# TEINDLAND WOODLAND NURSERY

The first section of the woodland nursery at Teindland, consisting of 300 square yards on a forest ride, was prepared and sown in 1944. This area is still in use and continues to produce a satisfactory annual crop of seedlings. Since 1944 the area of the nursery has gradually increased to 10 acres, of which about 7 acres are cultivated and the remaining 3 acres are roads and alleys. The last section to be brought into production was 1 acre in 1957. It is not proposed to extend the nursery beyond its present area.

The object of establishing the nursery on a woodland site was to grow one-year old conifer seedlings which would be big enough for lining-out. This object continues to be achieved at Teindland, but with the introduction of economic methods of weed control in nurseries established on arable soils, the advantage of growing a one-year seedling in the woodland nursery rather than a two-year seedling in the traditional type of tree nursery has largely disappeared. As a result of this and decreasing planting programmes, areas at the woodland nursery which are not required for seed sowing are now used for lining-out.

The initial advantages of the woodland nursery compared with the arable nursery site were:

1. Lower weeding costs.

2. Higher out-turn of seedlings per lb. of seed.

3. Strong seedlings fit for lining-out can be produced in one season.

These advantages are now much less pronounced than when the woodland nursery was started in 1944.

Most species of conifer can be grown successfully in the woodland nursery but the bulk of the seedlings produced are P. contorta and Sitka spruce. All species of larch can be grown satisfactorily but results with Scots pine and Norway spruce have been irregular and these species are now generally grown as two-year seedlings in the arable nurseries.

Hardwoods are rarely grown in the Teindland woodland nursery, although when necessary, birch, oak, maple and beech have all been sown with good results.

Woodland Soil Analysis. The nursery is situated on a fluvio-glacial channel margin and the porous nature of the soil has resulted in the development of a Normal Podzol without gleying and with no definite underlying iron pan. The desirable soil pH is maintained at about 4.0 and the readily soluble calcium content is 0.07% CaO. The organic matter content is 10% and the available phosphate and potash are kept up to a satisfactory level by the annual inorganic fertiliser application.

Manurial Treatments. These vary slightly from year to year, depending upon the results from the soil samples which are analysed every three years by the Macaulay Institute of Soil Research. The following are the standard manurial treatments:

(a) New Sections

| | |
|---|---|
| Ground Limestone | - 4 cwt./acre |
| Hopwaste | - 24 tons/acre (approx. 40-50 cu. yds.) |
| Superphosphate | - 5 cwt./acre |
| Muriate of Potash | - 1½ cwt./acre |
| Nitrochalk | - 3 cwt./acre. |

The limestone and hopwaste are applied during the late Autumn or early Winter, the phosphate and potash at least two weeks before sowing and the nitrochalk as two top dressings at the beginning and end of July. The second top dressing may be omitted if growth is satisfactory and if the pH has risen above the desirable optimum the Nitrogen is applied as Ammonium Sulphate.

(b) Normal Sections

| | |
|---|---|
| Hopwaste | - 10 tons/acre every alternate year |
| Superphosphate | - 5 cwt./acre |
| Muriate of Potash | - 1½ cwt./acre |
| Nitrochalk | - 3 cwt./acre. |

Nursery Operations

(a) Seedbeds - Ground cultivation for seedbed preparation is by Rotovator, up to a maximum depth of 8". This is done as early as possible after the clearance of the previous season's tree crop. The alleys are at 6' centres and seedbed width is 4'6". This is the maximum possible width to permit a limited amount of hand weeding and also the use of tractors for seed covering and subsequent operations. Hand cultivation of the seedbeds is limited to raking an even surface and the removal of any large stones. To conserve the available ground moisture, which is important in an area of low annual rainfall (29") where the minimum precipitation is during the growing season, emphasis is upon early sowing and soil consolidation. To achieve this, sowing starts during late March and is usually completed by early May. Consolidation is by rolling with a tractor-mounted 3 cwt. roller. Seed is sown by the "Coultas" seed distributor and is then covered by 3/16" gravel using a tractor-mounted grit distributor. Seed to be sown during April and May is generally stratified in sand for five to six weeks before sowing.

(b) Weeding

(i) T.V.O. is used at the rate of 60 gallons per acre, applied as late as possible before the appearance of the seedlings.

(ii) Subsequent spraying uses Esso White Spirit at the rate of 20 gallons per acre and a limited amount of hand weeding is also necessary.

By the use of oil sprays the nursery is maintained in a fairly weed-free condition.

(c) Protection.- The nursery has been free from pathological and insect troubles but losses have been incurred by Botrytis infection. These have been fairly local and have rarely been severe but to control the disease Fernide spraying at three-weekly intervals is carried out during July and August at the rate of 4 lbs. Fernide/200 gallons water/acre.

(d) Lining-out - The small area of the nursery and sections do not lend themselves to using mechanised lining-out methods and at Teindland this operation is done by hand using 10' boards and assisted by Rotohoe and Rotovator ground cultivation. Lining-out is confined to the areas which would otherwise be uncropped after the allocation of ground for seed sowing and although the cost of lining-out is about 30% above the average in the mechanised arable nurseries, this is compensated by the production of a very sturdy, well-rooted 1 + 1 transplant.

Average Annual Expenditure and Production per Cultivated Acre (excluding alleys, etc.)

| | £ | s. | d. |
|---|---|---|---|
| Capital Cost of Site Preparation | 10. | -. | - |
| Manures | 60. | -. | - |
| Preparing and Sowing Seedbeds (including £40 cost of covering grit) | 113. | -. | - |
| Weeding and Protection | 156. | -. | - |
| Lifting, Packing and Despatching Seedlings (including culling/grading where necessary) | 356. | -. | - |
| Total Cost per Acre (excluding overheads) | £695. | -. | - |

Average Out-turn of Seedlings per Acre - Seasons 1958 to 1961 - 1,670,000

Average Cost of Producing 1,000 1 year Seedlings (including overheads) - 15/3d

Yields per Pound of Seed - Based on results, the anticipated out-turn of usable seedlings per lb. of "effective" seed is:-

| | | | |
|---|---|---|---|
| Pinus contorta | - 35 ths. | European larch | - 10 ths. |
| Sitka spruce | - 45 ths. | Japanese larch | - 20 ths. |
| Norway spruce | - 16 ths. | Hybrid larch | - 10 ths. |