THE ESTABLISHMENT OF FOREST SEED ORCHARDS IN NORTHERN IRELAND

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During the recent visit paid by members of the Irish Forestry Society to Northern Ireland some interest was aroused by the grafted larch plants in the nursery at Newcastle forest. These grafts are the foundation of a forest seed orchard and although this is still in an early experimental stage it may be of interest to readers to know something of the aims, hopes and methods of the investigations.

THE SEED ORCHARD

A seed orchard may be described as a group of trees specially selected and treated so as to provide a frequent supply of seed of a known strain.

Briefly, this is accomplished by grafting scions taken from outstanding (elite) trees on to healthy stocks of the same, or a closely related species and by special treatments inducing the grafts to produce an early and regular seed crop.

Seed orchards have been in production for some time in Denmark, Sweden and the United States and most forestry-minded countries have now adopted the idea. In Britain the Forestry Commission have laid down a seed orchard at the Alice Holt Research Station and others are being prepared in widely scattered parts of the country.

THE VALUE OF SEED ORCHARDS TO FORESTY IN NORTHERN IRELAND

The forestry programme of Northern Ireland for many years to come will hinge upon the establishment of exotic conifers—mainly Sitka spruce, Contorta pine and the larches. The home supply of seed is negligible so that the forestry service is almost entirely dependent on the supply from commercial seed dealers. While the integrity of these men may be beyond reproach they suffer certain unavoidable handicaps which limit the reliability of their seed sources. For instance, their normal collection methods do not always enable a classification of seed according to parental strain, and they are always at the mercy of the natural periodicity of seed crops which may leave them without supplies of a particular seed for a number of years. To have a reliable home supply of seed from trees of known superior qualities has obvious advantages.

Northern Ireland makes somewhat exacting demands upon the trees it grows. Rainfall is high, sunny weather scarce, frost may occur on almost any day of the year and the soil covering the bulk of the potential

forest areas is peaty and acid. All these demand a high degree of adaptability from the introduced species and it is obvious that only certain strains will be able to thrive to give a final crop of timber. It has been shown that the qualities of adaptation peculiar to certain tree strains are inherent, so that to ensure a maximum potential development in the future plantations only seed of a suitable strain should be employed. To obtain this seed from dealers is practically impossible, whereas if the seed were collected from trees which have already grown to maturity under the exacting conditions of this country the chances of producing a successful timber crop are much more favourable. Unfortunately, there are very few existing stands of mature high quality exotic conifers in this country from which seed could be collected, but there are many outstanding individuals scattered around. Through the medium of seed orchards their qualities may be passed on to future generations.

It is of particular importance that the trees now being planted in Ireland should be of the highest quality for there are many indications that subsequent stands will be obtained by natural regeneration.

LOCATION OF A SEED ORCHARD

As for fruit orchards—to which seed orchards are closely akin—a great deal of care must be taken in the choice of site, for a single detrimental environmental factor can easily destroy the result and expense of several years' work. The requirements which may be considered essential are listed below and in addition to these the routine protection and hygiene procedure of normal nursery operations must be carried out.

(i) A rich, easily worked sandy-loam soil ;
(ii) A long growing season ;
(iii) Freedom from early or late killing frosts ;
(iv) Protection from strong winds, particularly cold and dry easterlies ;
(v) Shelter from early morning sun ;
(vi) Isolation from stands or individual trees of the same or similar species which may provide pollen for un-controlled fertilisation, or which may act as a source of insect attack or disease.

Given all the above factors and assuming that the trees are well grafted and healthy, a seed orchard should provide fertile seed from 4 to 8 years after establishment and with annual regularity thereafter.

SEED ORCHARD ESTABLISHMENT

The first requirement when establishing a seed orchard is a supply of healthy, well rooted stocks which should be 2+1 yr. or older plants,

12 to 18 inches high. For the most successful grafting these should be in pots in a greenhouse where temperature and humidity conditions can be controlled, but large greenhouses are not often available to the forestry service so that outside grafting must suffice. For this the rootstocks should be in lines at least 12 inches apart with the same distance between plants. It is advisable that the plants should have been in the lines for at least one season before grafting and they should be carefully pruned to give six inches of clear stem immediately above the soil level.

The next consideration is the collection of suitable scions from the selected elite trees. These should be healthy, robust shoots of the previous year's growth from 2 to 4 inches long. They should be collected towards the end of the winter dormant period but before any signs of flushing have occurred. Suitable material is usually confined to the vigorous branches in the upper crown and, since elite trees approaching maturity are often tall and difficult to climb, collection is often a problem. One alternative to climbing is to shoot down the ends of the upper branches.

For the grafting operation it is preferable that the rootstock should be flushing while the scion remains dormant; this may mean storing the scion in cold damp peat in the dark for a time if no cold storage facilities are available. No definite dates can be laid down for these operations owing to the unpredictability of the early spring weather in this country and to the varied time of flushing of the different tree species. The order of flushing in any area remains the same, however, and this linked with other phenological observations will give a good indication of when scions of any particular species may be collected.

For coniferous species variations of the "Veneer Side Graft" prove most successful, the scion being inserted into a slit cut in the stock, where it is held firm by raffia and carefully waxed to prevent drying out. The stock is then cut back, usually in three stages, so that the rising sap is diverted gradually into the developing scion, which should be firmly grafted by the end of the first season.

After a further season in the transplant lines the grafted plants should be ready for removal to the seed orchard site. Here they should be planted at about 15 feet apart so that the developing crowns will have plenty of light and freedom. During the establishment period the ground between plants may be utilized for seed beds or transplant lines.

Various methods of inducing early seed production have been tried, some of which are still in the experimental stage. These include root pruning, partial girdling, temporary strangulation, chemical methods and artificial drought. Root pruning appears to have given the best results to date but more efficient methods may come to light in the near future.