Slasher covers and fans to minimise roadside weed spread

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Summary It has been observed that the seeds of Chilean needle grass (Nassella neesiana) can be spread by the use of machinery to slash or mow roadsides that are infested with this weed. Modification of slashers by the addition of a cover or deck fans that can prevent seeds and/or seed heads settling on the top of the slasher appears to be effective. This project compared the relative effectiveness of each type of slasher modification to reduce seed build up in a Chilean needle grass infestation at a demonstration day held at Greenvale, Victoria, Australia, in November 2009.

Keywords Slasher cover, slasher fan, Chilean needle grass, roadside weed, biosecurity.

INTRODUCTION
Slashing is the most common method used to reduce the height and density of roadside vegetation. It is conducted primarily to reduce fire risks and to maximise visibility for road users. However slashing can have some serious indirect consequences on both the natural environment and agriculture. Roadside slashing is known to cause spread of serious environmental and agricultural weeds. Panicle seeds accumulate on the slasher deck. Therefore, if not cleaned down appropriately before leaving the site, seeds can be transported, resulting in new infestations establishing. Weeds that commonly spread through slashing operations include Chilean needle grass (Nassella neesiana Trin. & Rupr.), Texas needle grass (Nassella leucotricha Trin. & Rupr.), cane needle grass (Nassella hyalina), lobed needle grass (Nassella charruana Arech.), serrated tussock (Nassella trichotoma (Nees) Hack.), African love grass (Eragrostis curvula (Schrad.) Nees), espartillo (Amelechio caudatum Trin.), fire weed (Senecio madagascariensis Poiret) and Sporobolus species.

In each state and territory there is a legal requirement for the land manager to prevent the further spread of declared noxious weeds while undertaking routine roadside slashing. This project compared two slasher modifications to reduce the likelihood of spreading weeds along roadsides during slashing operations.

Timing of slashing Mowing or slashing at the right time can prevent or reduce panicle seed head production and encourage re-growth that is more palatable to stock (Grech 2007a). Research trials undertaken by the Department of Primary Industries Victoria have shown that to minimise panicle seed re-growth and the risk of transporting viable seed, slashing needs to occur prior to, or around the flowering stage (Grech 2007b).

Using Chilean needle grass as an example, flowering occurs for approximately 2 weeks, so there is a very limited window of opportunity within which slashing will be an effective control measure. The timing of flowering varies from year to year and needs to be closely checked once the panicle seeds emerge (Grech 2007c).

Slashing after the point of flowering is not recommended as the tractor and slasher are highly likely to become contaminated with viable panicle seed. However, it may not always be possible or practical to slash within this narrow time period.

Slasher cover The concept of slasher covers was developed as part of a joint project between the Royal Melbourne Institute of Technology (RMIT University), School of Aerospace, Mechanical and Manufacturing Engineering and the Department of Primary Industries Weed Research group during 2005 (Erakovic 2005). The cover works by physically stopping seed and pasture trash from building up on the slasher deck and being transported during the slashing operation. Any seed that comes in contact with the cover generally falls to the ground. This concept does not require any additional power from the tractor during operation (Figure 1).

The cover itself can be made of UV stable canvas or other toughened materials and is supported by a steel frame that is attached to the slasher deck. Limitations of the cover include extra time when hitching and unhitching the slasher as well as the potential for damage to mounting lugs when working in rough terrain. Day to day vibration of the slasher may also weaken the welds holding the subframe to the deck, so these points also need to be checked regularly.
The slasher fan concept has been in use in Queensland since 2006 and uses the principle of air movement via a hydraulic fan to blow any pasture trash or seeds off the deck of the slasher (Figure 2). The force and intensity of the air flow is dependant on the type of fan and position relative to the slasher deck and any obstructions to air flow.

The slasher fan should be used at all times when the slasher is operating and requires the operator to activate the remote hydraulic circuit. Vibration can also affect the mounts of the slasher fan, potentially leading to cracking; therefore these points also need to be checked regularly.

The trial was conducted in a Chilean needle grass infested paddock and each of the slasher 200 m passes were chosen in areas with equivalent Chilean needle grass infestations (approx 40% cover). In total three slasher 200 m passes were made and replicated four times. To compare weed seed collection, the trial utilised 2.1 m Howard rotary slashers. One was fitted with a cover and the other with a fan (above the slasher deck) and both were compared to the slasher being used with the fan turned off (control). After each 200 m slasher run through the Chilean needle grass-infested paddock, the Chilean needle grass seeds and trash were collected separately from the slasher deck and from the slasher chains for later sorting and analysis.

All material collected was dried until constant mass in brown paper bags. Thirty batches of 100 panicle seeds were weighed to calculate average seed weight. Grass trash from under the slasher deck, or on the tractor, was not collected. Data were log transformed to balance residuals prior to analysis using ANOVA.

RESULTS AND DISCUSSION

Statistical analysis of the clean downed material showed that the slashers with either the cover or the operating fan (Cover, Fan) had significantly less Chilean needle grass than the slasher with the fan turned off (No Fan) (P <0.001) (Table 1). However, all of the slashers (Cover, Fan and No Fan) accumulated similar amounts of pasture trash in the safety chains at the front and rear of the slasher deck (Table 1).

Implications

The choice of either the slasher cover or the slasher fan is dependant on each land manager’s situation and type of equipment.

It is anticipated that slasher cover and fan concepts will lead to a reduction in the spread of grassy weeds along linear reserves and roadsides. It is essential, however, that this technology be used in conjunction with other weed prevention practices, such as:

1. Having operators trained in weed identification and machinery hygiene,
2. Weed infestations are mapped and monitored,
3. Work plans protect ‘clean/non-infested’ areas by ensuring clean areas are slashed prior to entering contaminated areas,
4. Clean down/brush down zones are established and monitored appropriately, and
5. Avoid working in weather when panicle seeds will stick to machinery.
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REFERENCES


Table 1. Effect of fan, cover and no fan on seed and trash accumulation on slasher deck and chains.

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<th>Log transformed</th>
<th>Back transformed</th>
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<td>Cover</td>
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<tr>
<td>Panicle seed dry weight (g)</td>
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<td>Converted to number of panicle seeds</td>
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<td>Trash dry weight (g)</td>
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