

Site Preparation

Tree growth during establishment is critically important to the success of an intensive orchard. Factors that inhibit growth can add to costs through delayed bearing. Appropriate preparation of the planting site for an intensive pear orchard is essential to help achieve maximum growth and productivity in the first few years of establishment.

Planning Early

Planning should be done well in advance of planting, particularly if the site is an existing orchard block. Growers should plan developments at least two to three years in advance to allow enough time to: prepare an accurate budget, order trees, order trellising and irrigation systems, calculate labour costs and decide on cultural practices and equipment requirements. Growers may also need to identify and correct any drainage or nutrition problems and determine if soil fumigation is required. Sound local advice during planning and implementation is critical to the success of an intensive orchard.



Figure 1: Row forming

Evaluate the site

Before the final decision is made to develop a site, it should be thoroughly evaluated. An evaluation should take into account the site's suitability for pears <Link>. It is particularly important to understand drainage, soil type, slope, prevailing winds, aspect and frost susceptibility.

This may require mapping the area to identify issues and plan for corrective measures. If it is a replant site, it is particularly important to analyse the past history of the orchard and identify potential problem areas.

Site and Soil Preparation

This is the critical aspect of orchard redevelopment. The greater the attention to detail in this phase the greater the long-term benefits.

Soil Test

It is imperative to obtain a soil test [<Link>](#) before preparing the site. This will identify whether you need to apply nutrients or improve soil.

pH, nutrients, salinity and organic matter

Soils should be tested for pH, soil nutrients, salinity and organic matter so that any amendments can be made before planting [<Link>](#). If surface runoff during irrigation indicates slow soil infiltration rates, a test for gypsum requirement may also be needed.

A subsoil sample to check pH and gypsum requirements is useful if the site has been replanted more than once.

Risk of replant disease when replanting old blocks

'Replant Disease' is one factor that can cause poor growth and sometimes death in newly planted orchards. Replant disease can be specific or non-specific. Specific replant diseases such as 'Specific Apple Replant Disease' (SARD) affects apples planted directly after apples. 'Non-Specific' replant disease can affect apples planted after other fruit crop species, e.g. stonefruit (or other fruit crop species planted after each other e.g. cherries after apples).

The exact causes of replant disease are yet to be identified but they are widely attributed to a combination of soil-borne organisms (e.g. parasitic nematodes), and soil-borne fungi and bacteria.

Recognising replant disease is not easy, and a range of factors should be considered. Above ground the main symptom is a general lack of tree vigour and a failure to thrive. Below ground the roots can be blackened, with very few root hairs and a tendency for premature root decay. Replant disease is typically non-lethal but tree deaths can occur in newly planted trees, as often another pathogen (secondary infection) is associated with the tree death. Affected trees tend to recover and make normal growth after two to three years. However, the economic impact of the delayed production and low early yields can be very serious. It can turn a potentially profitable orchard into a poor or negative investment.

Pears are generally regarded as being less susceptible to replant disease than apples. Precaution should be taken when planting pears on dwarfing rootstocks (such as quince) into existing fruit blocks, and particularly old pear blocks.

Soil bioassay tests can give an indication of how the soil will influence growth of young trees and whether or not soil fumigation or other amendments are needed.

Replanting existing sites



Trees should be removed immediately after harvest—providing conditions enable easy removal of trees and roots. Timing and method of removal will depend on the site conditions, costs and availability of equipment.

Remove as many old roots as possible

Old roots can harbour harmful levels of soil organisms that can reduce the performance of newly planted trees. Decaying roots can also be toxic to young trees and can be a source of nematodes and disease. It's important to remove trees when soil conditions are suitable for maximum removal of roots.

After tree removal, tree lines should be ripped to a depth of 35-40 cm to remove any remaining roots. If practical, all root pieces longer than 30-40 cm and larger than 4-5 cm in diameter should be removed.

Do not burn old trees on land to be replanted

Heat generated by burning old trees can adversely affect soil micro-organisms and nutrient availability under the heap. For orchard uniformity it's best to burn the trees away from the replant site. If trees must be burnt on site, several small heaps are better than one single, large one.

Avoid erosion problems on steep slopes

On steep slopes tree removal can cause soil erosion. Growers may need to look at measures to minimise the speed of water running down the block. A cover crop should be planted if land is going to be left fallow for a long period.

Weed control

Managing weeds before planting will help reduce the competitive pressure of weeds during young tree establishment. It's important to control perennial weeds before planting as these are harder to manage in established blocks than in open ground. They will also compete with any cover crops or permanent sod sown.

Ripping

Ripping can improve soil aeration and drainage, reduce compaction problems and remove roots from previous orchard plantings (if needed). Ripping is best done when soil is dry.



Figure 2: Deep ripping

Cultivate soil

Planting sites need to be well cultivated with friable soil. Cultivation can also unearth old roots in an existing orchard block.

Mark out new rows

It's important to minimise the number of new rows in old row positions. Considerable debate centres around which is the best row orientation. As a general guide, orchards rows should be planted running as close to north-south as is practical; except where site constraints or operator safety prevent it.

Fumigate if required

Fumigation is only one tool that can be used to prepare the site, often many of the cultural practices such as adjusting nutrition and soil structure can reduce the need to fumigate.

If fumigation is required, prepare the soil to the right tilth and ensure there is adequate soil moisture (dry soils minimise the effectiveness of fumigation). Covers may be required depending on the chemical used to fumigate soil. These covers can greatly increase erosion problems on steeper sites so appropriate erosion minimisation actions are recommended, i.e. interceptor drains.

Fumigation is most successful in warm moist soils with temperatures over 16°C. Autumn is preferred to spring as the chemical must be removed before planting can proceed and this takes time. Test the germination of some quick sprouting vegetable seeds to check whether the chemical has been properly adequately removed from effected soil.

Even out the site if required

An irregularly surfaced, undulating site is best leveled to some extent. If major earthworks are required they should be completed prior to fumigation.

Apply and incorporate fertilisers and soil amendments

Prior to final soil preparation, any fertilisers or soil amendments such as gypsum or lime should be broadcast and incorporated at recommended rates (determined by soil tests) to a depth of 15-20cm.

Mound tree lines if necessary

Mounding tree lines can improve drainage as well as increase the depth of topsoil available to trees. This is particularly important where there is an impermeable clay sub-soil. Mounding can be done through moving topsoil from the centre of the traffic line to the tree line. Mounds should be approximately 0.5m high.

Final soil cultivation

Final soil cultivation should only take place when all fertiliser, soil amendments, mounds and grassed waterways (surface drainage) are in place. It's preferable to do so on the day trees are planted.

Establishment of cover crop or sod culture

Cover crops or sod culture can help to stabilise the soil and provide a firm surface during planting. They also can reduce weed competition and provide organic matter to the soil. The choice of cover crop will depend on local conditions. Commonly ryegrass or a mix of ryegrass and clover are used. Before planting, the tree line will need to be sprayed to ensure the cover crop is not competing with newly established trees.

Installation of support systems and irrigation



Figure 3: Installing trellising



Figure 4: Planting

Support systems and irrigation should be installed before planting or as early as possible after planting.

Movement of young tree tops can damage tree roots so it's important they are secured to a support system. It's also important to minimise any water stress to rapidly growing young trees through irrigation.

Acknowledgement to Paul James (Rural Solutions SA) for providing much of this information.

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

Successfully Replanting Orchards, Five Easy Steps, A Best Practice Guide by Paul James. This book is available by contacting the Apple and Pear Growers Association of South Australia at aplnpear@ozemail.com.au.

International Resources

[Planting and care of young orchards](#): Washington State University Publication.