Traditional orchards: formative pruning of young trees

This information note provides guidance on why young fruit trees require formative pruning and on how to prune them. The main part of the guidance applies to apples and pears, in particular dessert varieties. The final section explains the main differences when pruning other fruit trees. Other information notes in the series provide guidance on other aspects of orchard management. For an explanation of terms used in this leaflet see the information note TIN021 *Orchard glossary*.

Key points

- All young fruit trees require formative pruning to develop a balanced shape. The amount of work will vary according to the type of fruit tree.
- Formative pruning involves creating a trunk and pruning young growth back to encourage the tree to grow in the right direction and develop thick branches.
- The eventual aim is to develop an evenly spaced, open network of branches above the height of grazing livestock and/or machinery.
- Stone fruits do not respond to pruning as well as apple and pear trees so their formative pruning should be kept to a minimum.
- The style of pruning and final tree shape varies across the country. Trees should be pruned to the shape and style of those found locally.

Background

Formative pruning, or training, is the initial pruning of a young tree to develop a balanced shape. During this time the aim is to create a strong basic branch structure to ensure a healthy tree is developed that will crop well in the future. This is the most important period of pruning during the tree's life. If carried out incorrectly the tree will require lots of corrective work in later years.

Young trees that are not pruned may develop thin, vertical, overcrowded, crossing and badly placed branches. These may be unable to support the weight of the fruit produced and bend or break. The ideal is to create strong, well spaced laterals (horizontal branches which will bear the leaves and fruit) to support the weight of the fruit and ensure it gets as much sun as possible to help the fruit ripen.

There are various traditional local variations of developing fruit trees on vigorous rootstocks. However, the tree form can generally be broken down into three main sections. The first is the **trunk**, the initial central leader which forms the main stem of the tree. Radiating out from the trunk are the **framework branches**, major limbs which are usually retained for long periods, if not the entire lifetime of the tree. These in turn support the **lateral branches**, smaller side branches which bear leaves and fruit and are pruned and renewed on a more regular basis.

How to formatively prune

When planting trees on vigorous rootstocks in existing orchards, whether they are standards or half-standards, the first aim is to begin developing a framework branch structure.

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This will eventually support the laterals at a height above the reach of livestock and wild animals.

The framework branches on trees in horse or cattle-grazed orchards must be formed at a higher height than those in orchards grazed only with sheep. The height of framework branches is a long term decision and needs careful consideration because even if there are no plans to graze with livestock in the short term it may occur at some point in the future. The need to allow access for machinery also needs to be taken into consideration.

Forming the trunk

The height of the central leader (trunk) does not increase from the base as the tree grows: only the girth increases. Therefore the height at which each framework branch develops from the trunk remains the same throughout the tree's life. This means the only way to raise the height of the framework branches (and the lateral branches they support) is by removing or reshaping them to favour higher growth. As doing this may compromise the shape and balance of the tree it is important to begin forming the branches so that they attain the right height while the tree is still young.

With standard trees this height is reached by the formation of a trunk. To create half-standard trees the trunk is stopped lower down and the resulting two or more branches (secondary leaders) developed as long tall arches to create a multi-stemmed tree.

Until the desired stem height has been reached and the first branches are developed the aim is to establish a leader by removing competing stems. Initially, therefore, the central leader is left unpruned.

If the stem or bud becomes damaged, the central leader may grow weakly. In this case it can be cut back to a healthy, well-placed side shoot which will develop into a new leader. The same can be done if it grows too vigorously, to help build up a thick, strong trunk. If necessary the new leader can be staked for the first year to encourage it to grow upright.

In the first winter any side shoots (feathers) are cut back to leave snags 50-75 mm long with 2-3 buds.

In second and subsequent winters, new feathers are cut back to 50-75 mm and previously pruned snags cut back to the trunk. Feathers are progressively shortened and removed from ground level upwards each year to give a clear stem to the desired height (winters 3 and 4).

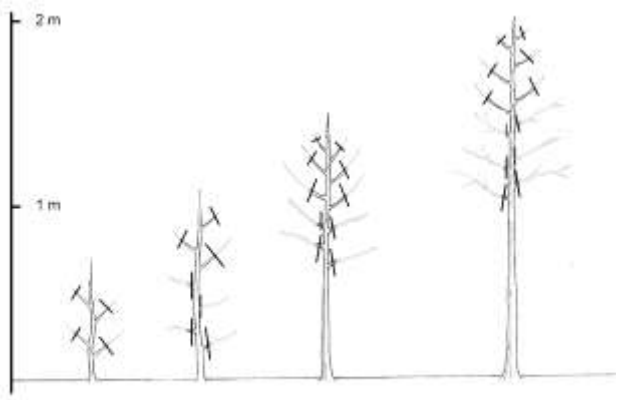

Figure 1 Formative pruning, 1st winter 2nd winter, 3rd winter 4th winter

This process encourages the stem to thicken and builds a strong trunk to support the head of the tree. Removing the feathers earlier, without 'snagging', produces a thinner, weaker stem. The feathers need to be removed eventually however, or they may grow up and compete with the main branches or grow around and through the tree guard. If browsed by stock they may be torn off to the trunk which could weaken the tree.

Any growth from the rootstock (ie from below the grafting union) should be removed as it will direct the trees energies away from the grafted variety.

Forming the first framework branches

The branches of each tier will all join the trunk at slightly different points and radiate out in different directions, having developed from alternating buds. In practice it is best to leave at least 20 cm of trunk between each branch (bearing in mind their eventual thickness) because if the branches all start from the same

height it will put an increased strain on the trunk at that point as they grow.

The height at which the first tier of branches should be developed depends on the type of rootstock and form required. On standards the first tier should be developed at 1.5-2.1 m (figure 2).

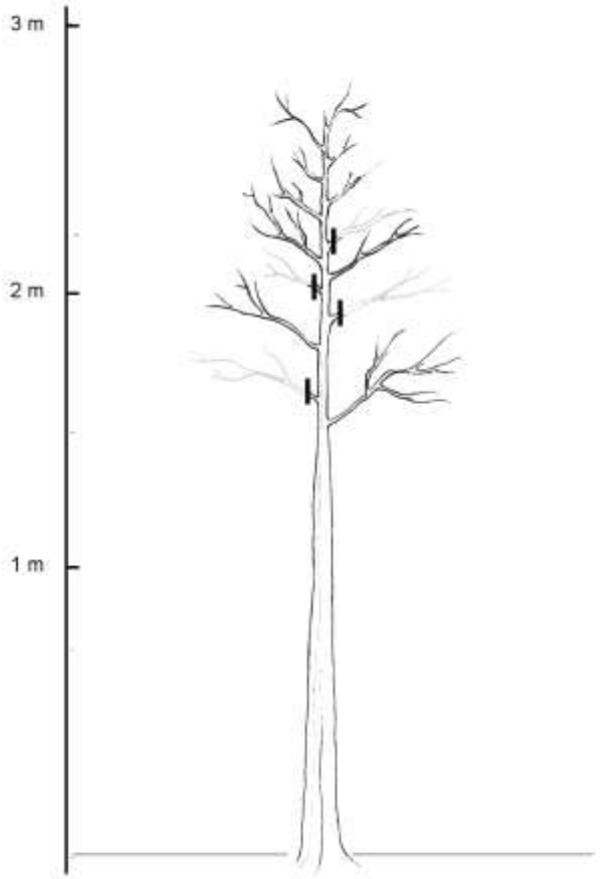

Figure 2 Developing framework branches on a standard tree, 5th winter

On half-standards this can be at any height below this almost down to ground level (Figure 7 below).

Approximately three to six evenly spaced secondary leaders that have formed wide angles with the trunk (which will ensure a stronger growing joint) should be pruned back by half (two thirds for weak shoots), to an outward-facing bud. These will form the first tier of branches. The remaining secondary leaders can be removed see figure 3.

Forming subsequent framework branches

From now on the aim is to develop a balanced branch system with an open habit. This will allow light in and air to circulate.

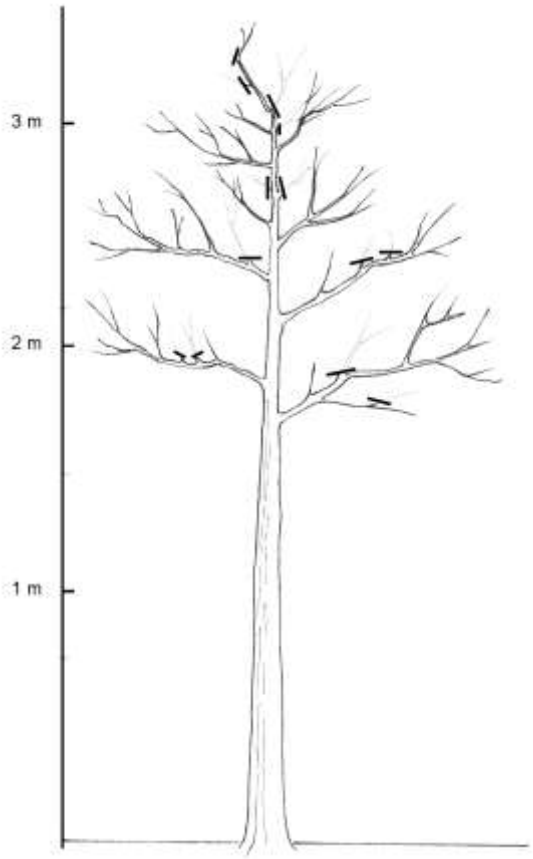

Figure 3 Developing framework branches on a standard tree, 6th winter

The eventual aim is to have 4-8 evenly spaced main branches radiating from the trunk like the spokes on a wheel if viewed from above (figure 4). These will form the framework from which the fruit-producing side branches and spurs will develop.

During the first few years the pruning will be relatively severe in relation to the amount of wood present on the tree. Generally speaking, the leader of each branch should be reduced each year by between a third and a half of the season's growth. To stimulate new vegetative shoot growth thin shoots should be pruned to short spurs of one or two buds only.

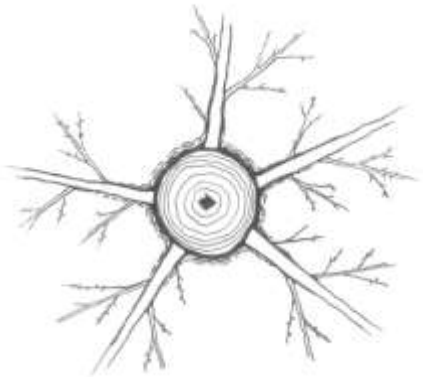

Figure 4 Aim is to have 4-8 evenly spaced main branches radiating from the trunk

The style of pruning and final tree shape varies across the country. When creating an open centred (goblet-shaped) tree, the central leader is removed once it has developed beyond the height of the first tier and several strong branches have begun to form below it (see figure 5).

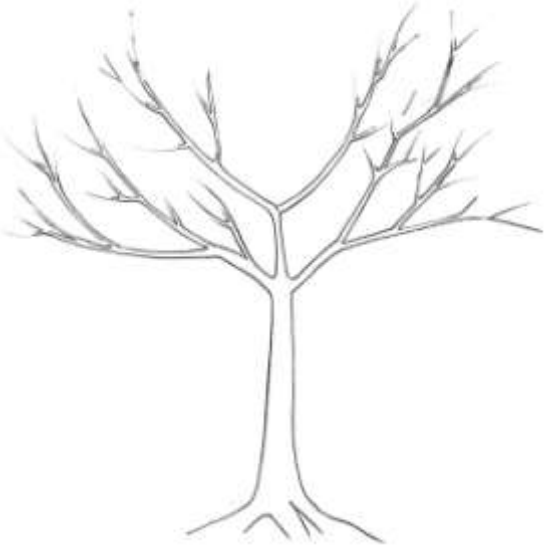

Figure 5 Goblet-shaped tree

This encourages the tree to put its energies into these branches which will now form the main framework branches (secondary leaders).

When creating a delayed open-centred tree, the central leader is left to grow on and the process of branch selection repeated, to form further tiers of branches higher up the trunk.

Each tier will therefore have fewer branches, with the consequence that the main branches will be spaced further apart, and higher up, the trunk see figure 6. As the first branches are formed lower down on the trunk when creating a half-standard tree, they are developed at a more upright angle than the secondary leaders on a standard tree. This raises the laterals and leafy growth to the desired height, effectively forming 'mini-trunks' growing out at different angles. The required number of 'spokes' may then be formed from these branches if necessary.

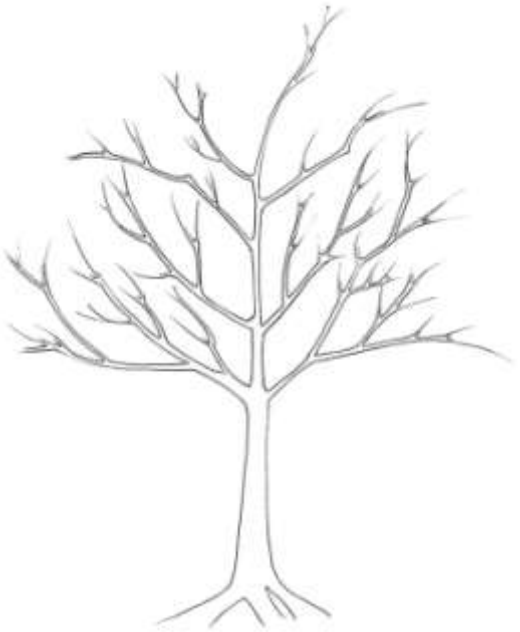

Figure 6

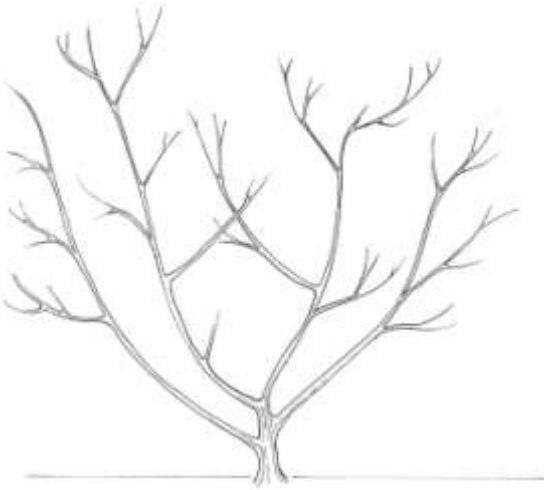

Figure 7Multi-stemmed half-standard

Forming the lateral branches

The basic shape of the tree takes about 8 to 10 years to form. After this the main emphasis of pruning moves towards the development of fruit bearing growth (for more information see TIN017 *Traditional orchards: maintenance pruning*) and beginning to shape the crown of the tree as it matures. Pruning is confined to removing diseased wood and selectively thinning, shortening or removing shoots and branches that are weak, crossing or growing back towards the centre of the crown, to maintain its shape.

Pruning to different shapes

Formative pruning is not a regimented process and should be varied according the growth of the individual tree. Different varieties have different growth habits, which should be allowed for when developing their shape. Some have a bushier habit than others, losing their dominant leader.

Pears have a more upright growth than apples. The important objective is forming an open, balanced network of strong, unshaded branches above the height of any grazing livestock and machinery: the method is of secondary importance. The form and shape of tree developed should take into locally distinctive pruning practices and tree forms. The selection of species and varieties should be guided by orchards in the local area.

Removing fruit

When young trees first start to fruit it can be tempting to leave these on the tree. These will use up energy that is best directed into vegetative growth so it is best to remove them. The weight of the fruit as it develops can also bend young branches out of shape (although this can be advantageous on trees with a particularly upright habit).

Formative pruning of stone fruit trees

The above guidance applies mainly to dessert apples and pears. Stone fruit trees do not respond as well as pears and apples to continuous pruning, so it is best to try and keep this to a minimum.

However the same basic principles still apply; all young fruit trees still have to develop a clear trunk, framework branches and a balanced shape.

All fruit trees will benefit from allowing light and air in, and removing branches which are crossing, weak or diseased.

To prevent excessive growth it is advisable to cut the end off the leader shoot when the tree is about 2 m tall and to shorten the ends of spreading branches to keep the tree within manageable dimensions. All pruning should be done in the summer months to prevent silver leaf infection.

Formative pruning of cobnut trees

The traditional practise for cobnuts is to grow open-centred trees about 2 m high, similar in shape to half-standard fruit trees. This is to maintain the tree at a convenient height for harvesting the nuts straight from the tree while they are still green.

From a central stem about 60 cm high, six to eight wide-angled framework branches are developed by pruning and pegging down. Shoots and wands below this height are removed. If it hasn't been removed already, the central leader should be shortened once it has reached 1 m.

As the tree grows some of the central branches can be cut away and others shortened to reduce their dominance in favour of more desirable, outward-facing buds or branches. Sometimes cobnuts are developed as a multi-stemmed bush rather than on a single stem, particularly on old plants where the central stem has died away and replaced by wands that have suckered from the roots.

After about six years the tree should have developed its goblet shape. After this point the aim is to maintain the framework branches, removing crowded and upright growth and producing an ongoing supply of new cropping wood. The shorter, weaker, horizontal branches can be removed rotationally over the years.

Further information

Natural England Technical Information Notes are available to download from the Natural England website: **www.naturalengland.org.uk**.

This information note is aimed at managers of traditional orchards and agri-environment scheme land management advisers. Other notes in this series include:

- TIN012 *Traditional orchards: a summary*
- TIN013 *Traditional orchards: site and tree selection*
- TIN014 *Traditional orchards: planting and establishing fruit trees*
- TIN015 *Traditional orchards: an introduction to pruning*
- TIN017 *Traditional orchards: maintenance pruning*
- TIN018 *Traditional orchards: restoration and management of mature and neglected orchards*
- TIN019 *Traditional orchards: fruit tree health*
- TIN020 *Traditional orchards: orchards and wildlife*
- TIN021 *Traditional orchards: glossary*

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