

INFORMATION NOTE

ODW 10:02



Forest Research
An agency of the Forestry Commission

TECHNICAL DEVELOPMENT BRANCH

TREE PLANTING

Introduction

This Information Note has been produced as a guide to effective tree protection and good weed control operations that are necessary to produce and maintain a successful establishment of a 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.

Information has been gathered from equipment and method trials based at a number of locations. This information must be taken as indicative only. Variation could be expected for other operations where factors such as terrain, product specification or operator efficiency differ

Mechanised Tree Planting

With the increased emphasis on finding alternative uses for agricultural land, there is scope for large areas to be converted to woodland. Farmers are accustomed to mechanised systems of management which use few personnel and would relate easily to mechanised planting systems.

Planting machines are not new, having been in use in both America and Europe for a number of years. To date, their use in the UK has been mainly restricted to the sandy soils of East Anglia, where the Forestry Commission has operated two Finn Forester planting machines for restocking since 1968. Tree nurseries have also used Finn Foresters in lining-out operations.

Plate 1

RJS Planter



A work study trial was carried out on the Quickwood planter in 1977¹ but since then little has been heard about that machine. The report only provides an overview of the machine capabilities and does not give output details. Some of the safety concerns that were raised in 1977 are still applicable today.

In the last 4 to 5 years, interest in mechanical planting machines has widened to other soil types. Agricultural cabbage planters have been adapted to plant tree cuttings (Super-Prefer) and a purpose-built machine (Whitfield F-85) has been operating in north east Scotland, on new planting schemes only².

Planting machines offer a means of planting a woodland quickly using a small team of operators. Whilst the quality of machine planting may be lower than standard manual planting, it is consistent and can achieve better results than operational manual planting. Manually controlled machines can achieve a higher planting quality than semi-automatic planters because the operator can influence the positioning of the plant in the furrow.

¹ Forestry Commission (1977), E(E) Work Study Branch Report No 42, Initial Trials of the Quickwood Planting Machine in Thetford Forest E(E).

² Forestry Commission (1992), Technical Development Branch Information Note 2/92, The Whitfield Planter.

Table 1

Comparison of New Planting Methods

Planting Method	Output (ha/shr)	Cost (£/ha)
Mechanical	0.28	92.92
Run length 300 m	0.21	123.27
Run length 50 m		
Manual planting	0.04	175.00
Double notch and screefing		

Previous evaluations of planting machines³ noted that they worked best on ex-agricultural ground which was not too rough or stony. None of the machines studied was considered to be capable of working on a forest restock site.

The use of planting machines should be matched to the soil type. They should not be used on soils which may benefit from preparatory ground preparation work such as mounding⁴.

The RJS planter (Plate 1) is an example of a 2 row planting machine with a herbicide spraying capability and was used to plant the workshop site. Others such as the Galmor Tree Planter are available throughout the country.

Plate 2

Planting Position



The planter weighs approximately 2.5 tonnes and carries 10 000 plants. The operators are surrounded by a PVC cab (Plate 2) which also incorporates seat belts, heated footplates and a warning stop horn. Tree sizes of between 15 cm and 90 cm of conifer and broadleaves can be planted. The in-row spacing of the plants can be varied from 0.5 m to 5 m and row width can be moved from 1.6 m to 2.5 m. The planter is usually pulled by JCB Fastracks or by a Caterpillar D5 on wetter ground. The machine can also carry out herbicide operations using a specially developed multi-band sprayer.

A comparison of mechanical and manual planting outputs and costs is given in Table 1.

Manual Tree Planting

The success of any planting scheme is enhanced by careful plant handling during lifting and packing at the nursery, transportation to site and planting. Bad handling damages plants, causes losses and increases establishment costs.

Many nurseries now deliver plants in co-extruded bags, which are designed to reduce the risk of overheating.

When handling bagged plants it is important not to:

- Throw, drop or handle bags roughly.
- Keep trees bagged for more than three weeks after delivery.
- Stack bags upon each other.
- Sit or stand on bagged plants.
- Leave bagged plants in direct sunlight or exposed to frost.

Plants should be inspected when delivered. Insecticide dipped trees should be ventilated by loosening the bag seal.

At planting, plants should be transferred to a forest planting bag. Workers sometimes drag the opened co-extruded bag along as they work. This may add to the risk of plant damage and also increase working time and overall cost.

Planting may be by one of three methods (Figure 1), the choice being dictated by the size of the root and the soil condition:

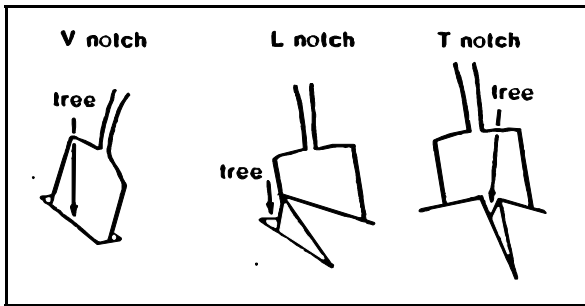
- A single (or 'V') notch.
- A double notch, 'L' or 'T'.

³ Forestry Commission (1995). Technical Development Branch Report 12/94, Evaluation of Planting Machines for Farm Woodlands.

⁴ Forestry Commission (1996), Research Information Note 288, Cultivation of lowland soils for new woodland establishment.

Figure 1

Notch Planting Methods



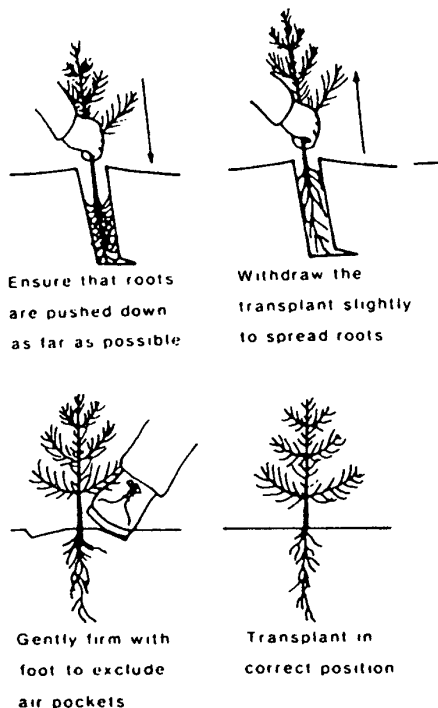
Single notch planting: A single slot is made with a suitable planting spade. The spade is inserted to the required depth and rocked backwards and forwards to open a slot so that the roots can be inserted. The spade is withdrawn and the slot closed using the ball of the foot.

Double notch planting: A double slot is made using a suitable planting spade. The slots can either be 'L' or 'T' shaped. The purpose of a double slot is to lift up the soil and create space to allow the roots to be distributed evenly. Once the tree has been positioned in the slot, the spade is removed and the soil is firmed with the ball of the foot.

It is important that the plant roots are distributed evenly (Figure 2).

Figure 2

Tree Insertion



Single notch planting is acceptable on light soils for plants with small root systems.

If the soil is too heavy to open adequately with a single notch, or the roots are too big for the notch, the root system will be compressed and bent into the slit. This will affect early survival rates and future growth, form and stability and it will be more appropriate to use a double 'L' or 'T' notch. A double planting slit ensures good root distribution in heavier soils.

If the root system is too big for a double notch, the plant must be pit planted.

Screefing may be required to:

- Mark the planting spot for a follow-up weeding.
- Remove a heavy humus layer to ensure that trees are planted to the correct depth in the soil.
- Level the planting position and bare the soil so that if a treeshelter is fitted, it can be properly sealed to the ground.

Outputs and Costs

Planting on ground which has had complete ploughing and harrowing can increase outputs by c. 36% compared to planting into unprepared grassland.

The use of a planting bag is ergonomically better, helps optimise output and maintain the quality of the plants and the chance of successful establishment in the first season.

Cost savings were not identified when using a single notch to plant container grown stock compared to a double notch when planting bare rooted stock in the soil types studied and with the planting stock used.

Studies of new planting operations broaden the database available and allow more detailed analysis of the effects of:

- plant spacing,
- soil and site type,
- plant size,
- plant type (bare root/container grown) and
- method of planting.

Technical Development Branch

Develops, evaluates and promotes safe and efficient equipment and methods of work, maintains output information and provides advice on forest operations.

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