

Managing small Woodlands

Forestry Commission
Booklet 46

Forestry Commission
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FORESTRY COMMISSION
Booklet 46

Managing Small Woodlands

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Forestry Commission
Northern Research Station
Roslin
Midlothian
EH25 9SY

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R E Crowther
Editor

Further reading

More detailed information on matters referred to in this booklet is available in other Forestry Commission publications and in those produced by The Ministry of Agriculture, Fisheries and Food (MAFF) and other organisations and individuals. References are given at the end of the relevant paragraphs in the text and a complete list of references is given on page 38. Where no originator is given the reference is to a Forestry Commission publication.

A landowner wishing to develop his interest in small woods or to improve existing small woodland is strongly recommended to acquire the following:

Forestry Practice, Bulletin 14

Know your Broadleaves, Booklet 20

Know your Conifers, Booklet 15

Forester's Companion, N D G James

Forest Management Tables, Booklet 34

Forest Mensuration Handbook, Booklet 39

Practical Forestry for the Agent and Surveyor, C E Hart



1 Objectives

Small woodlands, of various types, scattered widely over the countryside are a major feature of the landscape and form valuable assets for timber production, wildlife and game conservation. Over one million acres (400,000 hectares) of woodland in Great Britain are not yet under planned management. Roughly half of this occurs as smaller woods, up to 25 acres (10 hectares) in individual extent, with which this booklet is mainly concerned. There are about 50,000 separate owners of small woods, each holding, on average, only ten acres (4 hectares), and even this small total may be made up of two or three separate blocks or shelterbelts.

The purpose of this booklet is to provide the basic information for the establishment and management of small woods emphasising ways and means of modifying forestry practice to adapt it to their needs. The guidelines are drawn up bearing in mind the interests and abilities of an owner who is not a trained forester but who is interested in and has some knowledge of the countryside and agriculture. Where some owners may need to go into further detail suitable references are given.

The owner will need to draw up a plan for his woodlands which will take into account the potential of the particular woods and equally important integrate proposals for woodland management into the plans for the property as a whole.

The best course, in most circumstances, is to manage existing woods for timber production, with some or all of the additional benefits constantly in mind. The value set on each will vary with the owner's personal interests.

He will naturally consider the protection and possible appreciation of the capital value of his property, as well as income from sales of timber, increased yields due to better shelter for crops and stock, and improved shooting. He may also be interested in the landscape, recreation and conservation value of the woods. This review may possibly lead him to aim for an extension of the overall woodland cover. Benefits that accrue from the existence of thriving woodland include the following:

Timber Small woods will provide timber, the quality and quantity will depend on the way the wood is managed. Proper attention to the replacement of trees felled will ensure that the wood survives and produces timber for the future. However few small woods are likely to show a high rate of return from their timber output and for many, such as neglected scrub that can only slowly be improved to form a useful hardwood crop, the timber harvest will be long delayed.

Landscape The appearance of the rural landscape particularly in the lowlands owes much to trees in small woods and hedgerows. The latter have, in recent years, suffered from the trend in modern farming to increase field size and the advent of the mechanical hedge cutter which makes it difficult to allow saplings to emerge from hedges. Dutch elm disease and casualties caused by the 1976 drought have also taken their toll. Replacement of hedgerow trees is unlikely to be compatible with modern agricultural practices so the maintenance of the rural landscapes will depend increasingly on the small woods. Planting of field corners, stream and roadsides, steep rocky or wet patches are all possibilities that will make a worthwhile landscape contribution.

[*New Agricultural Landscapes*, Countryside Commission.]

Traditional lowland landscape in Britain depends not only on the presence of native broadleaves and pine but upon the many introduced species used mainly from the early 19th century onwards to diversify and enrich the copses, game coverts and estate woods planted by our forebears. The range of fast growing broadleaves which can provide rapid landscape improvements is increasing, alders, poplars and southern beeches are good examples.

While small woods are usually a benefit to the landscape it should be noted that the unsympathetic planting of woods with species and outlines that do not blend with the existing pattern of the countryside will not help the landscape. The skilful layout of planting boundaries and the retention or introduction of broadleaved trees will improve the visual appearance of conifer plantations just as the judicious use of a few conifers can add colour and charm to a broadleaved woodland.

[*The Landscape of Forests and Woods*, Booklet 44.]

Nature conservation Woodlands provide important habitats for plants, birds and other kinds of wildlife and their value for conservation is

usually high. At one extreme is the old woodland whose history can be traced back to Saxon times. These woods which are probably relics of the primeval forest provide a valuable asset for scientific study and for the conservation of a unique habitat. Worthwhile conservation of such a site may involve considerable expenditure and the loss of some timber production in the future. On the other hand, quite small measures such as keeping some dead trees for nesting sites or food sources, or leaving small areas unplanted often do much to assist conservation. The extent to which a woodland owner is prepared to incur expenditure or forego revenue to preserve the landscape and conserve wildlife is a matter of personal choice, but this choice can only be sensibly exercised if the implications of the various courses of action are fully understood. Further information is given in *Wildlife Conservation in Woodlands*, Booklet 29 and in 'General Management Principles for Nature Conservation in British Woodlands' by G F Peterken, in *Forestry*, Volume 50 No. 1 and advice can be obtained from the Nature Conservancy Council.

Sport The presence of woodland coverts may give a positive sporting value to an estate that would have none if it consisted of farmland alone. The design of spinneys to suit game birds should provide both ground cover for nesting, some open space for feeding and taller dense trees for roosting. The layout should be planned so that birds can be driven and flushed out of the wood easily for shooting. If new planting is contemplated then it will prove much simpler to incorporate the requirements for game at the start rather than try to impose them on woodland at a later stage. Advice can be obtained from the Game Conservancy. [*Forestry and Pheasants*, Booklet 15, Eley Game Advisory Station.]

Shelter Many of the small woods, particularly in the uplands and in the north of Britain, were planted or retained to give shelter from wind to livestock, agricultural crops and to buildings. In the lowlands, provision of shelter is less important though there are some specialised uses for orchards and horticulture where single row plantings are used, and for protection from sea winds.

The principal benefits lie in the reduction of wind speed in cold and wet conditions in winter and spring (the 'wind chill' effect) particularly with farm stock. Young stock and milk production can benefit substantially but hill breeds of both cattle and sheep are well adapted to these conditions and only in severe conditions will they benefit.

Shelterbelts have disadvantages in some situations, they take up space, and tree roots and shade reduce crop yields in their immediate vicinity. Belts may lead to eddying of wind causing corn to lodge while the reduction in wind may be a handicap at harvest time for hay and cereals. They are also expensive to establish and take time to become effective.

The establishment of new shelterbelts needs to be carefully planned and

integrated into the farm plan. Grants for shelterbelts are administered by MAFF and before embarking on the planting of shelterbelts advice should be sought from the Agricultural Development and Advisory Service (ADAS) in England and Wales and the Department of Agriculture and Fisheries for Scotland (DAFS) in Scotland.

[*Shelterbelts for Farmland*, Leaflet 15, Fixed Equipment on the Farm, MAFF.]

Who controls Woodland Operations?

Under the Town and Country Planning Act no formal permission is needed for the conversion of felled or derelict woodland to farming unless the land is subject to conditions of a felling licence. Where a timber crop exists, a licence to fell trees may be necessary and it is advisable to seek the advice of the Forestry Commission.

The Forestry Commission consult the local planning authority on the amenity aspects of any licence application to clear woodland and the appropriate Agricultural Department if conversion to farmland is requested, and take into account their views in deciding whether to grant an unconditional licence to fell the trees, or to grant a felling licence only on condition that the owner replants with trees. Most licences involving clearfelling are 'conditional'.

Where it is desired to afforest farmland and an owner wishes to obtain grant aid from the Forestry Commission under any of its schemes, the Commission consults the appropriate Agricultural Department about the proposed change of land use. The Commission has agreed procedures for consultation with local authorities on the environmental aspects of proposals for planting bare land that has not previously been woodland.

What practical aid is available?

The Forestry Commission provides financial, professional and technical assistance to woodland owners in a number of ways, to help them in bringing their existing woods to full production and to plant new ones. The various forms which direct financial aid may take are set out in Chapter 8.

Before commencing any forestry work that is likely to attract a grant (which cannot be paid until a scheme has been approved), owners are strongly advised to consult their Conservator of Forests, whose address will be found on page 40. Advice on the general suitability of any scheme will gladly be given by the Conservator's staff.

The Commission cannot, however, undertake the detailed management of a scheme, or such tasks as the preparation of a Plan of Operations, the actual replanting of woodlands, or the sale of timber. An owner who requires help in these respects is recommended to consult either a co-

operative forestry society, a forestry company, a forestry consultant or a firm of land agents.

The two associations of woodland owners, the Timber Growers' Organisation covering England and Wales, and the Scottish Woodland Owners Association in Scotland, will advise woodland owners who are in membership how and where to obtain the services of forestry companies, consultants and contractors.

[*Advice for Woodland Owners*, Forestry Commission]





2 Woodland types and possible courses of action

The past history* of small woodland obviously influences its present-day condition, and even though the area may be relatively small, it is likely to include several different types which may be distinct but often merge into one another. It is useful to distinguish the following types:

Mature or over-mature woods These contain trees that have reached or even exceeded their normal life span. This varies with different species and with their past history but sooner or later decisions on replacement have to be made. Clearly if trees are beginning to deteriorate (limbs being shed, rot in evidence), then an earlier decision will be needed than if trees are still healthy despite their age. Valuation of standing timber is a specialised business and the owner should seek expert advice and obtain more than one offer before selling. Decisions on how the wood is to be replaced should be taken before felling. See Chapter 4.

Middle-aged woods At this stage trees contain some timber but are capable of putting on more growth that will increase diameter and value. The main need is to ensure that trees have growing space and thinning may be necessary. See Chapter 7.

**Trees and Woodland in the British Landscape* by O Rackham, published by Dent.

Young woods and plantations Woods in this category range from newly planted plantations to thicket or pole stage crops in need of thinning. See Chapter 7. In the case of newly planted woods weeding and the replacement of dead trees will be necessary. See Chapter 4.

Coppice This method of managing woodlands by allowing coppice shoots to develop after felling was an important method of managing woodlands until the beginning of the 20th century. It is now only used on a relatively small scale for Sweet chestnut coppice in parts of southern England. Many small woods contain coppice regrowth originating from previous fellings.

Apart from chestnut, it is unlikely that it will be practicable to manage coppice economically on a regular coppice rotation. What are the other options? There are several possibilities which depend on the resources available and the objectives of the owner.

Leave alone Provided the coppice includes some tree species (such as ash, oak, alder, birch) and is not dominated by hazel or other shrubs it will eventually develop to produce marketable products. The advantage of such a policy is that little or no expenditure is necessary although the returns will be small. Such a wood will continue to make a contribution to the landscape though its value for game or wildlife conservation may well decline.

Improvement by selection It is possible to improve the timber value of neglected coppice by making selective cuttings. The principle is simple: coppice stems are removed so that only one is left on the stool, and where straight saplings are present these are given more growing space so that they can develop. This operation will need to be repeated 2 or 3 times over a long period, say 20–30 years.

Felling and replanting Provided the coppice has a reasonable volume, say 20 to 30 tonnes per acre (50 to 70 tonnes per hectare) of pulpwood (straight material over 7 cm or 3" in diameter) and some timber, and provided the wood is within a reasonable distance (70–100 miles) of a pulp mill, there is a likelihood that the felling will cover the cost of clearing the wood ready for planting and may even yield some profit.

The owner is then faced with two alternatives. If he wants to spend as little as possible he can leave the area alone and accept a further coppice crop. If on the other hand he wants to increase the value of his woodland he can replace with a more productive species. Provided the coppice stools are reasonably vigorous and stocking is adequate and protection given from deer, rabbits and domestic stock a coppice crop will develop that can later be improved by the selec-

tive cuttings mentioned above. It is probable that a number of natural seedlings will occur along with the coppice regrowth and these should be fostered.

Successful replanting will depend on the control of coppice regrowth and if costs are to be recovered a faster growing and higher yielding species than the original coppice will be needed. From an economic point of view the choice is limited to conifers on the majority of sites though the southern beeches (*Nothofagus obliqua* and *N. procera*) may be possible broadleaved alternatives.

Coppice regrowth can be controlled by an application of 2,4,5-T to the cut stumps. If the coppice is not controlled the new crop will almost certainly be damaged or lost.

[*Chemical Control of Weeds in the Forest*, Booklet 40]

Scrub The term scrub can be defined as ‘Inferior growth consisting chiefly of small or stunted trees and shrubs’. It is therefore not productive in the forestry sense of being capable of producing wood nor of developing into productive woodland in a reasonable period of time. It may however be important in the landscape and provide valuable food and shelter for wildlife. Scrub is usually characterised by the variety of woody species present and often by their varying ages and condition. Typical scrub and scrub woodland species are:

<i>Shrubs</i>	<i>Climbers</i>	<i>Tree species</i>
Hawthorn	Honeysuckle	Alder
Blackthorn	Old man’s beard	Birch
Hazel	Ivy	Willow
Rhododendron		Oak
Gorse		Scots pine
Broom		
Bramble		

Scrub is not likely to contain many young trees of timber potential and improvement is an expensive operation in which time and money can easily be wasted. Owners of scrub are well advised to seek good professional advice before commencing work.



3 The right tree for the site

The correct choice of species can have a greater effect on the success of planting and the subsequent growth of the wood than any other management decision. The choice must take into account the characteristics of the site, the species of tree it can support and the objectives of the owner. On exposed and poor upland areas the choice will be a narrow one, virtually restricted to the conifers which can contend with such conditions, and the only practical broadleaved trees to plant are likely to be alder, birch and willow. On the more fertile and sheltered lowland sites the choice will be much wider both in broadleaf species and conifers. On lowland heaths, however, the choice of both conifer and broadleaf is more restricted, Scots pine, Corsican pine and birch are suitable. Generally, in Lowland Britain the native species are well liked as components of the landscape and on nature conservation grounds but their rate of growth is slower, their cost of establishment greater and timber yields lower than conifers on the same site. Some exotic broadleaved trees, however, such as the southern beeches (*Nothofagus procera* and *obliqua*) have the advantages of both rapid growth and volume production as well as being similar in appearance to native trees in the landscape. There are a large number of trees that can be grown on the wide range of sites that occur. Table 1 is a basic list of those trees best suited to a broad range of site types. The most reliable way of checking that this information is correct

for a particular site is to look at trees growing on similar sites in the locality.

TABLE 1 SITE CLASSIFICATION AND RECOMMENDED SPECIES

<i>Site</i>	<i>Species</i>	
	<i>Conifer</i>	<i>Broadleaf</i>
UPLAND		
Peat and peaty soils	Sitka spruce Lodgepole pine	Alder, birch
Heath – podsolised or compacted	Scots pine Lodgepole pine	Birch
Mineral soils	Larches Douglas fir Scots pine	Oak Birch Southern beech
LOWLAND		
Heath }	{ Scots pine Corsican pine Corsican pine Norway spruce	Birch, oak, beech
Sands/gravels }		Sweet chestnut
Clays		Oak, beech
		Alder
Other Mineral soils		
Freely drained	Larches, pines Douglas fir	Oak, ash, beech Sweet chestnut Southern beech
Wet sites	Norway spruce Sitka spruce	Poplar hybrids Alder
Chalk and Calcareous soils		Beech

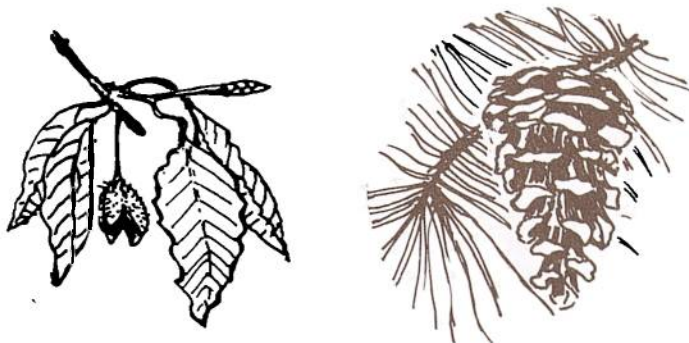
Mixtures

Although planting two or more species in mixture is a long-established practice the management of mixtures requires a high degree of skill. Mixtures of broadleaves with a conifer nurse have been used extensively, for instance oak with Norway spruce or Scots pine with beech. The object has been to establish the conifers quickly on the site so as to give some shelter and side shade to a second less hardy but more valuable species and to achieve a quick return from fast growing ones. The difficulty with mixtures is that if they are intimate, ie, the species vary tree by tree or row by row, there is every possibility that the more vigorous species will suppress the slower growing ones. If a coarser pattern is adopted such as three rows by three rows, it is difficult to avoid serious landscaping

problems caused by the unsightly 'pyjama stripe' effect. Small groups on a regular basis can also produce an ugly effect. Apart from landscape problems these mixtures very often create difficulties at the thicket stage when a thinning becomes necessary to prevent one species being suppressed. This will be costly and if delayed may be ineffective. There are in any case few sites where broadleaved trees require conifer nurses for their establishment.

On balance, in planting small woods with more than one species it is best to plant them in separate groups taking advantage of variations in ground that will suit the trees used, and will give an acceptable landscape effect.

More information on individual species is given in *Know your Broadleaves* Booklet 20, *Know your Conifers* Booklet 15 and *Forestry Practice* Bulletin 14.





4 Establishing new woods

In existing woodland, natural regeneration may occur from seed of the trees growing there but this is very unreliable in Britain. Hence felled woodland has to be replaced, except on very rare occasions, by planting nursery stock which must also be used to plant open land. Direct sowing with tree seed is theoretically possible but in practice the high cost of seed and the heavy losses of both seed and seedlings make this operation impracticable. In some special circumstances it is possible to use unrooted sets but willow and poplar are the only species established by this means. Whether the land is bare or has recently carried trees certain considerations are common to both. Depending on the type of land, control of unwanted vegetation, cultivation, drainage, fencing and fertilising all have to be attended to and in the case of the felled woodland decisions taken on the removal of trees and branchwood left from the felling operations. The object of these operations is to ensure the survival and continued healthy growth of the young trees and to protect them against deer and rabbits. The sequence in which these operations are carried out may vary depending on circumstances but generally they are best attended to in the following order:

- 1 Removal of unwanted vegetation.
- 2 Cultivation (if required) by plough.
- 3 Drainage by plough, digger or by hand.
- 4 Fencing and control of rabbits, deer and livestock.
- 5 Fertilising.

Certainly, planning of the whole operation beforehand will ensure that major difficulties are seen well in advance and catered for.

Removal of unwanted vegetation This work is expensive and the extent it is necessary depends on the amount of vegetation and whether it is likely to hamper subsequent operations. Extensive lop and top from felling is obviously a handicap on an area which requires drainage, the more so if rabbits are present and weed growth is prolific. On the other hand, planting through brash from conifer clear felling is much less costly than collecting and burning. In the uplands, where heather and bracken are present, controlled burning facilitates subsequent ploughing operations. In felled broadleaved woodland, stump treatment to prevent unwanted coppice regrowth is necessary.

Cultivation On a number of soil types some cultivation is essential to establish young trees. Special forestry ploughs are available for this work and are designed to plough to depths of up to 0.9 metre. Furrows are usually spaced between two and three metres apart, though complete ploughing may be practised on compacted soils.

Forestry ploughs are designed for the following conditions:

1 On water-logged soils, particularly peat and peaty gley, it is essential to provide a planting position raised above the surface to provide a drained planting site. The plough produces a ribbon of inverted turf upon which the tree is planted.

2 On ironpan and compacted soils the plough is combined with a sub-soiler that breaks the pan and loosens the soil. The planting position is usually in the disturbed side of the furrow.

On more fertile sites ploughing may give some benefit by controlling vegetation though herbicides can be used. Ploughing is more difficult in felled woodland because of the stumps while conditions for tree growth are likely to be reasonably favourable.

Ploughing is essential on peaty soils and on compacted heaths in both lowland and upland. On old rich woodland sites and on lowland pasture or other relatively fertile soils, ploughing is not necessary, provided vegetation is controlled by other means.

Drainage The main function of drains in woodland is to remove surface water and prevent surface waterlogging which kills trees. On the impermeable soils (clays and peats) which form a substantial proportion of woodland sites, drains do not lower the water-table or increase rooting depth appreciably. However, the most effective drainage of such soils is performed by the trees themselves which, once established, will draw water from the soil and transpire it. The depth and frequency of drains depends on the permeability of the soil, the slope and aspect of the site, and the

rainfall. More drains are necessary on clay soils in wetter areas whilst conversely many permeable soils will require little or no drainage.

On peaty soils the plough ridge provides a sufficiently drained planting site to establish young trees. Without ploughing, planting on such waterlogged soils will inevitably fail. Plough furrows produced for this purpose must be linked into a network of main drains. In small woods the necessary system can be put in with a 'back-acter' digger or even by hand if not extensive.

After a crop of trees has been felled on a wet site there is usually a considerable rise in the water-table. Reduced transpiration from the site, damage to the drainage system by the extraction of timber and brash causing blockage of drains all contribute to the sudden increase in wetness. Usually in small woods, opening up the old drainage system and ensuring that it connects with ditches or water courses across adjoining land is all that is necessary.

Fencing Young trees can be damaged and killed by farm stock, by rabbits and by deer. When farm stock are present fences will be required to enclose them irrespective of the need to prevent them straying into vulnerable young woodlands. Thus the cost of stock fencing is shared between the farm and the woodland.

When rabbits are present, as they are in most areas of Britain, protection of young trees will be necessary. Ideally control measures such as gassing which is the most effective, trapping and shooting should keep the rabbits down to a level where damage is insignificant. In practice this is rarely achieved and some form of fencing is necessary. Where stock fences are present rabbit netting can be added or, if stock are not present, a rabbit fence erected. On small areas it may be more economical to fit individual tree guards which can either be a circle of rabbit netting, approximately 0.7 m diameter, supported by a single post, or a purpose-made tree guard of welded mesh.

Deer, particularly red deer in Scotland and roe and fallow in England, can cause serious damage to young trees. The likelihood of damage is greater in a well-wooded countryside than where the woods are small and isolated. Deer fencing is extremely expensive and is especially so if the area to be protected is small. The use of chemical repellants or tree guards may be a better alternative in small woodlands. Repellants have to be applied to each tree either by dipping before planting or in subsequent years by spraying or painting each tree, and do not protect growth that takes place after the application. Individual tree protection with netting or welded mesh guards is an alternative to fencing or repellants; these must be high and strong enough to protect against the animals involved.

Fence specification, design of gates and information on hedges are covered in British Standards and in Ministry of Agriculture Leaflets in the

Fixed Equipment on the Farm series. Details are given below.

Rabbit Management in Woodlands, Leaflet 67.

Forest Fencing, Forest Record 68.

Chemical Repellants, Leaflet 73.

Fixed Equipment on the Farm, MAFF.

Permanent Farm Fences, Leaflet 6.

Farm and Estate hedges, Leaflet 11.

Fertilising Trees, like all other plants, require the common nutrients nitrogen, phosphorus and potassium (N, P and K) and on some sites one or more of these may be in short supply and thus limit growth or even jeopardise survival. Small woodlands surrounded by rich agricultural land are unlikely to be short of N, P and K. In Britain it is virtually unknown for lack of minor nutrients to affect growth.

Phosphate is usually necessary on heathland sites. It should be applied at planting and may be required later on in the rotation. This is the most common fertiliser used in forests in Britain.

When spruce is grown on heather-covered ground it goes into what is called 'heather check' which is due largely to competition with the heather for nitrogen. It is normal to kill the heather so that the spruce can get sufficient nitrogen but when chemical control of heather is not possible then nitrogen can be supplied. Nitrogen is also necessary on nutrient-poor sand-dunes when crops have reached thicket stage and on some very poor peat sites.

Potassium is only required on some acid peat sites.

Plants and planting

Success or failure in establishing a young wood depends more on the planting itself than any other single operation. Attention has to be given to all the following aspects, the neglect of any one can result in the death of plants or in poor growth.

Choice of species This is dealt with in Chapter 3. Correct choice of species (and in many cases of variety or provenance) will ensure that the trees are as well adapted to the site as possible.

Type and size of plant The best plant, that is one that has best potential for survival, is usually one that has had 2 or 3 years in the nursery and has been transplanted during that period. Nurserymen refer to plants as 1 + 1 or 1 + 2 denoting the number of years in the seedbed and in transplant lines respectively. Transplanting aids the development of a fibrous root and prevents too rapid growth of shoot and branches. The result is a transplant between 15 and 25 cm high with a well balanced root and shoot, which will be well suited to sites where weed growth is not a

problem. On weedy sites a larger plant is preferable, say 30–45 cm and exceptionally up to 60 cm. Plants larger than 60 cm are more expensive, need staking, and survival and earlier growth will be poorer than smaller plants. At the other end of the scale seedlings or small transplants are less likely to survive planting.

Plants should always be obtained from a reputable forest tree nurseryman who will supply the necessary certificates required under the Forest Reproductive Material Regulations. The 13 species and one genus covered by these regulations are Silver fir, European and Japanese larch, Norway and Sitka spruce, Scots pine, Weymouth pine, Austrian/Corsican pine, Douglas fir, beech, Red oak, Pedunculate oak, Sessile oak and poplar.

Conifers planted on a site which has recently carried a crop of conifers will require to be protected against some insect pests. Preferably the trees should be treated before they leave the nursery but if not, the top of the plant and up to one-quarter of the main root, but not the fibrous root system, should be dipped in a 1.6 per cent Gamma-Col formulation in water. Where heavy attack is expected one or two years after planting the trees should be sprayed with 0.125 per cent Lindane 20.

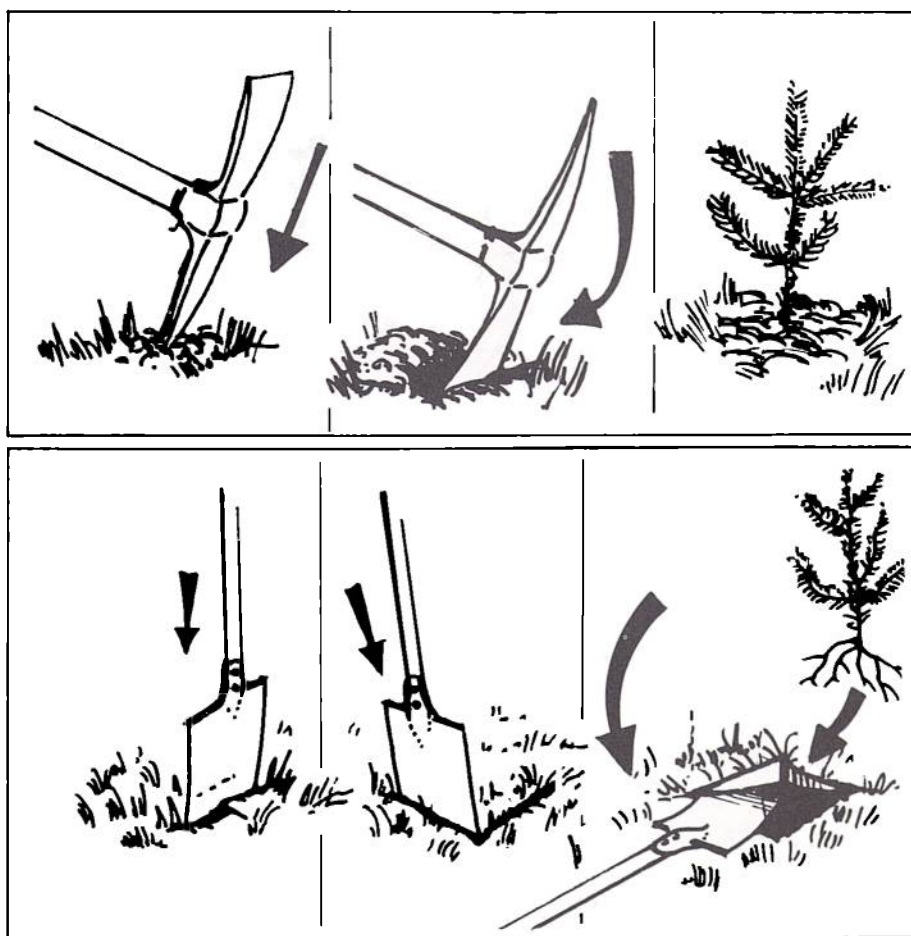
[*The Large Pine weevil and Black Pine beetles*, Leaflet 58.]

Condition of plants Plants can be easily damaged by careless handling between the nursery and the planting site which will affect survival. Careless lifting in the nursery can cause broken and stripped roots – badly affected plants should be rejected. Roots left exposed to the atmosphere will dry out and reduce survival, conifer plants left in large stacks either on transport or on the ground may heat and die. Polythene bags are a good way of preventing drying out but it is essential to store out of direct sunlight otherwise overheating will occur. The bags should be stacked only one deep so that air can circulate round the bags to keep the plants cool, and the top of the bags are kept slightly open to allow some exchange of air to occur but not so much that the plants dry out. If plants are not in polythene they must be heeled in or ‘sheughed’ as soon as received in a shallow trench prepared in advance in good moist soil and covered to prevent it from freezing. The bundles of plants must be untied if the plants are to remain in the trench for more than a few days. The plants are stood in the trench and their roots covered with moist soil. If this main storage trench is some way from the planting site it may be advantageous to keep one day’s supply of plants in a trench on the planting area itself. In any event plants should be carried from the trench to the planting site in a bag to stop the roots from drying out, and no more than 50 should be taken from the trench – or the polythene storage bag if this is the method used – at any one time, otherwise they will dry out.

To carry the plants for planting a polythene bag fitted with a shoulder

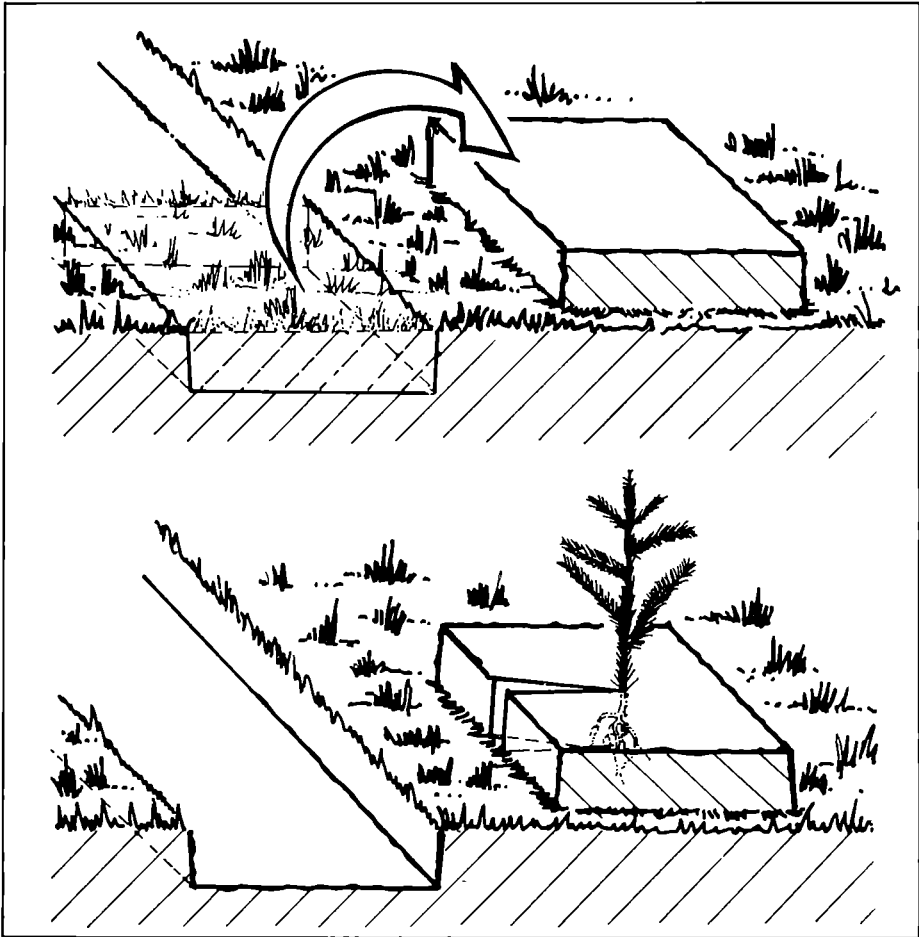
strap is perhaps the best method. Young trees have root systems which are extremely vulnerable to drying out. They have none of the ability to recover from this condition which is characteristic of cabbage and other market garden crops.

Season of planting Planting of bare rooted stock must be carried out during the dormant season from October to April when the soil is warm and moist. In the milder parts of the country this can be either in the autumn or spring. In other areas it should be delayed until spring. If adequate arrangements are made with the nursery it should be possible to plant out young trees almost as soon as they arrive, but if the ground is frozen or if there are very strong cold or drying winds planting must be delayed until conditions are more favourable.



Above Mattock planting. After removing the surface vegetation with the blade, scarify the soil with the pick (left). Excavate planting hole to the required depth for plant roots (centre). Insert plant and firm earth to soil collar of plant.

Below L-notch planting. (left and centre) Cut L-shaped notch. (right) Raise turf, insert plant, spreading roots below turf and firm to soil collar.



Turf planting. (above) Cut out turf and overturn to side of cutting. (below) Place plant in notch cut to centre of turf, spread roots below turf and firm with heel to close notch.

Planting technique Where land has first been ploughed with furrows spaced at the planting distance, transplants are effectively planted by making a slit or notch in the upturned soil with a garden spade, inserting the roots and firming the soil with the feet. On unploughed ground a section of turf may be cut out and placed alongside the hole, vegetation side down. The plant is then planted through the turf. Planting through the turf in this way provides some advantage to the plant over competing weeds and it can also provide a little local drainage effect against surface water. When only a small area is to be planted it is possible to take more care which will reduce the risk of losses and help the trees to establish themselves more quickly. A hole should be made with a spade, the roots should be spread out in the hole then the soil returned and firmed. Various planting methods are illustrated.

Spacing usually adopted for most species and circumstances is 2 metres between rows and 2 metres between plants. If mechanical weeding is intended a wider spacing between the rows to take the available tractor and weeding machine is necessary and a closer spacing between plants in the rows. The total plants required per full hectare is 2,500 but in practice some reduction for rides, roads and fence lines is necessary.

Weeding

When weeding young trees it is unnecessary, and undesirable, to remove all the unwanted vegetation. Only those weeds which are competing with the young trees for water, nutrients or light should be removed together with as many plants which could fall and smother the young trees.

Three different methods of weeding are used – hand tools, machines and herbicides.

On small areas it is unlikely to be worthwhile bringing in specialised forestry machines but normal agricultural machines may be able to cut the grassy or herbaceous vegetation on some sites, provided this was taken into account when the ground was prepared for planting, and the spacing between the rows of plants adjusted accordingly.

Hand-weeding, by means of a sickle or weeding hook, is expensive and not so long lasting as herbicide treatment, but it is simple to carry out when it is seen to be necessary usually in June and July. Most herbicides on the other hand are applied in winter, so weeding problems have to be anticipated well in advance so that equipment and materials are available at the right time.

The variety of weed species and of trees is such that no one herbicide can cover all situations. The main points to consider when selecting the herbicide to use are:

Weed type Different herbicides are needed for the following weed types.

Grasses and herbaceous weeds

Bracken

Heather

Mixtures of woody weeds and herbs

Woody weeds

Soil type Many herbicides are less effective on peaty soils.

Method of application

Granules

Spray (Medium volume)

Controlled droplet

Selectivity Whether herbicide can be applied overall or whether it has to be placed to avoid damage to young trees.

Time of application Whether before or after planting and time of year.

In small woods in the lowlands the most important weeds are likely to be mixed grasses and herbs that compete with newly planted trees. For these the simplest treatment is to use a granular herbicide either chlorthiamid (proprietary name Prefix) or atrazine (Herbazine or Weedox) applied during February and March. Even distribution round the tree is essential and granules must not be allowed to come into contact with the stems of the trees.

Other herbicides that can be used for grass and herbaceous weeds and for other weeds such as bracken, bramble and heather are given in the references below.

[*Guide lines to Forest Weed Control*, Leaflet 66]

[*Chemical control of weeds in the forest*, Booklet 40]

[*Weeding in the forest*, Bulletin 48]

[*Approved Products for farmers and growers*, MAFF]

As with hand-weeding it is only necessary to treat weeds that are immediately surrounding the tree and this application in spots or bands both economises in the use of herbicide and avoids a scorched earth appearance.

Properly handled and applied, herbicides are safe to use. However, there are risks to the trees if the correct application instructions are not followed, to human beings and stock if ingested and to fish if herbicides are allowed to get into water courses. The safety rules are:

- Before using a herbicide always read the instructions on the label.
- Always keep a herbicide concentrate in its original container.
- Dispose of all surplus dilutions, never store them.

Replacing losses

Trees that die during the first growing season are normally replaced. This process is called 'beating-up'. If losses are less than 15 per cent it is unnecessary to beat-up provided the losses are spread evenly throughout the area. Losses are usually much lower in the second and third years unless weeding is neglected, or trees are damaged by animals because protective measures have been inadequate. With adequate site preparation, good planting, satisfactory weed control and favourable weather conditions after planting it is possible to get trees established without any beating-up being necessary. A plantation is considered to be established when about 2,000 or 2,500 trees per hectare have reached a height of $1\frac{1}{2}$ to 2 m.

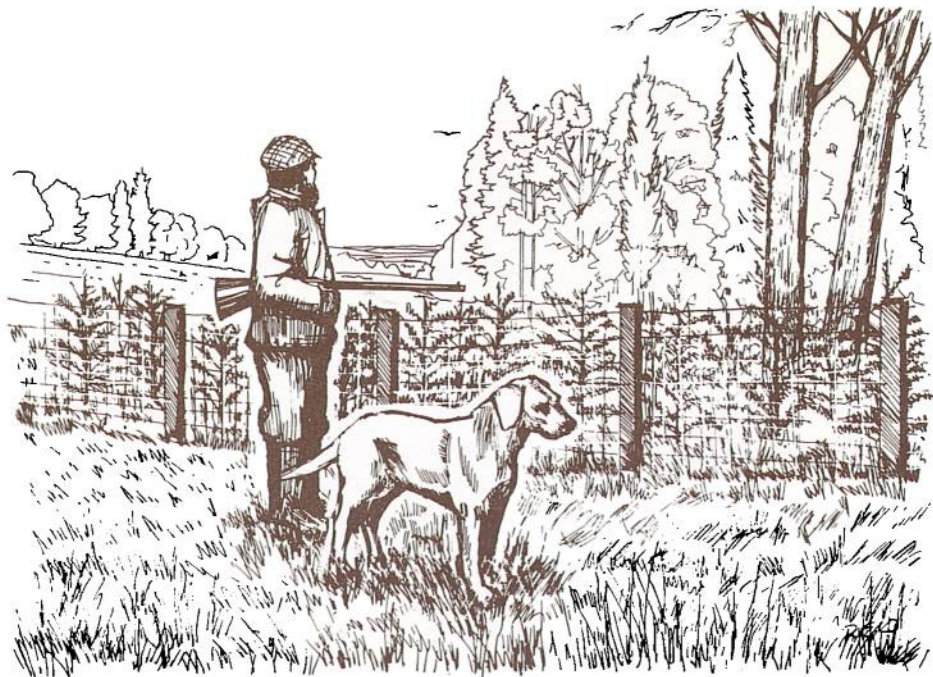
Costs

Decisions on woodland establishment cannot be made satisfactorily without knowing what costs are likely to be incurred. Detailed costings to cover the wide range of conditions likely to be encountered would be out of place in this booklet but figures gathered by Oxford and Aberdeen Universities of costs in private forestry give a guide*. These costs are averages of figures that vary very considerably not only in the cost of particular operations but in the way various operations are put together to complete the establishment process. For instance fencing costs per hectare can vary not only with the specification of the fence but also with the shape of the area and use made of existing fences. The figures quoted are for 1975, the latest available, but inflation since then will have caused substantial increases. Labour and materials are included but not overheads. The lower costs in Scotland reflect the larger proportion of upland planting.

TABLE 2 AVERAGE DIRECT COSTS PER HECTARE, 1975

<i>Operation</i>	<i>Average cost £ per hectare</i>	
	<i>England & Wales</i>	<i>Scotland</i>
Preparation of ground	93	49
Fencing (Labour 19p per metre)		
(Materials 53p per metre)	25	18
Planting (Plants at average cost £25 per 1000)	110	72
Beating up	33	17
Weeding (Total for 4 years)	97	41
Total establishment	358	197

*Economic survey of Private Forestry Establishment costs in England and Wales 1975. Department of Forestry, Oxford University.
Economic survey of Private Forestry (Scotland), Department of Forestry, Aberdeen University.



5 Protecting the woodland

The full list of the diseases and misfortunes that a woodland can suffer makes formidable reading and one wonders that any trees survive. Fortunately as in other activities like gardening or child rearing these troubles rarely come more than one at a time and are not always serious. In the young stages immediately after planting, protection from various sources of physical damage is necessary. The major items affecting small woods are as follows:

Fire Fire is always a risk in young plantations as the weed growth accumulates. The fire hazard is likely to be most serious in the spring before the fresh growth of vegetation has commenced and may develop again in late summer if there are prolonged dry spells. Elaborate fire precautions are unlikely to be justified on cost grounds but simple precautions such as ensuring reasonable access, the easy availability of water (not often practicable) and a supply of fire beaters are worthwhile. Advice can be obtained from the local fire service. Stubble burning is a particular risk where woodlands are adjacent to arable land and the ploughing of fire lines in these fields immediately after harvest is a sensible precaution if stubble burning is contemplated. Woodlands can be insured against fire.

Animals Animal damage to recently planted trees is common; rabbits are the worst culprits though farm stock, particularly sheep, can quickly cause serious losses. In the early stages following planting until the young

trees have grown tall enough to be out of reach of animals, fencing will have to be maintained and rabbits controlled. Deer are unlikely to frequent small isolated woods but may be troublesome when these are situated near larger woodlands or forests. If there are high risks of deer browsing young trees then protection with tree guards or chemical repellent is advisable. In some areas of Scotland, Red deer are a serious problem and deer fencing may be necessary. Cattle and sheep may be able to graze between mature trees on dry sites but pigs, horses and goats are liable to strip bark and should not be allowed in.

At the pole-stage, young hardwoods are particularly susceptible to the bark stripping activities of grey squirrels. This may occur in the crowns of the young trees either on the trunks or branches or at ground level. Beech and sycamore are particularly prone to attack but oak and other broadleaved species can also suffer. It is not unknown for conifers to be attacked and the Red squirrel can be responsible for bark stripping on Scots pine. There is no prospect of Grey squirrel numbers reducing permanently to a level at which no damage occurs, so the best method of preventing damage is to reduce numbers before and during the period when stripping occurs, that is April–June, by trapping or poisoning.

[*Grey Squirrel Control*, Leaflet 56]

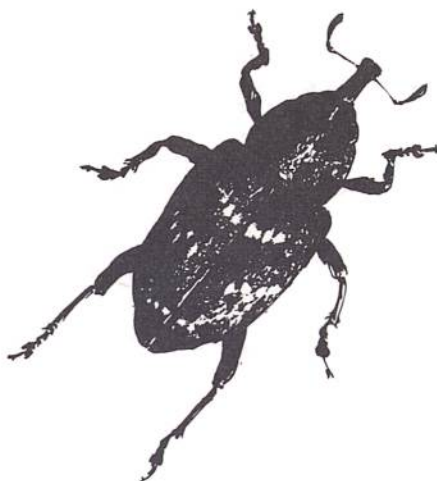
[*Rabbit Management in Woodlands*, Leaflet 67]

[*The Red Squirrel*, Forest Record 101]

Weeds The damage caused by neglect of weeding is one of the commonest of faults in small woodlands. This matter is dealt with in Chapter 4. In the lowlands, young pole-stage woods can suffer from the smothering and distorting effects of Old man's beard (*Clematis vitalba*) and honeysuckle (*Lonicera periclymenum*). If many trees are affected there is no remedy other than to cut the climbers and remove them from the trees. Ivy rarely harms vigorously growing trees.

[*Three Forest Climbers: Ivy, Old Man's Beard and Honeysuckle*, Forest Record 102]

Insects and Fungi Insects can be very damaging to conifers soon after planting. Plants that are to be planted on areas that contain recently felled conifer stumps should be treated with insecticides to protect them against pine weevil and pine beetle. These breed in conifer stumps and the adults emerge to feed on the stems of young trees. Damage and losses can be severe. Plants used in these situations should be treated with an insecticide (Gamma-Col) before planting, or if an attack is anticipated after one or two years spraying with Gamma-Col should be carried out. Some insect pests in woodlands cause serious damage, but many others cause minor damage which can be ignored. Few in either category can be



Pine weevil

economically and effectively treated and there is usually no alternative but to let nature run its course.

[*The Large Pine Weevil and Black Pine Beetles*, Leaflet 58]

Certain disease problems are severe enough to make planting of some species inadvisable and this is certainly true of elm at the present time. Currently beech is suffering from one of its periodic epidemics of Beech bark disease which makes its prospects appear somewhat uncertain. In both cases an insect is associated with spreading and allowing the entry of a fungus into the tree. Insect damage to European silver fir and a rust disease of Weymouth pine have long prevented extensive planting of these two species.

Many native trees have numerous insect populations, none more so than oak which may be periodically defoliated by the Oak leaf roller moth. Nevertheless trees recover and treatment is unnecessary.

Two important fungi are capable of causing substantial decay in living trees. *Fomes annosus* causes a root and butt rot mainly of conifers and gains entry by infecting freshly felled stumps and penetrating growing trees via the connecting roots. Control is achieved by treating freshly felled stumps with a fungicide (Leaflet No. 5). *Armillaria mellea* (Honey fungus) is a problem in old broadleaved woodlands where it can spread from old stumps through the soil and kill young trees, both broadleaved and conifers. In woodland there is no control measure that is economic but losses are scattered and unlikely to affect the whole wood.

[*Fomes annosus, A Fungus Causing Butt Rot, Root Rot and Death of Conifers*, Leaflet 5]

[*Beech Bark Disease*, Forest Record 96]

[*Dutch Elm Disease*, Forest Record 115]

[*External Signs of Decay in Trees*, Arboricultural Leaflet No. 1]

[*Honey Fungus*, Arboricultural Leaflet No. 2]



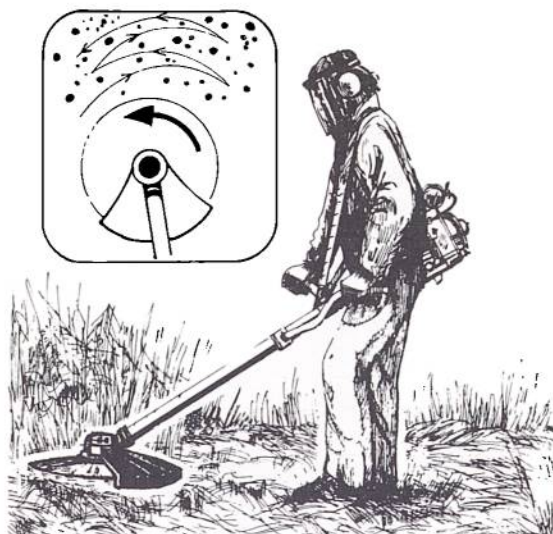
6 Woodland maintenance

In this Chapter the management of woodlands that are already established is discussed. This stage begins once the last weeding has been completed at about 4 or 5 years after planting and continues through the thinning stage until the wood is ultimately felled. Thinning commences at about 15 years in the case of fast growing species on fertile sites but may be at 20 or 25 years on the less productive upland areas or with some broadleaved species such as oak in the lowlands. Crops prior to thinning are described as being in the thicket stage or pole-stage and usually the amount of management required is small and inexpensive and comprises the following:

Fence Maintenance If fencing has been erected to exclude rabbits, the requirement to keep it up to exclude these animals ceases by the time the thicket stage is well advanced because trees grow beyond the stage when they are liable to be damaged. However farm stock can do serious damage to plantations at all stages.

When the thicket stage is reached the woodland may harbour rabbits, squirrels and deer which can seriously affect adjoining farmers and joint action between neighbours is essential to achieve effective control.

Cleaning Young woods particularly in the lowlands may produce large numbers of seedlings and coppice shoots of various broadleaved species. The density and rate of growth of these may be so great as to swamp the planted crop whether it be of broadleaved or coniferous trees. Clearly this may be a serious matter if the reason for planting is to obtain a crop of a



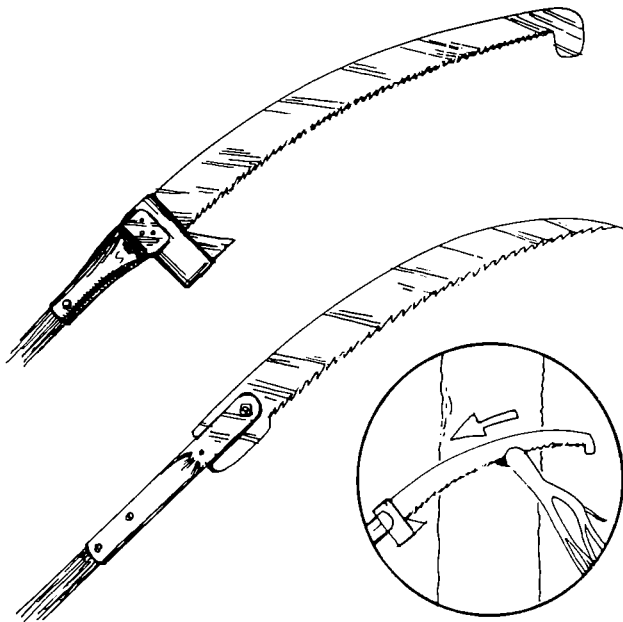
Clearing-saw cuts down small woody weeds

certain species and steps must be taken to remove the unwanted woody regrowth. This operation is termed cleaning and is a very costly one. With modern herbicides it is possible to prevent this situation arising by treating stumps prior to planting and when conifers have been planted by using 2,4,5-T as a spray before the thicket stage is reached.

Drainage Once the trees are established the only drainage upkeep necessary is to keep drains open so that surface water does not accumulate. The trees themselves, when canopy has closed, remove substantial quantities of water by transpiration and often drains necessary to remove water when the ground is bare perform no useful function when the wood has become established. Water-courses carrying water throughout the year must be kept free running both for the benefit of the woodland and for adjoining land.

Brashing and Pruning It is characteristic of young woodlands that once into the thicket stage access is very difficult because of the dead branches on the lower stems. This is particularly so on planted conifers and to a lesser extent with broadleaved species and woods originating from natural regeneration. In the past these branches were removed by handsaw to a height of 6 to 8 feet (2 to 2.3 metres), a process termed brashing. In recent years brashing has become much less common because it has been impossible to mechanise the operation and so contain costs. Brashing is now usually limited to the minimum necessary to give access. In small woods the need for brashing is likely to be determined by the requirements of game or wildlife and the availability of labour. Brashing is limited to removing branches up to a height of say 2 metres up the stem. Removal of branches above this height (pruning) may be carried out to

improve timber quality. Although pruning will increase the proportion of fine timber and should increase timber values, various factors make the economics of pruning doubtful for the majority of trees. Thus pruning to be effective has to be carried out in stages as the tree extends in height and branches die. There is little point in pruning trees that will be removed in thinnings in a few years and it is difficult to ensure that only main crop trees are pruned. Pruning is an expensive operation and returns long delayed in time and uncertain. Pruning may of course be carried out to improve the appearance of a wood and the considerable expense involved may then be justified on grounds other than enhanced timber values.





7 Thinning

In the section on planting it was suggested that trees be planted at a spacing of 2 metres between rows and 2 metres between plants in the row, giving an initial stocking of 2,500 trees per hectare. At this spacing, allowing for some losses due to a variety of causes, the trees will have begun to reach the thicket stage between ages 10 and 20 years depending on rate of growth – which is a function of species and site. Trees are now the dominant vegetation and a start has been made to the creation of forest conditions.

By age 15 to 30 years in conifers and age 30 to 50 years in broadleaves competition between the trees has reached the stage when some have been suppressed and killed by their more vigorous neighbours, and others are beginning to suffer from lack of growing space for their crowns.

Thinning the crop will benefit the remaining trees by giving them more room to grow and may give a small revenue. In conifers subsequent thinnings can be carried out every five years or so; with broadleaves the interval may be ten years or more.

The simplest form of first thinning is to remove every third or fourth line of trees. If this so called line-thinning method is adopted the second and subsequent thinnings should be 'selective' thinnings. The aim in a selective thinning is to free the better trees from the competition of their neighbours. These better trees should be spaced as evenly over the areas as is possible having regard to the variation in growth experienced in practice.

Although age gives some indication of the need for thinning, age is obviously not a good indicator for crops which are growing much more quickly or much slower than average for the species. The relationship between tree height and spacing provides a more convenient way of judging the need for thinning.

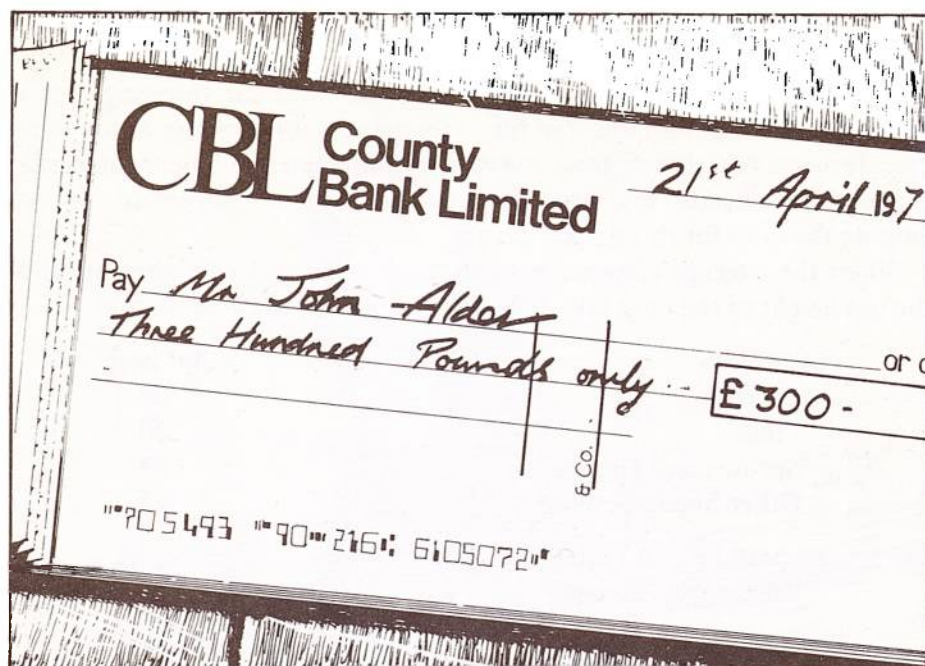
When the average distance between trees expressed as a percentage of the top height of the crop falls to the figures below, thinning is due.

CONIFERS	<i>per cent</i>			
Larches	20			
Pines	20			
Spruces and Douglas fir	15			
Other Shade-bearing species	15			
BROADLEAVED TREES				
Top height (metres)	10	15	20	25
	<i>per cent</i>			
Alder, birch, ash and sycamore	20	25	30	35
Oak and beech	10	15	20	25

These figures are an approximate guide; much more detailed information on thinning is given in *Forest Management Tables*, Booklet 34.

In most parts of Britain there are forestry consultants, land agents, forestry cooperatives, or forestry companies experienced in the marking and description of thinnings and mature trees for sale standing in the woods to merchants who will in turn fell and extract the timber. Although first thinnings may be difficult to sell except at a nominal price, second and subsequent thinnings can be a source of revenue.

Woods which have been thinned regularly generally produce a more valuable final crop of timber than unthinned stands. This apart, thinning is usually beneficial to the conservation of wildlife and often enhances the appearance of a wood. A few small well selected areas can be left unthinned if it is desired to provide a variety of habitat – for example, for game birds.



8 Grant aid

The principal sources of grant-aid for planting trees in Great Britain are the Forestry Commission's schemes. It is a condition of the Commission's grants that timber production must be one of the primary objectives of planting. Grant-aid is also available from other public bodies where a main objective of tree planting is not timber production; for example aid for amenity planting is available from the Countryside Commission, or the Countryside Commission for Scotland, or local authorities. For shelterbelt planting, grants are available from the agricultural departments.

The Forestry Commission's Small Woods Scheme

The Small Woods Scheme is designed to encourage the planting or restocking of small detached woodlands of less than 10 hectares (approximately 25 acres). Special emphasis is given to the planting of broadleaves where sites are suitable and where the existing landscape is essentially broadleaved in character. The emphasis on broadleaved trees in suitable locations does not, however, preclude mixtures or pure conifer planting where this would be equally acceptable on visual amenity and nature conservation grounds and is in harmony with the landscape.

Differential grants are payable from 1 October 1977 under the Small Woods Scheme in the following two ranges:

- (i) areas of 0.25 hectares up to but not including 3.0 hectares;
- (ii) areas of 3.0 hectares up to but not including 10.0 hectares.

Seventy-five per cent of the grant is paid following satisfactory planting of an approved area and the balance of the grant is payable 5 years later provided the wood has been satisfactorily established and maintained.

In Scotland, an application for grant under the Small Woods Scheme may be made only by the freeholder of the land on which the trees are to be grown, but in England and Wales application may be made either by the freeholder or by a tenant or lessee, provided the lessor is joined in the application.

Application forms for a Small Woods Grant may be had from any of the Forestry Commission offices whose addresses are given at page 40. Full details of the rates of grant and the conditions under which they are paid are to be found on the application form. It is important that no work should be carried out before the application has been approved.

The Dedication Scheme – Basis III

This scheme applies only to areas of 10 hectares or more. Its purpose is to encourage the management of woodlands following plans agreed with the Forestry Commission that are designed to ensure sound forestry practice, effective integration with agriculture, environmental safeguards, and such opportunities for public recreation as may be appropriate.

In return for a single planting grant (there is a higher rate for broadleaved trees than for conifers) and an annual management grant during the period of the establishment of the plantation (25 years for conifers, 50 years for broadleaved trees), the owner covenants by means of a Dedication Deed or Agreement not to use the land other than for forestry purposes and to work to an approved plan of operations.

Grants are also available under the Basis III scheme for existing unproductive woodlands which are rehabilitated by selective planting and natural regeneration aimed at bringing them into a productive state without recourse to complete clearance of the woodland. The same scheme is open to applications for planting or natural regeneration of native pinewoods of local origin in special areas in Scotland.

Previous Grant Schemes

There have been a number of earlier grant schemes operated by the Forestry Commission, notably Basis I and Basis II Dedication, the Approved Woodlands Scheme and a Small Woods Planting Grant Scheme. These were closed to new entrants in 1972, but grants continue to be paid to those who wished to remain in a scheme.

Grants for Amenity Tree Planting

It is a requirement of the Forestry Commission's grant schemes that timber production must be a primary objective of planting, and there will be some instances where an owner's proposals cannot be admitted because they are designed specifically for amenity purposes. There is also the point that the Small Woods Scheme cannot cover areas of less than a quarter hectare. However, grants are available, subject to certain conditions, for amenity planting through arrangements which are the responsibility of the Countryside Commission, the Countryside Commission for Scotland and local authorities. For the arrangements in England and Wales full details will be found in the Countryside Commission's leaflet CCP 103 '*Grants for Amenity Tree Planting and Management*'. In Scotland inquiries should be addressed to the Countryside Commission for Scotland.

To ensure that all grant-aid for tree planting is handled as conveniently as possible, the following arrangements have been made for considering proposals:

Areas of less than a quarter hectare All enquiries should be made to a Countryside Commission in the first instance.

Areas of a quarter but less than ten hectares Application should be made to the Conservator of Forests, Forestry Commission, under the Small Woods Scheme. If an application cannot be accepted, the Conservator will advise on other possible grant sources.

Areas of ten hectares and over These will fall to be considered first under the Forestry Commission's Basis III Dedication Scheme and application should be made to the Conservator of Forests.

Grants for Shelterbelts under Agricultural and Horticultural Capital Grant Schemes

As an alternative to the Forestry Commission and Countryside Commission Schemes, grants towards the cost of establishing shelterbelts on farm or horticultural holdings are available as follows:

<i>Type of Holdings</i>	<i>Scheme</i>	<i>Rate of Grant</i>
Lowland farms with development plans	Farm and Horticulture Development Regulations 1973	10 per cent
Horticultural holdings	Horticulture Capital Grant Scheme 1973	25 per cent
Horticultural holdings with development plans	Farm and Horticulture Development Regulations 1973	30 per cent

Farms in less-favoured areas	Farm Capital Grant Scheme 1973	} 50 per cent
	Farm and Horticulture	
	Development Regulations 1973	

Detailed information on these schemes is available, in England and Wales, from the divisional offices of the Ministry of Agriculture, Fisheries and Food, and in Scotland, from the area offices of the Department of Agriculture and Fisheries.

In all cases written approval must be obtained from the Ministry or the Department before work is started.

Taxation of Woodlands

There are special rules for the treatment of woodlands for income tax purposes; woodlands may also qualify for relief from capital transfer tax. Forestry Commission Leaflet No 12 *Taxation of Woodlands* outlines these arrangements.

References

Where no originator is given the publication is produced by the Forestry Commission and may be purchased at Her Majesty's Stationery Office shops.

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2 Woodland types and possible courses of action

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Beech Bark Disease, Forest Record 96.

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7 Thinning

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8 Grant Aid

Taxation of Woodlands, Leaflet 12.

Advice for Woodland Owners, 1977.

Grants for Amenity Tree Planting and Management, Countryside Commission 1978.

The Forestry Commission's Catalogue of Publications obtainable from the Publications Officer, Forest Research Station, Farnham, Surrey, provides an up-to-date list of its titles in print.

Addresses

Main Offices of the Forestry Commission

Headquarters of the Forestry Commission:

231 Corstorphine Road, Edinburgh, EH12 7AT. (031 334 0303)

London Office: 25 Savile Row, London, W1X 2AY. (01 734 4251)

Senior Officer for Wales:

Churchill House, Churchill Way, Cardiff, CF1 4TU. (0222 40661)

Director of Research and Development: Alice Holt Lodge, Wrecclesham, Farnham, Surrey, GU10 4LH. (042 04 2255)

Northern Research Station, Roslin, Midlothian, Scotland, EH25 9SY.

(031 445 2176)

Conservancy Offices

England: North-West: Dee Hills Park, Chester, CH3 5AT. (0244 24006)

North-East: 1A Grosvenor Terrace, York, YO3 7BD. (0904 20221)

East: Brooklands Avenue, Block D, Cambridge, CB2 2DY. (0223 58911)

New Forest and South-East: The Queen's House, Lyndhurst, Hants,

SO4 7NH. (042 128 2801)

South-West and Dean Forest: Flowers Hill, Brislington, Bristol, BS4 5JY.

(0272 778311)

Scotland: North: 21 Church Street, Inverness, IV1 1EL. (0463 32811)

East: 5 Queen's Gate, Aberdeen, AB9 2NQ. (0224 33361)

South: 55 Moffat Road, Dumfries, DG1 1NP. (0387 2425)

West: Portcullis House, 21 India Street, Glasgow, G2 4PL. (041 248 3931)

Wales: North: Victoria House, Victoria Terrace, Aberystwyth, Dyfed,

SY23 2DA. (0970 2367)

South: Churchill House, Churchill Way, Cardiff, CF1 4TU. (0222 40661)

Other Organisations

Timber Grower's Organisation, Agricultural Centre, Kenilworth, Warwickshire, CV8 2LG.

Scottish Woodland Owners Association, 6 Chester Street, Edinburgh.

The Countryside Commission:

England: John Dower House, Crescent Place, Cheltenham, Glos, GL50 3RA.

Wales: 8 Broad Street, Newtown, Powys, SY16 2LU.

The Countryside Commission for Scotland, Battleby, Redgorton, Perth, PH1 3EW.

Nature Conservancy Council, 19/20 Belgrave Square, London, SW1X 8PY, and 12 Hope Terrace, Edinburgh, EH9 2AS.

Agriculture – addresses of Regional Offices of MAFF, ADAS and DAFS may be found in the telephone directory.

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