Weed Assignment

Paterson's Curse
Echium plantagineum

Paterson's Curse (*Echium plantagineum*) is also known as Salvation Jane, Riverina Bluebell, Lady Campbell Weed, Purple Bugloss, Blue Weed and Purple Peril. It is an erect annual weed, which can grow to approximately 120 centimetres high. A stout taproot leads to a branched stem covered with coarse hairs. Narrow dark green stem leaves are smaller than the rosette leaves, with rosette leaves growing up to 30 centimetres long. All leaves are covered with coarse hairs. The bluish purple flowers are about 2 to 3 centimetres long with 5 stamens. These can produce up to 4 seeds, resulting in approximately 5000 seeds per plant. The seeds are usually brown to grey in colour, wrinkled, pitted, 3 sided and about 2 to 3 millimetres long. It spreads through the movement of its seeds, although these are spread through animals, water and contamination of grain, not by wind.

Paterson's Curse usually germinates during autumn, develops into rosette plants in winter and stems are produced in late winter. It flowers in early spring through to summer and dies when finished flowering.

Paterson's Curse tolerates many temperatures and survives periods without rain. However, it prefers warm temperate areas with heavy winter rainfall. It likes heavily grazed land and degraded pastures with few species and is found all around Australia, often along roadsides and other neglected areas.

It is often confused with Vipers Bugloss (*Echium vulgare*), which has most of the same characteristics.

Problems and Significance

There are many problems associated with Paterson's curse. It is a noxious weed in many areas of the state, however, not in the Orange region. Noxious weeds are weeds providing a considerable threat to agriculture, the environment and even humans.

It is known to contain pyrrolizidine alkaloids, making it toxic to animals, especially pigs, followed by horses. Sheep, goats and cattle are affected least. It causes chronic liver damage, loss of condition and possible death (although rare). In some people it may cause skin irritation and hay fever.

Paterson's Curse is easily able to replace other plants when in heavily grazed pasture. This means that it reduces the value of the pasture and replaces the natural vegetation of the area.

It has a tolerance of many temperatures, climates and soils, being able to germinate under a wide range of temperatures, survive long periods without moisture and reduce the soil fertility of the many different soil types that it tolerates.

It spreads easily and at times there can be up to 30 000 seeds per square metre in the ground. These can remain dormant for up to five years if need be. This means that controlling the weed for one year will not wipe it out, it needs to be managed effectively over a period of many years (at least five).

Although unable to spread by wind, seeds are still able to spread easily. They can be carried in the wool or fur of animals as well as through animal faeces. Runoff can carry them to lower areas and contamination of hay and other crops (especially grains), can move them large distances, especially during drought.

Paterson's Curse is also an expensive weed. It costs Australian graziers approximately $30 million every year. When used for benefits, it only gives back about $2 million.

However, it also has its benefits. Especially in the drier regions of South Australia, it is often the only sort of feed for livestock, bringing salvation, in times of drought, giving it the name of Salvation Jane.

It is also beneficial to the honey industry. Not only does it produce pollen for honey, but it is rich in protein, enabling a build up of bee numbers.

Paterson's curse spreads easily and is able to thrive under a wide range of conditions. It is easily able to replace other plants.

Management and Control

At James Sheahan Catholic High School, Paterson's Curse grows abundantly. This has been known to be a problem with grazing animals, with a cow falling victim to Paterson's Curse poisoning last year. With the School's Ag department's tight budget, it can be hard to manage many weeds effectively. Because it is not a noxious weed, we are not required to dispose of it, but it still causes a problem, especially due to the long period of time it takes to manage Paterson's Curse effectively.

Because of the large numbers of seeds that a single Paterson's Curse plant produces every year and the fact that these can remain dormant in the ground for up to five years, management of Paterson's Curse must be put in place over a period of many years.

The main strategies that would be used at James Sheahan to control Paterson's Curse include:

- Grazing
- Cultivating; and
- Competition

Paterson's Curse is most prominent in land grazed by cattle; however, it is dominant in most areas with low stocking rates. At school, stocking rates are low, so to graze Paterson's Curse, numbers need to be increased. So, for successful management of this weed, high numbers of grazing sheep, along with other means, will help with the control of Paterson's Curse. Spring and early summer are the best times for grazing Paterson's Curse. Adult goats and Merino sheep (non-pregnant and non-lactating) are the best animals to graze with. Pigs, horses and cattle should not be grazed on Paterson's Curse, so as to avoid liver damage. However, sheep should not be grazed on Paterson's Curse for a long period of time, or in two successive seasons. Stock should be kept in areas where the weed can be easily controlled, for about 10 days after grazing infected paddocks, so as to allow any seeds to pass out of the system.

Cultivating Paterson's Curse in late summer will help to increase the numbers of germinating seeds during autumn, reducing the numbers of seeds in the ground. This can be used in conjunction with the sowing of a winter fodder crop (a crop grown to be cut and fed to animals), so as to compete with the weed. In following years cultivation is continued and a pasture suited to the area should be sown. Hay cut from areas infested with this weed should not be sold, instead used on contaminated areas so as to reduce the spread.

In Europe, where the plant originated, it grows in pasture with as many as a hundred species all competing against each other. In Australia, the case is different, with Paterson's Curse only competing against 4-5 species, enabling it to establish and dominate pastures all over Australia.

Therefore, competition pastures could be established so as to cut down the numbers of Paterson's Curse in that particular area. Perennial pastures are best used for this purpose.

Herbicides can also be used in conjunction with these three procedures, however, it is costly, with possible side effects and is not necessary while the other weed management possibilities are used effectively in conjunction with each other. Dormant seed germination is also not encouraged by this process. Herbicides are expensive and with the school's low budget, it is lucky they aren't necessary. They are not essential in controlling Paterson's Curse, however if the school feels the need and the budget permits, they may be used. If spraying, late autumn is the best time, when the weed is in the small rosette stage, because most of the seeds have germinated by this time and plants are young and still susceptible. Heavy grazing should occur no sooner than 10 days after the application of the herbicide. Herbicides should be based on the crop or pasture type and the amount of damage willing to be accepted (reduced chemical amounts are best for the pasture). Some of the most effective sprays include 2,4-D and bromoxynil, which are contained in herbicides effective against young plants up to the 6-leaf stage. For Herbicide use, two treatments should be planned each year, the first in April to late June at early rosette stage and the second in September to October to control late germinations as a follow up treatment. When using herbicides, it is important to wear the proper protective gear.

When the strategy is almost complete and only a few weeds are popping up here and there, cultivating is the only method which needs to be used, in the form of hoeing and chipping. Herbicides may be used here too, with spot spraying a possibility.

There are also ways of using Biological Control against Paterson's Curse; however, these methods would not suit the school. Insects such as the Leaf-mining moth, Crown weevil, Root weevil, Flea beetle, Stem beetle and Pollen beetle have been released as ways of controlling Paterson's Curse, but many are not yet fully established.

These treatments can all be used in conjunction with each other and for best results should be used together.

Merits of the Weed Management Strategy

Any weed management strategy to reduce Paterson's Curse needs to be implemented over a period of many years due to the large numbers of seeds that any one plant can produce (up to about 5000) and the even larger number of seeds in the ground (anywhere up to approximately 30000 per square metre). This strategy does just that, gradually cutting down the number of Paterson's Curse in the school farm, using a range of different techniques, which, when used together, effectively reduces both the numbers of the weed its self and the number of seeds in the ground.

This strategy will effectively improve the site. Although taking many years, it should eventually cut out all Paterson's Curse weeds at the site. The area is then free to be used again as part of the schools agricultural program. It will also improve the appearance of the site, making it more pleasurable to look at. It will bring grazing cattle into the site, without the fear for the school of liver damage in the animals.

The strategy is cheap and cost effective – fitting the school's agriculture department's tight budget. Herbicides are not needed, but if the school feels the need and the budget permits, they may be used. Cultivation and grazing are free and competition plants are cheap too, with only the seeds needing to be bought. The money saved may be useful if put towards the other needs of the school farm, such as equipment and stock.

Because of the avoidance of herbicides and if they are used, the use of reduced amounts, this strategy is environmentally friendly. There will be no chemical runoff and the area will not only be free of chemicals, which might affect the grazing animals, but will be safe for the children in the surrounding areas.

The proposed strategy is able to be used in all sorts of weather and any time of the year. With the use of herbicides, there are restrictions as to the application. There are no restrictions in cultivating, grazing and competing, although there are certain times of year when it is best to perform these practices.

Most of the procedures encourage seed germination, resulting in fewer seeds in the ground (although more plants to control!). If these new plants are cultivated at the rosette stage, even less seeds are being produced, resulting in quicker management.

The strategy is designed to be long lasting; however there is the risk of contamination from nearby areas. This can be easily overcome by cultivating the weed before it has had time to establish itself properly. To be on the safe side, at least one of the processes (usually cultivation in the

form of hoeing and chipping) should be in place during the years following the conclusion of necessary treatment for any stray weeds.

There are no problems that the school should be aware of, except the risk of pasture deterioration and runoff (which would affect the school) if herbicides are used. Also they should be aware that any weed management strategy has to be designed to cover a period of many years where Paterson's Curse is involved.

Paterson's Curse is a serious weed which needs to be controlled, even in the school environment. There are many possible management strategies, which can be made cost effective and harmless quite easily. Although effective control will take many years, the numbers of Paterson's Curse will, eventually, be noticeably cut down.

Me with one of the many Paterson's Curse weeds on the school farm!

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