The weed control paradox or how and when do I learn to love my weeds? Major pasture weeds in northern NSW.

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Weed control is absolute ..... or is it a Paradox?

Definition: **Paradox** (noun) *1. a statement or proposition seemingly self-contradictory or absurd, and yet explicable as expressing a truth.*

2. a self-contradictory and false proposition.

3. any person or thing exhibiting apparent contradictions

– Macquarie Dictionary

Landholders and the public are bombarded with campaigns of fear and loathing, warning of eminent doom if weed X or Y gains a root-hold on our beloved and sacred earth. We have a whole Cooperative Research Centre devoted to weed management in Australia, through which millions of dollars are thrown against the 'Green Menace'. The Commonwealth has funded the 'Weeds of National Significance' program, aimed at improving the control and management of 20 weeds already present in Australia. The Department of Environment and Heritage's 'Alert list' highlights weeds with a high potential to invade that are currently of limited distribution, or not yet established in our wide brown land. Each Australian state has a list of species that are declared 'noxious'. Noxious is a term that conjures all sorts of pernicious and dastardly threats against us and our families. Councils have publications with titles like "WARNING! - WEEDS KILL! Don't lose your animals to poisonous plants! Weeds also harm humans!"

Hell, no wonder the Australian population suffers from stress.

So what happens when, after all the "fear and loathing" has been generated, do we say, "Well, now this weed is widespread, we will have to live with it?" We come down to the two scenarios of eradicate weeds locally, or limit the population density to acceptable levels, otherwise known in some circles as "loving the weed".

How confusing is this situation? Many a landholder has become mightily peeved when a different tack is suggested. How, when and why do we need to change our thinking? To be objective about weed control we must first understand what drives weed invasion and then evaluate what is achievable with the resources available.

Understanding weed invasion

Crawley (1987 cited in Scott 2000) suggested three factors that opened plant communities (including pastures) to weed invasion:

- Low levels of plant or ground cover.
- Frequent disturbance.
- Proximity to large sources of potential 'immigrants'.

Extension programs such as PROGRAZE have actively promoted the concept of managing ground cover and minimising disturbance to pastures. In some cases, disturbance could be seen as pastures full of annual species with few perennial components. Obviously if you have lots of unwanted plants (weeds) outside your fence, there is a much higher chance of seed or other reproductive plant parts entering your property.

What limits weed invasion?

The factors limiting weed invasion can be divided into barriers to dispersal and availability of suitable habitat (Cousens and Mortimer 1995).

Barriers

Barriers to dispersal on the farmcan include factors such as:

- *Alert individuals* - the value of whom should never be underestimated. Many new weed invasions have been found by observant individuals, not an organised survey.
  Siam weed (*Chromalaena odorata*) was found at Tully, northern Queensland, by a holidaying weed scientist! The local landholders had been calling it "giant billy goat weed", because the flower looked a bit like blue billy goat weed (*Ageratum houstonianum*).
  A new invasive species of lovegrass (*Eragrostis trichophora*) was identified because an alert grazier from Narrabri was concerned that the plant was becoming more common on surrounding

roadsides and was "popping-up" on his property. Everyone else in the community just saw African lovegrass.

- *On-farm hygiene* – often makes a huge difference to weeds entering a property and the rate of spread around the property. Thomas *et al.* (1984) showed that huge quantities of weed seed can be imported in feed grain and hay. Moerkerk (2002) surveyed planting seed from Victoria and southern NSW and found only 21% of samples were free of foreign seeds. Vehicles and machinery are often overlooked as sources of new infestations. A survey of 110 vehicles and plant found 250 weed species (Moerkerk 2006).
  New livestock, or animals back from agistment, will have viable weed seeds attached to hides or still in the gut, making quarantine an essential part of livestock management (Andrews 1995).
- *Good regional weed surveys and mapping* - help in finding new invasions and alerting landholders to new problems as well as monitoring the rate of spread
- *Changes in management practice* – can often drop barriers to invasion without landholders realising it. Weeds will often exist in low numbers for many years until management practices change. In a study of the pasture weed giant Parramatta grass (*Sporobolus fertilis*) Laffan (1985) found that this weed had been present on the NSW coast since the 1880s, however it wasn't recognised as a weed problem until the late 1960s. This coincided with an increase in truck movement of cattle and a decline in the dairy industry, with many properties being converted to beef cattle. This also coincided with a reduction in the amount of phosphorus being applied to pastures. A decline in pasture fertility and the rapid movement of stock by road reduced barriers to this weed's spread and invasion of pastures.

Suitable habitat

Without a suitable habitat weeds are unlikely to

It is in making these hard decisions where emotion often over rules the facts. Weed control is most cost effective during the introduction phase, which highlights the need for early detection. The Cooperative Research Centre for Australian Weed Management has recognised this and has a whole program devoted to improving the early detection of weeds in Australia.

On the property scale, landholders must be observant and have a reasonable idea of what species are on the property. Keep a particularly close eye around

altitude environments and are unlikely to threaten lower altitude pastures. At lower altitudes serrated tussock (*Nassella trichotoma*) is unlikely to be able to compete against better adapted more vigorous perennial grasses. African lovegrass (*Eragrostis curvula*) thrives on granitic and sandy soils.

Some species on the other hand have characteristics that allow them to thrive in a wide range of habitats. These species therefore have a much wider potential range. Coolatai grass (*Hyparrhenia hirta*) is a good example of a perennial grass that is capable of flourishing in a wide range of habitats. In its country of origin, South Africa, it is expanding its range due to changes in the landscape from human activity.

Describing the infestation

Once there are gaps in the barriers or the area of suitable habitat increases, there needs to be a way of describing the stage of the infestation so rational management decisions can be made.

Groves (1986) proposed three phases of weed invasion:

i) Introduction – the seeds, corms etc. arrive in low numbers, establishing the initial small infestation
ii) Colonisation – parts of the landscape suitable to this species are increasingly occupied
iii) Naturalisation – the population of weeds is self perpetuating in the landscape

Unfortunately, many landholders switch on to the problem in the late stages of colonisation. However, how do you tell when colonisation ends and naturalisation begins? Once this stage is reached some hard decisions need to be made. Is the fight worth it? Just how much money is available to continue the fight? The level of resources to be devoted to the fight will depend on the characteristics of the weed in question. Is the weed toxic? Does it have sharp fruits that damage livestock or contaminate the product, or will the stock eat the weed under certain

[illegible] characteristics making them highly successful pioneer species. With Australia's propensity for drought, ground cover is often below the desire 1500 kg DM/ha for higher rainfall areas, and 1000 kg DM/ha for lower rainfall areas. This op landscape to weed invasion or further spread.

Some weeds have preferences for certain soil ty temperatures or rainfall patterns. Their distribu will naturally be limited by these factors until something changes in the landscape. For examp hawkweeds (*Hieracium* spp.) are well adapted t

tracks, buildings and stockyards. Areas outside the property boundary also need monitoring. Check with the council about controlling weeds along roadsides adjacent to your boundary. Public liability can be an issue. Ask your council to develop and implement a roadside vegetation management plan. New weeds need to be identified and controlled.

Eradication – how likely is that?

The possibility of eradication is reliant on early identification and action. Once a weed population reaches the colonisation stages, eradication will be impossible.

If there is a large core infestation in the region, new infestations will continue to appear, so constant monitoring and control is necessary. How long can sufficient resources be expended to prevent weed invasion? The parthenium weed program in NSW is a great example of quarantine and eradication, costing approximately of $107,000 per year.

Which weeds can I learn to love?

Unfortunately, sometimes the horse bolts and weeds get to the colonisation stage before landholders and other land managers click to the problem. By this stage eradication will be unachievable. Hard decisions need to be made as to whether the weed must be minimised and kept in the background, or whether to live with the species and actually utilise it. At this point landholders can be classified either as eradicators, minimisers or utilisers.

The latter decision can divide communities because the properties' of utilisers can be seen as infection sites to the rest of the community. The other landholders hope that eradication is still possible, or the species should be kept at as low a level as possible. These species may also pose a threat to remnant native vegetation.

The utilisation of species relies on a drastic change in mind set, and often a considerable change in management. Often capital expenditure on fencing and watering points is required for effective utilisation. Minimisers will also need to change management to diminish the problem species. The main change can be best summarised as a move from managing stock, to managing ground cover and pastures.

Perennial grass species are the main candidates to utilise. They all need to be kept short to maximise feed value, and often some feed supplementation may be required if there is an insufficient quantity of legume in the pasture. Some species that have been utilised by landholders include:

- African lovegrass – well suited to low fertility soils. Dowe *et al.* (1995) found that good weight gains could be obtained by establishing subterranean clover in the lovegrass pasture or by applying nitrogen as urea over summer.
- Coolatai grass – drought tolerant and produces large quantities of dry matter. See "Management of Coolatai grass on the North West Slopes of NSW" by L. McCormick, G. Lodge and R. McGufficke, NSW DPI, for more detailed information.
- Chilean needle grass (*Nassella neesiana*) – one of the few species that produces green feed in winter. The main problem with stock occurs with heading in late spring and early autumn. Spray-topping with glyphosate can be used to reduce the number of seed-heads produced. See Agnote DPI 194 Chilean needle grass by A. Storrie and J. Lowien.
- Giant Parramatta grass and Parramatta grass (*Sporobolus capensis*) – drought tolerant and well suited to low fertility soils. See "Control of giant Parramatta grass", NSW DPI Agnote DPI/357 for more information.

Which weeds can I never love?

Weeds that can never be loved can often depend on the situation of the land manager. Landholders trying to maintain threatened native vegetation remnants with rare or endangered species will have a much longer list than a grazier. The carrying capacity of the land dictates how much money will be spent on weed control. Hill country with shallow soils and western areas with unreliable rainfall will be low priority areas for costly control measures.

The following weeds should be either be locally eradicated or minimised throughout northern NSW.

Indigestible perennial grass weeds

Following is a list of perennial grasses, either already established in northern NSW, or have potential to invade, and are so indigestible that stock will starve, regardless of management:

- Serrated tussock (*Nassella trichotoma*) - present
- Espartillo (*Achnantherum caudatum*) - present
- Mexican feather grass (*Nassella tenuissima*) – present?
- Uruguayan rice grass (*Piptochaetium montividense*)
- Texas needle grass (*Nassella leucotricha*)
- Lobed needle grass (*Nassella charruana*)
- Cane needle grass (*Nassella hyalina*)
- Giant weedy *Sporobolus* species - present

Invasive weedy grasses are a huge threat to the landscape because they are difficult to identify in the

early stages of invasion and there are few selective herbicides available.

Unpalatable monocots

Weedy monocots such as onion weed (*Asphodelus fistulosus*) are highly unpalatable to stock and can readily invade land where groundcover has fallen to low levels. Asphodelus is well established in pockets throughout northern NSW and has potential to spread when conditions are suitable.

Poisonous perennials

Poisonous perennial species including St John's wort (*Hypericum perfoliatum*), blue heliotrope (*Heliotropium amplexicaule*) and swan plant (*Gomphocarpus fruiticosus*) have rapidly expanded their ranges in northern NSW over the past five years due to a number of low rainfall years leading to low groundcover. They are difficult and expensive to control.

Silver-leaf nightshade (*Solanum elaeangnifolium*) is an extremely persistent toxic perennial that spreads by stock eating the fruits and cultivation equipment. Silver-leaf nightshade can also compete strongly with crops.

Riparian and flood-prone areas

Lippia (*Phyla canescens*) has become the major weed of riparian areas in the Murray-Darling basin. Each flood boosts its range by tens of thousands of hectares, degrading grazing land and native riparian habitat.

Rangelands

Rangelands are not immune to difficult weed problems, however to get an invasion of chenopod shrubs requires two consecutive wet summers combined with low ground cover. Three native species of concern over the past few years has been galvanised burr (*Sclerolaena birchii*) on light soils and black rolypoly (*Sclerolaena muricata*) and spiny saltbush (*Rhagodia spinescens*) on clay soils. These shrubs dominate the rangeland reducing the availability of perennial grasses and annual forbs. Stock are prevented from accessing dense infestations and they are also a contaminant of wool.

Areas with native timber cover pose special problems for weed control as ground spraying will be difficult and aerial application of herbicides often damages the native vegetation.

Conclusion

Early identification and control combined with dynamic farm hygiene practices are the keys to successful weed management when combined with groundcover management.

If weeds will get to the late colonisation stage before serious control measures are considered the difficult decision of whether to be a minimiser or utiliser will confront most landholders.

Toxic or damaging weeds must be minimised in the landscape. Some weeds however, may offer the opportunity to increase farm output on a sustainable basis and should not be rejected without a serious evaluation of the possible options.

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