

## Victorian serrated tussock management program

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**Summary** Serrated tussock *Nassella trichotoma* has been declared as the worst weed for decreasing carrying capacity. In 1988, serrated tussock was estimated to cost the Australian wool industry approximately \$12.9 million annually. A conservative figure given for the cost of lost grazing to serrated tussock in Victoria was \$5 million per year. In 1997 the estimated area of serrated tussock in Victoria was 130,000 hectares, but its potential distribution has been predicted to cover 4.6 million hectares in Victoria based on climatic models.

This very invasive, wind dispersed weed competes with desirable species and is not eaten by grazing animals.

The major challenges with serrated tussock are halting its spread, and the establishment of land management systems that reduce its impact and reduce its spread from densely infested areas that have naturally low productivity.

The community driven Victorian Serrated Tussock Strategy provides a framework that sets direction and establishes a coordination process for the management of serrated tussock in Victoria.

**Keywords** Serrated tussock, weed management strategy.

### INTRODUCTION

Serrated tussock has been declared as the worst weed for decreasing carrying capacity (Parsons and Cuthbertson 1992). In 1988, Serrated tussock was estimated to cost the Australian wool industry approximately \$12.9 million annually. A conservative figure given for the cost of lost grazing to serrated tussock in Victoria was \$5 million per year (Nicholson *et al.* 1997). In 1997 the estimated area of serrated tussock in Victoria was 130,000 ha, but its potential extent has been predicted to be 4.6 million ha in Victoria based on climatic models. It currently affects 130,000 ha in the outer north west of Melbourne fringe, Bacchus Marsh, Geelong and Ballarat areas, with some small infestations at Hamilton and Bairnsdale.

Serrated tussock is one of the twenty Weeds of National Significance (WONS) due to its highly invasive nature, its negative impacts on agricultural production and its threat to biodiversity, particularly native grassland communities. The grasslands and grassy woodlands of south-eastern Australia are the most poorly

preserved natural vegetation types in the region, and contain the greatest number of species facing extinction. Only 0.5 percent (10,000 ha) of the original 2 million ha of lowland grasslands now remain in near natural condition (Richard Boekel pers. comm.). Serrated tussock is threatening these grasslands.

In 1993 a community driven public meeting addressed the serrated tussock problem in Victoria, especially the threats it posed to Victoria's grazing industries and native grasslands if it were allowed to spread unchecked. From this meeting the Victorian Serrated Tussock Taskforce was formed. In later years this group became the Victorian Serrated Tussock Working Party (VSTWP). The taskforce was a community group, with its members representing the fourteen Landcare groups operating within the Melbourne–Geelong–Ballarat (M-G-B) infestation area. With the support of the Department of Conservation and Natural Resources, the Taskforce's goal was to develop a strategic plan for controlling serrated tussock in Victoria. In October 1994 the Taskforce commissioned INLAND Agricultural Pty. Ltd. to produce a management strategy for serrated tussock (Aberdeen 1995).

The strategy identified key causes of uncontrolled serrated tussock infestations as being:

- Lack of awareness by landholders.
- Lack of information regarding control techniques and legal obligations.
- Lack of motivation for landholders to conduct weed control, attributed to lack of enforcement and incentives.
- Need for research, analysis and dissemination of results.
- Lack of co-ordination of on-ground activities of land managers, both public and private.

Current estimates show serrated tussock to be affecting 130,000 ha of public and private land. The projected figure for potential area under threat is 4.6 million ha. In response to the completed Serrated Tussock Management Strategy, the Government established a Working Party to help advance the program. The twelve members of this working party comprise a range of stakeholders including Natural Resources and Environment (NRE), Port Phillip Catchment Board, Corangamite Catchment Authority, Landcare and community representatives. The group reports to

the secretary of the NRE and has the following terms of reference:

- a) Oversee the refinement and implementation of the Serrated Tussock Strategy.
- b) Advise on the impact and control of serrated tussock.
- c) Co-ordinate action by local government, Landcare groups and other groups on serrated tussock.

The Department of Natural Resources and Environment is the service provider to the Working Party. The model developed by NRE is to provide comprehensive awareness, property inspections and an extension program (extension officers) aimed at encouraging landowners to take all reasonable steps to eradicate serrated tussock. The second aspect of the role is to determine the scale of the problem through an on-going mapping program. The data collected provides benchmarks to base a percentage reduction figure as a performance indicator and to target future control programs. The data is recorded on the NRE Integrated Pest Management System (IPMS). Local government and Landcare groups have also been mapping and recording on this system in conjunction with the NRE program.

There has been, and continues to be, a critical need to increase community understanding of the economic and environmental ramifications of serrated tussock. The current extension activities continue to accelerate behavioural change to achieve faster adoption of the preferred management techniques to combat the tussock spread. To ensure a committed and co-ordinated compliance program, Direction notices and/or Work Agreements were issued to all properties recorded as having serrated tussock and which have been inspected by an Authorised Officer.

Current community attitudes indicate that landholders are prepared to accept a higher degree of regulatory action to involve all the serrated tussock affected properties in a timely and co-ordinated program. A key component of this program is that Rural Extension Officers (REOs) and Catchment Management Officers (CMOs) work with landholders and provide the opportunity to develop an agreed plan of action for the control and long-term eradication of serrated tussock on broad acre, non-arable land, e.g. the landowner will prevent seeding and reduce infestation size on an incremental basis. These agreements or property management plans do not exempt landholders from prosecution if they fail to meet the requirements of the Direction notices.

The VSTWP, in partnership with NRE, recognised the need for changes in the way it deals with serrated tussock. It aims to increase the effectiveness of existing inputs into its management through the acceptance of currently available opportunities, which include:

- Increasing acceptance of the wider ownership of serrated tussock problems.
- Increasing acceptance of the role of local government and community groups in the co-ordination of on-ground serrated tussock activities. Ensuring legislation facilitates appropriate management.
- Establishment of effective mechanisms for monitoring and evaluating mechanisms serrated tussock management.
- Introduction of more appropriate incentives / assistance to enable land managers to comply with weed management responsibilities.
- Increase the knowledge and technologies currently available for control of serrated tussock.

**Extension** A community information and education program is essential to catalyse, support and sustain the management of serrated tussock. The approach taken by NRE officers is to provide comprehensive awareness, property inspections and an extension program aimed at encouraging landowners to take all reasonable steps to eradicate serrated tussock.

**Local government programs** Local government involvement in serrated tussock control has reached the point in the West Port Phillip area that Local government must decide to what level it will resource the program. Local government must realise that, where serrated tussock is concerned, to continue with a 'business as usual' attitude is fraught with danger, while there is continual decline in the resource base and an increase in public concern over land management issues such as weed control.

**Compliance** Enforcement of the Catchment and Land Protection Act 1994 in relation to serrated tussock has the potential to 'ensure' the adoption or cessation of particular activities that aid or detract from weed management. In the serrated tussock areas, the Working Party and Landcare groups have observed the reversal of traditional attitudes that oppose regulation of the use of rural land. Current community attitudes indicate that land managers are prepared to accept a high degree of regulatory action to involve all the serrated tussock affected properties in a timely and co-ordinated program.

To ensure a committed and co-ordinated compliance program, landowners are divided into a) those with broad acre, non-arable country with greater than 10% density of serrated tussock, and b) those with arable land with less than 10% density of serrated tussock. The latter are issued with directions, while the broadacre properties are encouraged to develop

and implement Property Management Plans (PMPs). In both situations, time frames are negotiated between the CMO and the landowner. This process allows each landowner to be treated in a fair and reasonable manner, whilst ensuring the long-term control of serrated tussock. Landowners who enter into a PMP must achieve the milestones in the plan. Failure to do so will result in a Land Management Notice (LMN).

**Monitoring** A number of techniques have been used in the past, including roadside surveys, parish comparisons and random point assessments. The best means of determining benchmarks and treatments to determine the effectiveness of control is the NRE's Integrated Pest Management System (IPMS). The task is to get everyone inputting to this system (including Landcare groups and local government). Mapping of new infestations in various parts of the state is an indicator of the increase in identification skills and that identification of tussock is becoming an easier task. An intense monitoring program has occurred this year with all properties containing densities of serrated tussock, greater than 10% being reviewed to ensure Property Management Plans (PMPs) and Work Plan Agreements (WPAs) are in line with community expectations as determined by the Serrated Tussock Working Party. Each property under the monitoring program has been contacted monthly to ensure PMPs and WPAs are adhered to.

**Incentives** The VSTWP believes there is scope for a greater use of incentives to encourage serrated tussock management. The group acknowledges that incentives are an adjunct to other strategies used to change behaviour, e.g. awareness and regulation. To best achieve this option, funding had been allocated and criteria have been determined to achieve optimum results. The development of local serrated tussock management strategies by Landcare groups (or ideally groups of groups), will best determine the direction of on-ground actions for the Landcare areas. These plans must address the long-term management of the land resource and demonstrate the long-term landholder commitment.

## RESEARCH

**Management to reduce persistence** Research is in progress on the development of pasture management strategies that farmers can use to help prevent the invasion of serrated tussock seedlings into their pastures. It focuses both on killing mature plants, (because once the grass is established herbicides or cultivation are the only techniques available) and on killing 'weak' seedlings through pasture management techniques. It

will also contribute to understanding the ecology of serrated tussock, including triggers for germination and the causes of seedling death. The preliminary data suggest that spring and summer pasture management may be important for serrated tussock, control. Spring management of pastures promotes good growth that shades out new serrated tussock seedlings to impose both grazing and moisture stress on the weak seedlings. Funding from the NRE Wool Program, NRE Pest Plant Program, the Serrated Tussock Working Party and Corangamite Catchment Management Authority will ensure that this work (undertaken by a post-graduate student, Andrew Barritt) continues for another three years.

After the removal of serrated tussock, more eventually germinates. Most seedlings die due to competition from each other and from other pasture species, but some survive and require further control. In many cases, paddocks have been reinvaded with high densities of serrated tussock after only five years, and farmers have been forced to apply cultivation or blanket herbicide treatments. Research is in progress to investigate the selective removal of serrated tussock seedlings from an improved pasture, using low rates of flupropanate, 2,2-DPA and glyphosate. Two months after treatment, no herbicides were effective in decreasing serrated tussock seedling numbers to an acceptable level.

2,2-DPA at high rates of 9 and 12 kg ha<sup>-1</sup> decreased live seedling numbers from 100% to 49% and 57% respectively. In most cases seedling numbers increased due to germination occurring in autumn. After twelve months, the most effective herbicide for killing serrated tussock seedlings was flupropanate at 750 mL ha<sup>-1</sup> and 1.0 L ha<sup>-1</sup>. Seedling numbers declined from initial levels of 100% to 19% and 7% respectively. The plots treated with flupropanate treatment at 1.0 L ha<sup>-1</sup> contained an average of 0.25 live seedlings m<sup>-2</sup>, whereas the control (which received no herbicide treatment) averaged 8.6 live seedlings m<sup>-2</sup>.

## Killing serrated tussock and preventing seedhead emergence

*Glyphosate and flupropanate trial* Glyphosate and flupropanate are the main chemicals used to control serrated tussock. In a trial to investigate the control of unburnt serrated tussock under different rates of glyphosate and flupropanate, the effects of these herbicides on native grasses (mainly spear grass, *Stipa* spp. and wallaby grass *Danthonia* spp.) was also assessed. The trial also investigated the effect of adding glyphosate to flupropanate for controlling serrated tussock.

**Seedhead emergence** Preliminary results taken in December 2000 indicated that seed head emergence of serrated tussock was prevented in all treatments where glyphosate was used. Glyphosate killed serrated tussock when applied at rates of 1.0 L ha<sup>-1</sup> and above. The effectiveness of glyphosate could be explained by the time of spraying, since the plants were young (<12 months) and actively growing prior to setting seed.

**Herbicidal control of dense serrated tussock prior to native tree establishment** Serrated tussock freely invades rocky, degraded non-arable country, due to lack of competition. One long-term land management option is for landholders to replace serrated tussock with native tree seedlings. This practise is feasible, however a vigorous serrated tussock infestation will establish if the site is not prepared and managed properly. NRE is aiming to develop protocols for tree establishment on degraded country for long-term serrated tussock control, through a replicated trial at Rowsley. This rocky site contains dense serrated tussock. The trial investigates the use of flupropanate, glyphosate and simazine for pre- and post-emergence treatments. Pre-emergence herbicides were sprayed in July 2001, and half the site was direct seeded and the other half hand planted in August 2001. Post-emergence herbicides were scheduled to be applied in August 2002.

**Grow West – Integrated large scale revegetation for degraded non-arable land project 2002** Landholders are increasingly looking for assistance to restore large areas of the Rowsley Valley gorges and escarpments, due to the increasing urgency to provide longer-term control of serrated tussock.

There is currently 3500 hectares of land offered for revegetation, but this figure could quadruple if cost-effective procedures existed for revegetating large areas. Degraded valley escarpments often contain infestations of serrated tussock, rabbits, erosion and saline seepage. Restoration of valley sides would contribute to improving water quality by reducing salinity, nutrient and silt loads entering the river system and water supply.

This integrated community support program will provide landholders with the capacity to revegetate these large areas of land. This has required a lead organisation to take the role as program leader (Barwon Water, Catchment Management Authority, Dept. Natural Resources and Environment, Moorabool Shire) to manage and implement a large-scale revegetation program for the valley. The project and work required to deliver such a large program is beyond the means of the Landcare groups (they are telling us this!). These stakeholders have appointed a professional manager to deliver this project for the local community. The delivery of just one large-scale integrated community revegetation program could deliver significant outcomes.

#### REFERENCES

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