



Non-chemical weed control – Handpicked Wines



Background

Handpicked Wines has vineyards in Mornington, Yarra Valley, Tasmania and Barossa Valley. The 40-hectare Highbow Hill Vineyard in the Yarra Valley has sandy loam soils over clay and gravel over mudstone. The Yarra Valley has a cool climate with an average annual rainfall of 812.7 mm, spread across the year. In 2009, Handpicked Wines started converting its vineyards to organic, giving Vineyard Manager, Andrew Butler, the challenge of managing weeds without herbicides.

Key non-chemical weed control practices:

- Inter-row cropping to compete with weeds in the mid-row.
- Rolling of annual mid-row cover crops in spring, where possible, instead of cultivating them.
- Mechanical undervine weed control using a Clemens knife weeder and Clemens finger weeder in most blocks and a Boisselete undervine weeder in narrow, terraced blocks.
- Sheep grazing in winter or mulching and composting to reduce weed pressure.
- Retention of volunteer plants undervine in wet years when water is not limited.

Key results:

- Increased soil organic carbon levels in the mid-row of blocks with permanent swards and annual cover crops, compared to herbicides
- Comparable control of clovers, cereals, and legumes from rolling compared to cultivation
- Less effective control of grasses from rolling compared to cultivation
- The reduction or elimination of herbicides by using mechanical undervine weed control, without any negative effect on yield or quality
- Reduced need for weed control by tolerating weed growth in wet years
- Elimination of at least one weed control pass by grazing sheep in winter.



Weed control overview

Over time, Handpicked Wines has changed the way it views weeds in the vineyard. In Andrew's words, "It is less about what the vineyards look like, and more about how they are functioning". With this change of philosophy, weeds are only controlled if they are having a detrimental effect on yield or quality, either by competing with vines for nutrients and water or by growing into the canopy. In wet years, some plant growth undervine is encouraged. In drier years, particularly at sites where water is limited, weed growth undervine is carefully controlled.

Andrew and his team have trialled, and are continuing to trial, various weed control methods. They have concluded that no single tool will suit all their vineyard situations. Instead, they tailor their practices to suit the unique conditions and challenges of each site. Factors such as water availability, soil condition, weather conditions, weed spectrum and weed impact on vines are all considered when deciding which weed control tool to use.

Detailed description of weed control practices

Mid-row weed management

Handpicked Wines manages weeds in the mid-row by alternating rows of an annual cover crop (a mix of cereals and legumes) with rows of a permanent sward (fescue over-sown with a clover mix). The cereal/legume rows are cultivated and seeded in autumn; the crop is allowed to grow over winter and into spring; and is then slashed and side-thrown undervine. To manage weeds that start to creep into the permanent swards, the permanent sward rows are rotated with the annual cover crop rows every five years.

Recent soil test results show that the organic carbon levels in the mid-row have increased since starting the use of cover crops instead of herbicides. With the aim of retaining soil carbon that has been built with cover crops, Andrew has been trialling rolling the winter cover crop in summer instead of cultivating it (Figure 1). Rolling has been effective for managing the growth of clovers, cereals, and legumes but less effective for managing grasses. In addition, a more robust seeder is needed to get through the heavy cover crop trash.



Figure 1. Crip rolled mid row sward (image courtesy of Handpicked Wines)



Undervine weed management

After trialling various undervine weeders, Handpicked Wines concluded that using a combination of different weeders is the key. A Clemens knife weeder fitted with a rotary tiller (Figure 2) head used in combination with a Clemens finger weeder fitted with a rotating disc was found to give good results without being too slow. The slower knife weeder, with an operating speed of 7 km/h, is used early in the season to cut weeds off underground and lightly cultivate the soil. The finger weeder with a 12 km/h operating speed, is used for several quick clean-up passes during the growing season. The knife weeder and finger weeder can leave tougher weeds with thicker stems, such as mallow behind. To manage these weeds, a more aggressive dodge plough is used every few years.



Figure 2. Clemens Knife weeder with disc plough and rotating tiller attachments (photo courtesy of Clemens).

The Clemens finger weeder is robust and fast, but it is not suited to narrow rows or terraced/sloped blocks. In sloped blocks, Handpicked Wines uses a Boisselete undervine weeder with its self-adjusting mechanism. The offset over-row frame of the Boisselete Acolyte 150 (Figure 3) works on both sides of the row.

In some areas sheep are grazed in winter to manage weeds. Instead of using cover crops to build soil carbon in these areas, high rates of compost are spread undervine every three years (100-150 m³/ha). Winter sheep grazing eliminates one weed control pass, and the high rate of compost provides good weed suppression in the first season.

In low rainfall areas, Handpicked Wines spreads straw mulch undervine at a rate of 11 t/ha every three years to improve moisture retention. Excellent weed suppression is achieved for up to three years and improvements in soil health are also achieved. (Andrew has found huge numbers of earth worms under the straw.)



Figure 3 Over row Boisselette Acolyte with undervine finger weeder (photo courtesy of Handpicked Wines).



Managing challenging weeds

One of the biggest challenges for Handpicked Wines since converting to organic production has been managing couch undervine. A few different strategies have been tried, but Andrew admits that they haven't got it right yet. He says that picking the right undervine weeder is key – anything that breaks up couch spreads it further; a knife weeder cannot get under the dense mat; and a rotary tiller either breaks it up into little bits or gets jammed with the fibrous couch. The next strategy to be trialled is using a dodge plough to cut under the couch and flip it over into the mid-row, where it can be collected and removed from the vineyard. The cultivated area will be mulched with a thick cereal mulch to suppress weed growth. The allelopathic activity of the cereal should help to suppress the couch.

Where to next?

Handpicked Wines considers long-term cultivation to be just damaging to soil health as herbicide use. To reduce reliance on cultivation, the company is looking at establishing permanent undervine cover with self-seeding species that compete with the weeds. Last winter six rows in the Yarra Valley and six rows in the Mornington Peninsula were hand-seeded with an annual rye grass, clover and medic mix. A whipper snipper was used to keep the rye grass out of the canopy in the Mornington Peninsula. This season, earlier ripening varieties will be trialled to reduce the need for a whipper snipper pass. Andrew noted only a mild reduction in vigour in the areas where undervine cover crops were used to manage weeds.

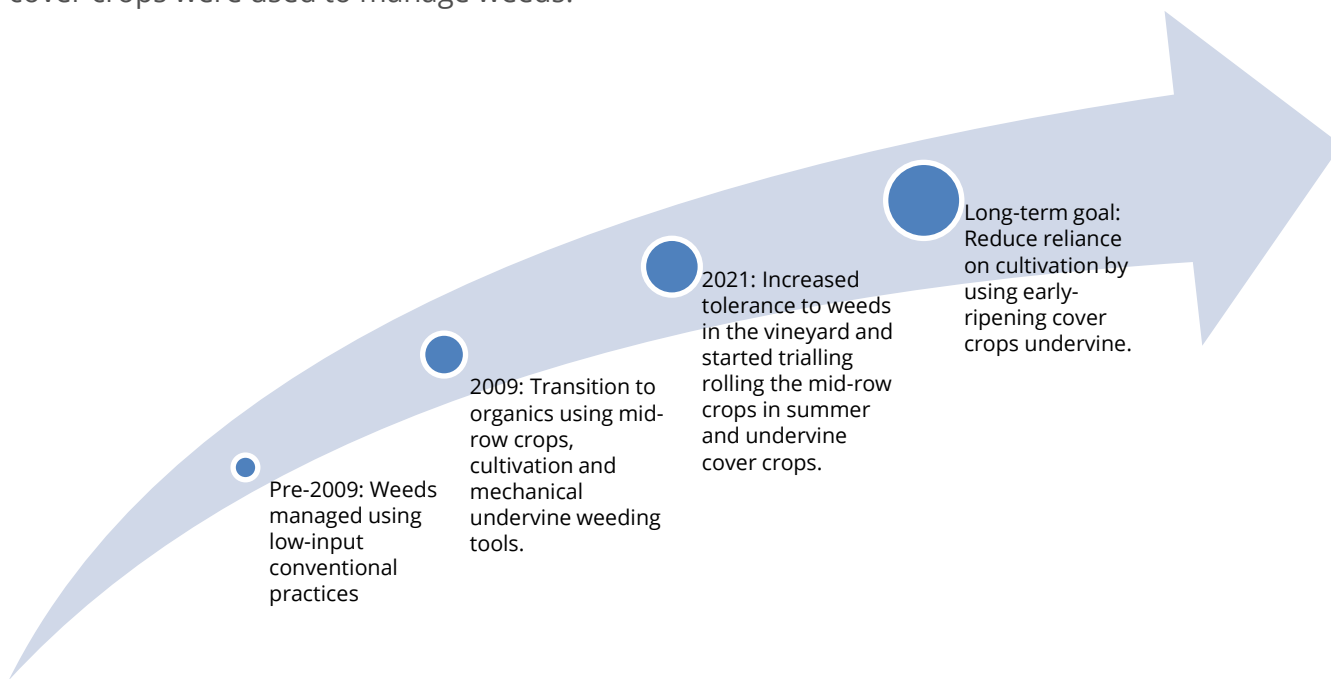


Figure 4. Progression of weed control practices at Handpicked Wines



Acknowledgement

This work was supported Australia's grapegrowers and winemakers through their investment body Wine Australia, with matching funds from the Australian Government. It was also supported by Landcare Australia. The AWRI is a member of the Wine Innovation Cluster. The AWRI thanks Andrew Butler and Handpicked Wines for generously sharing their time and information.

References and further reading

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[Cover crops and weed suppression](#) (Wine Australia fact sheet)

[Cover crops and vineyard floor temperature](#) (Wine Australia fact sheet)

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