planted there prior to his ownership.

The Reddies quickly realised that prickly acacia had to be managed to:

- make mustering easier and reduce costs
- contain and then reduce the level of infestation
- reclaim heavily infested areas for pasture production
- prevent or minimise infestation of unaffected or lightly infested areas
- preserve and increase property value
- reduce costs of damage to vehicle tyres—\$500 per year at the time.

The Reddie family has invested significantly in managing prickly acacia over the past decade. Though initially large, this investment now requires only minor financial and labour input to safeguard it.

History of control

Since purchasing the property, the Reddies have undertaken a major control program that has involved pulling or pushing the larger areas of prickly acacia. With the help of contract labour and 'labour barter' days, they have also carried out initial chemical and follow-up control using basal bark spraying, cut stump and soil application techniques. They have also trialled aerial spraying in conjunction with the Tropical Weeds Research Centre.

Charles' priorities were to reduce seed production and contain the prickly acacia in the dense infestations. Concurrently, he aimed to clean up the open downs country where the plant was fairly scattered and then to work back to the dense infestations. 'Where prickly acacia was seeding around dams, we got the big trees at the same time', Charles said.

Basal bark spraying began in April 1991 around the yards, the shed and nearby Landsborough Creek. The heavier infestations near the creek were treated with Access® and diesel, or Starane® and diesel, and some cut stump application. Velpar® was used in the more open infestations away from the creek. 'I had good results with basal bark spraying with Starane and diesel', Charles said. 'I cut a lot of trees down, in the drought years in the '90s with a chainsaw, around the creek, that have not returned... and treated with Starane and diesel...you would be struggling to see a tree there now...we've pretty well beaten the problem.'

'Cattle are worse ...they pass most of the seeds—you notice six to eight prickly acacias come up from the one cowpat.'

'I cut a lot of trees down, in the drought years in the '90s with a chainsaw.'





In 1992 a contract team was hired to carry out a major herbicide control program in the three western paddocks (Mitchell Grass Downs). Large trees around stock camps had contributed to a massive seed build-up around water points, which had resulted in very dense infestations. Trees were shading out the grass and water was then eroding the area. This was happening more on the black soil areas... 'Prickly acacia was a nuisance around gates... we paid contractors \$13 000 and they were only able to get over 1600 to 2000 ha of the thicker infestations', Charles said. The contract team undertook 48 days of spraying.

2,4,5-T® and Velpar L® were used with good results. As 2,4,5-T® became unavailable, Charles switched to using Garlon 600®, followed by Starane® and then Access® and diesel for basal bark spraying. The three western paddocks are now virtually free of prickly acacia and require only one to two days' follow-up control per year.

Charles believes that seed has survived in the soil for up to 10 years. 'In one paddock there hasn't been a seeding tree for 10 years; there may have been the odd one but that would be all. Seedlings are still coming up where the seed would have been real thick. Stock aren't bringing it in.' The Reddies do not shift stock from paddocks containing prickly acacia seed pods without first quarantining them in a holding paddock.¹

While follow-up remained the priority, control of prickly acacia on Zara centred on improving station management as a whole by basal bark spraying along fence lines and waterways. Charles also integrated his prickly

acacia control program with drought management and supplementary feeding of stock. Benefits gained from this have gone some way toward offsetting control costs, and Charles has occasionally been able to avoid agisting or selling stock because of it. It is useful, however, only when there is leaf on the acacia, which is often not the case during drought.

Throughout the dry years from 1992–95, over 530 hours were spent mechanically pushing prickly acacia for feed using a 70 Hp TD9 Dozer. According to Charles, 'You only have to start the machine up and the cattle get right into it... they follow the machine along.' As well as providing feed, this treatment results in a kill of approximately 95 per cent. Small trees to four metres were relatively easy to remove, while larger trees (to seven metres) created difficulties. Charles purchased a larger Fiat Allis HD11 dozer (140Hp) in 1995, and also hired a 200Hp dozer to continue pushing prickly acacia. He has noted that there is more erosion in areas where prickly acacia has been chemically controlled than where it has been pushed, because the dozer tracks act as mini ponds and the hollows left by the blade help pasture to re-establish. Charles tries to doze on the contour to maximise these benefits.

Starane® and water were sprayed from a helicopter² in an attempt to control dense thickets of prickly acacia on creeks and drainage lines. The results of the trial were not good—the average kill rate was approximately 30 per cent. Another trial, which involved foliar spraying small, very dense infestations with Starane® and diesel using a mister did not work too well either.

¹Stock should be quarantined for at least six days to empty themselves of seed.

²These trials were conducted in conjunction with the Tropical Weeds Research Centre, NRM&E.





Nathan March

▲ Joe Rolfe (DPI&F) and Charles Reddie inspect double chain pulled prickly acacia

In February 1994, two D9, 410 Hp dozers were used to pull some of the thickest areas of prickly acacia on Zara. 'You could hardly ride a motorbike or horse through it... it was that dense', Charles said. That year, \$10 200 was spent treating an area of about 500 ha where the density ranged from about 500 to several thousand trees per hectare. As there was virtually no pasture in these areas prior to pulling, buffel grass was lightly sown with the dozers. Poor rainfall ensured a good kill rate and low survival of prickly acacia seedlings in the treated area.

As a result of seedling growth, the area has been sprayed up to three times since—some

with Velpar®, some with Access® and some with diesel. 'Initial pulling cost was \$8.00/acre (\$20/ha) and it hasn't been a big expense since ... we've only been over it two or three times. Mitchell grass is coming back through it... hopefully we'll lock this up through the wet.' Charles has found double pulling to be the most economical form of clearing, 'About a quarter of the cost', he said.

Either a quad bike, or a two-wheeler bike with a spot gun is used to apply Velpar® for mop-up operations. The quad bike is equipped with a pressure sprayer... 'It carries more chemical... it serves its purpose when basal barking... it's quick to get from one tree





to the next.' Charles believes it is cheaper to basal bark spray than to use the cut stump technique, mainly due to greater labour costs. When infestations are away from other trees and not very dense, Velpar® has proved to be the cheapest chemical treatment because of the savings in time and labour.

Charles also experimented with using fire after pulling, when there was a good fuel load in the gidyea and boree areas. He found that it was reasonably successful in bringing 'a lot of seedlings up in a hurry' and 'it got rid of a lot of rubbish on the ground as well.' He said, 'We thought we'd try fire to get rid of some of the suckers... it didn't. A lot of them shot from the base again. It didn't seem to be a hot enough fire. It wasn't real successful.'

The Reddies have funded their own control of prickly acacia, over the last 10 years, with the assistance of neighbouring landholders through 'labour barter' days and some in-kind technical assistance from the local land protection officer.

Future direction of prickly acacia management on Zara

Charles does not tolerate prickly acacia—there are presently only about 80 ha left to be treated on the property. He does not even keep a few around as a drought resource, 'I eradicate them...that's my ambition... eradicate them. We spent too many dollars controlling them. We've got enough trees without having any of this. I wouldn't have them on the open downs country, I'd have something else.'

'I eradicate them... that's my ambition... eradicate them.'

Nathan March



▲ The Reddies are achieving their vision of a prickly acacia free property





Nathan March

▲ Effective prickly acacia control is protecting the upper Landsborough catchment on Zara

Charles believes the shift from sheep to cattle has resulted in an increase of prickly acacia on the downs and that new landholders who purchase Mitchell grass blocks should be made aware of their responsibility to control or manage prickly acacia by ‘a nice courteous letter from someone.’

To control grazing pressure and allow wet season spelling, Charles intends to fence his creek frontage along Landsborough Creek, according to land type. ‘We intend to fence-

off the creek out of the flood line and hopefully lock it up now and again—still allow grazing though...you can’t see prickly trees through there now... you wouldn’t believe it.’





Control of prickly acacia at Tarcombe

Craig Magnussen

Background

The Tarcombe and Guilford Park properties, located about 100 km south-west of Longreach, are owned by the Lamond family. They incorporate approximately 15 000 ha of predominantly Mitchell Grass Downs, with some flooded alluvial country and frontage to the Thomson River. The properties became infested with prickly acacia after intentional plantings by the Lamonds in the 1950s.

'We'd planted a handful of trees on the sand ridge down from the house in the early '50s after the DPI were promoting them.³ During dry times we'd cart water to them to keep them alive. The trees never looked like becoming a problem until a run of good seasons ... then they just exploded! We've been battling them ever since', Mrs Lamond said.

The main prickly acacia infestation is on an unnamed creek that runs from east to west through the Tarcombe block. However, as a result of cattle spreading pods away from a central dam, there had also been a considerable migration of the pest onto the surrounding Mitchell Grass Downs flats. The same level of seed migration and establishment did not occur on the Mitchell grass flats surrounding the other three dams along this creek, as those areas were stocked predominantly with sheep.

There are three other main areas of infestation; on the Tarcombe block, one is centred around twin dams and another on the Bimerah dam and associated creek line

running to the north; on the Guilford block, the infestation is centred on two dams and an interconnecting creek. Other less significant infestations have occasionally appeared on both blocks, but those outlined above have been the main focus of control efforts over the past six years.

In 1997, the infestations on Tarcombe and another along the Barcoo River represented the southern extremity of the range of prickly acacia in the Lake Eyre Basin. Because of the proximity of Tarcombe to the Thomson River, and the fact that its infestation was the southern-most prickly acacia in the Longreach Shire, the 'Bridge to Bridge' program was initiated by the Longreach Landcare Group. The aim of the program was ultimately to eradicate prickly acacia from the area between Longreach Bridge and the Lochern Bridge to the south, on the Thomson River. It was decided that the most practical and cost-effective way to achieve this considerable undertaking was to begin at the bottom of the Thomson system within the shire and work northwards⁴.

The Department of Natural Resources and Mines' Strategic Weed Eradication and Education Program (SWEEP) began in earnest at Tarcombe in 1997 with a team of six men spraying for five months. Basal bark spraying, mechanical control, foliar spraying and burning have been used in a further six control campaigns since then. The technique is chosen based on how appropriate it is for the current stage of the plant's life cycle.

³Prickly acacia was declared a weed in 1957 (Queensland).

⁴Weed control principles usually advise control start from the top of the catchment and work down. However, within the Lake Eyre Basin, many rivers flow slowly and spread out, thereby reducing the risk of long-range water based prickly acacia seed spread.





The SWEEP team hasn't been alone in the fight against prickly acacia at Tarcombe. Other vital contributors include Longreach Shire Council, Longreach Landcare, Queensland Parks and Wildlife Service, Barcoo Shire Council and, of course, the Lamond family.

The process

Basal bark spraying

The first comprehensive chemical treatment, which focussed solely on the Tarcombe block, involved basal bark spraying using only Starane® and diesel at a rate of 1:60. The mix was applied to the plant stems from a hand-held spray bottle. All parts of the plants above ground were sprayed up to about 30 cm (higher for larger trees).

The main creek through the property was targeted first, starting from the Thomson River in the west and working towards the higher country in the east. The dam backwater, with extremely thick seedling prickly acacia, was the first major obstacle encountered. It was



Craig Magnussen

▲ Foliar spraying

extremely hard going as plants had come up 'like the hairs on a dog's back.' They were about 2 m high, and the infestation was sometimes as much as 50–100 m across. Treating the rest of the area, although still a lengthy operation, was relatively easy by comparison.

Foliar spraying

Though basal bark spraying with Starane® and diesel had proved very successful, a better option to treat the backwater would have been to foliar spray with Starane® and water (with wetting agent added) at a rate of 200:1—the method that was subsequently employed at Tarcombe. In drier areas, this rate was also effective on seedlings and smaller trees (up to shoulder height). It should be noted that good leaf cover is essential when foliar spraying.

When foliar spraying was first used at Tarcombe it was hoped that the previous good season would result in a high germination rate of the large prickly acacia seed bank. In theory, this would have meant less seedling recruitment and consequently less herbicide used in subsequent control efforts. Though this proved correct, above

'It was extremely hard going as plants had come up "like the hairs on a dog's back".'

'It should be noted that good leaf cover is essential when foliar spraying.'



Craig Magnussen

▲ SWEEP control operators, Scott Mitchell and Bruce Shailer in backwater of dam. Note the extremely thick infestation.





average rainfall over the next two seasons also resulted in extremely high levels of seedling recruitment.

Mechanical control

A thick patch of a couple of hundred hectares of prickly acacia was earmarked for trying out a mechanical control method. The machine used was a Volvo 150C (equivalent to a Cat 966F) rubber-tyred loader. Anecdotal evidence suggested that such a machine would disturb the soil less than a tracked machine, resulting in less seedling recruitment. The method proved extremely effective and efficient. The operator would lift the bucket as he hit the trees, pulling the taproot out of the ground or breaking it off beneath the surface (both methods kill plants outright). The job was finished within 40 hours at \$115 per hour (now about \$130/hour). Seedling recruitment was quite low, with good regeneration of native pasture in the ensuing years.

Fire treatment

The infestation was basal bark sprayed once before it was decided to try fire treatment in the following season. The likely effect of fire on the existing prickly acacia seedlings or seed bank was unknown. Once weather conditions were favourable, a fire was put through the patch, which was by then covered, in varying degrees, with Mitchell grass and wiregrasses. Though the fire did not burn well in some parts, overall it exceeded expectations. Some seedlings were killed and a lot of the dead material on the ground (from the machinery work) was incinerated, paving the way for easier control in the future using motorbikes or other vehicles. The fire didn't seem to promote germination, as subsequent



Craig Magnussen

▲ Fire treatment of prickly acacia seedlings

seedling recruitment was minimal. A further round of basal spraying was carried out in the following season, and minimal attention has been required since.

In the ensuing years, only relatively small control projects have been undertaken in an attempt to kill new seedlings and thus prevent any trees from reaching maturity and producing seed. SWEEP teams, mostly basal spraying from four-wheeled motorbikes, have been used for these projects in the more scattered, open areas. More concentrated areas of new seedlings have been treated with foliar spray.

Weedbuster days

In conjunction with visits by the SWEEP teams, the Longreach Landcare Group has held several 'Weedbuster days', the first of these only a couple of weeks after the project began in 1997. A considerable stretch of creek line with thick mature trees was selected beforehand. In a very long day that ran till after sundown, an excellent roll up of about 30 people worked extremely well to knock over the infestation. Those who





attended were mostly local landholders, with others from NR&M, DPI, QPWS and the Longreach and Barcoo shire councils. The kill rate was excellent, despite the fact that many of those attending had never sprayed prickly acacia before. This day really kicked off the Longreach Landcare Group's 'Bridge to Bridge' project, and several more Weedbuster days have been held along the Thomson River since. At present there are no infestations between the two bridges on the Thomson River that are not already controlled, or being controlled.

Control of prickly acacia at Tarcombe is now at a stage where all seeding trees have been killed—virtually no seed has been produced in the past few years. It now requires only a handful of volunteers (landholders, Longreach Shire Council and officers from NR&M) working for one or two days a year to clean up any emerging seedlings.

Since 1997 approximately \$250 000 has been spent, excluding the Lamonds' considerable contribution which would have easily equalled this since control operations began. This amount includes the cost of about 54 000 L of diesel and about 900 L of herbicide.

The result

As a result of these efforts, country that was formerly heavily infested with prickly acacia has gradually reverted to open Mitchell Grass Downs, and the clean country to the south in the Cooper Creek catchment has been safeguarded, ultimately protecting the clean status of Lake Eyre. All those involved are to be congratulated on their efforts, most of all the Lamond family for their unwavering commitment to the project.



Craig Magnussen

▲ Craig Magnussen inspects the results of control efforts





Prickly acacia management on Audreystone

Damian Byrne and Bill Ford

Introduction

In 1998, Bill Ford purchased Audreystone which, at the time, consisted of 2800 ha of relatively clean Mitchell Grass Downs pasture, 1600 ha of dense prickly acacia forest, and another 1600 ha of medium to light density prickly acacia. After attempting to muster sheep, Bill quickly came to the conclusion that the prickly acacia would have to go. Ever since, he has been a man on a mission to control and eventually eradicate prickly acacia from his property.

Despite multiple setbacks that would have reduced most to tears, Bill has persevered to the point where today no standing forested acacia remains on his property. In its place there are now open Mitchell Grass Downs divided into several goat paddocks. Though many landholders have successfully removed mature trees, few can boast of 'taking the scalp' of seedling regrowth, especially over larger areas.

Audreystone is a great example of what can be achieved by someone with the drive and determination to overcome the pest. Though better techniques and alternative methods are available, they are ineffective without persistent follow-up control. In the past four years, like the prickly menace, Bill has been down several times, but he has always got up without hesitation, and got into it with new ideas.

Control methods

Control methods such as fencing, restricting cattle movement, selling the cattle herd, moving watering points, controlling grazing of sheep and goats, cropping, and using more traditional chemical and mechanical methods have been used on Audreystone.

Mechanical control

Before purchasing the property Bill was a dozer contractor, so it was not surprising that he chose mechanical control as one of his main tools against the pest.

Table 3 shows details of the main mechanical methods used on Audreystone to date—pulling, raking, blade ploughing, and 'crocodile seeding.' Each method has had its place, though there have been some standout performers.

'Bill quickly came to the conclusion that the prickly acacia would have to go.'





Table 3: Results of mechanical control methods

Method	Outcome
Single pull and goats (fenced)	<ul style="list-style-type: none"> • Best results achieved • <5 per cent regrowth—incredible result! • Large number of goats fenced into area when pulled; a small number left in paddock for months after the pull. Continual pressure of residual goats appears to have had a large impact in only one paddock—replications have never been quite as good, although still better than other methods
Single pull without goats	<ul style="list-style-type: none"> • Larger percentage of seedlings established than when goats are present, but still quite good • Resulted in a higher survival rate of adult trees than when double pulled. (This will not be a problem if goats are to feed on the remaining mature trees as they soon die as a result of this grazing) • Cheapest method of getting dense infestations onto the ground
Double pull	<ul style="list-style-type: none"> • Very few adult trees survived • Resulted in establishment of a larger percentage of seedlings than single pull
Raking	<ul style="list-style-type: none"> • Large percentage of seedlings established • Few seedlings destroyed • Gave a tidy result • Good preparation for blade ploughing • Cheap
Blade plough	<ul style="list-style-type: none"> • Large percentage of seedlings established • Soil seed bank depleted quickly • Good crop establishment • 100% kill of seedlings • Storm runoff reduced • Expensive
Crocodile seeder	<ul style="list-style-type: none"> • Excellent for re-establishing Mitchell grass • Caused limited damage to seedling acacia • Reduced storm runoff by gouging large holes in the ground • Resulted in good crop establishment • Cheap





'The best outcome resulted from combining mechanical control with use of grazing animals.'

Nathan March



▲ Crocodile Seeder at a field day on Audreystone

Damian Byrne



▲ Chain pulling

Peter Spies



◀ Pulled country followed by control by goats

Single pull and goats

As the table shows, the best outcome resulted from combining mechanical control with use of grazing animals. Single pulling and grazing with goats produced incredible results that still amaze local land protection officer Damian Byrne each time he enters the paddock to reassess it. In comparison with that from all other methods used, regrowth is virtually negligible. Though it is difficult to determine exactly why it was so successful, the following is a detailed description of what was done:

1. A 100 ha paddock of medium- to high-density mature acacia was fenced and stocked with 800 goats.
2. Within a few days the goats had eaten all available foliage up to 2 m and were eating the bark off the trees as well. They were also attempting to get out of the paddock to find more available acacia foliage.
3. During the dry season, trees were then single pulled after seven days of stocking with goats.
4. Goats immediately began browsing on acacia as it was pulled.
5. They were left to browse in the paddock for eight weeks.
6. One hundred goats were left in the paddock for six months.
7. After six months, about 20 per cent of the mature trees were still alive but they all died eventually after continual goat attack.





Important factors to note from this were:

- paddocks must be fenced to ensure the required browsing pressure on the acacia
- single pull allows mature trees to die slowly (if attacked by goats), which prevents an immediate and massive emergence of seedlings throughout the entire paddock
- a residual number of goats can control seedlings as they emerge.

Goats as prickly acacia control agents

Using goats to control prickly acacia came as a totally new challenge to Bill, but as there were plenty of feral goats roaming on the property (due to the abundance of prickly acacia), and they keep a steady market value, he decided to put them to work. As there was already a fully electrified goat paddock on the property (from past prickly acacia trials in the mid-nineties), it was easy to start trialling them.

It immediately became obvious that the goats were highly efficient at destroying prickly acacia, which they preferred to everything except Bathurst burr. They also paid little attention to the pasture. Most of the foliage was removed and the bark stripped on all trees under 2 m. Though they killed only a small percentage of the plants, they prevented them from growing, keeping them about 1–2 m high. This allowed more time to be spent on other control work in any particular paddock.

Bill has rotated sheep and goats through several smaller 100 ha paddocks. Having the sheep eat the grass and the goats browse on the acacia has worked quite well, though the

stocking rate of goats needs to be high to have an impact—Bill has found that 12/ha works best for him.



Peter Spies

▲ Goat browsing prickly acacia

Fencing and waters

When Bill arrived at Audreystone there weren't many fences or watering points—all stock came to water in the centre area of the property, and this had led to severe degradation. The area had become bare, eroded and densely covered in prickly acacia. A netting fence running north–south on the property divided the relatively clean downs area from the infested country, thus preventing further spread of prickly acacia.

Today, the watering points are well dispersed across the property and there are many new paddocks. This means that the goats and sheep can be concentrated in areas requiring control and can be rotated through these paddocks, which also benefit from being spelled. This has enabled the central area to recover and has given Bill greater control over his stock, pasture management, and acacia.

'A netting fence running north–south on the property divided the relatively clean downs area from the infested country.'





Sheep and cattle

Bill is a cattleman and until he purchased Audreystone had had little experience with sheep. He was particularly proud of the cattle breed that he had been developing for about 20 years. However, he reluctantly decided to sell his whole herd as he realised that as long as he had cattle on the property he would have a problem with prickly acacia.

Crossbred sheep are now his forte. They have a slight impact on acacia, particularly on seedlings of less than 15 cm. Bill still agists some cattle on the property—they are mostly kept in the clean area, or in with the acacia when there are no pods on the trees.

Chemical control

Chemical control also has its place on Audreystone, and areas of scattered prickly acacia trees are treated this way.

Cropping

Bill has had a bit to do with cropping, having originally come from the Roma area. He thought he would try some forage sorghum on Audreystone by just throwing out seed while blade ploughing prickly acacia. The rainfall was favourable and an excellent crop came up, which went a long way towards paying for the blade ploughing. The crop also seemed to compete with acacia seedlings; however, once it died off, the acacia seedling regrowth came back very aggressively.

Since then Bill has blade ploughed the area again and there seems to be very little seedling germination, but it is still too early to make any real assessment of this.

Bill has had four such crops since he has been on Audreystone and only one has failed due to drought. As the main benefit is financial, it makes sense to throw out some oats or sorghum when blade ploughing when there is a good chance of rain. In Bill's experience, the crops have not hampered the regeneration of native pastures and the areas that have been cropped have grassed up very well.

Two large contour banks have also been developed on the property to prevent erosion and to assist in cropping along their topside where soil moisture is higher.



Damian Byrne

▲ Forage sorghum crop in pulled and blade ploughed paddock—once dense prickly acacia





Peter Spies



▲ Prickly acacia 'black forest' at Audreystone, 1999

Regeneration of native pastures

Right across the property where prickly acacia has been taken out, the native grasses have come back well. This was very surprising, as Bill didn't think there would be any grass seed in the soil because of the lack of grass under the prickly acacia. In some areas, only herbage came up in the first year, but beautiful grass paddocks have now developed.

Greening Australia realised the benefit of Bill's project to the Mitchell Grass Downs ecosystem and supported his work with two rounds of financial assistance. This helped to pay for fencing smaller paddocks and supplying water.

Summary

Good management has made Audreystone a successful property and Bill has taken a whole property management approach to controlling prickly acacia. Most day-to-day activities—whether moving stock to another paddock, blade ploughing or fencing—have had an impact on its management. Country that was once unproductive is now some of the best in the area. Control hasn't been an economical burden, but has turned profits in Bill's favour, and has increased the carrying capacity and resale value of the property.

However, Bill's great determination and desire to beat prickly acacia has been the main reason for his success.

'Where prickly acacia has been taken out, the native grasses have come back well.'



Damian Byrne

▲ Native pasture regeneration in the area formerly known as the 'black forest.' January 2002





Prickly acacia management on Bibil

Chris and Louise Moloney

Introduction

Bibil station, owned by Chris and Louise Moloney, is a property on the edge of what is known as the Desert Uplands and Mitchell Grass Downs, 65 km north of Muttaborra in central western Queensland. Bibil consists of two leasehold blocks, both of which are about 9100 ha.

'Their aim is to contain and manage prickly acacia'.

Bibil has a variety of land types, including Mitchell Grass Downs, gidyea woodland, spinifex, open ironbark woodland, plateau-type country and the Tower Hill Creek channels. The property runs both sheep and cattle, although wool is the main source of income. On average, about 8000 sheep (including 4000 ewes) are run with about 150 shorthorn cows.

Since the Moloney family purchased the property in 1981 they have tried to control prickly acacia, which they cut and herbicide treated and used for stock fodder during the dry years of the 1990s. They recognised prickly acacia's shade value to the Mitchell Grass Downs. They also recognised its invasive nature, but have decided just to live with the pest, and hopefully turn it to their advantage.

Management aims

Their aim is to contain and manage prickly acacia rather than attempt eradication, which may not be feasible. If used as stock fodder during dry periods it can add to productivity. The Moloneys are even investigating its use as craft wood for giftware and fine furniture.



Peter Spies

▲ Prickly acacia regrowth on bore drain prior to re-treatment with Diuron

Prickly acacia prefers watercourses and bore drains, and heaver soil on the edge of the pebbly gidyea country, but also occurs on the open downs. It can't compete with gidyea (especially the suckers), though some acacia seedlings will emerge where the gidyea has been pulled. There is still a medium infestation on some areas of the downs, while other paddocks have been cleaned up and now are virtually free of prickly acacia; however, to maintain this advantage, yearly follow up will be required.

The Moloneys use an integrated program of running Diuron® along bore drains, using camels, cut-stump spraying, and drought feeding to contain and manage the plant. These drains, which were the worst affected areas, are now essentially under control. This has been achieved by treating with Diuron® every two years and basal spraying any regrowth or seedlings that emerge on the





edges of the drains. In dry times prickly acacia is cut as fodder using a chainsaw, thus allowing stock access to the green (immature) pods and leaves. In one paddock, camels are used to contain or control prickly acacia. Though they won't eradicate it completely, they eat the pods and flowers, and generally strip the trees of any foliage within their reach.

Diuron®

When the Moloney family took over the property in 1981, prickly acacia was already growing along both sides of the 30 km of bore drains. This made it hard to delve and drive along drains and, when the Moloney children started to drive and ride bikes, it became a nightmare for tyres!

Prickly acacia was not really regarded as a problem in the early 1980s and landholders had not really started to control it. During the mid '80s the Moloneys put a grader along both sides of the bore drain – 'to get rid of the prickly acacia and clean it up...nobody really knew much back then, but looking back this was one of our worst mistakes. Today we never put a grader or disturb the ground along the drain unless really necessary. Then we had to reclaim at least one side of the drain so we could drive along it and delve', Louise said.

In the early 1990s, use of Diuron® was suggested as it was used in irrigation ditches. It proved a quick and easy way to protect bore drains from becoming overgrown by prickly acacia. 'Using liquid diuron, a herbicide product by Nufarm, was better than using the powdered or granular forms. Depending on the type and aggressiveness of

the prickly acacia, this product can be used annually—and this can be stretched to every two or even three years in some places along the drain', Louise said.

The Moloneys have found that there is no best time to apply Diuron®, except in summer in dry years when trees are relying solely on the drain for water. 'Last year, when we had three inches of rain for the year, we got 100 per cent kill along the drain', Louise said.

Diuron® will kill any trees (both weed and desirable native or planted species) that use water from the drain, with the exception of false sandalwood (*Eremophila mitchellii*), which seems to be resistant. The Moloneys recommend that to protect 'any areas, like your homestead, that rely on the drain, stop spraying about 1.5 or 2 km up as Diuron® will carry a distance in the drain. It is advisable to divert water before it reaches the homestead or any trees you want to keep, for a couple of weeks.'

'Mixing rates of diuron are tricky as the labels all use farming or broad acre terms and we spot spray. So, it has taken a bit of trial and error to get the rates right.' They apply Diuron® using a 12-volt diaphragm pump set up in the back of a vehicle, with the driver spraying out the window.

'An integrated program of running Diuron® along bore drains, using camels, cut-stump spraying, and drought feeding.'

► Treating bore drain with Diuron



Louise Moloney





'Up to 140 trees of various sizes can be cut with a chainsaw in an hour.'

After spraying, the drain is left for two days before the bore is turned back on at half its flow; this is gradually increased to full flow after a few days. Any small prickly acacias that appear subsequently are basal or foliar-sprayed with AF Rubber Vine Spray® and diesel before they get too big. This can be done up to twice a year depending on the season.

Use of Diuron® is not a once-off treatment, as seedling prickly acacia will reappear and grow again. The Moloneys usually repeat the treatment when the regrowth has reached a fair height, as 'a poor kill rate may result' if [this] is done when the trees are only small', according to Louise.

Cut stump spraying

On Bibil, prickly acacia is usually cut for feed during dry times, as both the leaves and green pods have high fodder value. A lot was cut with a chainsaw for this purpose in the '90s and again in 2002. As the plant defoliates during drought when it is needed most, the trees with the best foliage are found along drains or watercourses, or around dams.

Up to 140 trees of various sizes can be cut with a chainsaw in an hour. A smaller chainsaw—usually one with a 14 to 18-inch bar—is preferable as it is easier to carry. As

the direction of fall of prickly trees is unpredictable, it is advisable to wear protective clothing including a hardhat and protective chaps. After a tree has been felled, the diesel and herbicide mix must be applied to the entire surface of the stump within 30 seconds, after which the tree re-seals itself, rendering the herbicide less effective. Starane®, Access®, or AF Rubber Vine Spray® are all suitable, but the Moloneys have found the latter the cheapest. Using a household plastic bottle with a pump is recommended for application.



Peter Spies

▲ Cattle grazing on cut prickly acacia along bore drain

'Sound of a starting chainsaw or a vehicle is enough to have cattle running towards the action.'

The Moloneys report that after a few days of cutting, the sound of a starting chainsaw or a vehicle is enough to have cattle running towards the action! The stock soon learn to eat their way through the available foliage and small branches, but they especially like the seed pods and flowers. If the trees are cut when the pods are green, the seeds will not germinate. As any leaf left by the cattle is soon cleaned up by the sheep, there is very little residue the next day. One disadvantage of the process is that there is some risk of weak cattle becoming bogged if prickly acacia is cut along drains.



Louise Moloney

◀ Chris Moloney cut-stumping prickly acacia



Camels

In December 1999, the Moloneys purchased 11 camels from 350 km south-west of Birdsville to 'see if they were as good as the word said they were for containing prickly acacias... Never having seen camels before, I was excited to see the truck arrive with these animals with their long necks sticking over the top of the crate. It took quite a while to unload just 11 camels, as each time they started to go down the race they would hit their humps on the top of the cattle-unloading race', said Louise.

The camels were kept in the yards for about 10 days and were fed hay and cut prickly acacia to familiarise them with the weed as feed. When they were finally let out, the Moloneys expected them to be like a mob of weaner cattle and rush about forming 'rugby scrums.' Instead, they just walked out in their arrogant way in single file.

The camels were released into a 1820 ha paddock containing a mix of gidyea, desert spinifex, and open downs with prickly acacia, all enclosed in a standard 6-wire fence. Apart from the occasional escapee that has had to be put back in, the camels have never caused any problem with fences. Neither have they had any trouble breeding—their numbers had doubled by December 2002.

For the first year or two, the camels had no noticeable effect on the prickly acacia. However, in, 2002 the Moloneys noticed that 'they don't seem to kill [it], but really attack the flowers, seed pods and any leaves.... In the paddock where they have had the most effect, they have taken the worry out of our having to contain the pest ourselves. In fact,

we have had to move cattle from this paddock, during the recent dry, as there is now no prickly acacia left with leaves for us to cut as cattle fodder', Louise said.

The Moloneys realise that though camels will not eradicate the prickly acacia, they will, hopefully, stop the continuous spread of the seed.

'Camels will not eradicate the prickly acacia, they will, hopefully, stop the continuous spread of the seed.'



Peter Spiess

▲ Camels browsing prickly acacia at Bibil





The economic costs of prickly acacia on Wyangarie

Elton Miller and Peter Spies with David Carter

Introduction

Wyangarie, owned by David and Jane Carter, is a 20 000 ha property near Richmond in north-west Queensland. The predominantly cattle fattening property, which is all Mitchell Grass Downs, has been in the family since 1910. On it, the Carters run about 2500 head, and used to aim at turning off 3–3.5 year old steers in August–September each year.

After a series of wet years beginning in 1974, prickly acacia spread very rapidly. From practically no trees, there is now a medium to heavy infestation on much of the property and in some places there are isolated patches. The 30 km of bore drains are also heavily infested. Various means of control (mostly

chemical) have been trialled, but what was once prime Mitchell Grass Downs is now a prickly acacia shrubland. Table 4 shows estimates of current densities.

Table 4: Estimate of current prickly acacia density on Wyangarie

Density	Area (ha)	% of property
Nil	-	-
Isolated	4000	20
Light	-	-
Medium	6000	30
Heavy	10000	50
Total	20000	100



Peter Spies

▲ Medium density infestation on Wyangarie, Richmond





Control methods

Chemical control

The excessive cost of currently available methods prohibits the full control of prickly acacia on Wyangarie, and it is presently managed only at key sites (e.g. Diuron® is run along thickly infested bore drains, and quad bikes are used to mop up strategic areas). David states he 'doesn't get too excited' about prickly acacia and, because of the scale of the problem, believes there is not much value in just 'throwing chemicals' at it. He does believe, however, that any attempt to control the pest must begin with an attack on the big seed-producing trees.

Double pulling

In 1996, David 'chained' about 500 acres (200 ha) to assess the effect of knocking the plants over to make them available as stockfeed. He believed that the feed or nutrient benefit gained might partially offset the costs of control.

Since then, about 1000 acres (400 ha) have been pulled. The results of double pulling (pulling first one way, then back in the other direction two to three weeks later) have been good. According to David, the cost of clearing this way depends on the size of the machines and the length of chain—especially if there is a large machine in the middle and large machines on either side pulling 300 m of chain.

Mitchell grass has come back into areas that have been pulled. David believes this is because grass seed that has been lying in deep cracks has germinated in the wet years.

Costs and benefits

In this assessment, all costs and benefits have been converted into their dollar value in 2003 to take account of inflation. They are as follows:

- Labour—\$15 per hour
- Average diesel price—50c/L (incorporating rebate).
- Price of Starane®—\$496.00/20 L (at 25 June 2003).
- Robinson R22 helicopter:
 - dry hire—\$325.00/h
 - AvGas—\$350/200 L (consumed by an R22 at about 33 L/h).
- Cattle prices at 26 June 2003:
 - live export (finished steers)—400 kg at \$1.30/kg.
 - larger steers for the domestic trade into meatworks—\$1.38/kg live weight.

Costs

Control costs: Current yearly control costs are approximately \$17 500, including about \$12 700 for chemical control and associated labour, and about \$4800 for mechanical control and labour. Basal-bark spraying with Starane®, which is about 90 per cent effective, has been found to be the best way to date to treat smaller areas. Each year, to better manage general farm costs rather than trying to overcome the prickly acacia problem, maintenance spraying is carried out along roads, fences, bore drains and in the house paddocks.

Capital expenditure: The purchase and use of equipment adds to the cost of control. It includes the initial purchase price (and any subsequent repayments and interest costs), the cost of repairs and maintenance, running costs and depreciation. The cost of using

'Any attempt to control the pest must begin with an attack on the big seed-producing trees.'





general farm vehicles such as utilities and motorbikes has not been included in this assessment. Details of equipment purchased for prickly acacia control are provided in table 5.

Table 5: Equipment costs for prickly acacia control on Wyangarie

Item	Replacement value (\$)¹	Acquisition price (\$)²	Year purchased	% usage³
1 x D5 Caterpillar dozer	350 000	60 000	1991	30
1 x Yamaha 350 4-wheeler	10 000	6 500	1994	20
5 x backpack sprayers	800	na	Various	100

1 Estimated replacement value in 2003

2 Price originally paid

3 Average percentage of total use of item spent on prickly acacia control

Extra fencing: (related to capital expenditure): To help reduce mustering costs and to keep cattle out of prickly acacia infestations, an extra 15 km of standard 3-barb fencing was erected on Wyangarie between 1975 and 1992. In 2003 dollars, the total material and labour costs of this have been valued at \$26 650.

Grass production: In a 3400 ha paddock of prickly acacia on Wyangarie, the pest has reached densities where it is significantly affecting grass production. Not only has the amount of grass been reduced, but there have also been significant changes in pasture composition—in medium to dense infestations, pastures previously dominated by Mitchell grass are now dominated by annuals such as Flinders and button grass.

Before prickly acacia reached high densities, David could turn off 400–500 head of three-

and-a-half-year-old heavier bullocks at a live weight of 550–600 kg. In an average year, this has now been reduced to 400–500 head of 2.5–3-year-old steers with a live weight of about 400–420 kg.

Though it must also be taken into account that marketing strategies have changed over the same period, with a greater emphasis on live export, this still represents a significant drop in the carrying capacity of the property. It also has implications for property management. As a very rough estimate of lost beef production, assume that production has decreased by 165 kg per beast for 450 head; this equates to 74 250 kg valued at \$1.38/kg live weight, giving an average annual loss of income of \$102 465. A realistic price range for live weight beef would be \$1.20 to \$1.50/kg, giving a range of \$89 100 to \$111 375 in gross beef production losses per year. Net losses could be calculated by





subtracting the variable costs of beef production from the gross losses.

Though the Carters face variations in income from other causes (such as droughts and fluctuating commodity prices), which have a greater influence on profitability than woody weeds, this loss is still substantial.

Impacts on management:

On Wyangarie, prickly acacia has:

- made it more difficult to grow out Jap Ox bullocks on the property, thus reducing the Carters marketing options—they now target their product to the feeder steer or live export market
- increased mustering costs
- prevented the Carters from keeping cattle in the same paddock for more than a year—the rogue cattle that remain become more difficult to muster and may eventually have to be shot, or they can corrupt new cattle moving into the paddock and make them more difficult to muster
- created a harbour for kangaroos, which not only eat valuable pasture but also impede cattle mustering.

The time and money spent in controlling prickly acacia, and the extra time needed to muster paddocks could be spent undertaking other activities on the property.

Mustering costs: Dense infestations of prickly acacia on Wyangarie have increased mustering costs. These can be quantified by comparing the cost of mustering a clean paddock with that of an infested one.

It takes seven stockmen half a day, and five hours with a helicopter to muster the infested 8500 acres (3341 ha) 'finishing paddock.' At \$525 for on-ground mustering costs, and \$1914 for the helicopter and fuel, this amounts to \$2439 per muster. It costs only about \$380 to muster a paddock of a similar size that is free of prickly acacia.

In similar sized paddocks with medium density infestations it takes five or six stockmen half a day, and four to five hours in an ultralight to muster. The cost of labour is about \$413 and that of the ultralight is about \$972, giving a total of \$1385 per muster. Based on the above costs and the current densities of prickly acacia on Wyangarie, it is estimated that a single annual muster costs about \$9940, compared with the \$2210 it would cost to muster clean paddocks. The difference of \$7730 per year can be attributed to prickly acacia.

Based on the above figures, costs per hectare of mustering are approximately:

- 71c in densely infested paddocks
- 40c in medium infestations
- 11c in paddocks free of prickly acacia.

The respective savings of 60c/ha and 29c/ha that would be made by eliminating infestations are not insignificant.





Maintenance of station vehicles: On Wyangarie, prickly acacia thorns are responsible for about one punctured tyre per week. Assuming that one hour per week is spent on vehicle maintenance (changing tyres, replacing tubes and pumping up slow leaks), the labour cost of this is estimated as \$780 annually. The additional cost of replacement tubes and repair kits would increase this to over \$870 per year.

Medical attention: Though someone from Wyangarie requires medical attention every year or two to have a thorn removed from a knuckle joint or something similar, no serious injuries have occurred to date, so this cost has not been valued.

Property value: David is sure that the value of Wyangarie has been reduced by the presence of prickly acacia, but he is not sure by how much. Though this cost was not valued, it is directly related to the effect of reduced beef production from the property.

Benefits

While some marginal benefits may be gained by using leaf and pods as cattle fodder, they are not a substitute for Mitchell grass, and do not compensate for the lost grass production caused by medium to high density infestations of prickly acacia. As this results in lost beef production (factored into the Carters' new reduced stocking rate), it is not appropriate to value leaf and pods.





Conclusion

In light of the above, the Carters estimate that the presence of prickly acacia on Wyangarie is responsible for about \$128 000 annually in lost income and increased costs. Other costs, such as its impact on station management are difficult to estimate, but exist nevertheless. As the financial position of Wyangarie has not been disclosed, this analysis does not take account of the tax implications of control, but they must be considered when determining the true financial impact of prickly acacia.

As they knew the full extent of the costs involved in controlling prickly acacia, when they bought another Mitchell Grass Downs property in the early '90s, the Carters first ensured it was free of the pest, and say they would not buy infested land again.

Money, rather than time, is the main constraint on the control effort. David would like to see research undertaken on biological control and dieback, which occurred on prickly acacia in some areas of the property in 1987. As the pest has not grown back in these areas, he believes that encouraging dieback may be an efficient way to control infestations.

David is concerned about prickly acacia in river systems and believes there is a real need to 'attack prickly acacia from the start of the catchment and work down... there would be plenty of it in the rivers and creeks.' The problem is compounded because Diuron® cannot be used in areas where there are coolibahs and other riparian vegetation. Without control, David is convinced of the potential of prickly acacia to spread much further than its current distribution because

it now occurs on the watershed of river systems flowing south into the Lake Eyre basin and north into the Gulf country. Specifically, on substantial sections of the Flinders River, the riverbanks are heavily infested with prickly acacia and rubber vine, both of which will inevitably spread each time the river floods.

Because of the size of the problem, David believes a coordinated, catchment-based approach, education and/or biological control are necessary. An attempt to form a regional group to eradicate prickly acacia from the McKinlay, Richmond, Flinders, Winton and Aramac shires failed because of lack of funding from both state and federal governments, and the inability of industry to fund such a large-scale program.

The Carters would not consider borrowing money to control woody weeds, but David says he would undertake more control if chemical and employment subsidies were available. He is not keen on employment schemes because he believes that people employed in these schemes can be ineffective and inefficient. Likewise, incentives such as 150 per cent tax deductibility of weed control costs are not much use if landholders are not paying personal income tax. Government efforts should first be directed towards cleaning and controlling areas of light or scattered infestations, as these are easier to control.

'David believes a coordinated, catchment-based approach, education and/or biological control are necessary.'





▲ Prickly acacia infestations in the Hughenden area, north-west Queensland

