

INFORMATION NOTE

ODW 10:02a



PLANT TYPES, HANDLING AND CARE

Introduction

This Information Note has been produced as a guide to choosing plants for different situations that are necessary to produce and maintain a successful establishment of woodland.

Outdoor Workshops (ODW) are a Technical Development Branch (TDB) initiative designed to offer practical advice to practical people through presentation, demonstration and user guidance. The ODW programme will involve repeating trials and introducing new systems throughout Great Britain so that a wide range of sites, systems and practitioners can be included.

There is a wide variation between the specifications and costs of plants offered by different nurseries. A recent survey of nursery stock found a total of 15 plant types and sizes for six species.

Nurseries normally hold stocks of commonly planted species used in forestry. Sales catalogues are normally produced each autumn and list for each species the types, sizes and price of plants on offer.

Description of Plant Types

It is important to understand the definitions of the different plant types that are given in nursery catalogues. The three categories of plant types are:

- Bare root
- Cuttings
- Cell-grown

The different plant types and further divisions of each type are explained below.

Bare Root Plants

Plants (Plate 1) that leave the nursery without any rooting substrate are described as bare root stock. These can be raised from seedlings or cuttings. A cell-grown seedling is also described as bare root after it has been transplanted into a nursery bed and grown before lifting.

Plate 1

Selection of bare root plants



Seedlings

Seedlings remain in nursery beds until they reach a size suitable for lifting. The height of the seedlings will depend on various factors such as the date when they were sown and irrigation treatments. It is unusual for seedlings to be sold for forest planting.

Transplants

Seedlings can be grown in the nursery beds for one or two years before being transplanted or lined-out to provide more space for the plants to develop. Root systems become more compact and fibrous after transplanting. Good quality plants are produced when they are given sufficient space to grow. Broadleaves generally need more space and less time to grow than conifers. Overcrowding of any species produces drawn and spindly plants; correct spacing produces sturdy plants with a good root system.

Cuttings

Cuttings are the main method of producing plants from superior varieties selected by tree breeders. Production costs are higher than plants grown as seedlings and are therefore sold for a premium.

Rooted Cuttings

The main conifer species propagated by cuttings is Sitka spruce. Seed for stock plants is produced using families of trees that have been selected for vigour, straightness and branching characteristics. Improvements in vigour more than compensate for the additional costs of these plants. Very few broadleaves are grown as rooted cuttings.

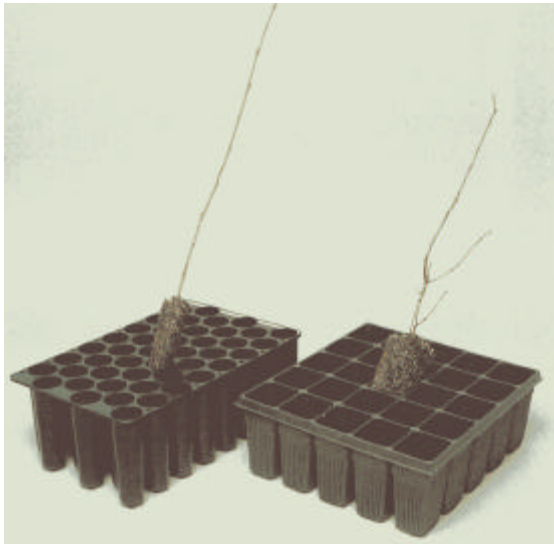
After the cuttings have rooted they are transplanted into nursery beds like conventional seedlings.

Cell-grown plants

Seedlings grown in small containers are generally referred to as cell-grown stock (Plate 2). They are generally produced in plastic tunnels or poly houses, or glasshouses. The containers or cells are usually combined to form modular trays made from plastic or polystyrene. The plants are grown in an artificial growing medium; seedlings that are removed from the tray with the medium are referred to as plugs.

Plate 2

Cell-grown



Cell-grown stock is normally sold after one year because seedlings have faster germination and growth inside the poly houses and glass houses compared to open-grown seedlings. Most cell-grown stock will be hardened off outdoors by the end of the growing season.

Plant Specifications

Plant Size

Plants are normally graded within height ranges that are specified by the customer or the nursery. The root collar diameters of plants should meet standards as described in the British Standard for Nursery Stock, (British Standards Institution 1984a). The Standard specifies minimum diameters (mm) for different height classes (cm) of the commonly produced forestry species. Some examples of size specifications for bare root plants are shown in Table 1.

Table 1

Examples of minimum root collar diameters (mm) bare root

Species	Height Band (cm)						
	10	15	20	30	40	50	60
Birch	-	-	3	4	4.5	5.5	6.5
Beech	-	-	4	5	6	7.5	9
Oak/Ash/G ean/Lime	-	-	5	6.5	8	9.5	11
Pine (not Corsican)	3	4	4.5	6.5	8	9.5	-
Sitka spruce	-	2.5	3	4	5	6	7
Douglas fir	-	-	3	4	5	6	-
Noble fir	5	5	5	6.5	8	9.5	-

For cell-grown plants the specifications are less comprehensive but a guide has been produced by the Horticultural Trades Association Forestry Group. The guide describes minimum root collar diameters (mm) and minimum cell volumes (cc) for different height ranges of broadleaves and conifers (Table 2).

Table 2

Minimum root collar diameters for cell-grown stock

	Height Band (cm)	10-20	20-40	40-60	60-90	
		Minimum root collar diameter (mm)	Broadleaf	4	4	6
	Conifer	3	4	6	8	
	Minimum cell volume (cc)	Broadleaf	50	100	150	200
	Conifer	50	100	150	N/A	

Root:shoot ratios

The ratio of root collar diameter to height is described as the sturdiness of a plant. Sturdy plants have better developed root systems in proportion to their shoots than tall and thin plants. Survival and growth of trees can benefit when sturdiness is improved.

Seedlings with large fibrous root systems are better able to supply the shoots with water to enable growth and a high root:shoot ratio enables them to withstand moisture stress after they have been planted. If the root:shoot ratios are too small then shoots may die back to desiccation before roots are able to regenerate.

Plants with high root:shoot ratios are considered as being of good quality because they have better relative height growth rate than plants with low root:shoot ratios.

However, plants with good root:shoot ratios can still suffer damage if they are handled or planted poorly.

Ordering Plants and Delivery

Ordering plants

Nursery catalogues are normally available by early September and plants should be ordered as soon as possible thereafter. Where possible, plants should be inspected in the nursery before placing an order, most nurseries welcome visitors or may supply samples for approval.

To ensure good quality stock the following points should be detailed on the order form:

- Specification for size and condition
- Country where grown
- Notice of delivery sites and dates and times
- Plant handling procedures
- Complaint procedure and right to return
- Payment conditions.

Other requirements such as seed origin, type of packaging e.g. co-extruded bags, labelling (lifting, grading and storage dates) may also be available depending on the nursery.

Advice Notes

Normally advice notes will accompany the delivery of the plants. Before the delivery is unloaded, checks should be made to ensure that the description and quantity of plants matches the order.

Points to check on the advice note include:

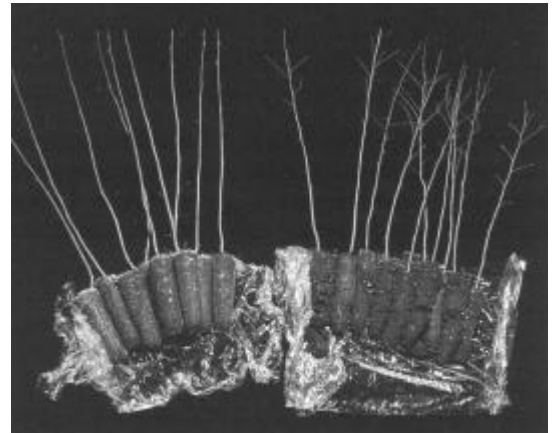
- Quantities for different species.
- Plant type and specification.

Checking Deliveries

Bags should be counted as they are unloaded and checked against the advice note for the load. All bags should be in good condition with no tears or signs of being crushed (Plate 3). The bags should be randomly sampled to make checks on the planting stock. The plants should meet any agreed standards when the plants were ordered.

Plate 3

Check the plants and packaging



Storage of plants

Estate and farm buildings provide valuable cover for plants before they are planted. This type of store should be unheated and well ventilated. Fully dormant plants can be stored in good condition for three weeks by following basic principles:

- Plant the most sensitive species immediately e.g. Douglas fir, Norway spruce.
- Always place the bags upright, spaced singly about 25 cm apart. Do not stack or place in heaps.
- Inspect the bags regularly for signs of overheating, check by opening bags and examining bundles (ventilate bags if necessary).

If no buildings are available then some form of canopy (under trees) store (Plate 4) is preferable to leaving the plants in the open. Plants should only be stored in the open as a last resort. And will remain in good condition for three weeks when additional principles are followed:

- Always turn down necks of the bags to avoid rain running into the bags.
- Choose a dense canopy with low risk from frost and preferably on a north facing slope.

Plate 4

Canopy Store



Plant Handling and Care

The failure of plants to produce active shoot growth in the spring following planting can frequently be avoided if care is taken over the handling of the plants from the time they leave the nursery to the time they are planted. The damage to be avoided tends to occur in three main ways:

- Root drying
- Overheating
- Physical damage

Root drying

Even on cool dull days a drying wind can quickly desiccate the root system of a young tree. Bare rooted plants are normally handled using co-extruded black and white plastic bags. These bags, which are black on the inside and white on the outside, are opaque and reflect sun's heat to keep the trees cool inside. Plants should be sealed in such bags during storage. During the planting operation, use a planting bag to keep the roots moist. Remove trees one at a time to avoid desiccation. Old fertiliser bags are not suitable, as any chemical residue will scorch the roots of the plants.

Overheating

Bright sunlight shining on translucent or dark material can lead to high temperatures. Keep plants in the shade, even when in bags or other containers. The co-extruded bags should not be covered with a non-reflective material, as this can cause them to heat up.

Physical damage

Broken roots or shoots are visible, but unseen internal damage from rough handling is just as important in reducing the vigour of planting stock. Never throw bags of

plants around. Unload them carefully. Do not stack other materials on top of the plants. Do not use the spade to push roots into the ground.

Planting Tools

There is a wide range of planting tools (Plate 5) designed for different plant types and planting techniques. Most trees can be planted with a well-worn garden spade. The size of the spade for bare root stock should reflect the depth and width of notch that is needed. The wide, shallow, pointed spade is suitable for plants with large root systems to be planted in stony soils. The deep narrow spade is better for planting conifers on cultivated mineral soils and peats. Other types of tool may be preferred for different planting conditions.

Plate 5

A selection of planting tools



There is a wide range of tools for planting cell-grown stock. These range from simple devices such as planting spears through to Scandinavian designs of planting tubes.

Planting bags should match the size and type of planting stock. Choice of bag is usually by personal preference although some handling systems require specialised harnesses and frames to hold boxes from the nursery.

Forestry Commission
Technical Development Branch
Ae Village
Dumfries
DG1 1QB
Tel: 01387 860264
Fax: 01387 860386
e-mail: tdb.ae@forestry.gsi.gov.uk