

# Weed control options for commercial organic vineyards



By Toby Bekkers

Toby Bekkers, Viticulturist. Email: toby@tobybekkers.com

## INTRODUCTION

**W**eed control is almost universally cited as the most difficult management challenge on organic farms, and finding cost-effective alternatives to chemical weed control is seen as somewhat of a holy grail amongst organic grapegrowers. In the absence of herbicides, expectations of vineyard appearance, management intensity and cost require adjustment. However, there are a number of potential benefits to balance the equation that makes these techniques a tangible option for organic and conventional growers alike.

## CONTEXT

The vineyard we recognise today, particularly the 'country club' look of a single-species cover crop and ruler-sharp under-vine herbicide strip, is a relatively modern development. In the recent past, only a generation ago, herbicide was a new innovation. One can understand the rapid shift from labour-intensive, under-vine cultivation to a simpler, more cost-effective alternative at that time. However, this transition may not be without negative consequences and the world in which we operate and its tolerance to some practices has, for a number of reasons, changed.

The motivators for adoption of non-chemical weed control are, therefore, varied and include the following:

**Organic certification:** Certified organic production precludes the use of herbicide in order to service a segment of the market that wishes to consume products manufactured without the use of chemical inputs. Generally, certified organic growers pursue the goals of healthy soils and farms, which they believe are best achieved in the absence of chemical inputs.

**Soil health:** Many believe that prolonged herbicide use affects soil biotic activity. The result of this, it is believed, is a reduction in the grapevine's ability to interact naturally with its soil and environment, with effects on plant resilience and, therefore, fruit quality. Given the importance of microbial activity in making nutrients available to plants in organic systems, this theory probably has some merit. By observation,

I would suggest that the effects on soil structure are likely to be equally important when it comes to limiting vine potential. Physical soil attributes under long-term herbicide regimes appear to me to be negatively affected due largely to the absence of the aerating and soil carbon benefits of plant (i.e., weed or pasture) root activity. Herbicide strips often appear compacted and 'capped' with a layer of hard topsoil. The capacity of these soils to accept water and air must, therefore, be reduced, as likely would be microbial activity in the absence of plant-produced substrates for growth.

The belief that healthy soils optimise plant performance and wine quality has become widespread amongst leading producers. In visiting 30 top-tier vineyards in Europe over the last 12 months, some were organic, some biodynamic, some conventionally managed in every other way but not one was herbiciding their vineyard.

**OH&S, waste disposal:** Issues such as operator safety and waste disposal are much better understood and, consequently, are more heavily regulated than at any time in the past. For many businesses these factors contribute to the decision to move to alternative practices.

**Weed resistance/persistence:** Weed problems in vineyards can generally be narrowed down to a small number of the most persistent weed species that remain after consistent chemical weed control. The easily killed species become hard to find, the under-vine population becomes less diverse and consists of a handful of the hardest-to-kill species. In addition, there is the possibility of herbicide resistance, with the increasing incidence of annual ryegrass resistance to glyphosate a notable example. Alternative techniques leverage the benefits of physical weed removal and enhanced population diversity whereby persistent/resistant species become a smaller percentage of the weed population.

**Community/consumer expectations:** Farming practices are under more scrutiny than ever from both customers and the wider community. Whether right or wrong, these expectations change the business environment and motivate many to consider a change in practice. Those that choose

organic certification have no choice but to eliminate herbicide but many others are beginning to make a voluntary shift in anticipation of buyer or community expectations becoming even more rigid.

## ORGANIC WEED CONTROL OPTIONS

What, then, are the options available in the absence of herbicide and what are the benefits and pitfalls of each? From my perspective these six options offer a suite of techniques that have potential for use in commercial vineyards:

### Mechanical weeding

Mechanical under-vine weeding is the most widespread organic weed control technique. Traditionally, under-vine ploughing was literally horse-powered and the technique then adapted to be tractor mounted. The variety of tools available is endless and consists mainly of two styles, both of which rely on a retractable arm that can dodge in-between and around each vine or post. The traditional dodge plough, disc and knife system is the most common system I have seen. The plough is used to 'pull out' soil from the under vine strip in winter. It is then 'thrown back' with a disc in early spring to form a small mound which is 'knifed' with a blade attachment during the summer. The alternative is one of the many rotating head systems that operate in-between vines and posts in the same manner but have a hydraulically-driven, rotating head that cultivates the soil.

### Positives

- Under-vine ploughing/knifing can be quite gentle in the hands of a good operator
- Weed/pasture regrowth can be left to provide some organic matter and plant root 'restructuring' of soil between passes
- Good weed control possible
- Double sided and automatic systems now more reliable and easier to operate
- Can operate regardless of wind conditions
- Becomes easier and faster as soil condition is improved

### Negatives

- Rotating head systems in particular can damage soil structure through violent scarification

- Slow
- Uses more fuel than herbicide systems
- Over use can result in a reduction of soil health indicators
- Single sided systems are still considerably more expensive than herbicide
- The window of opportunity may be small on some soil types, dependent on soil moisture
- Damage to vines and infrastructure (particularly irrigation) is possible
- Slow and difficult at first until soil condition is improved

#### Mowing

Under-vine mowing is increasing in popularity, particularly amongst those with an aversion to cultivation. Mowing offers the possibility to encourage plant diversity under vine, rather than generating a vacuum for weeds to fill through chemical treatment or cultivation. Mowers tend to be slow to operate but double-sided options cover the ground at a speed faster than cultivation, although slower than herbiciding. Mowers may be a good option in warm areas with limited summer weed growth but may be a less feasible option where summer rainfall or irrigation encourages regrowth, necessitating multiple passes.

#### Positives

- Creates no ecological 'vacuum' in the system and encourages a diverse under-vine population of plants
- Limits soil structural damage associated with cultivation (particularly with rotating head cultivation systems)
- Faster than cultivation

#### Negatives

- Under-vine competition for moisture
- Multiple passes may be required
- Damage to vines and irrigation
- Generally faster than cultivating under vine but still slower than herbicide
- Fuel use

#### Mulching

Thick under-vine mulching has proven to be effective as a weed control agent. Straw, grape marc or coarse composted mulches are the most common. Where applied thickly enough, control can be very good and additional benefits of moisture retention, topsoil cooling, microbial and nutrient inputs may all assist in offsetting the cost of application. Issues such as material provenance, excessive nutrient loads and contamination all require careful consideration. Typically, growers look to achieve three years of control depending on the vineyard and product used. The two major factors in determining whether this method works well are density (thickness) of application and product texture. Control is poor where mulches are applied too thinly or when weeds are able to grow in the mulch itself because the texture is too fine. Fixing weed problems organically is difficult in poorly applied mulch because mechanical weeders and mowers are unable to operate effectively with large volumes of straw or mulch choking their progress along the row.

#### Positives

- Can offer excellent control and complementary benefits e.g., moisture retention

#### Negatives

- Expense
- Possible contamination
- Fire risk

#### Grazing

Grazing sheep or cattle in vineyards is not a new concept; it has always been a management option for some. My observation is that economic pressures have made this technique even more

**FELCO REWARD  
\$400  
TRADE-IN AND  
FREE  
BONUS OFFER**



- Upgrade to Felco 800 and receive \$400 for your old Felco 82.
- Receive a Felco jacket and beanie with any Felco 800/810 purchased.

See your Felcotronic Dealer for details.  
Offer expires 31/08/11.

Call 1800 730 257 [www.felco.com.au](http://www.felco.com.au)



**FELCO®**  
SWISS + MADE



**Sheep are a great tool for managing weed problems but there are some potential pitfalls for organically certified growers who need to be aware of the provenance of the stock brought onto the property.**

popular in recent times. When employed well, running stock in a vineyard can produce excellent results in terms of weed control. In particular, sheep are a great tool for managing weed problems. Additionally, grazing often has the effect of changing the weed/pasture population. For example, grazing heavily capeweed-infested vineyards often results in a medic/clover and grass dominant pasture in the subsequent season.

There are some potential pitfalls for organically certified growers who need to carefully manage the provenance of stock brought onto the property. Similarly, conventional growers should also give consideration to the possibility of stock bringing in weed seeds. The downside of intensive grazing is compaction and overgrazing, both of which need to be managed carefully. Strip or cell grazing techniques may have application in vineyards into the future.

*Positives*

- Minimal or no cost where stock are easily available
- Can be very effective

- Often results in a positive manipulation of plant populations

*Negatives*

- Seasonal - can only be done outside of the vine growing season (stock like green vine leaves and fruit)
- Compaction/overgrazing
- Another thing to manage
- Contamination
- Cost of stock if buying rather than share farming/agistment
- May damage irrigation infrastructure

**Steam/Flame**

Steam and flame weeding techniques have been trialled extensively over a long period of time. While there is no doubt that weed control can be very effective using these systems, generating and maintaining the high temperatures required for effective control has been difficult to achieve on a commercial scale. Fuel and water consumption can be high and flame has obvious restrictions for use during summer from a fire prevention standpoint. However, smaller, more portable units are now available and provide another tool for spot control of escape weeds or around sheds and other infrastructure.

*Positive*

- Control can be very effective
- Good options exist for spot treatments/infrastructure areas
- Another tool in the armoury

*Negatives*

- Fuel and water hungry on a large scale
- Difficult to generate and maintain sufficient heat to replace other methods of control
- Flame is a fire risk

**Manipulation of weed or pasture populations**

Perhaps the least understood technique,

but one that I believe offers tremendous potential, is the concept of manipulating plant populations. Using one or more of the above techniques (and others) it may be possible to encourage a balanced population of plant diversity in the mid-row and under-vine that provides a number of benefits without requiring significant ongoing management. The ultimate goal would be a self-sustaining population that could be tolerated without the need for regular intervention.

*Positive*

- Self-regulation, little or no inputs required
- The right blend of species could provide a host of benefits e.g. nitrogen fixation, soil aeration, carbon accumulation, biodiversity services, etc.

*Negative*

- May be difficult to encourage the correct balance
- Populations may be unstable depending on seasonal variation
- Competition for water

**NO SINGLE ANSWER**

Given there is a suite of weed control options available, it is worthwhile noting that it is rare to find an enterprise where one single method produces a satisfactory result. Most successful organic growers employ a number of these techniques. Where mechanical weed control is the only method used, growers typically have access to a number of different machines that can deal with different soil types or topography.

**PERCEPTION**

Possibly the greatest hurdle to overcome in the transition to organic systems is the shift in perception required around what constitutes beauty in a vineyard landscape. While 'sanitary', manicured vineyards appeal to many as a sign of good management, getting the best out of our landscape in the future may require a shift in expectations. This is particularly so in organic systems hoping to leverage the benefits of a diverse ecology to produce a superior product and healthier landscape.

This should not be used as an excuse for lazy farming, but if we take our cues from nature as to what constitutes beauty and functionality in a natural system, then diversity and an acceptance of some level of natural deviation from the 'country club' ideal should be seen as a positive rather than a negative.

*Toby Bekkers, former general manager and senior viticulturist at Paxton Vineyards, in McLaren Vale, operates his own viticulture and wine business consultancy specialising in biodynamic and organic production.*



Vinewright

Quality Grapevines

Paul Wright  
PO Box 180  
Mt Pleasant  
South Australia 5235  
Ph 08 8568 2385  
[www.vinewright.com.au](http://www.vinewright.com.au)