

ALL ABOUT ALMONDS

Almond planting and early tree establishment — a researcher's experience

Part 1. In the nursery



Nurseries seek to produce a consistent tree quality to avoid additional downstream costs for growers.

Plant & Food Research began working with the almond industry in 2014 to help re-design almond orchards. This meant taking a fresh approach to lift productivity above the norms established by Californian growers.

Knowledge generated from this study is helping the almond industry move towards higher profits from new, high density growing systems.

**Dr Grant Thorp
and Ann Smith**

When working on similar projects with other crops, research has started in the nursery as a route to making changes in the orchard.

- Most fruit growers look to nurseries to supply trees that require minimal effort and cost to plant and establish in their orchards.
- With this in mind, most almond trees in Australia are spring-budded in November/December in field nurseries and then delivered to orchards in the following winter for planting as bare-rooted trees.
- During establishment of our research trials we encountered a number of variations on this theme.

Early questions were asked around the type of tree being produced by the nurseries, with comparisons made in the orchard between spring budded, late-budded, dormant budded and container-grown trees.

In this article we describe our experiences with these different tree types and the new approaches we introduced into our research trials.

Spring-budded trees

Spring-budded trees, especially when budded on 'Nemaguard' seedling rootstocks, require a long growing season in the nursery to reach sufficient size and have a strong root system for planting in the orchard the following winter. More vigorous clonal rootstocks such as 'Garnem' and 'Bright's Hybrid' will produce stronger trees and root systems in the nursery but this extra vigour might not be desired in the mature tree in the orchard.

Any delays with spring budding, which can happen if rootstocks and/or budwood are delivered late to the nursery, will mean smaller trees than desired. While nurseries can push the growth of these late-budded trees

until later in the season with water and fertiliser, this can increase the risk that trees will still have full leaf cover and will not be sufficiently dormant when dug out and delivered to growers for planting. Also, with standard procedure at planting being to head trees back to 90 cm and stimulate strong scaffold branching (Figure 1), late-budded trees struggle to reach this height before winter. Growers are then faced with additional cost in the first year to prune/train these late-budded trees to form a clean trunk to provide access for tree shakers during harvest and to form strong scaffold branching.

Figure 1. Traditional spring-budded 'Nonpareil' trees on 'Nemaguard' rootstock before (left) and after (right) planting. Once planted, all trees were headed back to a height of 90 cm, all shoots below 60 cm on the trunk were removed, and any remaining branches above 60 cm were cut back to two buds.



Dormant-budded "two-year-old" trees

Dormant-budded trees were once a standard method for almond propagation in Australia. This tree type is budded in late-summer, grown on in the nursery for another year, then planted in the orchard as a two-year-old tree (Figure 2). Dormant-budded trees are therefore much larger than spring-budded trees and establish very quickly when planted out in the orchard. However, they do incur additional cost to cover the extra year's growth in the nursery and because of their size, they can incur additional transport and handling costs.

On a positive note, our experience was that dormant-budded "two-year-old trees" could produce their first significant crop earlier than spring-budded trees, especially with 'Vela' which generally produce their first significant crop as third-leaf trees.



Figure 2. Dormant -budded "two-year-old" 'Nonpareil' trees on 'Nemaguard' rootstock are larger and have a stronger, more robust root system than spring-budded trees.

Pruned vs unpruned central leader trees

Almond trees, once budded in the nursery, naturally develop a strong central leader with numerous side branches (Figure 3). Nurseries progressively remove these side branches from low down on the trunk to facilitate weed management and other nursery operations. Prior to wrenching and digging out for dispatch to growers, trees will be headed back to approximately 1 m tall and, if requested by growers, the nursery will trim back all remaining side branches to two buds (Figure 1). A simple option considered in our trials was to leave these trees unpruned and plant

them as central leader trees at their full height, without being cut back in the nursery or when planted in the orchard, and with minimal pruning of the remaining side branches (Figure 4). As a precaution with these “unpruned” trees, especially if they are not fully dormant when dispatched from the nursery, is to use an anti-stress spray to protect buds from desiccation. Applied to trees as a spray or dip before planting, anti-stress sprays are non-toxic, water soluble polymer sprays used to reduce the effects of transplant shock and frost damage.



Figure 3. Almond trees, once budded in the nursery, naturally develop a strong central leader with numerous side branches (left) which can be planted out as unpruned central leader trees (right).



A key difference between the pruned and unpruned tree types is in the number of winter buds in spring. While the standard trees that have been headed back and trimmed have relatively few buds, the unpruned central leader trees have numerous buds which affect the rate of tree development in spring.

With relatively few buds on a standard headed and trimmed tree, there are fewer shoots that form during spring (Figure 4). Those that are present are compressed into a narrow branching zone and undergo rapid extension to form a wide canopy. The issue with this is that the standard trees with their large branches can be more prone to blow over and experience limb breakage during strong wind storms. In contrast, unpruned central leader trees have numerous buds and thus numerous shoots extending at the same time during spring growth. Because there are so many shoots, their growth is subdued and trees form narrow canopies with more uniform branching over an extended branching zone, which appears to make these trees less prone to breakage.

Figure 4. Standard headed and trimmed (upper) and central leader (lower) 'Nonpareil' almond trees in spring (left) and late summer (right). Note the extended zone of scaffold branching on the central leader trees. Herbicide spray guards were wrapped and clipped together around the trunk of the central leader trees.



Dormant-budded “sleeping eye” trees

A variation on dormant-budded trees that we are evaluating is budding trees in late-summer and planting them out into the orchard in winter, 3 to 4 months after budding, with what are called “sleeping-eye” buds. By inserting either one or two buds at least 70 cm above the ground on the rootstock stem, the rootstock forms the trunk on the budded tree and the scion variety grows from these buds (Figure 5). The second bud is included in case the first bud fails.

An important task with these dormant-budded trees is to remove suckers forming from the rootstock before the scion variety has grown out and established dominance. This de-suckering task can be simplified if the trees are budded onto a red-leaved rootstock, for example ‘Cornerstone’, ‘Garnem’ or ‘Nemared’, as workers can easily distinguish between the green leaf of the scion variety and the red leaf of the rootstock (Figure 6).

Figure 5. ‘Garnem’ rootstock dormant-budded in March with sleeping eye buds placed at approximately 70 cm height on the trunk of the rootstock (left) and the new shoot growth forming in spring from these buds (right) after planting in the orchard.



Figure 6. Trees dormant-budded with sleeping eye buds before (left) and after (right) de-suckering in spring to remove the red-leaved shoots of the ‘Garnem’ rootstock.



Dormant-budded sleeping eye trees are obviously quick and inexpensive for the nursery to produce. Nurseries might insert one or two sleeping eye buds in each tree, the additional bud being insurance if the first bud fails. If there are two buds and both buds produce shoots, as in Figures 5 and 6, then the grower must select the stronger of these shoots to avoid having too many branches growing from the same position on the trunk (Figure 7). Further details on these trees are provided in “Part 2. In the orchard – tree staking and tying” of this All About Almond series.



Figure 7. Growth response after two years of ‘Nonpareil’ trees dormant-budded with sleeping eye buds on ‘Garnem’ rootstock.

Containerised vs bare-rooted trees

Many nurseries in California and Spain, and also the Agromillora nursery in Australia, produce potted or containerised almond trees (Figure 8). These trees provide the nursery and grower with greater flexibility and a lower cost option as the trees can be propagated at any time of the year with a quick turn-around time from ordering to propagation to planting. The trees are also well suited for machine planting which is encouraging growers, especially in Spain, to plant even smaller trees, almost straight out of their liner pots (Figure 9).

The trade-off with containerised trees is that they are much smaller when planted and so require additional pruning and training in the first year of growth in the orchard to develop a strong fruiting canopy and a clear trunk suitable for shake harvesting, unless over-the-row grape harvesters are going to be used.

Timing is also critical with containerised plants. If plants are left too long in the pots, they can become root-bound and they may also produce flowers that must then be removed to stimulate strong shoot growth to form the final trunk of the tree.

Figure 8. Examples of small, container grown almond trees ready for planting.





Figure 9. Small almond trees machine planted in Spain (image provided by José Mariá Lainez).

For more information

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