

An introduction to orchard management



Produced by the North East Wales Orchard
Recovery Project 2012

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Traditional orchard habitat



The area of traditional orchards in the U.K. has declined by over 60% in the last 50 years. Once a common sight in the British countryside they have now become rare and have recently been listed as a national biodiversity priority habitat.

With the loss of the traditional orchard habitat we also face the potential loss of the 1800 species associated with orchards, rare fruit varieties, knowledge, ancient traditions and prominent landscape features. The decline has been attributed to changing agricultural practices and competition from supermarkets which can provide imported fruit at cheap prices, rendering our native orchard produce not economically viable.



Traditional orchards are assumed to be over 60 years in age and have often occupied the same area of land for hundreds of years; they are planted at low densities and cultivated using low intensity methods avoiding the use of pesticides and herbicides in favour of grazing and natural pest control.

The orchards traditionally associated with North East Wales are dominated by apple varieties and range from formal orchards established on fertile, free draining pasture to a selection of trees distributed evenly throughout hedgerows. In addition to apples, pears, plums, damsons, walnuts and cherries also have significance in North East Wales.

Traditional local farm orchards were stocked with cider, cooking and general all-rounder apples and perry pears, limited in variety, size and numbers. Heritage orchards established on large estates were stocked with a wider assortment of trees featuring dessert and culinary apples and pears and are now considered rare.



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These older traditional varieties are often better suited to local site conditions than the modern cultivars. Although a large proportion of traditional fruit tree varieties have been lost, a considerable number do survive and are found locally. Nationally these trees are important for productivity, diversity and resilience to pests and diseases. In several cases certain varieties of fruit trees have never been locally described and are absent from the national orchard collection.

Traditional orchard pasture is normally species rich, unimproved grassland, traditionally grazed by sheep, geese and cattle and provides convenient shelter and security for young spring lambs.



Orchards and Wildlife

An orchard can provide a refuge for wildlife in our landscape dominated by intensive agriculture. The combination of fruit trees and grassland that have often been undisturbed for hundreds of years and avoided any agricultural improvement results in an environment that is immensely rich in biodiversity.



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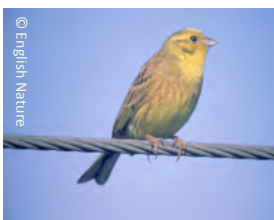
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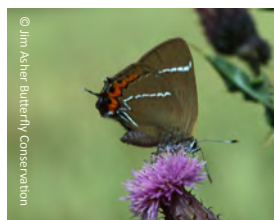
Just one apple tree can support over 1000 different invertebrates including moths, bugs and beetles. Often a traditional orchard provides a mosaic of different habitats similar to parkland. The fruit trees themselves provide varied opportunities for wildlife. They are fairly short lived hardwoods; this means that they will exhibit veteran tree characteristics like hollow trunks, split bark and holes relatively quickly. And because traditional orchards are planted at a low density the dead and decaying wood is usually within a fairly open environment with lots of light and sunshine.



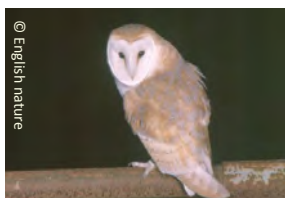
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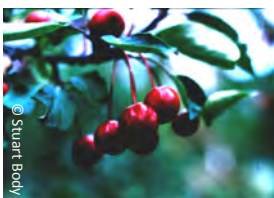
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These factors provide ideal conditions for invertebrates. Over 400 types of insect have been found in traditional orchards that are classed as specialist wood decay species. These invertebrates subsequently provide a food source for many birds and mammals. Apple, pear, plum and cherry blossom in the spring providing an excellent nectar source for many insects including bees, hoverflies and moths. The branches of the fruit trees provide a nesting site for mistle thrushes and chaffinches and windfall fruit feeds invertebrates, birds and mammals.



Orchard Plants: In addition to the fruit trees, a wide variety of plants can be found in an orchard. "Chicken of the wood" and "weeping bracket fungus" thrive on the dead and decaying wood and the unimproved grazed or cut grassland often found in orchards provides the ideal habitat for a rare group of fungi called waxcaps. Lichen, mosses and liverworts also grow on the fruit tree bark. Climbing plants including ivy, honeysuckle and mistletoe grow through the tangled fruit tree branches. Ivy berries provide early fruits for birds and a valuable late nectar source for insects.



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Honeysuckle provides a nectar source when in flower and fruit in the autumn; its bark is also used by dormice to build nests, a species which has also been found in traditional orchards. Mistletoe is a semi-parasitic plant that favours apple trees and is consequently often found in orchards. Its white berries provide a winter food source for wildlife particularly the mistle thrush and migratory blackcap which act as vectors to disperse the seeds.



The unimproved grasslands in orchards can be rich in wild grassland flowers like ox-eye daisies, umbellifers, trefoils, clovers and vetches which are all useful food sources and create a meadow alive with pollinating insects in the summer months.



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Invertebrates: Invertebrates use the mosaic of habitats in an orchard throughout the year. A well varied orchard will sustain many invertebrates for the whole of their lifecycle. In the spring, queen bees and wasps emerge from hibernation and feed up on the abundant fruit blossom available, later their workers help to control caterpillars. Bumblebees are frequently found in orchards and are excellent pollinators. In the summer months bumblebees will find pollen and nectar in the wild grassland flowers and the hedgerow. Spiders will hunt and build webs to take advantage of all the flies attracted to the flowers and fruits of the orchard. Fallen fruit in autumn provides food for bees, butterflies, moths and hoverflies, while bumblebees will hibernate in hedgerows through the winter and ladybirds will overwinter under the bark of the fruit trees.



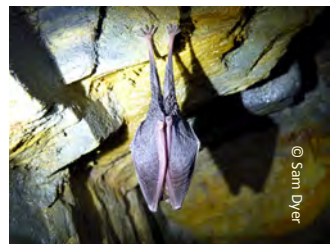
Birds: A single orchard can provide food and a nesting site for around forty different species of bird including thrushes, finches, flycatchers, woodpeckers and migratory fieldfare, blackcap and redwing. Birds will use the tree hollows and branches for nesting and will feed on the fruit throughout the year. Managing a hedgerow around an orchard sympathetically can also encourage birds; for example the bullfinch and turtle dove prefer large hedges. Birds and bats both act as the orchard's natural pest control with species like the thrush and chaffinch feeding tirelessly on grubs.



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Mammals: Larger mammals like foxes are drawn to orchards to hunt rabbits. Foxes and badgers will also feed on windfall fruit. Deer, rabbits, hares, bank and field voles and mice will all forage in the orchard's grassland. The rarer hazel dormouse has also been recorded nesting in orchards. Hedgehogs are attracted to orchards for the abundant invertebrate life and fallen fruit. A variety of bat species will also use orchards as foraging grounds; the pipistrelle and brown long eared bat feed on the invertebrates attracted to the orchard's fruit and pollen. Like birds, bats will use the cracks and hollows in the orchard trees to roost.



Some common orchard species:

Invertebrates:

Stag beetle,
noble chafer
apple lace bug
violet oil beetle
white letter hairstreak
northern brown argus
pearl bordered fritillary
goat moth
mistletoe marble
orchard tooth

Mammals:

Hedgehog
Dormouse
bats: noctule, lesser
horseshoe, brown
long-eared, soprano
and common
pipistrelle

Reptiles:

Slow worm
Common lizard
Grass snake

Birds:

Grey partridge
Linnet
Common cuckoo
Starling
Yellowhammer
Spotted flycatcher
Marsh tit
Dunnock
Willow tit
Blackbirds
Blackcaps
House sparrow
Bullfinch
Tree sparrow
Mistle thrush
Lesser spotted woodpecker
Hawfinch
Song thrush

Amphibians:

Great crested newt
Common toad



The biodiversity value in an orchard can easily be improved by taking some simple steps:

Plant new trees: The older trees may be most important now but planting new trees secures the future of your orchard and maintains a diverse age structure ensuring a variety of different habitats within the orchard.

Keep standing dead wood and dying wood, provided it is not diseased: This will provide a substrate for fungi and lichens, provide for a group of niche species which are dependant on decaying wood and enhance the natural orchard habitat further.

Plant hedges: Hedges not only provide shelter for an orchard they also provide a link connecting the orchard to the surrounding landscape. Hedges provide additional cross pollination opportunities with species like wild plum (bullace), hazel and crab apple. Hedgerows help create a microclimate in the orchard and can provide additional sources of food over the winter, particularly for birds.

Remove excess nutrients from the orchard grassland: Graze or cut the grassland for hay, this removes nutrients encouraging wildflower diversity which will help attract pollinators to the orchard.

Retain fallen fruit: Windfall provides an invaluable source of food for many species including birds, mammals and invertebrates. Take note however, diseased trees have a tendency to retain fruit on the branches, whereby perpetuating the lifecycle of the pathogen.

Planting an orchard



Traditional orchards are described as being a mixed plantation of fruiting trees grown on desired rootstock and trained as standards or half-standards established at a planting density of 300 trees per ha. Trees are grown on specific rootstock and spaced at 5 to 7m centres with a final height of 10 to 12m.

The Site: The ideal site for a fruit orchard should consist of a gentle south facing slope which is sheltered from cold winds, at or below 90m/300ft with moderately free draining soils of pH 5.6 to 6.0 with approximately 75cm/30in of rainfall per year.

Sites possessing these attributes will produce fruit of good quality and flavour. In addition, sufficient space should be provided which is appropriate to the vigour of the chosen root stock. Sites with some shading, which are slightly elevated with increased levels of exposure will be acceptable, especially with early-ripening fruiting varieties. Frost damage and consequently a drop in fruit yields will be evident with early-flowering varieties planted in exposed areas.



Apples will tolerate more varied site conditions and will fruit successfully up to 180m/600ft. Altitudes of 300m/1000ft are not unknown for orchards in Britain, but fruit production will be more variable and species choice more limited. Avoid waterlogged soils, excessively dry sites, exposed areas, frost hollows and soils with exceptionally high or low pH levels.

Traditional orchards have an association with, and will support an element of, light grazing. However trees should be individually guarded against browsing and the areas should be fenced off with grazing levels closely monitored. While grazing is used as a management tool for controlling herbaceous and woody weeds, on a cautionary note, domestic stock can damage trees.

Choosing Trees: The type of fruit and fruit varieties should be chosen according to the site conditions, pollination groups, climatic factors and taste. Heritage varieties are often considered preferable for ecological reasons because they do not depend on pesticides; they therefore create a better environment for wildlife.

When acquiring fruit trees, only buy healthy plants, stocky in appearance and sufficiently hardened-off to withstand winter weather conditions. Most traditional nurseries stock heritage varieties with cuttings grafted onto container grown rootstocks or bare-root transplants.



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Site Preparation: Site preparation should ensure that trees are planted in stock-proof areas. Weeds should ideally be cleared by hand or by the use of a suitable herbicide. Hard ground or compacted soils should be rotivated or ploughed and the soil should be fertilised. If a site is exposed, provide protection by the erection of a windbreak.

Plant Care and Handling: Many young trees fail to grow or die prematurely because of neglect and/or rough handling which can occur before and during planting. This form of damage usually occurs in 3 ways; root drying, overheating/freezing and/or physical shock. To eliminate these problems ensure trees are kept in suitable containers and watered when required, store the young trees in the shade and/or undercover and only remove the tree from the container or bag when actually planting. Young trees are very susceptible to physical shock so handle gently, don't drop or throw young plants and be aware of tender buds.



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When to Plant: The standard planting season or planting window for bare root trees is between November and March. Container grown trees can be planted much later into the summer months with a regular watering regime. During the winter planting season trees are dormant and will tolerate a modest degree of disturbance. Some simple rules to follow when planting young trees are: don't plant if the ground is frozen and don't plant if the area is water logged.

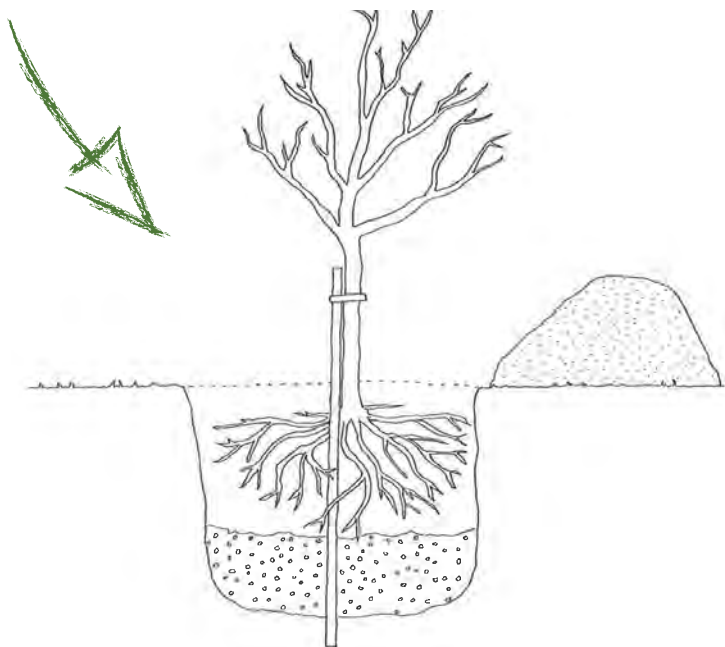
Spacing: Generally, plant spacing is dictated by the potential size of the mature trees, which is influenced predominantly by the vigour and growth characteristics of the rootstock. Traditional orchards stocked with large heritage varieties are planted at 5.5m spacing which equates to 330 trees per hectare, whereas smaller trees grafted on half standards are planted at 3m spacing or 1100 trees per ha. However, five small trees, planted in containers and kept on a patio is also considered an orchard!



Planting: It is very important that trees are planted firmly and at the correct depth. Always ensure that the tree “root collar” is at the right level. This is where the root changes into a stem and is usually indicated by a soil mark and a slight change in colour (not to be confused by the graft union which will be higher).

The recommended method is **Pit Planting**, suitable for all soil types. The method entails:

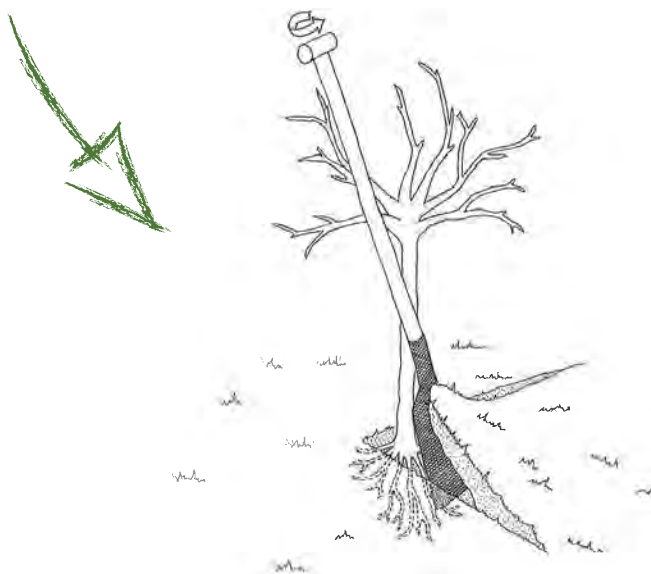
- ➡ Digging a pit using a spade or mattock; the pit should be big enough to accommodate the root system.
- ➡ Hold the tree upright in the hole and ensure that the root collar is at ground level.
- ➡ Return the soil around the roots and firm to minimise air pockets. Make sure the soil is consolidated to the full depth of the pit.





An alternative method for one year old bare root plants on well drained and weed free areas is the **Notch Planting Method**. This planting method entails:

- ➡ Cutting an L, T, V or H shaped notch deep enough to take the root system.
- ➡ Lever up the soil and insert the root, being careful not to distort or damage them.
- ➡ Remove the spade and carefully ease the plant upwards until the root collar is at ground level.
- ➡ Then firm in the tree with the heel, removing air pockets and ensuring the tree is upright.



Staking and Watering: Most trees less than 1.2m do not require staking. However, if large trees are to be planted, then staking the tree to one third of the height with a single tie will be necessary. Some movement of the tree will stimulate root growth. Always water in your trees and maintain the watering regime during the establishment phase.



Aftercare: When the trees have been planted, aftercare should focus on watering, weeding, pest control and firming trees in. Keep an area of 1m² around the base of each tree free of weeds. This can be achieved by using organic mulches, mulch mats, hand weeding or herbicides. Note that regular strimming and grass cutting around the trees is not as effective as weed control. Cutting grass only stimulates root growth and ultimately water and nutrient competition by the grass. For the first few months after planting, particularly after strong winds or frosts, firming in the soil around the trees is important. Firming in involves gently pushing the soil down around the tree, this prevents air pockets forming around the roots which may make the tree unstable or vulnerable to frost damage. Trees which are not firmed in properly never make satisfactory growth and usually die.



Rabbits, hares, voles and livestock can cause considerable damage to trees, especially young trees. The use of protective guards coupled with adequate fencing should be used with stock. Guards should be regularly checked and reset if required. Insects can cause defoliation and damage shoots, bark and roots. Maintain and inspect trees regularly and monitor for damage. Should damage occur, take advice and action to minimise the affected area.



Management

Orchard management and the law: The legislation that applies to your orchard will depend on its location, whether it has any protection and the species that may be present. If you are the landowner you will often be aware of these circumstances.

Orchards may be within designated conservation sites (E.g. SSSI) or provide a home for protected species such as bats. If this is the case you may need to consult the Countryside Council for Wales before undertaking any work. In addition the Forestry Commission's Felling Licence limits the volume of timber which can be felled without a licence. Some orchard trees may also be protected under the Town and Country Planning Act, if they have tree preservation orders or when they are growing within a designated conservation area. For these trees it is an offence to lop, top, fell, wilfully damage or destroy a tree without consent. In these cases there are specific exemptions which can permit work on trees grown for fruit production. These exemptions vary and clarification should be sought before carrying out work to protected trees.

The local planning authority in your area and the Forestry Commission will be able to inform you about whether or not these restrictions apply to your orchard trees.



Management and Restoration: As with all semi-natural habitats, if left unattended traditional orchards can become dense scrub and tangled thickets. The key to a healthy and productive orchard is “Best Practice” management. When considering restoration programmes for semi-natural habitats, the first step must be an assessment and ecological audit of the orchard. This assessment should include all growing stock, boundaries and marginal areas, soils, herb-layer and all other features which have a bearing on future management i.e. provision for access, availability of water, local markets and potential end use. When considering the physical condition of individual trees growing within an old orchard, it is vitally important that the variety and the heritage value of the tree be identified.



Objectives: Management objectives associated with heritage orchards should focus on restoring the health and vitality of the orchard as well as production. If the trees are severely compromised and are beyond restoration, grafting and budding material onto suitable rootstock should be undertaken. This process of rejuvenating trees will perpetuate the survival of the existing orchard stock and when firmly established, the old parent tree can be left to decline naturally. Remember old and decaying deadwood is an important ecological component of any wooded semi-natural habitat.





Other management intentions should focus on the sympathetic management of pest and diseases, restorative and/or formative pruning, improving soil conditions, reducing weed competition and restocking where necessary.

Pruning: In its simplest form, pruning involves removing a segment of a tree or shrub by physical means for a specific function. Pruning is used to improve the shape and character of a tree whilst maintaining health. Removing unwanted growth and deadwood from an old derelict fruit tree, if done correctly, will restore health and vigour.

How to Prune: Although there are numerous ways of pruning trees and shrubs, the general principles and the tools to be used are basically the same. Saws are employed for the removal of large limbs and secateurs and long handled pruners (heavy duty shearers) are used for removing smaller material. It is highly unlikely that run of the mill pruning jobs will require the use of a chainsaw, nevertheless corrective pruning on large trees undertaken by a professional with a chainsaw is an option. Additional tools used for pruning include sharp knives, rakes, ladders and wheelbarrows.



When pruning, cuts must be clean and therefore sharp tools are required. Blunt or incorrectly sharpened tools will crush tissue and will leave snags. Also techniques used to remove material should avoid tear-back and bark stripping. Avoid snags and tear-backs especially near the branch collar as this collar is used to heal the wound and is an important defence in preventing the ingress of infection. To prevent cross contamination always clean and sterilise tools with an appropriate product or methylated spirit.

Horizontal pruning cuts should be avoided. All cuts should be sloping, continuous and clean to facilitate the removal of water and any harmful pathogens. There should be no need to use paint to seal wounds as appropriate cutting techniques will self-heal. Prune trees as per species; different species are pruned at different times of the year. As a general rule apples and pears are pruned in winter during the dormant period whereas cherries, plums and damsons are pruned in June when growth is strong. It is beneficial for *Prunus* spp to bleed thus preventing the ingress of pathogens associated with the disease silver leaf. Ensure that you clean-up after work, disposing of material in a suitable manner, especially if the cut material is infected with a harmful and potentially contagious disease.

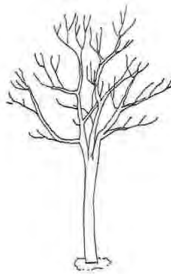
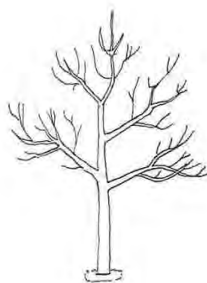
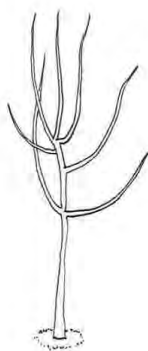


Pruning should focus on the removal of dead, diseased and crossing branches, reduce overcrowding and improve symmetry and balance and if necessary redefine shape and stature. Different techniques are adopted when pruning fruit trees that bear fruit on tips (tip-bearing fruit trees) and with trees that bear fruit on older wood (spur-bearing fruit trees).



Correct
pruning

Nursery
grown tree

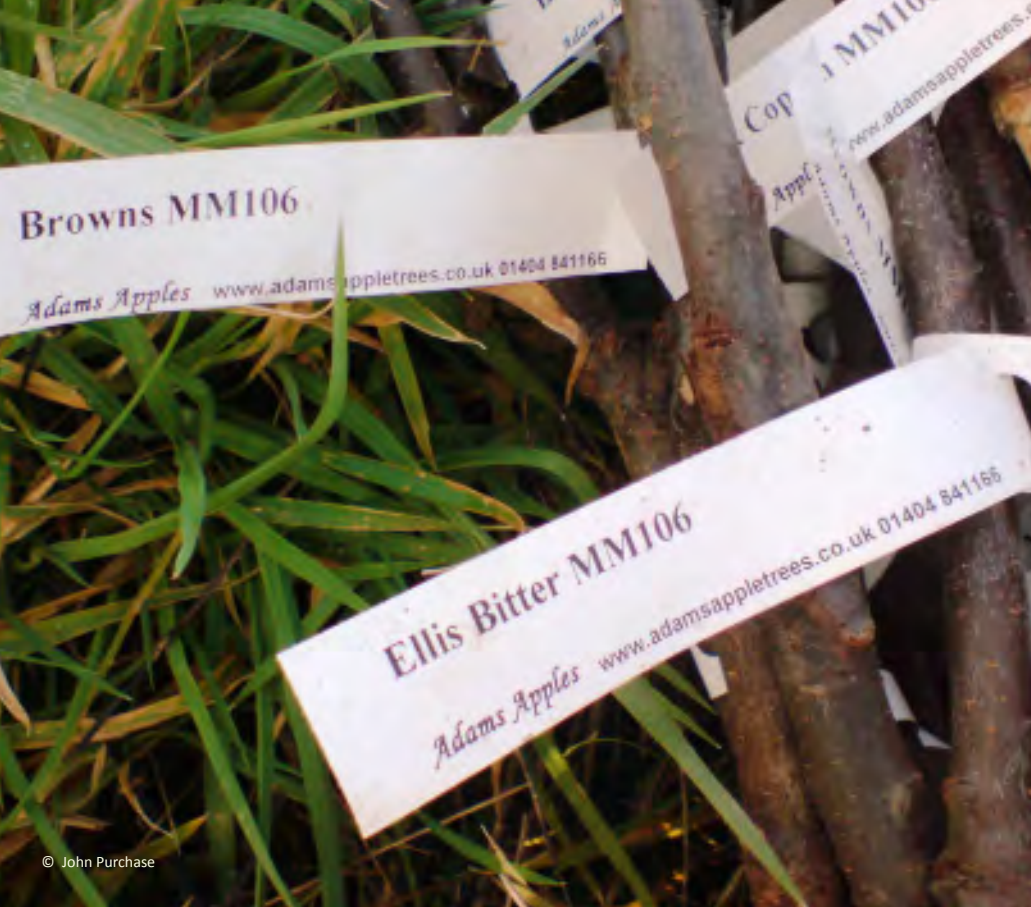


Incorrect
pruning



Grafting and Rootstock: Many forms of fruit are unable to produce exact copies by sexual means – a tree grown from seed will have a different genetic pattern to its ‘mother’ tree, similar to a mother and child. In order to produce an exact copy, with the same fruiting characteristics, we take a piece of the original tree, the desired plant and graft or bud the material directly onto a section of suitable rootstock. This allows us to grow a variety of fruit identical to the parent tree.

All orchard management includes a degree of grafting or budding, which in its simplest form, is transplanting a section of tissue from one tree to another, with the subsequent tree developing into an exact copy of the original. Grafting and budding techniques rely on the vascular tissue (cambium) of the rootstock uniting to form a single and continuous segment of tissue. Plants that develop from these propagation methods will have all of the attributes of the mother plant and the vigour of the rootstock. This phenomenon is used to great advantage when fruit trees are chosen for their fruiting capacity whilst the rootstock is chosen for its vigour, soil and site tolerance and ability to fend off and resist diseases.



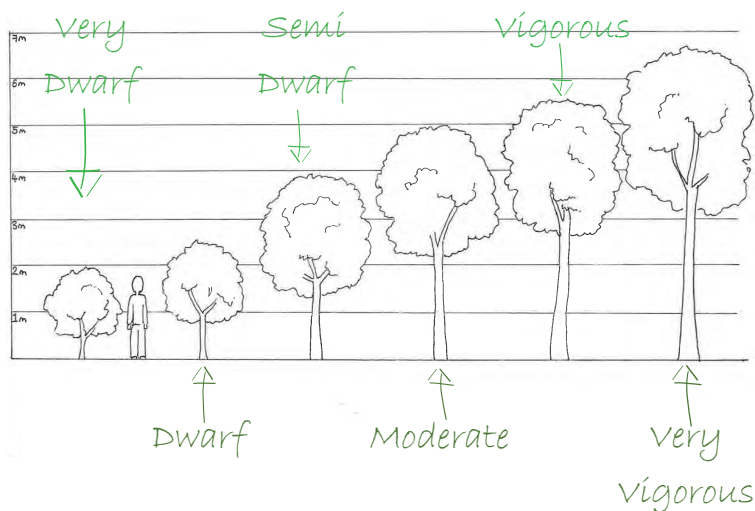
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Choosing a Rootstock: One of the most important factors when considering choice of rootstock is the fruit production. Tree size and ultimately crop yields are determined by the vigour and vitality of the rootstock. Apple trees grown on dwarfing rootstock such as M9 and M26 will attain relatively small terminal heights with low production levels. Apple trees grown on vigorous rootstock such as M25 will promote large fruiting trees capable of producing high quantities of fruit.



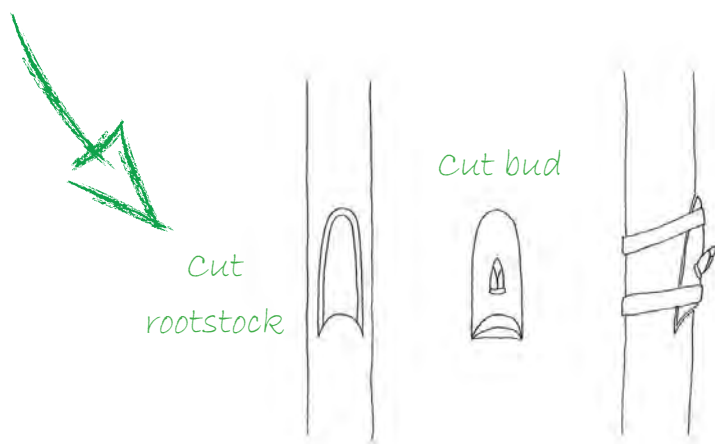
Rootstocks are produced in beds where the parent material is lined out and the beds are earthed up each spring, to encourage the lower part of the plant to produce roots at the base of the lower shoots. In the autumn the soil is brushed away and the branches with roots are cut off and in turn, lined out to grow on. Nurseries produce large quantities of this material which is classified as "0 plus 1", each autumn.

Heritage rootstocks tend to produce large trees as the rootstock developed a large, deep taproot. Modern plant breeders have moved away from these to produce a smaller, more manageable tree. Choice of rootstock is very important as it will reflect the size of the mature tree. The space and soil type of where the tree is to be planted will determine the choice of rootstock. Another general rule associated with fruiting trees is that the larger the tree, the longer it will take to produce fruit, an M25 rootstock for example will take between 5 and 8 years, while an M26 will take between 2 and 3 years.



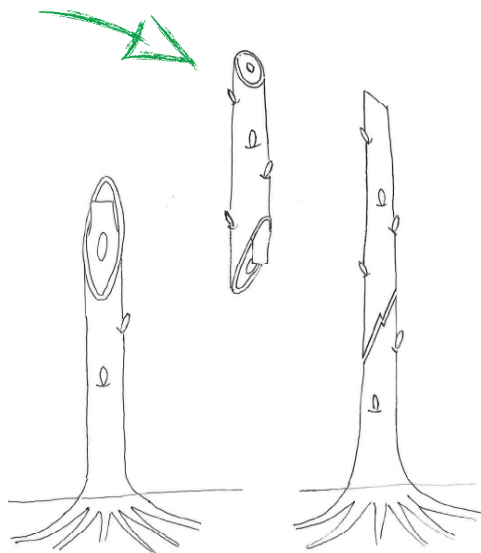
Grafting Techniques: There are two main environments for grafting: outside in the “field” and “bench” grafting under cover in a green house or polytunnel. When grafting in the field or orchard “Whip and Tongue” grafts are chosen because the tongue forms a very stable wind resistant graft. Because of the secure indoor environment of a polytunnel, bench grafting techniques can be very varied and utilise many different forms of grafting.

In the case of **budding**, one single bud is used to produce the new fruit tree. The main types of budding used are “T” or Shield budding, Inverted “T” and Chip budding, all of which are carried out in the field by budding onto rootstock, the rootstock being one year old cuttings which are species compatible with the grafting material or varieties chosen. Budding is normally carried out in July and August.





In **grafting** a cutting of the desired variety comprising of three to five buds called a “scion” is used to produce a new fruit tree. Types of grafting include; Whip, Wedge, Saddle Whip and Tongue Grafts. Grafting is carried out during the dormant period in February and March just before the spring growth appears.





Productivity and harvesting

Trees grown on fertile soils, in a well-managed and healthy orchards will sustain a level of fruit production for extended periods often in excess of 150 years for apples and 300 years for pears.

Pruning for Productivity: An important feature associated with fruit production is pruning. Different varieties of fruiting trees have different fruiting habits. Some trees produce fruits on fruit spurs which grow on two year old wood whereas other trees produce fruits on one year old fruit shoots. Therefore the removal of unnecessary and diseased wood will have a significant affect on fruit yields especially if the incorrect technique is applied.

Harvesting: Harvesting crops and picking fruit should be undertaken when the fruit is ripe, preferably from the tree and before fruit-fall. When planning and designing an orchard, consideration must be given to choosing varieties which have the capacity to be stored.



Fruit harvested and destined for storage and consumed or processed at a later date should be picked when the fruit is mature and firm and not when ripe and certainly picked before wind-fall. Fallen fruit has a tendency to bruise and will severely affect the ability of the fruit to remain pristine and free from decay. Other considerations when harvesting fruit for storage is that the harvesting period will be extended as not all fruit ripens collectively. Commercial apple crops (Heritage varieties) in excess of 120kg per tree/30 tonnes per ha are known, however most modern apple orchards now adopt smaller trees, planted in windrows and produce in excess of 60 tonnes per ha.

Additional Products: Orchards can also provide a supplementary income or produce with winter mistletoe, cultivated spring daffodils and honey.



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