

Quad-stem V-trellis conversion pays off

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With significant changes occurring in the fruit growing world, plantings are entering a new period of orchard intensification.

Converting from traditional plantings to a V trellis can produce high dividends in greatly increased yield, fruit size, uniformity and quality – with a potential doubling or tripling of crop production possible as indicated in this case study.

Broadly speaking, current global apple planting trends aim to:

1. Simplify canopy structure

- a. Fruiting wood tending to be maintained on relatively short and thin branches close to the trunk facilitating:
 - i. consistent light interception within the canopy
 - ii. Simplified tree management

2. Reduce tree height

- a. Most are aiming for 3.5-4.0m of canopy height

While this isn't an exhaustive list, these two outcomes have been the status quo at each 'intensification step' throughout history – and are likely to be long into the future with these processes tending to achieve higher fruit value per unit input (ie. higher return per unit cost).



Tough love! The existing trees are radically pruned and grafted, with the new wood trained onto the trellis wires.

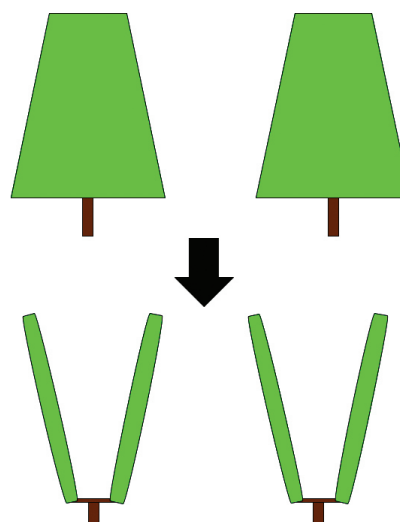
Given the broad goals for intensification as outlined, grafting over older plantings to employ these end goals has the potential to be as effective as more modern planting spacings, particularly where limitations are imposed by pre-existing overhead netting structures or where more intensive row spacings are difficult, such as on steep hills.

Below is an example of a conversion block in the Yarra Valley that has shifted from a traditional central leader tree spacing (5.4 x 3.4m) to a sharp angle V-trellis.

Central leader to quad-stem V-trellis conversion – a case study

Original	
System:	Central leader
Row spacing:	5.4m
Tree spacing:	3.4m
Leaders per hectare:	545/ha
Rootstock:	Northern Spy
Year planted:	1990
Variety:	Cripps Red (Sundowner)
Annual yield:	~26 tonnes/ha

Converted to:	
System:	V-trellis (11° angle)
Row spacing:	5.4m (4.4m post to post, 1.0m opening)
Tree spacing:	3.4m (1.7m between leaders on each side of V)
Leaders per hectare:	2178/ha (4 leaders per existing rootstock)
Variety:	Scilate (Envy™)



A diagram of the central leader to V trellis conversion.

Below is a step-by-step description of how the conversion of the existing orchard is achieved:

Year 0

- A step graft (also referred to as a beaver graft) was undertaken on the existing trees
 - a. A wedge is taken out of one side of the trunk and two bark grafts inserted
 - b. This step isn't a necessity but maximises the opportunity for graft take with the pre-existing tree acting like a giant nurse limb
- The Cripps Red (Sundowner) block cropped at **26t/ha** in its final year.

Year 1

- Original treetops removed following harvest
- Two additional bark grafts undertaken opposite last year's step graft
- V-trellis installed for new system
- Graft growth was pruned in December to produce four leaders and these were trained to bottom wire
 - a. These were trained and pruned to produce desired growth throughout remainder of the season
 - b. Once at the desired spacing (in this case 1.7m apart) shoots were trained vertically and secured to trellis wires when possible
- At this spacing between uprights, a formal approach to training was undertaken with lateral branches being attached horizontally to trellis wires.

Years 2-5

- The process of training the upright stem continues; with pruning now undertaken to induce fruiting wood on each of the formally trained laterals whilst continuing to grow the height of the stem (trunk)
- Depending on progress, a near-full canopy will be achieved by year 5
- In this block's case, there still is approximately 15% of the canopy to be filled in the upper part of the tree (annual wood in place; will spur in the next growing season).

This block produced **48** tonnes per hectare of high quality fruit in 2020 and is expected to produce **60** tonnes per hectare in 2021. Actual yields could be higher, but fruit size is targeted to be large on this orchard (250g) and hence croploads are slightly lower to achieve this outcome.

Ultimately, this block is expected to yield around **70-80** tonnes per hectare of high quality fruit at a large size (250g).

Advantages of this conversion approach:

- Cost of these grafts and training is generally lower than equivalent nursery trees
- No lag-time waiting for trees to be produced



The Scilate (marketed as Envy™) block at harvest in 2020 (bearing approx 50t/ha of large-sized fruit).

- Apple replant disease issues are avoided
- Irrigation demand is relatively low given established rootstock
- Improved light distribution and yield throughout tree canopy relative to old system
- Relatively quick for block to become profitable

Disadvantages and risks:

- Standard risks of grafting (eg. poor take, virus issues if present)
- Performance is reliant on the pre-existing block being relatively uniform with no major underlying issues that would otherwise be corrected in a replant scenario.

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An alternative option whereby three uprights are being trained off each lateral branch (cordon). This photo is from the end of the second leaf (ie. two years from grafting).