

The National Plant Specification - Handling and Establishment

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Forward

The first edition of this document was produced by the Committee of Plant Supply and Establishment in 1985 to give some central guidance on the processes of plant handling and establishment on a commercial scale.

This new edition follows much of the format of the original but has been fully revised to take account of new research and techniques. It also includes an expanded introduction and list of further reading and references.

Thanks are due to John Parker BSc Hort. A.L.I. who co-ordinated the revision and to other members of the CPSE for recommendations and advice on the content.

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J.C.L.I.
19 High Street, Theale, Reading, Berkshire RG7 5AH
Telephone No. 01189 303 132

Introduction

Most of the amenity tree and shrub species used in the United Kingdom can be reliably and easily transplanted, provided:-

- the planting soil is properly prepared, drained and will support the chosen plants
- the plants are healthy and have been carefully lifted, stored and transported as relatively fragile living organisms
- the planting is done correctly and in the right season
- the planting is followed by proper after care.

For large scale planting the ideal conditions are difficult to achieve and there are often large numbers of plant failures or very little growth for the first few years after planting.

This code of practice shows how this can be avoided and recommends the essential minimum standards that are required to achieve satisfactory planting and establishment. For the most part they are based on the accumulated experiences of the horticultural and landscaping industry and supplemented by an increasing body of scientific and systematic research, all of which support the following general principles.

1. Hardy nursery stock plants, even when they are dormant, are living organisms and although they have a certain "shelf life" they will quickly die if they are not properly stored or handled. There is evidence that after bad commercial practice some plants may be incapable of surviving even before they are planted.
2. Small stock, seedlings and transplants will generally transplant and establish better than standard trees and other large stock. However, they obviously have much less early impact in a landscaping scheme and they are rather more susceptible to root drying and failure if they are not handled correctly, and to damage by weeds and rabbits.
3. Root drying is the most common source of plant failure and lethal drying can take place very quickly if lifted plants are left unwrapped. Root dips may provide some protection against drying but are not a substitute for, or provide any significant advantage over proper handling and root protection.

4. Black polythene bags are an essential aid for keeping bare roots moist. However, in sunlight they will rapidly absorb heat and thus warm up any plant material inside to potentially lethal temperatures. Co-extruded black and white polythene bags, though more expensive, do not suffer from this fault and are strongly recommended as the best practical protection for lifted bare root plants where shaded storage is not available.
5. Small stock in particular is sensitive to rough handling and the physical shock of repeated dropping or crushing will significantly reduce the survival rate.
6. Cell grown stock, usually small seedlings, are much more able to survive poor storage and handling but do not necessarily show any distinct advantage over well handled bare root seedlings.
7. Container grown plants are a much more reliable form of planting stock and can be successfully planted at almost any time of the year, if adequate watering is available. They are, however, considerably more expensive to grow and transport.
8. At all stages between lifting and establishment, plants are susceptible to rodent damage and protective measures should be taken.
9. Even the best quality and carefully handled stock will not flourish in waterlogged or infertile soils (apart from willows and a few other species). Adequate drainage and soil preparation are therefore just as important as plant handling.
10. Finally, professional after care is essential if the plants are to survive and establish beyond the planting stage. In particular it is important to ensure that appropriate watering is available in dry spells and the competition for soil moisture is reduced by rigorous weed control.

In attempting to give concise guidance a number of aspects of good management practice have only been touched on or have been omitted. Fuller details for specific sectors of the landscape and forestry planting industry can be found in the publications that are listed on page 19.

Similarly, the formal requirements of contract arrangements are not covered in the booklet as in many planting schemes the number of parties and the links between them can be complex. However, it is essential that the contractual responsibilities are clearly defined if cost effective results are to be obtained.

Finally, although this document is mainly directed towards hardwood trees and shrubs, similar recommendations also apply to herbaceous species.

Contents

PART 1 - RECOMMENDATIONS FOR PLANT HANDLING FROM LIFTING UNTIL DISPATCH

Gives guidance to the Nurseryman or the requirements where the Purchaser has to rely on the Nurseryman. In any invitation to tender and contract to supply plants, the Purchaser is advised to stipulate that the Nurseryman adheres to "CPSE Recommendations for Plant Handling from Lifting until Dispatch".

PART 2 - SPECIFICATION FOR PACKAGING AND TRANSPORTING NURSERY STOCK

Sets out requirements which can - and it is recommended should - be checked by the Purchaser on delivery. It is in a suitable form, apart from the introductory paragraph, for the Purchaser to include in full as an integral part of any invitation to tender and contract to supply plants.

PART 3 - RECOMMENDATIONS FOR PLANT HANDLING FROM DELIVERY TO SITE TO SUCCESSFUL ESTABLISHMENT

Explains the requirements for successful establishment for the benefit of:-

- Landscape Architect
- Plant Purchasers
- Landscape Contractors

Those responsible for preparing, planting, and maintenance contracts, should ensure each requirement is adequately specified in any invitation to tender and contract to undertake such works. Many of the photographs are in a form suitable for direct inclusion, but for some - in particular "7.4. Providing Moisture" - a decision on the most cost effective solution is essential.

Note

The main body of the text refers to field grown, bare root stock. Specific recommendations for container grown stock are shown in italics.

PART 1

RECOMMENDATIONS FOR PLANT HANDLING FROM LIFTING UNTIL DISPATCH

INTRODUCTION

Objective

Once out of the ground, plants and especially plant roots are highly susceptible to damage. Adherence to these recommendations should ensure that plant roots are exposed to the risk of damage for the minimum time, so that following re-planting there will be maximum plant survival. Container grown plants, although less prone to root drying, need to be protected from extremes of cold and physical damage to the shoots. Nursery operations should be carried out by appropriately skilled operatives under the control of competent management and with adequate supervision.

Scope

These recommendations apply to the handling of trees, shrubs, climbers, roses, conifers, forestry planting stock, hedging plants, fruit trees and bushes.

Similar recommendations also apply to herbaceous perennials, alpiners, etc. but the primary concern of this booklet is for hardwood species.

Damage

Damage to plants and plant roots can be caused after lifting by:-

- drying-out (even in still, apparently moist air)
- heating up
- freezing
- water-logging
- physical breakage

Plant viability can also be reduced by crushing, dropping etc. even if no visible physical breakage results. Plants must therefore be handled gently and with care at all times.

Length of Time at Risk

Ensure the period between lifting and placing plants under temporary storage, and the periods between such storage and dispatching from the nursery are kept to a minimum.

Unless in cold storage, ensure the plants are in temporary storage for the minimum of time appropriate to the method of temporary storage and time of year.

Dispatch bare-root plants in sufficient time to allow the purchaser to plant dormant stock. (this usually means dispatch by mid March unless otherwise agreed with the purchaser).

TIME OF LIFTING

Bare-root and Root-balled Plants

Lifting deciduous plants when the ground is moist and the plants are dormant - normally between mid October and March. (Earlier or later lifting may be possible where local conditions or seasons permit but, where possible, lifting should be delayed until the leaves have been shed and the plants are fully dormant).

Lift evergreen species between September and April provided the ground is moist. (Note: - evergreen plants, other than forestry transplants, should be root balled or container grown).

For all species avoid lifting during severe ground frost or when the ground is frozen. Pay particular attention to protecting roots when lifting in a drying wind or in the sun.

Ensure root balls are adequately supported to prevent the soil falling off the root.

Container and Cell-grown Plants

Move at any season, except during periods of extreme cold, provided the root systems are well established in the containers and the plants are fully hardened off.

BUNDLING AND BAGGING

All bare roots should be put into plastic bags or given equivalent protection immediately after lifting.

So as to minimise the risk of heating up, only bundle when foliage surface is dry, and consider the type and condition of the plants when deciding the number per bundle, or how many to put into the bag.

Do not bundle container-grown or root-balled plants.

Securely tie in the lateral branches of feathered trees and other stock if they may be damaged during transit.

TRANSPORTING PLANTS WITHIN THE NURSERY

Be as speedy as possible in getting plants into temporary storage, as they are at particular risk during this transportation period.

Minimise the moisture loss at all times; always protect bare roots. On open vehicles securely sheet over roots in such a way that there is a minimum draught under the sheet.

Root-balled and container-grown plants may be transported within the nursery without additional protection, provided the plants are not exposed to extremes of temperature.

SHORT TERM STORAGE BEFORE DISPATCH

Plants may be stored for the minimum of time appropriate to the method of temporary storage and packaging, provided the following requirements are strictly adhered to:

Bare root Plants

Outside

Keep the plants in a sheltered and preferably shaded location. Surround the roots with a freely-drained moisture-retentive material moistened periodically as the condition of the material requires. Ensure good contact between the material and the roots.

Indoors

Relatively short periods of exposure outside of plastic bags, even in an unheated packing shed, can result in serious drying out, especially of roots, and thus plant losses. For unprotected plants kept in such a location for up to 24 hours, lightly spray the roots at regular intervals to keep them moist. For longer periods, surround the roots with a freely-draining, moisture-retentive material and moisten as frequently as the conditions require. Ensure good contact between the material and the roots.

In Polythene Bags

Protect the bags from direct sunlight at all times unless the plants are in black and white co-extruded polythene bags. Do not stack bags for any length of time. Where delays of more than a few days occur, store the bags upright in a shady position or shed, or place them in a cold store. Regularly examine the stock for signs of fungal disease and, if necessary, open up the bags and keep them upright in a cool ventilated position.

In Cold Storage

In direct cold stores enclose the plants entirely in polythene. In jacket or humidified cold stores, no special protection is necessary, provided the humidity is maintained at a high level.

Root-balled Plants

For short periods of storage, keep permeable wrappings moist by watering.

For longer periods of storage, any polythene wrappings should be well perforated and protected from direct sunlight. Place plants with root-balls with permeable wrappings on a well-drained surface and cover with a freely-draining, moisture-retentive material, moistened as regularly as the condition of the material requires. Ensure good contact between the material and the root-ball.

Container-grown Plants

Stand containers upright on well drained, weed-free ground. Whatever the time of year, water sufficiently to prevent the compost drying out. Support tall plants to prevent them blowing over. During the winter months give temporary frost protection to susceptible species and plants recently grown under cover.

LOADING FOR DISPATCH

Unless otherwise instructed by the purchaser, adhere to the specification for packaging and transporting nursery stock which forms Part II of this booklet.

PART 2

SPECIFICATION FOR PACKAGING AND TRANSPORTING NURSERY STOCK

INTRODUCTION

Good handling and packaging between the nursery bed and final planting are essential if damage to plants is to be minimised. This Specification should be incorporated as an integral part of any invitation to tender for and contract to supply trees and shrubs.

with high unit value plants the purchaser may wish to specify additional packaging - but this may increase the cost of the plants (see para 4.7 below).

Throughout this document the use of black plastic bags is specified as the basic minimum requirement for the packaging of bare roots. However, as an alternative, it is recommended that the purchase should specify the use of c-extruded black and white plastic bags as the best practical means of protecting against drying out and heating up in sunlight. This is particularly important for late season planting say from early March onwards.

On receipt of a delivery, the purchaser should check that each requirement of this specification has been complied with by the supplier.

BUNDLING

General

Bundles of bare rooted plants shall consist of graded plants of one species with all shoots facing the same direction. Quantities of any item shall be bundled into equal numbers of plants; any remaining part-bundle shall be clearly marked. A bundle shall be of such a size that one person can handle it on receipt, unless the supplier has ascertained, in advance and in writing from the purchaser, that mechanical handling will be available at the place and time of delivery. Bundles shall be tied securely with string, twine, plastic strip or other suitable material which will not, by its nature or tension, cause damage to the plants, or each bundle may be enclosed in a securely tied bag.

Bare-root Trees

Do not exceed the following quantities in each bundle. The quantity shall be reduced where larger heads or roots may be subject to damage.

A

Seedlings & transplants

per bundle

Up to 20cm high

100

20 - 60 cm high

75

60 - 100 cm high

50

B

Whips & Feathered Trees

per bundle

1 - 1.5m high

25

1.5 - 1.75m high

15

1.75 - 2.5m high

5

C

Standard Trees

per bundle

4 - 8cm girth

5

8 - 10cm girth

3

10 - 12cm girth

2

12cm plus girth

not bundled

Root-balled and Container Grown Plants

These plants shall not be bundled but may be packed in crates or packages to ease handling and prevent damage or deterioration in transit.

Cell-grown Plants (i.e. plants grown in a variety of ways with a cylinder or block of rooting material attached) These can be packed in a variety of trays or flatpacks; normally with a maximum of 50 plants in each pack.

LABELLING

General

Each individual or plant bundle, bag or lot of one species of plants shall be labelled by the supplier with a securely attached and durable primary label.

The PLANT NAME, SIZE and QUANTITY in the bundle or bag, and the TOTAL QUANTITY in the consignment shall be clearly and durably displayed on every label, and if requested, together with the SUPPLIER'S NAME. A

reasonable proportion of a large consignment of distinct plants shall bear a durably written secondary label easily related to the primary label.

EU Regulations & Plant Health Regulations

Species requiring plant passports that are the subject of the Plant Health (Great Britain) Order 1993 and forestry species specified under the EU Forest Reproductive Materials Regulations (1977) shall be documented in accordance with those Regulations.

PACKAGING

Bare root Plants up to 60cm tall

Bare-root plants up to 60cm tall shall be entirely enclosed in black plastic bags (150 gauge minimum) securely tied at the top. Plants shall be loosely bundled within the bag, which shall be of an adequate size. All shoots must face in the same direction so that roots and shoots are not in contact. Thorny or very busy plants may be dealt with as in 4.2 below.

Bare-root Plants 60cm tall and above up to standard trees with 14cm girth

If total enclosure is not practicable as in 4.1 above, the roots of bundles of plants shall be enclosed in a black plastic bag which shall be securely tied around the stems.

Bare-root Trees 14 - 18cm girth

To be supplied mainly free from soil adhering to the roots unless otherwise specified, but with the roots packed with a pre-wetted moisture-retentive granular or fibrous material, enclosed in either black polythene bags, or in a porous material such as hessian, and firmly secured.

Root-balled Plants

Trees over 14cm girth, and certain other trees and shrubs which by their nature require balling at smaller sizes, shall be root wrapped or rootballed (See BS 3936 part 1 1992 and National Plant Specification).

Root balls shall be kept moist, supported by twine or stronger material where the root ball so requires to prevent collapse, and kept moist by wrapping firmly with moisture-retentive porous material such as sacking.

Packing shall be firmly secured over the top of the root ball. Where wire netting is used to support the ball, any moisture-retentive material such as sacking shall be wrapped inside the wire netting. (See Part III 6.4).

Container and Cell-Grown Plants

Container grown plants will not normally receive additional packaging but degradable pots or cells that are likely to disintegrate in transit shall be enclosed in polythene film (250 gauge) and firmly secured. They should never be stacked or put together in a way likely to damage one another, e.g. through weight or overheating.

Variations in Packaging

Variations from the above packaging may be appropriate in certain circumstances. The purchaser shall state such revised specification in the tender conditions for the purchase and supply of plants, or the requirements shall be otherwise agreed in writing between the purchaser and supplier prior to submission of tenders.

For example, exceptionally, and only if agreed by the purchaser, plants may be supplied bare-root, without root wrapping, for bulk deliveries. If so the roots shall be kept moist at all times preferably by packing with suitable moisture retentive material. The plants must also be protected from draughts and be sheeted over in transit.

Alternatively, pallets or bins sealed with polythene and shrink wrapped are suitable for bulk delivery of bare root transplants.

TRANSPORT

Open Lorries

All plants shall be loaded, stacked and unloaded in such a way that breakage or crushing by the weight of plants above, or the security ropes, will not occur. The consignment shall be completely and firmly covered with opaque sheeting in such a way that there is the minimum draught under the sheet from the direction of travel.

Closed Lorries or Containers

All plant material shall be loaded in such a way that breakage or crushing by the weight of plants above is avoided during loading, transit and unloading. Provision shall also be made to ensure that the load remains cool and moist at all times.

Transit by Third Parties (e.g. Post, rail, road, etc)

Where transport is entrusted to others, not under the control of the supplier or the purchaser, the sender must ensure that the packaging is adequate to protect the plants whilst in the third party's charge.

Consignments shall be clearly addressed, manageable units, securely crated or packaged to withstand mechanical damage. The packaging must also include sufficient moisture retentive material around the roots to ensure that they remain cool and moist until they are delivered to the purchaser.

PART 3

RECOMMENDATIONS FOR PLANT HANDLING FROM DELIVERY TO SITE TO SUCCESSFUL ESTABLISHMENT

INTRODUCTION

Plants are living things, even when dormant and transplanting and establishment involves them in considerable stress. If the process is to be successful it must be planned, managed and supervised to satisfy the basic biological requirements of the plants. To achieve this, the planting must be followed by a period of planned aftercare, covering at least two growing seasons.

These recommendations set out the requirements that should be followed and specified in detail according to the situation on each particular site. They assume that the nurseryman supplying the stock has adhered to the "Recommendations for Plant Handling from lifting until Dispatch" and the purchaser has specified, and the nurseryman has adhered to, the "Specification for Packaging and Transporting Nursery Stock". It is also assumed that the species and plant specification (age, size, etc) are correctly chosen for the geographical location and site conditions.

External Pressures

Even when the work is properly specified, there are many outside pressures that provide strong incentives to set aside or compromise the biological and other principles and factors. These include:-

- The relatively short lifting and planting season for open grown plants
- The logistics of lifting and supplying large numbers of different species
- The financial pressure to complete projects as a whole, or within a financial year or complete deliveries in time for early payment

- The unpredictable and often unsuitable weather conditions which may reduce the effective planting season
- Engineering and building contractors not making the site available on time.

Management Measures

In order to counter these pressures, it is essential that:-

1. The planting specifications are prepared in detail to suit the requirements of the site.
2. The planting is planned, as far as possible in advance of the planting season and plants are ordered, in the normally available sizes. (For guidance see National Plant Specification).
3. The planting area is adequately prepared when soil conditions are suitable, preferably in advance of the actual planting.
4. Arrangements are made for close liaison with the nurseryman during the planting season so that the supply of plants can be co-ordinated with the planting on site.
5. Adequate facilities are available for the receipt and storage of plants, including a conveniently situated water supply.
6. The receipt and care of the plants and the planting is only carried out by appropriately skilled operatives under the control of competent management and with adequate supervision.
7. After care is properly specified in advance and the finance secured as part of the overall planting and establishment cost.

PLANTING SEASON

Bare Root or Root-balled Plants

The natural planting season is during the dormant period which is normally from mid October to the end of March, but early planting, before the end of the year, is generally more successful than planting from January onwards. Late plantings are particularly vulnerable to Spring droughts and should be avoided unless watering can be carried out, or planting can be done with cold stored plants. Evergreens establish more readily if planted in early Autumn or late Spring; provided water can be applied in dry spells of weather.

In exceptional circumstances, where there is serious risk of frost lift, autumn planting is not recommended. In such circumstances it is preferable to plant as soon as the soil becomes workable in the spring.

Container-grown Plants

These may be planted throughout the year in appropriate weather conditions provided they are regularly watered.

RECEIPT AND UNLOADING

When placing an order, the purchaser shall give the nurseryman notice of any restrictions of access to the delivery site, and notify him whether mechanical lifting aids are available for off-loading.

The nurseryman shall give adequate notice of the date and time of delivery within the agreed programme, and the purchaser shall ensure that adequate numbers of staff with mechanical lifting aids, where previously notified, are available to assist the off-loading without delay.

During unloading damage in handling shall be avoided.

The purchaser shall inspect and check the plants as quickly as possible after unloading to ensure each requirement has been complied with by the supplier. Whenever possible the deliveries should be planned so that the plants can be planted as soon as possible. If this is not possible the plants shall be moved in to temporary storage.

TEMPORARY STORAGE ON SITE

Short Term

Where the daytime air temperature is under 10°C plants may be stored in their packaging, under cover and away from sunlight, for a maximum of 7 days after receipt from the nurseryman but this may be extended to 14 days if temperatures are under 5°C. During this time the roots must be kept moist.

Longer Storage

Bare Root Plants and Root-Wrapped Plants

Bare root plants and plants root-wrapped in porous material should be heeled-in or plunged into moisture retentive material. Any non-porous root wrappings shall be removed before heeling in.

The roots of all plants shall be moist and placed so that all are in contact with the plunge medium. In order to achieve this, a free moving medium is required, such as a 50/50 mixture of coarse sand and peat, or sawdust, and care must be taken to ensure no degradation or heating up of the material occurs. Bundles of plants will require cutting open and spreading out so that intimate contact between the roots and the plunging medium is achieved. The plunging site shall be well drained and sheltered, and stout rails will be needed to support standard trees and other large stock. An adequate supply of water points is essential and the plunge medium must be kept moist at all times.

If necessary, plants may remain heeled-in from November to mid March, but the period shall be kept as short as possible. Beyond this period, plants required for late plantings shall be kept in cold store. Any other plants shall be planted out in nursery beds for a further season or containerised prior to the start of new growth.

Root-balled Plants in Porous Material

Root-balled plants in porous material shall be supported upright with the ball immersed in a deep layer of moist straw, hay, sand, peat, pulverised bark, sawdust, suitable soil or other suitable material. Watering may be essential to prevent the ball drying out.

Container-grown Plants

Containers shall be stood upright on well-drained, weed-free ground. Sufficient watering will be required for container grown stock at any time of the year to prevent the compost drying out. Tall plants will require support to prevent them blowing over. Species susceptible to frost damage shall be given temporary protection. (See also Part I para. 5.3).

Removal from Temporary Storage

Container grown stock and root-balled plants shall be well watered before transportation to the planting site. The roots of bare-root stock shall be moist before removal from the heeling-in or plunge medium and the roots shall be placed directly into black polythene bags to prevent drying-out and kept in them until immediately before planting. Consignments supplied in bulk shall be split up and wrapped in black polythene bags to minimise the length of time plants are exposed to drying during the planting process. (The use of co-extruded black and white polythene bags is recommended. See Part II 1.3). Plants shall be re-labelled as necessary.

GROUND PREPARATION

The planting site shall:-

Be naturally or physically drained, or raise by mounding so that the plants will not be subjected to waterlogging at any time.

Have a soil texture and structure that will retain and release moisture and nutrients to the plant and a crumb structure that will promote root growth to at least 3 times the width and 1.5 times the depth of the roots of the plants to be planted.

Preparation of the Planting Site

The following are essential points that should be considered and specified as necessary if these properties are to be achieved:-

- Any ground preparation is best carried out in advance of the planting season, when the weather is more reliable and less soil structure damage is likely to be caused. This will allow more time for the planting operations but it is essential to ensure that the soil is protected from construction traffic or other compaction or pollution.
- Extremely heavy and poorly structured soils may need to be improved by the thorough incorporation of suitable organic matter and special drainage arrangements. Extremely light soils may also need added organic matter to improve their water holding capacity and avoid the need for frequent irrigation. (Peat based composts or similar are not suitable for these purposes).

Where planting is proposed on imported soil or made up ground or where the soil structure has been impaired, a good soil structure needs to be established before planting takes place. This may involve deep soil cultivation and draining, followed by grassing or herbaceous cover, and the delay of planting for at least one growing season.

If ground preparation as specified in 5.2 is necessary it shall be carried out over an area at least 3 times the diameter of the root spread, and 1.5 times the depth of the roots, of the plants to be planted.

PLANTING

Soil Conditions for Planting

At the time of planting, the soil shall be moist and friable and not frozen, excessively dry, or water-logged.

Planting Requirements

The excavated hole shall be of sufficient size to accommodate the spread roots and the stock shall be planted so that after any settlement it is at the same depth as it was grown in the nursery. If the sides of the planting hole become smeared during digging, particularly on heavy clay soils, the smearing shall be broken up before planting.

Stabilising Support and Protection

Most plants above 1m high will need a support to hold them secure at ground level either by stakes or by cables for very large stock. Stakes or stout canes as specified, shall be inserted before planting. Plants shall be held secure against the stake by the use of a proprietary tie, or similar method, ensuring that the stem shall not chafe against the stake and there is space for stem expansion. Short stakes to hold the base of the stem are preferable but individual guards or shelters may be needed to protect trees against physical damage by vandals, cattle, rabbits, mowers or strimmers. Alternatively, the plantation may be protected by suitable fencing. See also 7.5.

Treatment of Plants immediately Prior to Planting

Bare root plants shall be kept in polythene bags until immediately before planting. They shall be kept out of direct sunlight unless co-extruded bags are used. Similarly all containers and wrapping, unless fully bio-degradable, shall be removed at the latest point before planting.

Root-balled plants and plants in root control bags shall be placed in the planting pit before the hessian or other protective material is removed to avoid disturbance of the root-ball. Wire netting shall be left on the root ball provided that there is only biodegradable porous material between the wire netting and the rootball. Root control bags should be removed.

Damaged or torn roots and stems shall be cut back cleanly with a knife or secateurs and, particularly with container-grown plants, any coiled roots shall be spread out or cut to prevent future stability problems.

Back-filling

During backfilling around the plant, the soil shall be lightly firmed to ensure intimate contact with the roots, but with large material, successive layers of soil will need to be firmed as backfilling proceeds. The layers of soil shall be firmed separately so that the plant is securely held but penetration of moisture is not restricted. Snow must not be allowed to become mixed with the backfill material. Plastic perforated pipe for irrigation should be installed as part of the back filling, where specified. (see 7.4 below).

Pruning

After planting, any damaged, dead, diseased or crossing branches shall be removed by pruning.

Opinions differ on whether the size of the head of a standard tree should be reduced after planting, but if it is decided to do so, do not prune the central leader if it is intended that the tree should grow to full stature. (see BSI 3936 Part I Appendix Table 4 for guidance).

AFTER-CARE

Firming after Frost or Wind

If the roots of newly planted plants are loosened, they shall be re-firmed as soon as practicable. This is readily achieved with the toe of the boot, to exclude air pockets from around the roots and particularly next to the base of the stem.

Weed Control

Weeds and grass compete for moisture and nutrients and shall be eliminated until the plants are well established; usually for at least 2 years. Cutting or mowing weeds does not prevent this competition. Pre-planting site preparation may give a weed-free start. A minimum of a one metre diameter weed-free area shall be maintained around each transplant, by herbicide applications, mulches or hoeing throughout the whole of the first two years. Larger weed-free areas are appropriate for larger plants and should at least cover the surface of the original planting pit.

Mechanical strimmers and mowers must not be used near the stems of the plants as they can seriously damage the bark.

Conserving Moisture

Mulching may be used to conserve soil moisture. Mulches achieve this by helping to control weeds which rapidly transpire moisture, and by reducing evaporation from the soil. Mulches may consist of either sheet materials such as ultra-violet stabilised polythene, roofing felt; or granular materials like pea gravel, ground bark or

wood chippings. Mulches shall only be applied when the soil is moist. Regular hoeing in dry weather will produce a dust mulch.

Providing Moisture

Though local climate and soil types will vary the requirements, as a guide it is recommended that during the growing season, newly planted trees and shrubs shall be irrigated following any four week period without appreciable rainfall. This may not apply to forestry planting but is particularly important for amenity trees in harsh urban or exposed positions.

For reasonable growth, irrigation shall be applied at fortnightly intervals to moisten the soil so that the full rooting depth of soil is saturated. The amount of water required will vary considerably according to the texture and structure of the soil but as a guide a heavy standard tree will require at least 20 litres and a small transplant approximately 10 litres for each watering. Soils with low water holding capacity will only need smaller amounts of water but with irrigation carried out more frequently.

Container grown stock using soil-less compost may require more frequent watering in the early stages as once the compost dries out it can be very difficult to re-wet.

Water must always be applied so that the soil is moistened to the depth of the root zone. For large nursery stock this can be facilitated by installing lengths of perforated plastic drainage pipe, or similar devices, in the planting pit at the time of planting.

Overwatering is wasteful, both of water and other resources, and will only serve to leach nutrients away from the soil.

Protection

Plants may be damaged by voles, mice, hares, rabbits, deer, farm stock and vandals and suitable protection shall be considered at the planning stage. Regular inspections, say once a month, are essential so that appropriate action may be taken. Local circumstances will dictate whether it is best to fence a large area, use individual guards, or use poison for rodents. Maliciously damaged plants shall be replaced as soon as possible.

Stake Maintenance

Stakes and ties must be maintained to prevent damage to trees. Stakes shall be inspected regularly to ensure they remain secure and ties shall be adjusted at least once a year to ensure they are not cutting into the stem. As soon as they are no longer necessary, stakes shall be removed to encourage the trees to develop naturally. This should normally be up to 3 years after planting.

Further Reading and References

Plant sizes
and specification BS 3936 Part I 1992

Choice of species Trees and Shrubs for Landscape Planting (JCLI Recommended Plant List)

Contracts for CPSE Recommended Standard Form of Tender for the
Plant Supply Supply and Delivery of Plants

Statutory Regulations Plant Health (Great Britain) Order 1993

EEC Forest Reproductive Material Regulations 1977

ARBORICULTURE RESEARCH NOTES



CS DESIGN
SOFTWARE

www.csdhub.com
Home of the National Plant Specification



No. 97-91-ARB Amenity Tree Planting with Bare-Root Stock

8-79-ARB Damage to Broadleaved Seedlings by Desiccation

75-88-ARB Alginure Root Dip and tree Establishment

64-86-SILN Rough Handling Reduces the Viability of Planting Stock

98-91-ARB Cell Grown Broadleaved Stock

110-87-SILN The use of Co-extruded Polythene Bags for Handling Bare-Rooted Planting

Available from:- Arboricultural Advisory and Information Service
Forest Research Station
Alice Holt Lodge
Wrecclesham
Farnham
Surrey GU10 4LH

FORESTRY COMMISSION PUBLICATIONS

Research Information Electrolyte leakage tests as an indication of plant vitality
Note 210

Bulletin 111 Forestry Nursery Practice

Available from:- Forestry Commission Publications
Alice Holt Lodge (as above).