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THE LARGE SCALE RAISING OF NURSERY PLANTS BY SEED PRODUCTION IN ENGLAND

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THE PAST

Apart from the nationally-owned Forestry Commission which operates several large nurseries mainly oriented toward seed production and the privately-owned forestry nurseries similarly organised, production by seed in most English nurseries has not reached an advanced stage of development or sophistication.

It is difficult to be certain of the reasons for this situation but some contributory factors can be isolated. In broad terms the monetary value of items raised from seed is not so high as clonal forms or rare species produced by vegetative propagation. This has an influence on the owner or management who perhaps erroneously imagines that the higher priced items are the most profitable. Most of the nurseries in England are small in physical size and turnover and also they are heavily biased towards the retail trade. This type of business has few resources for large scale seed production in terms of finance or land. The main requirements are for clonal forms to satisfy the retail trade and the policy, naturally enough, has been concentrated upon purchasing from abroad seed-raised items for use as understocks, etc., rather than attempting to produce them at home. The large and highly efficient seed production nurseries of Holland, Northern Germany,

Belgium and Denmark have not been slow to exploit the situation and working largely through the expert Dutch sales organisation have supplied virtually 90% of the requirements in this country for seeding understocks from roses to forest trees.

THE PRESENT

Quite recently there has been a change in attitude in our nurseries and now far greater interest in seed production is evident. There are several reasons for this change. A rising standard of living enjoyed by continental growers has resulted in increased costs with subsequent effects on selling price. The wise English grower realises that this trend is likely to continue. During the last few years requirements for nursery stock, particularly trees, has increased enormously in Great Britain, and in many European countries shortages have occurred and are likely to become more frequent. An increasing trend towards co-operation among growers in England (of which the formation of our Region is just one example) has led to the formation of production and marketing groups with greater opportunities to capitalise, mechanise and rationalise their production. Mechanisation is coming to the larger nurseries also and with it a new approach towards row-cropping and mass production methods, many applicable to large scale seed production.

The grower now has more expertise in his handling of the seed and seedling crops. Members of this Society are able to refer to information made available at past meetings and discuss various problems with their colleagues, experimental work concerned with the production of rose seedlings for use as understocks is being carried out on governmental trial grounds and growers visits abroad have also made great contributions to our knowledge.

The production of small batches of seed under glass or broadcast in small beds in the open has not changed noticeably for many years. This system which is confined to the more exotic species has always been under the direct control of the propagator rather than a specialist seed raising department. Mainly due to the efforts of the Society, more is now understood about pre-sowing treatments, warm and cold stratification and sulphuric acid dips. This has served to raise the status of seed production in the mind of the British propagator who previously tended to look upon it as the "poor cousin," scarcely comparable with propagation by cutting and grafting. Knowledge gained from the application of new techniques to small batches of seed can normally be translated to large scale production.

THE FUTURE

The problems to be tackled in the future fall into the following categories:

1) **Obtaining Seed.** It seems obvious that in the future the seed of very many species previously obtained from collections made in the

wild will be either extremely expensive or unobtainable. The grower will be forced to accept seed collected from arboreta or man-made plantings which may show hybrid characteristics and possible reduced vigour. At the time of writing we are trying once again to obtain seed from the United States of several *Quercus* species including *Q. phellos* and *Q. ellipsiodalis*. The last time we had acorns of these two species was when some were brought back in a suitcase after a visit to the U.S.A.! Co-operation by nurserymen throughout the world could lead to worthwhile sources of native seed being made available.

Frequently the handling of seed by the seed companies is lamentably poor and seed arrives in a dead or dying condition. We now collect as much of our own seed as possible, where necessary using a homemade collecting platform with a lifting height of 28 feet for harvesting seed such as *Acer, Fraxinus, Sorbus* species, etc.

2) **Pre-sowing Treatments.** This is one of the technical aspects which can best be served by experimental work at government level and the normal exchange of knowledge between interested growers and particularly by members of the Society.

I expect to see English growers making much greater use of temperature controlled environments. The cold store will be used as a pre-conditioner to improve germination, and also as a management aid to enable prolonged storage of seed from one year to the next or to delay sowing until soil and season are at an optimum.

The chemical treatment of seed to aid germination by materials such as sulphuric acid is now in use by some growers. Fungicidal seed-dressings are being tried by nurserymen to improve seedling stands and growth. Materials, including Thiram and Captan, have been used. A recent trial of our own showed that a pre-sowing seed dressing of Thiram nearly doubled the stand and has so far increased growth by 50% in Norway maple *(Acer platanoides)*.

3) **Soil Treatment before Sowing.** One aspect of modern technology which will profoundly affect large scale seed production is the increasing use of soil sterilants which if properly used can result in larger, healthier seedlings and significantly reduce production problems by the virtual elimination of weeds and weed seeds. Two materials have been tried in some English nurseries. Metham sodium, either in liquid formulation — known as Vapam — or granular (prill) — known as Dazomet — and methyl bromide. The latter material appears the more successful but it is so expensive that its use is mainly confined to glasshouse conditions. Dazomet is now being used by a few nurseries including ourselves, but is is expensive and can only be justified if one is assured of a good crop. For this reason we tend not to favour it for seed crops. Allyl alcohol has been used by ourselves with variable results. For the present we intend to make our main efforts with this chemical because it has advantages over the other available materials. It is comparatively cheap, only a third the

cost of Dazomet, and a tenth the cost of methyl bromide. It has a short persistence in the soil — only ten days from application to sowing at 50° F, which aids flexibility in use. The main disadvantage of it is the toxicity hazard to the operator. Expensive protective clothing with industrial respirators must be used. At present we are the only commercial company in England with Ministry clearance for its use.

4) **Sowing Techniques.** Unless soil sterilants and residual herbicides of great efficiency can be developed, sowing in drills is likely to entirely replace broadcast sowing. Accuracy of spacing over a wide range of seed shape and size will be required. It is possible that pelleted seed applied by a precision seed drill will become the normal practice for some species as it is already in so many market garden crops.

5) Care of Seed Beds and Seedlings during and after Germination. Modern plastic nets and similar materials are likely to simplify and cheapen the problems of frost protection, and protection from the larger pests such as birds. Little work has been carried out in England to establish the value of water sprays against frost damage in broad-leaved seedlings.

More effective materials for use against root-rots and damping-off would be welcomed. At present a mixture of cuprou oxide and Zineb applied as a post germination drench are being used with fair results.

One of the great problems and probably the main limiting factor to seed production in England at present is the problem of weed control. Even if soil sterilants are used weeds are still a potential menace and few chemicals completely eradicate all weeds. The use of residual herbicides as pre-or post-germination treatments is in the long term an unavoidable necessity. Some nurseries, such as ours, are basing their post-germination weed control programme on the so called 'chemical hoes' such as Paraquat. These are mechanically guarded from contact with the seedling crop by some means. In our case this is achieved by a modified steerage hoe fitted with low pressure anti-drift spray jets, the whole being enclosed in sophisticated shoe-shaped cover. Obviously this type of system cannot control weed growth within the row, and we have considered trying a non-volatile, translocated type of herbicide such as MCPB instead of a contact material. In this connection we have been interested in Dacamine which is not marketed to date in Britain. We hope that the herbicide will control weeds in the row which spread out sufficiently to absorb some of the spray.

With the above system some degree of hand weeding is necessary, and regular passes with the chemical hoe must be made. Only a residual herbicide can give extended and effective weed control in and between the rows and in broadcast seeding systems is the only feasible method other than hand weeding.

In roses, PCP (Propachlor) has shown promise. Trials are in progress to screen several materials on a range of broadleaved seedlings at the Ministry Trial Station in Derbyshire. We ourselves have carried out trials with Simazine, Lenacil, Brasoran, and granular CIPC; none of these can, at this stage, be recommended without reservation. Trials with Lenacil over the past two years indicate that it is perhaps the most promising.

MODERATOR HESS: Thank you very much, Mr. Martyr; you did a fine job of presenting Mr. Humphrey's paper, and we are all sorry that he was not able to be with us.

The next speaker on the program is one who does not really need any introduction; he is a past-president of the Eastern Region and a well known seedling grower, Mr. Hugh Steavenson.

SEEDLING PRODUCTION IN THE FIELD

HUGH STEAVENSON

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Some of our Western Region friends may wonder about the purpose of field-grown seedlings. I have visited many west coast nurseries, particularly in California, where trees and shrubs grown from seed never hit the "ground" until finally installed in their ultimate landscape location. There is obvious merit in container production and even some field production in starting seedlings in flats in the greenhouse, pricking off into pots and shifting to larger containers or field rows as growth advances; but there are also some limitations and some disadvantages to this procedure as against bare-root production of seedling liners in the field.

For some time — perhaps a few decades — arborists have projected that virtually all trees used in landscape plantings would be of selected clones. This, of course, would necessitate asexual propagation, usually by budding or grafting. Such propagation requires seedling understocks, except in those rare instances in which the clone is grown on its own root or grafted to a vegetatively-produced understock.

Though asexual selections are increasingly moving to the forefront in both shade and ornamental trees and though the merit of many such cultivars over the species is beyond question, it is remarkable that so much current production of trees, particularly shade trees, is of seedling rather than asexual origin.

Several years ago one of the leading arboriculturists of our area pointed out that approximately 80% of the major trees planted in the