

Nursery Trees

Quality of nursery trees is one of the most important factors when establishing an orchard. The profitability of any intensive pear orchard is related to its ability to produce early yields of fruit. This is highly dependent on planting high quality nursery trees which have strong growth and will develop an adequate canopy structure in the early years after planting.

An adequate canopy structure is one that allows for optimal light interception and has enough buds with the capacity to produce flowers. This is best achieved through use of nursery trees that have already developed a good canopy structure. It is also important that nursery trees are healthy – i.e. free from pests and diseases; and free from physical injuries.



Figure 1: Scion collection

Types of nursery trees

There are a number of different types of nursery tree that can be used when planting an orchard. These include:

- **One year old whips** – produced through bench grafting of rootstocks in winter, planting in spring and then encouragement of a single bud to grow. These are often unbranched and can lack uniformity.
- **Summer budded trees** – produced over two seasons with rootstocks planted in spring and budded in summer. These are headed at the bud in late winter, with the bud growing into a tree the next season.
- **Two year old feathered trees (or ‘Knip’ trees)** – produced over two seasons. One year old trees produced through either bench grafting or summer budding are held over in the nursery for another year and in the second winter are headed to the required height (50-75cm). A single shoot is allowed to grow from the top bud and any laterals are removed. The shoot grows very vigorously and produces branches on the current seasons growth (called feathers).

- **Sleeping eye trees** – summer budded rootstocks that are cut above the dormant bud and stored for planting in a nursery or orchard.



Which trees will give the best results for an intensive system?

Many studies have shown that the use of highly feathered nursery trees, such as two year old **knip** trees can result in significant yields in the second and third year after planting. This compares to unbranched trees (or whips) that may take 4 or 5 years to produce a yield.

Highly feathered **knip** trees are the most favoured nursery tree type in many European production systems.

The best quality **knip** tree should have:

- A minimum height of 1.6m above the graft union
- A minimum stem diameter of 14-16mm measured at least 10cm above the graft union
- Between 6-15 well positioned feathers/laterals with a maximum length of 30cm
- Feathers starting no less than 80cm above the soil
- Feathers with moderate vigour – that is with a diameter no greater than 30% of the trunk.
- Feathers with wide crotch angles.



Figure 2: *Knip trees in Belgian nursery.*

Often these trees require little (or no) pruning at planting, particularly if feathers are already well located around the tree.

The drawback of **knip** trees is that they are produced at a higher cost and are more expensive than a one year **whip**. However, the long term production losses incurred through use of cheaper, poor quality trees could cost more than the added initial cost of planting quality **knip** trees.

It is important that growers understand the requirements of their intended system before deciding on a nursery tree. If tree densities exceed 4,000 trees/ha and spacings become narrower, highly feathered trees become less desirable. Systems such as the super spindle (4,000-7,000 trees/ha) are often best planted with shorter branched whips. These trees should still be uniform in size and healthy.

Sleeping eye trees are also an option to keep tree costs down when very high density orchards of 8,000 trees/ha or more are being established. However, there is a higher risk of tree loss at planting with the sleeping eye option.

Ordering a nursery tree

When ordering a nursery tree, growers need to consider which tree type will give them the best start for their system. This requires a good understanding of the planting site and intended system. If growers want highly feathered nursery trees, they will need to order at least 2-3 years in advance. If whips are the tree of choice, less lead time is required, but growers should still order with enough time to ensure best chance of starting a system with the highest quality trees.

Fundamentally, growers must develop a good relationship with their nursery in order to get the right tree for their system. Being able to clearly specify the requirements of a tree can make this a smooth transparent process. APFIP has released a guide to nursery tree specifications, a useful reference when ordering trees from a nursery.



Further information

These Australian and international sites may be useful for growers. However they are intended as an information source only. Any specific recommendations may be outdated or irrelevant for Australian conditions and growers should seek local advice.

Australian Resources

Australian Pome Fruit Improvement Program[®] Ltd (APFIP) Nursery Tree Specifications – For information on nursery tree specifications: <http://www.apfip.com.au/>

References (Note full access may incur a fee)

Elkins, R.B., DeJong, T.M., Klonsky, K. and DeMoura R. (2008) Economic Evaluation of High Density Versus Standard Orchard Configurations- Case Study using Performance Data for 'Golden Russet Bosc' Pears. *Acta Horticulturae* 800: 739-746