



Fertiliser use in the vineyard

Priorities, challenges and best practice approaches

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Introduction

The Sustainable Wine Roundtable exists to develop an evidence base for coordinated action to drive sustainability in the wine sector. Huge amounts of good practice exist, but this is not necessarily shared.

The value of collaboration has been demonstrated in the success of the Bottle Weight Accord, where now 25 companies are working towards the reduction of their average bottle weight to below 420g by the end of 2026. In its first year, the Accord resulted in carbon reductions more than 140,000 tonnes of carbon. This is equivalent to the emissions of a medium sized town of 18,000 homes.

This paper reports on a small research programme which SWR undertook earlier in 2025 to explore whether a similar approach of collaboration and sharing of insights would be applicable also to the sustainability of viticulture. It is clear that a collaborative approach is indeed valuable and provides great opportunities for vine growers to share knowledge and learn from each other.

The research

A questionnaire was sent to a number of SWR's leading producer-side members and a small number of interviews were also conducted. Though relatively few in numbers, the companies involved are leaders in the field, and therefore provide a good litmus test of priorities around chemical inputs and vineyard management.

Questions asked covered the following issues:

- How is the use of chemicals and other inputs managed as part of a wider approach to sustainability?
- What are current priorities on sustainability in the vineyard, and why?
- What fertilisers are being used at present, and what alternatives are being explored?
- What is being done to address use of other chemicals?

These interview and questionnaire responses have been augmented with additional literature research to dig a little deeper into the key issues identified. Other research and evidence from other aspects of SWR's work has also been incorporated.

The body of this paper sets out the results of this research and the main issues which emerged. It then identifies a number of key questions to be explored further as part of the SVP.



The findings

Priorities

It is clear from interviews that there is a widespread desire to reduce the use of chemicals in the vineyard. Obviously, the cohort for this study are producers for whom sustainability is a central priority, so they are not necessarily representative of the wine industry as a whole. However, it is, nevertheless, important to recognise that reduced chemical use is a core plank of leading practice on sustainable viticulture.

“We apply applies up to 40 kg of nitrogen per hectare but aim to progressively reduce this amount to 0 kg. This is complemented by with liquid and solid fertilisers.”

Another frequently-mentioned priority is water management. It is widely recognised that a key feature of climate change is the alterations witnessed in rainfall patterns in many parts of the world. Many areas – South Africa, parts of Australia and California – have become increasingly arid. For growers in these regions, conserving as much rainfall as possible – for example through building reservoirs – is the priority. For those where the problem is of excessive precipitation, the aim is to manage water run-off in a such a way as to minimise soil erosion.

“As well as advanced irrigation technologies we use soil monitoring to optimize water use in our vineyards. This helps significantly reduce water consumption and helps us adapt to changing climate conditions.”

A third priority is carbon reduction. This is perhaps not too much of a surprise given the current and increasing pressure on carbon reporting. However, not all of those interviewed for this study will themselves required to report on their emissions. However, as part of international supply chains, the pressure comes from end buyers and retailers for whom the carbon emissions from their supplier vineyards are a key element of their scope 3 emissions.

“Our aim is to reduce reliance on nitrogen fertilisers due to their impact on carbon footprint.”

What is most interesting is that, for all those interviewed, a key tool in achieving both water management and carbon reduction is soil health. Almost every interview gave this as a – if not the – key priority in vineyard management.

Central to this, of course, is the recognition that healthy, vibrant soils are vital to the production of healthy grapes and to yields. However, there is increased focus also on how well-maintained soils can provide benefits in other areas such as carbon sequestration and water management. Healthy soils are, therefore, both an end in themselves, and also a means to delivering other desirable ends.

“Our key priorities in the vineyard are to minimise soil interventions, to reduce diesel consumption and to improve soil fertility.”

In achieving healthier soils, the main focus is on increasing the organic matter in the soil. In many growing regions, the soils are relatively poor, so the aim is to increase soil humus – the dark, organic material that forms in soil when plant and animal matter decays. Not only does this result in more productive soils, it also supports improved carbon retention. However, a challenge mentioned in a number of cases was the need to avoid excessive soil salinity.

“We use goat manure or compost to increase organic matter content. This improves soil structure and enhances water retention.”

Although less frequently mentioned, the topic of biodiversity was also raised. There are two aspects to this. The first is biodiversity within the soil – part of the imperative discussed above, to generate and maintain healthy soils. The second is a gradual process of increasing the variability of plant and animal life within the wider wine estate.

“We are implementing conservation zones and biological corridors that support the development of native species.”

What was also highly note-worthy from the feedback was how dynamic the process is. It is clear that all those responding see themselves as, in effect, experimenting with new ways of doing things. They are constantly trying new things and changing tack in response to real-time observations of what is working best.





“We follow common principles while recognising that each vineyard has its own specific characteristics due to its soil type, location, grape variety, history, and production goals.”

Management Process

The interviews also focused on the processes that vineyard owners use proactively to manage the priorities set out above. What are the practical steps taken to ensure that improvements happen over time?

It is clear from the interviews that key to this is the importance of monitoring. Most undertake regular surveys of soil health – clarity about key aspects of soil health is key to knowing what actions are required.

However, it is not just soil surveys which are increasingly being used. A number interviewees reported that they were regularly monitoring climactic conditions – changes in rainfall patterns, heat and so on – as a tool to anticipate potential disease and other challenges.

“Ours is a data-driven approach. Our actions are driven by what the data tells us about where the challenges are”

“We conduct regular soil analysis to precisely determine and apply the specific nutrient needs of each vineyard block.”

“Constant monitoring of climatic conditions is carried out, as these affect the incidence of diseases.”

To some extent, the focus on data and measurement result from the requirements of standards bodies, and for certification and audit purposes. However, as is clear from our interviews, these data are also seen as of increasing importance from the perspective of good vineyard management.

The use of soil analysis as a means to govern where and when chemical intervention is needed might seem an obvious thing to do. However, this has not always been the case. The evidence, not just from wine but also from many other agricultural sectors, is that, historically, most farmers have used a blanket approach to the application of all types of chemicals.

“We focus on increasing organic matter through composting, organic fertilisers, and other management techniques that enrich and strengthen the soil.”

Therefore, our finding that leaders in viticulture are using a much more targeted approach is highly significant. The reality is that in any farming operation, some areas of land will require more support than others, and the data-driven approach typified by many of our interview responses is the means to achieve this. Obviously, this means that lower amounts and fewer chemicals are used, with the sustainability benefits that this brings. However, this approach will also yield significant financial benefits as well as input costs will be significantly reduced.

“Fertilization is adjusted according to soil chemical analysis, and when excess levels are detected, applications are reduced to increase economic efficiency and reduce environmental impact.”





Fertilisers

The initial aim of the research interviews was to explore current usage patterns and changes in the use of fertilisers in members' vineyards.

"Fertilisation is adjusted according to soil chemical analysis, and when excess levels are detected, applications are reduced"

In this regard, it is clear that a key challenge is use of synthetic nitrogen and there is a general desire to reduce its use over time. However, it is also clear that challenges exist in relation to other chemical compounds that might be used as an alternative. For example, urea can lead to soil acidity, and some have found that potassium can damage vines' rootstock.

As with the wider findings about vineyard management, a clear picture to emerge from the interviews is a move away from blanket use of fertilisers to a more targeted and nuanced approach.

However, given the impact of other variables – rainfall and so on – the question of what is needed, and where changes dynamically over time. What was right last season may well have changed this season.

"We conduct regular soil analysis to precisely determine and apply the specific nutrient needs of each vineyard block."

For some, a further problem is to respond to the challenge of managing a range of different soil types even in one estate. One respondent reported 9 different soil types in their vineyard!

A focus on compost

As part of their efforts to reduce fertiliser use, growers are focusing on making and using composts. Typically, these are made from a mixture of animal manure and grape wastes. They are seen as a means to build soil organic matter and reduce the need for synthetic fertilisers over the long term.

However, there are clearly challenges in this. Some reported problems with bought-in composts because of presence of seeds and salinity. Also reported were problems with fungi in compost in dry climate conditions, and mushroom compost leading to disease pressure.

“We are implementing a composting program to build up soil organic matter and reduce the need for synthetic fertilisers over the long term.”

“We have primarily used compost but have encountered challenges related to traceability, seed presence, and salinity. We now incorporate spent grape marc in select plots, alternating its use.”

Pest and disease management

Although this initial interview process was intended to look particularly at fertiliser use, we did also get responses about changing behaviours in relation to other vineyard chemicals.

“We have a goal to reduce herbicide use by 30% across our vineyards.”

“We aim to minimize the use of agrochemicals by prioritizing practices that promote biological pest and disease control.”

It is clear that vineyards are seeking to reduce as far as possible the use of these other chemicals. Non-chemical approaches are being used in situations where pesticides or fungicides might have been used. For example, sexual confusion techniques with pheromones are being used to control pests like grapevine moth. In addressing issues like powdery mildew, growers are using cultural practices like canopy management as an alternative.



Consolidated findings

In 2024, SWR published a report exploring how the wine sector might move away from chemically-intensive agriculture, and over time to incorporate more regenerative techniques. The Sustainable Viticulture Protocol set out a set of six principles which were intended as a basis of providing a common approach to achieving this, which at the same time recognised that specific actions would be determined by local realities. By mapping the findings of this study, we can observe the following:

Core Principles	Findings
Vineyard mapping Understanding what is needed, and where. Treating the entire vineyard will often not be necessary	It is clear that growers are taking considerable steps to map where inputs are and are not needed. Both in soil analysis and monitoring of conditions, managers are ensuring they know better how best to target chemical use.
Presumption of reduction over time Even if zero is not possible, how and where can reductions be made?	Across all areas of chemical use commented on by respondents to this survey there is clearly a focus on reduction over time.
Use mildest solution available Taking account of the impact on people and the environment, but which is still effective.	Nothing specific emerged on this topic from this survey, but it seems highly likely that respondents will be using the mildest chemical options.
Use the least possible Even if legally-permitted amounts are higher, use the lowest dosage possible to address the problem	Likewise, no specific evidence emerged from this study, but use of lower dosages seems to be a logical consequence of other actions discussed.
Use of regenerative techniques Not all will be relevant, but many reduce the need for chemicals and provide other sustainability benefits	There is a lot going on here. It is fascinating to see the focus on use of composts, and increased use of IPM.
Plan in changes to reduce base need For example, replanting with local and/or disease resistant varieties, improving drainage and other approaches.	Changes in pruning techniques may seem a simple thing to do. However, simple though it may be, it is clearly highly effective as a means of significantly reducing the need for chemicals which would otherwise be needed to address challenges like mildew.



Impact on outcomes

In turn, the SVP is intended to deliver four key outcomes in terms of vineyard health. It is clear from this survey that the practices being undertaken are driving these outcomes extremely well.

Key outcomes	Findings
Soil health Soil health is maintained and improved over time.	Soil health is at the core of what interviewees are doing. Both as an end in itself – to produce good grapes – and as a means to support other aims like water management, soils are at the core of best practice.
Water Water courses on- and off-farm are kept clean and free from chemical residues.	Clearly those who responded to our questionnaire are using fewer chemicals, which will inevitably have beneficial impacts on run-off. The focus on soil health is also seen as beneficial in terms of water management.
C02 Carbon emissions from the vineyard are reduced over time.	Emissions reductions are stated to be a key aim of our interviewees. Using fewer chemicals (especially fertilisers) will help in this regard. The focus on soil health will also result in greater levels of carbon sequestration.
Biodiversity Biodiversity within the vineyard and the wider estate is monitored and enhanced.	Although not a core focus for all respondents, this topic is certainly on the radar for some of them. Moreover, the focus on soil health will mean that biodiversity at the microbial level will be improved.

Where next?

Although small, this initial survey and interviews have demonstrated the value of the sharing best practice in sustainable vineyard management. On the basis of the findings, we can pose some further interesting questions which need to be explored in more detail.

- **What are the best tools for vineyard mapping?**

All those interviewed undertook detailed mapping of their vineyards to be able to anticipate nutrition and other needs. However, for those new to this process, what tools work best in achieving this? Do bespoke tools have to be developed, or are off-the-shelf options available?

- **What other monitoring would be helpful?**

Soil monitoring clearly helps identify where chemical inputs are, and are not needed. Some also monitor climatic conditions in order to be able to anticipate climate-related vineyard challenges. What other monitoring might be valuable, for example in anticipating prevalence of particular pests?

- **If not synthetic nitrogen, then what?**

Obviously in the long run, the intention of most of those interviewed is to move away entirely nitrogen. But what works best as a transition. It is clear that there are problems with some of the alternatives – like urea – so what are the best options to use?

- **How to address challenges in making compost?**

Compost is clearly seen as a key plank in the strategy to move away from synthetic fertiliser use. However, it is also clear that composting is not as easy as might be assumed. What are the best techniques to making compost free from problems such as salinity? There are clearly particular problems associated with composting in certain climates – arid ones for example – so what knowledge and insights can be shared on this?

- **How best to reduce the use and need for other chemicals?**

The role of IPM in reducing the need for pesticides is well established. That said, there would be a lot of mileage in exploring which techniques are most effective with different pests. Similarly, changed pruning techniques help avoid challenges like downy mildew. This begs the question about what other practices/ approaches might help reduce the need for chemicals in other situations.

- **How long does change take?**

In viticulture, as in all agriculture, changes take time to bed down, and the impact of altered viticultural approaches may not be apparent for a number of months, if not longer. One respondent said that they tested changes for at least two years. Is this sufficient? Sharing insights about which approaches are most successful will help others to have the confidence to make changes.



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