



Management of vines post-grafting: maximising the strike rate

By Tony Hoare¹

Grafting or top-working of winegrapes using the chip-bud method has become popular in Australian vineyards in recent years. Grafting to change varieties is a new and viable option as growers can preserve the infrastructure of the vineyard (trellis and irrigation), utilise the existing root system and vine trunks and achieve a yield of between 50-100% of full potential the following season. A 'quick' change-over to a more desirable variety or clone can be afforded without the wait of establishing a new vine. Grafting will deliver a crop the next season, which generally takes three years to achieve from a newly-planted vineyard. The success of grafting depends first on the skill and experience of the grafters and, secondly, the follow-up management of the vineyard once grafting has been completed. Most vines, regardless of age and variety, are suited to grafting as long as they are virus free. There is a number of post-grafting management aspects that

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One blown-out grafted shoot on the right and the inevitable blowout of the grafted shoot in the left. The twine is at too much of an angle and should be more vertical.



A well-trained grafted vine comfortably filling the wire in first season.



A potential 'blowout' – the shoot is yet to be taped to the twine and the length of the shoot makes it prone to pulling the bud out of the trunk before it has calloused enough.

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need attention and there are some particular signs to look for to indicate how to respond to the vines for a maximum strike rate.

Tasks to complete immediately after grafting

Tie up

Once the grafted buds have calloused and begin to grow, the rate of growth is very rapid. The grafted buds generally emerge three to five weeks after grafting and it is important to ensure that the support for these new shoots is in place well before they begin to burst. This is the most critical period to ensure a good strike rate and prevent what is referred to as 'blowouts'. A blowout is caused when the emerging grafted shoot has not been supported and is then dislodged from the trunk by wind, causing the shoot to die. Grafting tape does not provide enough support for the shoot and tying up the grafted shoot until it reaches the cordon wire is critical to ensure a successful result. A calloused vine is not generally strong enough until the second year to support itself without assistance. A vine grafter will not replace a blowout without

charging for extra labour as this is the fault of the vineyard manager or owner.

Use vine twine or equivalent to tie from below the buds to the cordon wire. Tying below the grafts with a loop will allow the newly-formed shoots to grow past the twine where they can be quickly attached. Otherwise, if the new shoots are forced to grow up to the twine, they can be blown or broken off before they reach it. If two buds have been grafted, split the twine into two and tie a half hitch on the cordon wire. Try to keep the twine on a slight angle (about 15cm gap on the wire) as the shoot growth will be vertical and should align with the twine so the shoots can be fastened to it. It is highly recommended to have the cordon wire in place to attach the twine. If this is not in place, vines will need to be staked. The newly-grafted shoot will need to be fastened to the twine using a Tapener® taping device or something similar. Twisting the new shoot is not a good option as this usually means that too much growth is required before the shoot can be trained and it may break before that is possible. Fastening with tape to the twine will provide critical support to the shoots and stabilise them against potential blowouts, especially

from wind. The growth of the grafted buds is rapid and to avoid blowouts, it is important to ensure that there are enough vine trainers on hand to keep up with the growth. Vine training the new shoots may take two to three passes before vines are safely on the cordon wire, which depends on the vigour of the new grafts and percentage of uptake. Twine should be cut from around the vine trunk at pruning if canes have been successfully trained and secured on the cordon wire. Otherwise, the trunk may be strangled by the twine.

Weeks 1-5 following grafting

Vine training

The high vigour of shoot growth in grafted vines is due to the fact that the vines have an established root system and only one or two shoots to support. In some instances, grafted shoots will fill the wire within a matter of weeks, so be prepared for between three to four training passes during the first five weeks. Sometimes buds can sit dormant and not move for some weeks. This can be due to a number of circumstances ranging from cool weather, extreme heat, graft



A well-managed, grafted vine with water shoots on top of the wire with shoot tips removed.



A well-trained grafted vine in the second season. Note the crossed over cordons.



Newly emerged grafted buds with twine tied correctly below the buds.



Garden weevils are a major threat to grafted buds and young shoots.

incompatibility with rootstock, heat-treated budwood, or budwood stored incorrectly and dormancy-broken and grafter technique. In most instances, the lack of growth is caused by delayed callousing, which can be adversely affected by any of the aforementioned situations. The grafted buds will generally grow and even if the initial primary bud does not burst, a secondary bud can grow soon afterwards if the bud remains alive and callousing occurs. Do not, under any circumstances, open up the tape or enlarge

the tape hole around the bud. Professional tapers know what they are doing and purposely make the hole as small as possible to prevent the bud drying out. Altering the tape in any way will most likely open up the bud to drying out which will kill the bud before it has a chance to callous. The buds have enormous strength once they begin to grow and will make their way through the small opening easily. Tape can and should be removed from vines in the second season once callousing has occurred and the vines

have attached to the cordon wire. Most grafting tape used in Australia is not biodegradable and will need to be removed to prevent any potential strangulation of the rootstock or new scion wood.

If shoot growth proceeds as normal, then expect to fill the cordon wire in the first season. If two grafted buds burst, the best training is to cross the canes over as they reach the wire so the gap is minimal at that point. This practice promotes a strong vine that can potentially be machine-harvested the following year. It also increases the bud number of the vineyard and adds extra yield. If a single bud bursts, it is advisable to pinch out the growing tip of the shoot and train two laterals as the new cordons. Once the new shoots achieve the desired length on the cordon wire, pinch out the growing tip to promote lateral growth for the following year's spur positions. As with any new vine, rolling of the cordons can occur and the use of a 'catch wire' of foliage wires will help achieve a vertical position for the spurs.

Excessive sap flow

Sap flow varies according to soil moisture, grape variety and vine age. Excessive sap flow will build up pressure behind the newly-grafted bud and cause the bud to not callous effectively. The buds can also go 'mouldy' with the excessive moisture from the sap build-up under the tape. If this occurs, then the

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likelihood of a poor strike is inevitable. It is particularly a risk in low lying vineyards, heavy soils with high clay content, poorly drained sites prone to waterlogging and when there are long rain events in spring. To overcome this threat to grafted buds, a simple 'squeeze' test is recommended. Simply place an index finger and thumb around the base of the bud and squeeze. If sap flows easily through the tape via the grafted bud opening, then there is an excess of sap and some action needs to be taken. Another sign of excess sap flow is a very damp and dark section of bark under the grafted buds which doesn't dry out. White grafting tape will also be stained by sap evident from a pinky or black discolouration. Always consult the grafters about what constitutes excess sap flow before making any cuts under the grafted buds. If required, the grafters will advise of how to make cuts under the grafted buds to allow excess sap to escape, and the grafted buds to callous.

Sucker or water shoot removal

A commonly asked question is how many suckers to leave on the rootstock once the cordons are removed. There are two schools of thought and both seem to work, although one requires a quicker response in removing the rootstock shoots. Standard practice is to leave one to two shoots at the top of the rootstock trunk and then remove the growing tip to only leave four or five mature leaves. This will promote sap flow past the grafted buds and should not out-compete them. The risk of leaving too many shoots and active growing tips is that the grafted buds can sometimes remain dormant for longer and have a delayed budburst because of the competition for sap flow and potential shading out of the grafted buds. The water shoots can also confuse vine trainers who can sometimes accidentally remove the grafted shoots that have attached themselves to the water shoots. There is no requirement for water shoots below the top of the vine and these will only make it more difficult for undervine herbicide application. Water shoots may also provide a haven for pests that can damage grafted shoots such as weevils, earwigs and grasshoppers. If it is decided to leave spurs in shortened cordons

whilst grafting, the timing of removing these will be very important for the success of the grafted buds. As soon as the grafted bud begins to move and shows a green tip, all water shoots should be removed to maximise growth of the grafted shoots. Past experience has shown that a clean trunk with no water shoots can still achieve an excellent strike rate and is much more convenient to graft and manage afterwards.

Pest and disease management

There are a number of pests and diseases that can lower the strike rate of grafted vines. The main pests are the chewing insects. Garden or elephant weevils are a particular problem in vineyards where there is a high level of pruning and undervine weed debris. Having a clean undervine area will assist in reducing the habitat of these pests and the problems they cause grafted vines. Removing them by hand or using silicon barrier glue are options to control the pest without having to use insecticides. Earwigs are another chewing insect that appear to be more of a problem in vineyards that are not debarked. Debarking the top 15cm of the vine trunk makes the grafter's job easier. However, there is the added benefit of removing the habitat for earwigs which can cause major problems if chewing newly-grafted shoots before they have the chance to grow. Vine moth caterpillars and snails are the other major leaf-eating pests that affect grafted vines. Depending on the region and disease pressure, it is prudent to apply a standard powdery mildew and downy mildew control program to ensure leaf health is maintained for the entire season and to prevent the build-up of inoculum on canes for the following season. Be mindful of any spray drift on neighbouring blocks if spraying grafted vines outside of the chemical withholding periods for bearing vines.

Irrigation

In dry winter and spring conditions following low rainfall, and especially with some rootstocks such as Riesling and Semillon, it will be necessary to irrigate. It is important to monitor soil moisture closely to ensure that vines have adequate water available to maintain shoot growth

and a healthy sap flow in the trunk. A weekly irrigation with regular monitoring of the buds to test for excess sap flow using the 'squeeze test' is critical. If there is no excessive sap flow, and if water shoots are growing, then this generally indicates that soil moisture is adequate. If grafted bud growth is slow or stunted, this may indicate that the soil moisture is low and irrigations may need to be increased either in length or frequency. Generally speaking, short, frequent irrigations are enough to maintain a healthy grafted vine in the first season. It is easier to apply too much water than not enough to grafted vines, and it is always advisable to ask questions of the grafters regarding a suitable irrigation strategy.

Weed management

Undervine weeds should be kept under control using either herbicides or organic methods. Weeds can grow quite quickly to the height of the grafted shoots where they can shade grafted buds or even lead to them becoming attached to the tendrils, making it difficult to train the grafted shoots.

Removing excess trunk

It is fine to remove the 'knob' of excess trunk from grafted vines once they have established themselves on the wire. Where *Eutypa lata* (Deadarm) is an issue, leave a 5cm buffer to allow for any potential dieback. If cutting back into green trunk, it is advisable to apply wound paint as soon as the cut is made. The cutting off of the excess trunk is purely for cosmetic reasons and will help make the grafted vines appear more natural.

Summary

Field grafting is a big investment and should only be undertaken where there is an attention to detail both in vineyard preparation and in management following grafting. Post-grafting management requires constant attention. The success of the final grafting result relies heavily on the timing and quality of post-grafting management. An average strike rate from grafting is greatly enhanced by good follow-up management which, in turn, should result in a greater pay back for the grafting investment.