3D weed management

Onopordum Thistles Case Studies

Four Case Studies of Farmers Managing Onopordum Thistles in Grazing Systems

HELPING **PRODUCERS** TO MANAGE WEEDS IN GRAZING SYSTEMS

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Contents:

Onopordum thistle refers to any species of the genus Onopordum, including Scotch thistle (*Onopordum acanthium*), Illyrian thistle (*Onopordum illyricum*), stemless thistle (*Onopordum acaulon*) and Taurian thistle (*Onopordum tauricum*).

Onopordum thistles are either annual or biannual weeds that affect around a million hectares of eastern Australia. They compete directly with autumn, winter, spring and sometimes early summer growing pastures for moisture, sunlight and nutrients.

Onopordum thistle seeds can persist for several seasons and are spread by animals, birds, vehicles and water. These weeds have a tendency to form dense stands, smothering desirable vegetation with their rosette leaves, reducing pasture stocking rates and excluding livestock from heavily infested areas.

Stock poisoning as a result of eating Onopordum thistles is possible. Physical damage to grazing animals and contamination of wool can also be a significant issue.

Case Study 1 - Rosemount

Rick Hutchinson, **"Rosemount", Jugiong, New South Wales**

The Hutchinsons invested in Rosemount at Jugiong six years ago. The farm operation has now amalgamated three neighbouring properties, bringing it to 1,440 ha. The property is managed by Phil Campbell.

The production system

The emphasis of the grazing enterprise on Rosemount has shifted from wool production to cattle. From 300 cows, 130 steers are sold at 450 kg, and heifers not retained for breeding are sold at 380-400 kg.

Rosemount ran 7,000 wethers in 1990, but the sheep enterprise is now primarily lamb production. 1,000 prime lambs are produced each year, with wool now a by-product of the sheep enterprise.

Water is reticulated into 40 troughs across the property and pastures are set stocked. The carrying capacity of the property has been lifted by fertilising pastures with superphosphate and sowing introduced pastures under an expanded cropping program.

A small block of lucerne is grown on the river flats for hay. About 160 hectares of fodder crops are grown each year for grazing and, in a good year, grain production.

Typically, 490 ha of the property is cropped but approximately 15% of the land is too hilly or rocky for cropping.

Onopordum thistles

Two of the farms already had a moderate level of thistle infestation when they were purchased by the Hutchinsons. The third farm (about 230 ha) was heavily infested with thistles and, as means of control, goats were run on the property by the previous owner.

Today all three farms have low infestations of Onopordum thistles in terms of groundcover.

Since buying the property, Rick and Phil have made a concerted effort to effectively control the thistles. Rick said that he has hit them hard but realises that the control efforts will need to continue into the future.

The incentive to act

Rick's goal is to turn off high quality livestock. Good genetics, well bred and well grown animals are important to him.

When Rick bought the properties, he was well aware of the Onopordum thistle problem. Control of thistles and other weeds was high on his initial list of actions, both to lift the farms' carrying capacity, and to make the properties a better place to live and work.

With neighbours who shared his philosophy on weed control and offered helpful advice, Rick began to address the problem immediately. Thistles are the number one weed.

Deliberation

Finding information about thistles was relatively easy. Rick spoke with a friend in another area who had success with control and also with a local agronomist. He was aware of others successfully dealing with thistles in the Boorowa area, so he visited them to gather information about different strategies.

Rick also spoke with his neighbours to ask them what worked in the area and to facilitate a common approach to thistle control.

Rick ensured that he cross referenced each piece of information. Actions that passed his common sense test and fitted the labour and financial capacity were implemented.

The key message that he took on board early was that "it takes a while, but don't panic as they can be controlled. A rushed job is not necessarily the right way to go".

Diversity in the approach

Rick approached the control of this weed as an investment to improve carrying capacity. His program focuses on cropping to remove heavy infestations, establishing competitive pastures, and concentrated spot spraying to control infestations in non-arable areas.

Crops and pastures

Cropping, at a cost of around $140/ha, is part of the change in management to lift the productive capacity of the whole farming enterprise. Arable land is sprayed with herbicides and direct drilled to cereal crops for four years. Oats and wheat are sown on around 35% (490 ha) of the total farm area each year.

Even with the poor seasonal conditions over the past five years, cropping has had an overall positive return.

A pasture mix is undersown with the fourth crop. Phalaris and clovers are included, and ryegrass and chicory have also been tried recently.

Rick said that the key to success is good pasture establishment. In some cases, pastures are re-sown if conditions did not allow a good establishment.

In the first three years of the program, superphosphate was spread over the whole property, making the existing pastures more competitive against thistles.

Herbicides

Once a pasture is established, thistles are controlled by monitoring and spot spraying with herbicide. Seeds are brought in by water and birds so ongoing monitoring and treatment is essential.

A team of spray contractors are brought in during August to clean up rocky outcrops and inaccessible areas to reduce the risk of significant reinfestation. Particular attention is paid to creeklines, under trees and fencelines near infested areas or rocky outcrops. The country has a lot of rocky outcrops so this work does take significant time and effort.

Rick knows that some farmers do not worry if the thistles take over non-arable areas. In the long run he feels that this will cost time and money. Rick said that it is important to set a clear control objective so that everyone is working towards one goal.

Grazing management

Grazing is managed to maintain groundcover.

Grazing management changed with the shift towards more cattle and less sheep. Cattle are grazed in paddocks first, followed by sheep when the grass is shorter.

Biological control

Biological control has been discussed by other people and Rick has heard that some other farmers are relying on biological control solely to control thistles. Rick doesn't rely on this.

Diligence

The key to ongoing control has been to get on top of the problem early and to dedicate particular effort to the control of thistles.

Commitment, diligence, a planned approach and a thistle control budget have been pivotal.

The thistle control effort has dominated farm operations over time. People working with Rick on the farm know that August/September is the time for thistle control, before flowering.

Rick and Phil are constantly checking the areas where thistles have been controlled in the cropping operation. They also have the team looking for new weeds to spot spray and contractors are brought in to help with the effort.

Rick said that if he missed one year, he would be right back where he started.

Benefits and costs

Rick is certain that the thistles would have taken over the whole farm area if nothing had been done to reduce their impact on the farm carrying capacity.

Having decided to control thistles, Rick has invested significantly in his control strategy. He is confident that, even over six years, there have been huge improvements. He is much less worried about thistles now than he was when he began the program.

By controlling the thistles, Rick said he has maintained the property's original stocking rate for the past six years, even through drought.

Rick estimates that he has spent about $10,000 a year in herbicides, and all up, there is about two months thistle control work for two workers each year.

Thistles had reduced carrying capacity by 20-25%. The change in management to include cropping and control the thistles has improved overall farm productivity.

The combination of cropping, spot spraying and the increased carrying capacity under the new farming system are returning significant benefits for the outlay. Using NSW DPI farm budgets, the net benefit of controlling Onopordum thistles on Rosemount is around $8,000 per year for the grazing operation alone.

The cropping enterprise provides additional feed and direct returns, along with greater flexibility and thistle control options.

Annual costs and benefits of weed management

Costs

Direct costs of spot spraying 490 ha	$12,000

Benefits

Avoided 20% loss of carrying capacity	$20,000
Annual net benefit	$8,000

Keys to success

Rick believes that the critical factor in their success was taking account of a number of different views when developing the control strategy.

Rick spoke to friends who had past success, local agronomists, and neighbours. He cross referenced the information these sources gave him, then applied the common sense options that fitted with the labour and financial capacity of the farm operation.

It remains important that he and his neighbours have a similar philosophy for managing the weed.

Rick has leaned toward more rapid means of controlling the weed, but thinks that the key strategies of pasture establishment and ongoing persistence would have the same outcome in the long run.

Rick knows he has invested significant effort in control. He is confident that the tools exist to control thistle and he will achieve long-term success through ongoing control.

Summary

Rick has managed thistles by:

✔ Using a four-year cropping program to establish competitive pastures, reduce large stands of thistles and maintain carrying capacity.

✔ Spot spraying gullies, creek lines, fence lines and rocky areas with herbicide to keep pasture country clean.

✔ Grazing appropriately – shifting the balance to more cattle and less sheep and maintaining groundcover.

✔ With significant investment and effort, thistles are being effectively controlled to minimise the impact they have on carrying capacity.

Top tips ✔

Rick's key messages for managing Onopordum thistles are:

✔ Don't panic! Thistles can be controlled with a budget and diligence.

✔ Budget for a sustained effort.

✔ Use herbicides and cropping in heavily infested areas to establish pasture.

✔ Focus on an initial control program, as it will save money and effort in the long run.

✔ Monitor and treat inaccessible areas as they can be a source of reinfestation.

Case Study 2 - Burrendong

Dougald and Lachlan Campbell, **"Burrendong", Wellington, New South Wales**

Burrendong is a 1,800 ha dryland grazing property in the Dripstone district, near Wellington in central west NSW. The Campbell family purchased the farm in the 1870s. Dougald and Lachlan are the fifth generation to manage the farm.

The production system

The main enterprises at Burrendong are a self-replacing Merino breeding flock of 6,000 ewes and a 5,000-head Merino wether flock. Trade sheep and cattle are also part of the business, depending on seasonal and market conditions. The Campbells currently have 70 cows plus calves.

Since 2000, most of the property has undergone significant structural change, with the introduction of modified cell grazing. Work involved major subdivision, upgrading water supplies, and fencing off 7 km of an 11 km river frontage to improve river and stock water management.

The pasture base is native perennial grasses with winter annuals such as sub clover, and annual grasses such as ryegrass, complementing the winter feed. These pastures respond effectively to rain at any time of year, which is an essential feature for the variable rainfall patterns in the area.

No fertiliser has been used on the property since a cell grazing program commenced. However, Dougald and Lachlan's late father, Malcolm, was a pioneer of pasture improvement, using superphosphate and sub clover. It is therefore likely that reasonable accumulation of sulphur and phosphorus is helping to maintain soil fertility across the property. The Campbells plan to fertilise again when production is observed to be limited by mineral deficiencies.

Despite a run of difficult seasons, carrying capacity has increased and both livestock and pasture have performed above expectations.

Onopordum thistles

Onopordum thistles, principally Scotch thistle, have been a troublesome weed at Burrendong for as long as Dougald and Lachlan can remember.

The weed dominated sheep camps and gullies, and had spread to dominate many parts of the pasture. They estimate that, through lost pasture production, the weed reduced stock numbers by up to 10% across the farm. In addition, thistles often made stock handling difficult, had the potential to cause stock poisoning (especially in cattle) and contributed to wool contamination.

While Onopordum thistles had been treated regularly with herbicides as part of the weed control program, the Campbells felt that no real progress was being made.

The incentive to act

Burrendong has always been a profitable and well run property. However, after attending a grazing management course, the Campbells realised that both the profitability and long-term sustainability of their property could be improved by a more holistic approach to pasture and livestock management.

The family set a goal to holistically manage their property to achieve profitability, repair and enhance the landscape, and to allow for an enjoyable lifestyle.

It became clear to the Campbells that the Onopordum thistle problem throughout Burrendong was a result of the way they managed grazing on the property.

Deliberation

Thistles began to be seen as part of an overall imbalance in the pasture on Burrendong. Sheep camps and extended grazing periods thinned out native perennials, and winter annuals occasionally smothered perennial pastures just as they were beginning to grow.

They believed a competitive, well populated, perennial-based pasture would out-compete the weeds.

This led to a new approach - higher stock density grazing for shorter periods. Paddocks were subdivided and new watering points were created to implement cell grazing.

Athough this approach was initially costly, the Campbells believed that this new approach would help them preserve groundcover, more evenly distribute nutrients (animal waste) across a paddock, and ensure all plants were grazed equally for short periods, with good opportunities to recover from grazing.

Dougald and Lachlan believed that a reduction in weed infestations, and improvements in productivity and sustainability, could be achieved by fostering perennial pastures (especially native species), improving groundcover, and integrating the management of both animal and plants.

The strategy maintains good groundcover levels with around 1,000 kg/ha dry matter or better left to protect the soil, build soil organic matter and ensure better rainfall capture.

Dougald and Lachlan have observed that the perennial grasses are surviving and regenerating well, as they have the opportunity to replenish root and seed reserves.

Paddocks are set stocked during winter lambing to minimise lamb losses from mismothering. There is little impact on the perennial pasture base, which is mainly dormant during winter. Set stocking in winter also helps annuals like sub clover perform optimally, by preventing them from accumulating too much dry matter.

Pasture recovery periods vary according to rainfall received and pasture growth patterns. For example, 35 days after summer rain, the summer perennials are commonly approaching flowering, which is an ideal time to graze them. The grazing rotation may be adapted to make better use of this.

The number of grazing days spent in each paddock varies according to feed availability and stock requirements.

The system has worked well over the past six years, with perennial plant density building and weed densities gradually declining.

Despite a run of very difficult years, including drought, livestock productivity has increased.

The competitive pastures resulting from the Campbell's management system are the key to controlling weeds like Onopordum thistles at Burrendong. The family believes weeds are no longer an issue when the farm is managed to achieve productive perennial-based pastures, the species grown (mainly natives) suit the area, and plant density ensures almost complete groundcover.

Herbicides

Before the Campbells developed their management strategy, an enormous amount of time and money was devoted to spraying weeds like Onopordum thistle. Today, weed spraying is no longer necessary on Burrendong.

Biological control

Biological control agents have never been deliberately released at Burrendong but are present throughout the district. Dougald and Lachlan think they probably contribute to control, but they believe that biological controls shouldn't be the sole method of weed management.

Diversity in the approach

The Campbells' weed management strategy is embedded in the changes made to their grazing management practices.

Grazing and pasture management

Dougald and Lachlan use a flexible grazing strategy with up to 70 paddocks per system. The duration of grazing in each paddock ranges from one to three days, followed by resting the paddock for up to 100 days.

Summary

The Campbells are controlling Onopordum thistles at Burrendong as a result of adopting holistic property management, including flexible cell grazing. The system has delivered more productive pastures and livestock, improved groundcover, a larger area of native perennial grasses, and ultimately, greater profitability.

Production has increased 10%, which is worth around $30,000 each year. The greatest expense has been additional fencing and water, at a total one-off cost of $200,000. The system has reduced herbicide use and application costs by $16,000/year.

Top tips ✔

Dougald and Lachlan recommend that other people:

✔ Examine why Onopordum thistles are a problem. In all probability, it is because of grazing management practices that discourage a strong perennial-based pasture, result in low groundcover, and fail to target highly fertile areas such as sheep camps.

✔ Develop a grazing system that encourages a strong perennial pasture, always retains good groundcover, and that avoids creating areas like sheep camps.

✔ Consider adopting holistic property management, including flexible cell grazing.

Diligence

Dougald and Lachlan say that the keys to success in agriculture, including weed control are understanding the property environment, continuous and careful monitoring of pastures and livestock, and management that suits the overall well being of the property.

In contrast to a lot of other weed control programs, the Campbells' approach relies on getting the overall property management right, with positive flow-on effects for weed management. In this sense, weeds are regarded as a symptom of other problems, such as overgrazing, lack of suitable perennials and poor groundcover.

Maintaining competitive, perennial-based pastures across the entire property also prevents potential weed incursions from adjoining properties and public areas.

Benefits and costs

Since adopting a whole-of-property management approach, weed densities have dramatically declined on Burrendong. The level of Onopordum thistles is now so low that it is no longer regarded as a major problem.

Overall, the property is now in much better condition. The perennial pasture base has greatly improved (and is still improving), ground cover is always adequate, soil quality has improved and productivity has increased.

The change to a holistic system of grazing cost around $200,000 for the new watering system and subdivision fencing.

With a reduction in herbicide costs of around $10,000 per year, reduced labour requirements for spraying and 10% higher production, the Campbells' investment has already paid for itself and will continue to provide benefits into the future.

Annual benefits of weed management

Benefits

Reduced herbicide costs	$10,000
Reduced spraying labour costs (200 hrs @ $30/hr)	$6,000
10% production increase	$30,000
Annual net benefit	$46,000

There are additional costs and benefits associated with holistic management on Burrendong.

The Campbells have been able to keep ahead financially, as well as dramatically improve their property's natural resources, despite some very poor seasonal conditions and comparatively low wool prices.

With young families, Dougald and Lachlan also enjoy a reduced work load and additional time with their families under the new management system.

Keys to success

Dougald and Lachlan feel the keys to their success have included:

➜ Education – attending a grazing management course provided knowledge and motivation for changing to a more sustainable and profitable management system.

➜ Planning, undertaking and following through with the new approach – even in difficult times it is important to remain focused and stay with the program.

➜ Fully understanding the dynamics of overall property management, so that decisions are based on logic and sound knowledge.

Case Study 3 - Clonalton

Tony and Pattianne Gay, **"Clonalton", Reid's Flat, New South Wales**

Clonalton is a 2,000 ha property at Reid's Flat, south-east of Cowra in Central NSW. The property is owned by Tony and Pattianne Gay. Tony has lived on Clonalton all his life.

The production system

The property is primarily used for grazing around 12,000 Merino sheep, comprising 6,000 ewes, 3,000 wethers and 3,000 hoggets. Over time, Tony has adapted his wool enterprise to achieve a finer micron.

Around 20% of the land is arable and a small area of grazing oats is grown each year. 280 ha is timbered.

Tony recently purchased a second property, where he joins Merino ewes to crossbred rams for prime lamb production.

The pasture is dominated by native species such as microlaena, with some sub clover. Phalaris and clovers have been sown over time, and fertiliser is applied each year – typically single superphosphate.

In the past few years, Tony has used MCPA as a ground spray to control annual weeds such as Paterson's curse, saffron thistle and cape weed.

Tony has increased the stocking rate over the past ten years, running approximately 8.5 DSE/ha. He has made few other changes to his grazing management, using a set stocking, and only moving stock when sheep are to be sold. In dry times, wethers are the first to be sold.

Onopordum thistles

Tony has always recognised Onopordum thistle and the potential problems it can cause.

To Tony's knowledge, it has always been present on the property.

About 20 years ago the flock had a significant footrot outbreak. During this time, the management focus shifted from weed management to eradicating footrot. As a consequence, the thistle problem became more than just isolated pockets across the property.

During this period, when thistles were at their worst, 10% of the property was heavily infested by thistles, 35% with moderate infestations and 55% with low infestations.

Tony estimates that this has been reduced to 5% of the property being heavily infested with Onopordum thistle, 30% with a moderate infestation and 65% with a low infestation. Heavy infestations also vary with seasonal conditions.

Paterson's curse, cape weed and saffron thistle are the other problem weeds on Clonalton. Paterson's curse is more prolific and has a bigger negative effect on grass production.

The incentive to act

The primary goal for Tony and Pattianne's farm is to maintain a profitable business. They want to produce lower micron wool, maintain a good wool flock, and keep the property in good condition.

The spread of Onopordum thistles whilst Tony was busy managing the footrot outbreak prompted him to take action against them.

The main impact of Onopordum thistle on Tony's Merino wool enterprise is increased vegetable matter in the wool, which attracts a price discount. The extent of this discount is influenced by market conditions and the quality of other wool on the market.

The thistle can also increase the risk of scabby mouth, particularly in lambs. Tony vaccinates against this when necessary.

Onopordum thistle becomes a bigger problem in dry times, when sheep push into thistle areas for feed. Thick stands are a nuisance during mustering.

Tony does not believe that thistles have had a significant impact on his carrying capacity, as pastures tend to grow right up around the base of thistle plants and sheep will graze in thistle patches.

Tony understands that thistles don't like competition, which further motivates him to maintain good pastures.

The management of Onopordum thistles is an ongoing process, to avoid the potential economic impact on the farm enterprise, and to reduce the risk of the weed taking over if left unmanaged.

Overall, the effort made to control thistles is driven by seasonal conditions and the impact on both farm returns and day-to-day farm management activities.

Deliberation

Tony mainly relied on discussions with his peers to obtain information about how to manage the weed.

He does not see their goal as eradication of Onopordum thistle. He aims to keep the weed at a level that minimises the economic impact of thistle-based vegetable matter in the wool clip.

Tony's weed control tactics are linked to seasonal conditions and the weed's impact on economics and management. The effort made to control the weed each year is determined by the effect that each of these three factors is having on the farm system.

When the economic costs of the weed (lost pasture production and vegetative contamination of wool) increase significantly, or when the seasonal conditions are favourable for weed growth, a more concerted effort is made to spray thistles and keep them under control.

Diversity in the approach

Selective herbicide application and biological control are the two main methods that Tony uses to manage Onopordum thistles.

Managing for competitive pastures is also part of the overall weed management approach on the farm.

Other weed management approaches, other than very labour intensive chipping out of the weeds more than 20 years ago, have not been attempted.

Herbicides

The first phase in weed management (around 20 years ago) targeted the thickest patches scattered over an area of around 200 ha with MCPA and chlorpyralid. Areas such as sheep camps, which are often harder to access with a boom spray, were also targeted.

The second phase, which began 10 years ago, targeted Paterson's curse and involved spraying MCPA over 300-400 ha, and MCPA plus chlorpyralid over 40-50 ha, both at a cost of around $12/ha.

Boom spray applications of either MCPA, at a rate of 800 mL/ha, or terbutryn, at 250 mL/ha, have effectively controlled the thistle on Clonalton.

This later approach was chosen because it was relatively simple and effective. The weed is now at a level where its economic impact does not warrant an increase in the area sprayed.

Tony has also used a mix of MCPA and chlorpyralid to kill mature weeds that survived an application of regular MCPA.

Biological control

CSIRO Entomology released crown weevils at Clonalton six years ago. The weevils eat the seeds within the head of the plant, reducing seed production. The weevils persisted and increased in numbers, expanding their area of influence.

Over time, stem weevils have also made their way onto the property, from other thistle infestations in the area.

While these biological measures have been an important component of the weed management program, Tony believes they should not be viewed as independent methods of control. Rather, they work best when used together with herbicides and pasture management.

Diligence

Tony attributes his success in managing Onopordum thistles to maintaining a consistent approach to control the weed.

Persistence in spraying plants early has helped to reduce the number of plants reaching maturity and the potential for seed production.

On reflection, Tony said that if he had his time again, he would pay more attention early on to the lighter infestations, as these areas can quickly spread.

Benefits and costs

Tony and Pattianne have significantly reduced the area of the farm that is heavily infested by thistles. Over the past 20 years, this area has halved from around 10% of the farm to just 5%.

Control of Onopordum thistle at Clonalton reduces vegetable matter (VM) in the wool clip, makes mustering of sheep easier, and reduces the incidence of scabby mouth in lambs.

The level of VM in the wool clip still tends to fluctuate seasonally. In drier years, when feed becomes scarce, sheep push into thistle patches for feed and in doing so, increase the amount of VM in the wool.

The primary economic benefit from controlling the thistle is a reduction of VM in the wool. A higher VM content in the wool clip can typically reduce the price Tony receives by 50-60 c/kg of wool. Managing Onopordum thistle over the last 20 years has avoided a 20% discount on the wool price due to VM, delivering a benefit of around $6,600 per year.

The costs of Onopordum thistle management are largely integrated with the control of other broad leaf weeds, such as Paterson's curse. Annual weed spraying costs have been estimated to be $4,200 to treat 300 - 400 ha of the property for broadleaf weeds each year. About half of this, or $2,100 could be solely attributed to thistle control. Tony also uses MCPA plus chlorpyralid to control large thistle plants, and based on treating 40-50 ha per year, this is estimated to cost a further $540.

Annual costs and benefits of weed management

Costs

Spraying thistles with herbicides	$2,640

Benefits

Avoid 20% discount for VM in wool	$6,600
Annual net benefit	$3,960

Keys to success

Tony does not believe that his current weed strategy will eradicate the weed but it is keeping the weed at a manageable level.

He commented that being successful "depends on your definition of success". His indicators of success include no new areas being invaded by thistles and declining VM levels in his wool clip.

Tony lists two key factors critical to the success of his strategy over the past 20 years.

The first is perseverance - "keep on chipping away at it" with a consistent approach.

The second is getting the timing right for herbicide applications, especially MCPA. He said "the earlier you can spray, the better" because it is easier to kill the immature seedlings, thereby reducing the number of plants maturing and setting seed.

The greatest challenge to success is getting to the weed. For example, rocky outcrops and tree patches prevent spraying with the boom. Sheep camps are also problematic for access, as these particularly fertile areas often around rocks and trees.

Tony believes that his weed management strategy would apply in other regions.

Summary

Tony and Pattianne Gay have effectively managed Onopordum thistles at Clonalton by:

✔ Actively spraying thistle patches early each year.

✔ Focusing on larger infestations and susceptible areas such as sheep camps.

✔ Trying to keep the weed at a manageable level, rather than trying to eradicate it.

✔ Maintaining good pastures that compete with weeds.

✔ Encouraging biological controls to complement the other tools.

Tony and Pattianne have significantly reduced the area of the farm that is heavily infested by thistle. Over the past 20 years, heavily infested areas have halved from around 10% of the farm to just 5%. This has reduced vegetative matter contamination in their wool clip, giving a benefit worth around $6,600 each year.

Top tips ✔

Tony and Pattianne's suggestions to farmers managing Onopordum thistle are:

✔ It is more cost efficient and effective to spray thistles in conjunction with other weeds.

✔ It is best to hit the largest and worst patches with a boom spray of selective herbicide.

✔ Thistles need to be managed when they are impacting on production.

✔ Keep thistles at a manageable level - it may not be cost effective to try and eradicate them, but it is too costly to let them go.

✔ Manage pastures to encourage competitiveness.

✔ Biological controls are useful when combined with herbicides and pasture improvement in an overall weed management program, but don't rely on them as the sole method.

Case Study 4 - Cobargo

Bob and Elizabeth Douglas, **"Cobargo", Kyneton, Victoria**

The Douglas family has held Cobargo, a 123 ha grazing property near Kyneton in the Macedon Ranges of central Victoria, since 1970. Bob took over the management of the property from his parents in 1993.

The production system

Prior to 1993, the property carried about 35 cows plus some cattle for fattening. No pastures were sown, fertiliser use was limited and there was a heavy reliance on bought in feed and fodder.

Since 1993, Bob has considerably lifted farm productivity.

The property currently carries 80 spring calving cows plus progeny. The progeny are carried through and sold at 18 months. In addition, the property runs a flock of 250 spring lambing Suffolk ewes.

Onopordum thistles

The two main weed species in the area are scotch thistles and gorse. When left uncontrolled, both species provide habitat for vermin including rabbits and foxes. Both weeds compete with pasture, reducing carrying capacity. Wool can also be contaminated by the weed seeds and with resulting price discounts.

Prior to 1993, there were low to moderate infestations of Scotch thistles on the property. The naturalised pastures on the property at the time provided some competition to the thistles. Chipping of thistles was done on an annual basis to achieve partial control.

The commencement of the pasture introduction program increased the number of thistles and therefore the need for a more strategic approach to control. Thistles took advantage of the cultivation, increased soil fertility and low plant populations in the newly sown pasture - all a part of the early stages of pasture improvement.

Even though systematic control of Scotch thistles has been practiced at Cobargo for many years, soil seed reserves are activated by cultivation, and airborne seed is blown in by the wind. These infestations could quickly dominate in the absence of a control program.

The incentive to act

Although small in scale, the property has been developed and managed to a set of commercial objectives since 1993.

The Douglas' aim to improve the productivity of the property in a financially and environmentally sustainable manner.

Achieving this objective commenced with the preparation of a whole farm plan that identified drainage lines and three soil types on the property, and plotted the location of existing and future infrastructure including laneways, fencing and stock watering points. Remnant vegetation and the location of shelter belts were also incorporated into the whole farm plan.

The desire to control thistles was driven by a number of factors including profitability, management and personal satisfaction. The prime driver was the commitment to improve profitability through pasture introduction, increased fertility and increased carrying capacity. In the absence of weeds, pastures can be grazed more effectively and there is less contamination of fodder and livestock products.

A key driver was also the personal satisfaction of being able to work and live in a weed free environment. Scotch thistles germinate on the property each year mainly from airborne seed landing on the property. Unless these germinations are controlled annually, the extent of Scotch thistle on the property would quickly increase.

Since 1993, the objective for Cobargo has been to achieve a property free of weeds. The specific objective is to be weed free at the end of each year. The key to achieving this has been the implementation of an annual control program that aims to prevent any Scotch thistle plants on the property from seeding.

Deliberation

Bob's desire has always been to improve the productivity and profitability of the property and to enhance the "presence" of the property. Introduced pastures and the eradication of weeds were seen as being integral to achieving this objective.

Bob is an active member of the Kyneton Prime Livestock Group. The group freely exchanges information on all aspects of livestock production including pasture improvement and management, weed control, husbandry and marketing. Bob also obtains information from rural publications, suppliers and his own research.

This information, combined with a general awareness of the benefits of introduced pastures and the costs of weed-infested pastures, drove Bob to embark on a control strategy.

Bob has adopted an integrated approach to weed control that involves pasture introduction, grazing management and annual eradication to prevent Scotch thistles seeding on the property.

Diversity in the approach

The weed management strategy focuses on healthy pastures that compete with thistles. It includes introduced pasture, cultivation for fodder crops, increased fertiliser use, grazing management, and weed control.

Pastures and cropping

A pasture introduction program has been progressively implemented with approximately 10 ha sown each year. The designated area is cultivated in spring prior to sowing a summer fodder crop, usually turnips. This is followed by introduced pastures, sown in autumn.

On the higher areas, which tend to have lighter soils, the pasture mix includes perennial ryegrasses, cocksfoot, white clover and a mix of sub clovers. Fescue is substituted for cocksfoot on the lower areas of the farm where the soils tend to be heavier.

Soil tests results help to determine the fertiliser program and lime is routinely applied when sowing new pastures. In addition, all established pastures receive annual applications of superphosphate.

Herbicides and chipping

Weed control aims to prevent seed set on the property each year through a combination of spot spraying with MCPA and hand chipping. This is done mainly in the spring though it is an ongoing activity whenever weeds are found.

Diligence

The success of the strategy relies on persistence. In addition to promoting introduced pastures and practising rotational grazing, the strategy is to prevent any weeds from setting seed, then germinating on the property each year.

This requires constant surveillance, and eradication by spot spraying or hand chipping wherever thistles are found.

The main source of any new infestations is airborne seed from neighbouring areas. It is not possible to prevent these airborne seeds settling and germinating on the property, but encouraging competitive pastures reduces the opportunity for thistles to germinate and establish.

Summary

Bob Douglas has effectively managed Scotch thistles at Cobargo by implementing a control program focused on competitive pastures that includes:

✔ Boom spraying cultivated areas.

✔ Sowing introduced pastures.

✔ Spot spraying and chipping annual infestations.

Bob has adopted an integrated approach to controlling weeds in general, involving pasture introduction, grazing management and annual weed eradication.

The property is now relatively free of scotch thistles and net farm returns have doubled to $325/ha. Without effective weed control, farm carrying capacity may have reduced by 30% which would have reduced the farm's net income by around $20,000 each year.

Top tips ✔

Bob recommends to someone else in this situation:

✔ Don't rely on a single tool – monitor the needs of the soils, the pastures and the livestock.

✔ Be alert for weeds when routinely inspecting the property

✔ Carry a spray unit and a hoe on the farm utility or the motorbike so that any infestations can be treated when they are observed during routine inspections of the property

✔ Ground spray cultivated areas or newly established pastures

✔ Establish and maintain productive mixed pastures in order to provide as much competition as possible for the weeds.

✔ Control any annual infestations each year by spot spraying or chipping in order to prevent any seed being set on the property

✔ Use appropriate grazing management to balance the needs of the pastures and livestock.

Benefits and costs

There is currently very little Scotch thistle on Cobargo, but seeds still germinate from airborne seed landing on the property.

An aggressive approach towards control in the early years reduced the Scotch thistle population on the property and lowered the ongoing costs of control.

In recent years control has been achieved mainly by chipping and limited spot spraying.

The combination of pasture introduction, grazing management and weed control has increased the carrying capacity by 250%.

Financial returns from the property have increased with the increase in productivity. Cobargo now generates a net margin of around $325/ha. Without effective weed control, it is estimated that the carrying capacity would be reduced by 30%, which would reduce net income by around $20,000 each year.

Although all of the financial gain cannot be attributed to the removal of thistles from the property, thistles certainly provided the impetus to implement an integrated approach to weed management focused on the pastures, soils and livestock. Bob and Elizabeth now have the personal satisfaction and reward of being able to live and work on a productive, weed-free property

Keys to sucess

The key to the effective implementation of this strategy has been persistence, particularly:

➜ Identifying weeds during routine inspections of the property.

➜ Carrying a spray unit and hoe on the farm utility so that identified weeds can be controlled immediately.

➜ Ground spraying cultivated areas or newly established pastures where infestations are most likely.

➜ Establishing introduced pastures and using rotational grazing to provide competition for weeds.

➜ Attending to annual infestations from airborne seed to prevent seed set. By preventing seed set, infestations in subsequent years are reduced and ongoing control costs are lowered.

Other publications from AWI and MLA:

3D Weed Management: Onopordum thistles

Tips & Tools: Weed removers, pasture improvers – Effective weed control

For more information contact:

AWI
www.wool.com.au
or 1800 070 099

MLA
www.mla.com.au
or 1800 023 100

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