How do I winter clean pastures to remove annual grass weeds?

The issue:	When left uncontrolled, populations of annual grass weeds reduce the quality and productivity of sub-clover based pastures and, eventually, out-compete desirable species. Winter cleaning is an effective tactic to reduce annual grass weeds with short seed viability.
The impact:	Winter cleaning can increase the composition and contribution of desirable grasses and sub-clovers, making the pasture more productive.
The opportunity:	If winter cleaning is successfully implemented, it supports improved growth of perennial and sub-clover content, extending the productive life of a sown pasture and improving livestock productivity.

What is winter cleaning?

Winter cleaning is a herbicide application technique to remove or 'clean' annual grasses, mainly silver grass, from established mixed grass/sub-clover pastures. It relies on a chemical (simazine) being absorbed through the roots when plants are actively growing. The cleaning effect is lifted further for mature plants by applying a second herbicide (paraquat) which damages the leaves.

Removal or suppression of the annual grasses creates bare ground for more desirable pasture species to populate.

Untreated pasture (left) compared to winter cleaned pasture (right) in mid-November

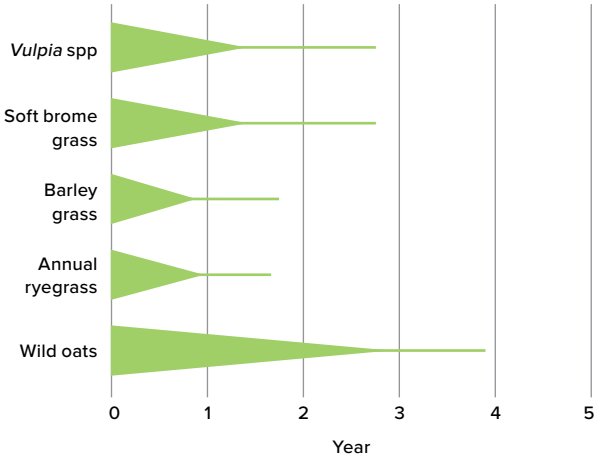
What plants does winter cleaning target?

Winter cleaning is highly effective on *Vulpia* species, such as silver grass, rat-tail fescue *(Vulpia myuros)*, sand fescue *(Vulpia fasciculata)* and squirrel-tail fescue *(Vulpia bromoides)*. It will also suppress barley grass *(Hordeum leporinum)* and soft brome grass *(Bromus hordeaceus)*.

The technique is effective because it removes the grasses from the pasture before they have time to set seed. Silver, soft brome and barley grasses have short seed life (viability) and disrupting the seed set, even for one year, can dramatically reduce the seed available for germination the next year (see Figure 1).

Other annual grasses (annual ryegrass, wild oats) and some broadleaf weeds can also be suppressed by herbicide application, but the effect is not lasting. The growth of perennial grasses and sub-clover will temporarily slow, but they will go on to recover.

Figure 1. Longevity of seeds of annual grasses affected by winter cleaning. Longer cones indicate greater seed dormancy before germination



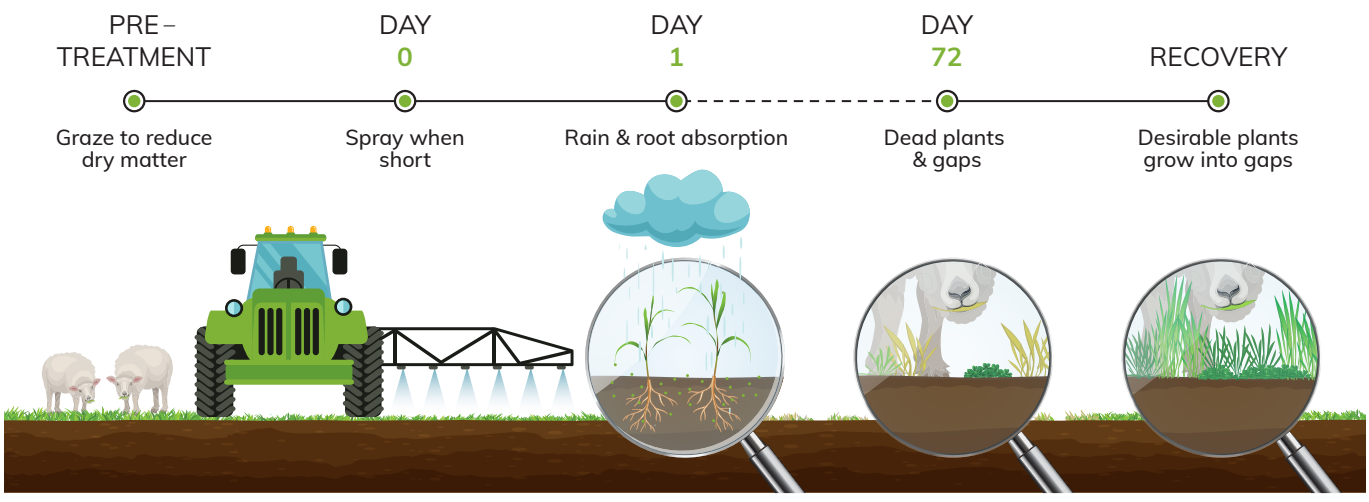
Herbicide effect and use

Simazine is a root-absorbed residual herbicide. It relies on rain to wash the chemical from the leaves into the soil, enough soil moisture for uptake by a growing plant and biological activity to remove the remaining herbicide from the soil. Simazine uptake is reduced under waterlogged conditions.[1]

The herbicide restricts carbohydrate production, so weed growth only slows when plant reserves are exhausted. Therefore, larger plants take longer to show the effects of simazine uptake. Hard grazing before application is desirable to reduce the remaining dry matter and root mass and quicken the response.

The cleaning effect can be enhanced by the addition (to the herbicide mix) of a small amount of paraquat (such as Gramoxone®), a contact grass-selective herbicide with no residual activity. Paraquat 'burns' the leaves, which reduces the amount of material remaining. It is particularly useful when the target weeds are more mature.

The process of winter cleaning pastures



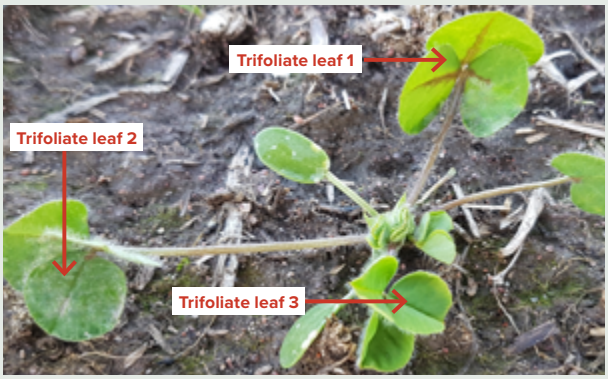
Simazine remains effective in the soil for 6–12 weeks. Shorter residual periods occur under conditions which favour greater biological activity, such as soils with high organic matter, good moisture, good fertility and warmer soil temperatures.

Plants begin to yellow and appear burnt at the leaf tip. Under favourable conditions the target plants start to die 2–4 weeks after simazine application, but quicker if paraquat is also applied. Paraquat can result in sub-clover leaf damage but the leaves will recover.

Same plot, pre-treatment in late July (top) and 14 days later (bottom) after the applications of simazine and paraquat

Timing

Winter is the most common time for herbicide application as because the target grasses have germinated, the clovers have at least three trifoliate (true) leaves and there is usually adequate soil moisture.



Sub-clover plant showing three trifoliate leaves

It is advisable to avoid the coldest period in winter (commonly July) because herbicide uptake, desirable plant recovery and herbicide degradation are all slower during this time.

Earlier treatment, favoured by an early autumn break, is possible if the ideal conditions can be met. This provides a longer period after treatment for more desirable plants to recover before the colder months, reducing the loss of winter feed and filling the gaps created by the removal of the annual grasses.

Early spring application can also be considered. This timing captures any grasses late to germinate and avoids suppressing winter growth, however, the treatment may not be as effective if the plants are larger or have matured early.[2] Late application reduces the time more desirable species have to fill the bare patches created by removing the annual grasses. It can also negatively impact early-flowering sub-clovers.

Avoid combining winter cleaning and spray-grazing (for control of broadleaf weeds). If both treatments are required, undertake the spray-grazing first when broadleaf plants are small. Allow at least three weeks before starting the winter cleaning treatment.

Winter cleaning is not recommended in newly established pastures (less than 12 months old).

Rate

The label rate of simazine is determined by soil type, with lower rates on light-textured soils and higher rates for soils with a higher clay content. Label rates for pastures may be lower than crop application for the same weed. This is to avoid lasting damage to the sub-clover.

The addition of a small amount of paraquat to the herbicide mix is recommended when plants become more mature.

Adequate herbicide coverage is critical. Label directions for minimum water volumes are likely to be higher than amounts used for many other herbicides. A wetter is also recommended.

Grazing and over-sowing

There is a 14-day withholding period before grazing can commence, extended to 21 days if the pasture is to be utilised for silage or hay. The herbicide label provides all the critical comments and precautions for the safe and responsible use of this technique. Always read the label and only use as directed.

The minimum plant-back period (the time before sowing into that paddock can take place) for pasture species is six weeks on heavy-clay soils and eight weeks on light-textured soils. This period may need to be extended for more sensitive pasture species such as phalaris, clovers, lucerne and cocksfoot, compared to ryegrass and tall fescue.[2]

Pasture recovery

Once the herbicide effect has ceased, growth of desirable plants should be encouraged to fill the bare spaces created. This will maximise the benefits from the treatment and reduce the chances of other weeds replacing the annual grasses that were removed.

The gaps can be filled by increased growth of existing sub-clover or growth of new species introduced with over-sowing.

Perennial grasses provide greater long-term control of *Vulpia* species compared to sub-clover because of their upright growth habit, but they are less effective at filling bare spaces created by removing annual weeds.

Apply rotational grazing until plants begin flowering. The aim is to keep the pasture between 3–8cm to allow sub-clover runners to grow into the gaps and stimulate new tiller growth on the grasses. Relax grazing pressure during sub-clover flowering to maximise seed set.[3]

Adequate soil fertility will also assist in the growth of sub-clovers and perennial grasses.

Long-term impacts

A wide range of responses have been reported to winter cleaning. The variability can be explained by the initial weed infestation, soil and climatic conditions, timing and rate of herbicide application, other species present in the pasture and post-spraying grazing management. Below is a summary of results of numerous trials:

- Winter cleaning will result in a reduction in winter production in the year of application. The impact is greater when annual grasses are dominant and spraying is delayed. Suppression of sub-clover and grasses can occur. Losses in dry matter can be as large as 50% for up to eight weeks.[4, 5, 6]
- The contribution of desirable species to overall production will increase in the long term, leading to more high quality feed and longer seasonal growth.[6, 7]
- More sub-clover will germinate in following years because of the removal of the allelopathic toxins which leach out of dry silver grass, reducing germination and seedling growth in sub-clover.[8]
- The benefits from winter cleaning can be seen for five years or more.[7]

The impact of treatment with simazine and paraquat on sub-clover and grasses before (left) and 10 days following (right)

Other management considerations

The loss of pasture production after spraying is arguably the greatest downside to winter cleaning. Therefore, applying the treatment in years of adequate or abundant pasture growth will lessen the short-term negative effects. Other approaches include only treating one or two paddocks a year.

It is recommended to undertake a whole-farm feed budget to understand and manage the potential loss of feed. The overall cost of winter cleaning increases dramatically if the loss of feed is to be replaced by supplementary feeding or through boosting growth on other paddocks with nitrogen or gibberellic acid.

Another major consideration is to ensure there are sufficient desirable plants to fill the gaps. This may be hard to achieve if the desirable grass or sub-clover content is low before treatment or if other competitive weeds, such as capeweed or erodium, are also present.

Before deciding to winter clean, consider these questions:

- Are there are sufficient plants to fill the bare spaces?
- Can appropriate grazing management be applied?
- Are soil conditions favourable for the growth of desired species?
- Is competition from broadleaf weeds minimal?

While winter cleaning can be highly effective in reducing annual grasses in the year of treatment, some seed carryover is likely. If there is insufficient competition within the pasture, prolific-seeding annual grasses can quickly rebuild plant numbers.

Different tactics, such as silage, spray-topping or crash grazing at seed head emergence may be required to minimise silver grass seeding in the following seasons.

Silver grass setting seed among sub-clover

References and more information

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