

## Managing invasive weeds with pastures and livestock

S. Millar

“Chevy Chase”, Spring Ridge NSW 2343

**Abstract.** “Chevy Chase” is a light soil property that has been invaded by blue heliotrope and spiny burrgrass as a result of previous management decisions. Changes in farm practices, including the introduction of perennial summer grasses in a pasture mix, a fertiliser program and strategic grazing management have reduced the competitive advantage of these invasive weeds. The program has suffered setbacks, but looks to be providing an economic and agronomic way ahead.

### Introduction

In 1988, my wife Wendy and I moved from managing a sheep and cattle property on the Southern Tablelands of NSW to our own property “Chevy Chase” on the Liverpool Plains, North-West Slopes of NSW. “Chevy Chase” is 1340 ha of light soil grazing country with an annual average rainfall of 675 mm (over about the last 50 years). When we purchased “Chevy Chase” our initial aim was to run Merino sheep (for wool) and approximately 150 cows. In fact, we purchased 250 cows from the previous owner and 500 wethers in early 1989, and this became our enterprise mix for the next 6 years, as well as about 100 ha barley and 50 ha oats. In 1994, we sowed our first pasture grass, undersowing millet with Katambora Rhodes grass (*Chloris gayana*) and in autumn of 1995 spreading Avila serradella (*Ornithopus compressus*). In 1995-6, we made a significant decision to move back to our original aims, to run a self-replacing Merino flock with approximately 40% of the flock being wethers. Along with this change we decided it was time to seriously address the significant and persistent problem of 2 weeds, blue heliotrope (*Heliotropium amplexicaule*), and spiny burrgrass (*Cenchrus longispinus* and *Cenchrus incertus*), that were reducing the productivity of our country and, in the case of spiny burrgrass, proving a substantial staff health issue as well as contaminating our wool. Consequently, we began a co-ordinated program of pasture improvement and grazing management.

### History

The previous owner ran “Chevy Chase” as a cattle grazing enterprise, with sheep in the earlier days. Large areas, up to 350 ha, of oats (for grazing) and

smaller areas, up to 100 ha, of barley (for grain) were grown each year, using conventional farming techniques. Lucerne was sown to provide summer grazing along with native grass pastures. At some stage spiny burrgrass and blue heliotrope were introduced and became an ever increasing problem. Both weeds are well adapted to lighter textured low fertility soils and are actively encouraged by cultivation. Spiny burrgrass establishes from seed, while blue heliotrope establishes from both seed and root fragments after cultivation. The only effective and economic method of control of both weeds is the establishment of a vigorous summer-growing perennial grass pasture. Lucerne, winter cropping or sowing winter legumes do not provide effective levels of competition or ground cover to control either weed.

“Blue heliotrope is a perennial summer growing weed that spreads by root fragments during cultivation, seed, domestic and feral animals, water and creeping root systems.” (Freebairn *et al.* 1997). Control of blue heliotrope by the use of herbicides is not feasible for large scale infestations as they are not generally effective and are expensive. “Spiny burrgrass is essentially a summer growing annual, although it occasionally acts as a biennial.” (Freebairn *et al.* 1997). Spiny burrgrass is sensitive to the pre-emergent herbicide trifluralin. The main aim of control is to prevent seeding for at least 3 years. This combined with an improvement in soil fertility and the introduction of a competitive perennial summer-growing pasture can successfully out compete spiny burrgrass.

## Management and control

### Pasture establishment

We have found that the key to successfully managing, and hopefully controlling, blue heliotrope is the maintenance of a strong, competitive summer-growing perennial grass pasture. Grazing pressure, soil fertility and adequate soil moisture are the critical management issues we have faced in overcoming such a persistent weed. Spiny burrgrass has so far, proved a much easier plant to control. Being an annual and having a seed with a short life, has meant that wherever a perennial grass pasture has been established for more than 2-3 years spiny burrgrass is mostly absent, with only the odd plant found in most pasture paddocks. Paddocks that have been cultivated again in the last few years show no sign of spiny burrgrass reappearing.

Our program consists of spraying the selected paddock in spring with glyphosate (450g/L) at 1.25-1.5 L/ha with ammonium sulphate (Ammo®, Liase®) and an acidic wetter (LI700®), as our bore water can be as high as pH 8.5. We use rainwater where we can. We have used both high (2 L/ha) and low (1 L/ha) rates of glyphosate with good and poor results at both rates. We spray again in early to mid summer depending on rainfall, in order to prevent the blue heliotrope flowering and seeding, and to kill any spiny burrgrass. In the initial cropping year, we also cultivate with offset discs to break up the blue heliotrope plants in late summer. A winter crop of oats, winter wheat or, in the past, barley, is then sown in March-April. The crop allows a winter application of a selective herbicide that will control germinations of blue heliotrope. In the second year, there is normally no need to cultivate and the crops are direct drilled into the stubble. After the second crop the paddock is sprayed with glyphosate and then

cultivated and sown in early autumn with a mixture of perennial grasses. In the beginning, we used both Pioneer and Katambora Rhodes grass and Consol lovegrass (*Eragrostis curvula*, type *Conferta*), more recently we have also sown Premier digit grass (*Digitaria eriantha* ssp. *eriantha*) and Bambatsi panic (*Panicum coloratum* var. *makarikariense*). Following the poor performance of Rhodes grass during the drought, we are trialling Pensacola bahia grass (*Paspalum notatum*) and creeping bluegrass (*Bothriochloa insculpta*) and in a saline site, Dundas tall wheatgrass (*Thinopyrum ponticum*) and 2 types of marine couch (*Paspalum vaginatum* and *Sporobolus virginicus*). Details of seed costs are outlined in Table 1. All our grasses are normally sown without legumes because, as we sow our grasses in autumn, we have seen the rapid growth of subterranean clovers and serradella smother the emerging grass seedlings. All our legumes are spread in the autumn of the second year. We have sown some paddocks with lucerne in the pasture mix, but with mixed success, mostly resulting in a reasonable stand of lucerne, but with poor grass performance.

### Grazing management

Grazing management is critical to the survival of the summer grasses. Katambora Rhodes grass and Premier digit grass are slower to initiate growth in spring, not showing significant growth until early October. Consol lovegrass shows increased growth in late August. Blue heliotrope starts to grow in mid to late September whilst the subterranean clover and serradella can begin to dominate in late August or early September. We have endeavoured to control the bulk of legumes to allow the growth of the grasses to compete with the blue heliotrope. In a good season, legume growth can smother the shooting grasses and then die down to allow germination of new blue heliotrope seedlings in the bare ground. Therefore

Table 1. Cost of pasture seed

Variety	Rate (kg/ha)	Cost (\$/kg)	Total cost (\$/ha)
<i>Summer sowings (1st year)</i>			
Rhodes grass cv. Katambora	2	\$ 11.00	\$ 22.00
Digit grass cv. Premier	1	\$ 17.00	\$ 17.00
African lovegrass cv. Consol	0.25	\$ 18.00	\$ 4.50
Bahia grass cv. Pensacola	1	\$ 9.50	\$ 9.50
Creeping bluegrass cv. Bisset	1	\$ 19.00	\$ 19.00
<i>Autumn sowings (2nd year)</i>			
Subterranean clover cv. Dalkeith	2	\$ 6.00	\$ 12.00
cv. Junee (sometimes cv. York)	2	\$ 6.00	\$ 12.00
Serradella cv. Avila	2	\$ 7.50	\$ 15.00
Lucerne cv. Genesis	3	\$ 7.00	\$ 21.00

our grazing management is strategic rather than on a set rotation. We are also reducing the size of our paddocks to allow a greater flexibility in stock movement. Seasonal variations in rainfall and temperature sometimes mean that we have little grass or legume growth and yet blue heliotrope is still able to grow competitively. We are currently looking for a cost effective way of controlling blue heliotrope with selective herbicides that suppress the weed and allow the grasses to be more competitive in drier springs. We have also released the blue heliotrope leaf beetle (*Deuterocampta quadrijuga*) and possibly in the more distant future this biological control may achieve the desired spring reduction in blue heliotrope.

In a favourable autumn, Rhodes grass can grow very fast and become tall and rank, preventing the germination of subterranean clover and serradella. Although this has not been a problem in recent years, in the past we have slashed the grass to allow legume germination. This is a problem for us especially, for we now run only sheep, with their reluctance to graze the long grass.

Our grazing management is directed towards maintaining a strong competitive summer grass cover. We do this in spring by reducing the clover and serradella growth to allow strong growth and establishment of the grasses and in autumn by providing enough open sward to permit the germination of winter annual legumes to provide both winter feed and the nitrogen (N) to drive the grass system.

#### Soil fertility

The soil types and structure vary over the whole of "Chevy Chase", with the largest proportion being solodized solonetz, which has a poor natural fertility. Soil tests have shown low phosphorus (7 ppm) and low N (5 ppm) levels. The pH of most of the soils is 6-6.5 with one of the older cultivation paddocks having a pH of 5. The soils have a low water holding capacity, but after prolonged rainfall can become boggy with 'no bottom'. These same soils can dry very hard as a consequence of many years of cultivation reducing the organic matter and fertility. Topsoil depth ranges from 100 to 250 mm with an overall soil depth of around 500 mm before reaching a relatively impermeable layer.

Fertility of the soil is another key factor in the management and control of both blue heliotrope and spiny burgrass. During the cropping phase of our

pasture development program we sow the crop with 100 kg/ha urea (or equivalent e.g. 200 kg/ha ammonium sulfate) and 100 kg/ha DAP. We have used ammonium sulfate this year in the hope that the additional sulfur will be available for the clovers in the following pasture. When the pasture is established we endeavour to apply 100 kg/ha single superphosphate annually, although we did not apply any in 2002 and 2003 due to drought conditions.

#### Summary

The imperative to embark upon this program to control and remove blue heliotrope and spiny burgrass was not only financial, although to allow the weeds to continue to spread and dominate would have been financially crippling, but also the observation that to continue a system which depended upon the cultivation of large areas of light textured, degraded, poor fertility soil on an annual basis was unsustainable. The costs of the program have been high, not just in the initial cropping and pasture establishment, but as a result of the failures of both crop and pastures and the need to resow. Light soil farming involves higher risk than that of our neighbours on more favourable self-mulching soils.

The last 2 years have seen much of our pastures wither and die, despite being lightly grazed or not grazed at all during the driest months of the drought. An interesting observation is that more of our Rhodes grass pastures died during the spring of 2003 when rainfall was not sufficient to wet the soil profile allowing it to dry out between rain events coming into the hotter summer months. After each rain the grass would respond, as would the blue heliotrope, then run out of moisture and stress to the point where each time a proportion of the plants would die. The blue heliotrope, however, managed to seed down providing a problem for years to come. The challenge is now to provide a favourable environment for the re-establishment of grasses from the existing seed bank. We have sown winter crops this year in an endeavour to quickly re-establish strong pastures where they have declined to a level that is not recoverable by careful management.

One consequence of the drought is that we are looking to increase the number of grasses we use in our pasture mix in an attempt to prevent the loss of the perennial grass component in such a way as the loss of the Rhodes grass this past year.

The most important component of our program to control our weeds is our perennial summer-growing grasses, the most difficult part of our program is the establishment of these perennial summer grass pastures and the most challenging ongoing management issue is the maintenance of the perennial summer grasses in the pasture.

## Reference

- Freebairn R, Mullen C, Croft G, Maiden C, Carberry P, Morrissey P (1997) Light Soils: Managing them better. (NSW Agriculture: Dubbo)