

nique can be applied in the production of the popular shrub range then the more highly capitalized systems can be put to more efficient use in the propagation of high value "difficult" subjects.

SEEDLING OAK PRODUCTION IN CONTAINERS

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Species of oak grown are: *Quercus robur* (Common oak or Pedunculate oak) 80%; *Quercus petraea* (Sessile oak) 5%; *Quercus rubra* (Red oak) 5%; *Quercus ilex* (Evergreen oak) 5%; *Quercus cerris* (Turkey oak) 5%.

WHY GROW THEM?

To fulfill the demand. E.F.G. produces up to 100,000 units per annum; there is little promotion of the product and I am sure there is scope for further development.

REASONS FOR THE DEMAND.

Vegetational Climax. The planners are attempting to re-create the vegetational climax of which the oak is the classic example in Great Britain. The Sessile oak being dominant on the acid soils in the west and north and the Pedunculate oak dominating the vegetation on the basic soil of the south and east. Sessile and Common oak interbreed freely and there are numerous hybrids occurring naturally throughout Great Britain. One interesting fact about oak trees which supports the planners choice is that 287 different species of invertebrates are dependent upon the oak tree at some stage in their life cycle. This diversity demonstrates the longevity of the oak as the dominant tree species in the environment and also serves to indicate the stability which it lends to a woodland habitat. Some oaks live to a great age, with a typical hedgerow specimen reaching 200 years and pollarded trees reaching an age of 300 to 400 years. Most oak trees in the U.K. are approximately 70 years old. This means that the oak trees in Britain are now middle aged and also that no plantings of oak have taken place over the last century.

In natural woodland, e.g. the New Forest, the average density of standard oak trees is 1-1/2 trees per acre. So relatively low numbers of mature trees are required for the oak to exert its dominant influence over a landscape. The best site for oak would support, on average, 25 standard trees per acre. However, it should be pointed out that good sites for oak trees are also

good sites for arable farming and have long since been converted to that use.

Romantic attractions. Oaks have a romantic attraction in the minds of Englishmen in a similar manner to the rose. This traditional appeal goes back to the first Elizabethan Age when England's navy, which ruled the seas, was built from "Hearts of Oak".

These two factors, the *Vegetational Climax*, and the *Romantic attraction* combine to motivate present day landscape planners towards planting oak in the hopes of achieving a long lasting effect on the British landscape.

Import Restrictions. Oak plants are a prohibited import to the United Kingdom. Over the past 50 odd years Continental nurseries have been a major source of hardy nursery stock for the U.K. market. Therefore, import restrictions effectively removed it from the reservoirs of planting material available to landscapers.

Fir Trees. In the minds of most people E.F.G. nurseries and fir trees are synonymous. Therefore, it was a positive decision to grow a classical hardwood and what could be a better choice for E.F.G. to grow than the oak tree?

WHY POT GROWN?

Reliability of establishment. Oaks are notoriously bad transplanters with frequent high losses from bare root material. This poor establishment can be attributed mainly to: Bad planting — either the wrong site, wrong soil conditions or unskilled labour; poor plant care; and slow root regeneration.

Increased value. Bare root oak seedlings are relatively cheap and easy to produce. E.F.G. seeks to add value by potting such a product. The pot and compost should be thought of as packaging and wrapping, but packaging which adds the benefits of protection and reliability to an otherwise unreliable product.

ALTERNATIVES TO POT GROWN OAK

Bare root transplants. These are relatively cheap but are subject to heavy losses due to the various factors mentioned previously.

Sow acorns. This practice has been carried out in the past but there is little evidence *today* of it being a successful operation. This lack of success is most probably due to grazing animals. Acorns themselves are a valuable food source for birds and small mammals. Any acorns which survive and produce young seedlings are then subject to grazing by caterpillars, small mammals and even deer. That acorn eaters and seedling grazers can have such a drastic effect on oak populations is

probably due to the fact that, in turn, their predators have largely been eliminated by zealous game-keeping.

Oak seedlings are intolerant of shading. Modern woodland management strives to achieve a closed canopy condition which effectively shades out oak seedlings. There are one or two recorded instances of oak effectively invading railway embankments adjacent to oak woods, this success being largely attributed to exposure and lack of shade.

WHO BUYS POT GROWN TRANSPLANTS?

Private forestry. Where the recreational and sporting values of the woodland are considered as well as, or in spite of, the volume of timber grown per acre.

Local authorities currently use pot grown oaks on reclamation and rehabilitation schemes, motorway and trunk road landscaping, country parks and environment woodland schemes in urban areas.

PRODUCTION DETAILS.

When to Sow. Ideally acorns should be sown as soon as collected, or if buying in, as soon as delivered. The operation should be completed in November/December and January. Seed should be graded for size — the biggest yielding the biggest seedlings. E.F.G. acorns are sown in Finnish peat pots but sweet pea or Japanese paper pots would be just as practical. The Fin pots are then placed approximately 100 at a time in polystyrene handling trays. Germination and early growth takes place in a poly tunnel — no heat being provided but fan cooling is available if required to limit abnormally high temperatures. The acorns are germinated in a peat compost, no fertilizers being necessary at this stage. In April/May when seedlings are approximately 6-9" tall the first cultural operation takes place. This entails pruning the tap root, grading, potting into 4 × 7" whalehides, standing 20 plants to a polystyrene handling tray and subsequently placing this package on the normal container sandbeds. Outside during the growing season plants usually flush three times and grade out at the end of the season as 18-24" and 24-30" transplants.

SEED SOURCES.

Home Collections — this method is by far the best source of seed; it allows sowing to be made at the optimum time. Seed should be graded according to size - the rule of thumb being that big acorns produce big seedlings. Weevil-infected acorns can be eliminated by a simple flotation test, the ones which float being infected, the ones which sink being the sound seed.

U.K. sources. Acorns bought from United Kingdom sources are as good as any. They have been selected over 4 to 5 genera-

tions. A registered source is the Crown Commission Estate in Windsor.

Continental sources — Holland is probably the best source for *Quercus robur* and *Quercus rubra*. These are collected from roadside trees and have had two to three generations of selection. Germany, in particular Spessart, is regarded as the best source for *Quercus petraea* and is also good for *Quercus rubra*.

SHORT TERM STORAGE

The best advice is to sow when collected and thus avoid the problems of storage.

If immediate sowing is out of the question then the important storage criteria are that the seed should be cool and moist. Avoid stacking sacks of acorns as these will overheat and ruin the seed.

A PERSONAL VIEW OF THE ROLE OF A PROPAGATION RESEARCH WORKER

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Within the limits of their terms of reference the attitudes of research workers to applied research topics are coloured partly by their interest in the science of their subject and partly by their interest in the problems of the industry they serve. It does not follow that a science bias or an industry bias or even a middle of the road approach is necessarily best, but it is inescapable that the research worker serves two masters. His scientist overlords will assess his work on its scientific content and hopefully also will judge its value in the horticultural context. Nurserymen are exceptional if they concern themselves with the underlying science, understandably they want a technique which can be explained in precise terms so as to be able to judge its usefulness against the wide range of other interacting factors in nursery management, but they are prepared to leave the collecting of the relevant data and its interpretation to the scientist.

Division of labour. Horticulture is a co-ordinating science requiring knowledge of plant behaviour, soil science, chemistry, physics and so forth, with an ever present appreciation of the commercial background against which innovations and improved techniques will be measured. Within horticulture, propagation similarly draws on a wide range of knowledge and skills. A propagation research worker could legitimately study topics such as nursery soil sickness and specific replant disease