

etically determine the highest capacity of any piece of a plant at any given time.

Having achieved material of high capacity it is now necessary to ensure that its potential is realised. The factors which influence its performance can be divided broadly again into two groups. The factors which we can class as treatment are fairly simple, such as fungicide and hormone applications, wounding, maintenance of polarity, removal of leaves and buds, etc. and are all treatments carried out at the moment of propagation to ensure that any artificial aid which may ensure success does not limit performance. Finally, the *environment* will eventually determine performance; in other words, where the material is put at its moment of propagation. Basically, the environmental factors are those of the atmosphere and those of the medium; most important of these are temperature, light, humidity, air, etc. A knowledge of all these factors will enable the production of a performance so that the high capacity may be exhibited.

A knowledge of these theoretical considerations when applied practically provides the student with a chance to handle plant material in many forms and provides an opportunity to prove to himself that the theoretical predictions were reasonably accurate. It also provides an opportunity to familiarise him with various environments for propagation.

Finally, despite these considerations, we are concerned with a commercial atmosphere essentially; it is important that a reasonable and balanced approach to the techniques evolved is maintained and that the student realises the economic and managerial implications involved.

VISIT TO THE BOSKOOP RESEARCH STATION

Boskoop, Holland

Proefstation Voor De Boomwekerij

21st April, 1969

A party of 34 members (including a few guests) flew from Coventry airport to Rotterdam and thence went by coach to Boskoop where they spent 7 packed hours. The arrangements went like clockwork and not even the fact that the weather was bleak and wet throughout damped the enthusiasm of anyone; it was voted an excellent and most informative visit, a great value for the money and the officers of I.P.P.S. were encouraged to consider further possible short visits abroad.

The party visited the Research Station at Boskoop where they were greeted by the new Director, Dr. Roelofsen, himself an I.P.P.S. member. After an excellent 'koffietafel' at the Hotel Florida, four nurseries were visited —

Fa Th. Streng and Fa J. Streng (2 nurseries)

Fa G. Kooy and Zn.

Fa F. J. Grootendorst and Zn.

Boskoop

As all nurserymen must know, Boskoop is the most important nursery centre in Holland, with 950 nurseries occupying a total area of about 1500 acres. This represents about one-sixth of the total nursery trade in the Netherlands, which exceeds 9,000 acres. The Director, Dr. Roelofsen, outlined the main areas and their specialisms, such as the 900 odd acres of rose stocks in Groningen, the forest and hedge plants on the sands at Zundert and the concentration of avenue trees at Oudembosch. The total export value exceeds £8 million per year.

The Boskoop topsoil is not pure peat as many of us have popularly supposed but a mixture of about equal parts of peat, sand and clay with a pH between 4.5 and 5.5 and a water table that can be maintained about 2 feet below the surface. Beneath the surface is a 10 ft. layer of peat and a 30 ft. layer of peaty clay. It is a loosely compacted soil and we watched demonstrations of a cane being pushed six feet straight down the profile without any difficulty or undue pressure. There is a constant shrinkage of the soil due to drainage of the peat and a continuous loss of soil in the removal of the rootballs and we saw land being made up again by the addition of new soil from outside and from the dredgings of the canals. The looseness of the soil presents expensive problems when buildings or roads have to be constructed.

However often one visits Boskoop it never ceases to interest and amaze and the nurseryman will never come away without learning something. The shape of the holdings — perhaps a strip of land scarcely 100 feet wide and $\frac{3}{4}$ mile long as was the case with the first two nurseries visited — makes mechanisation exceedingly difficult. Indeed attempts to mechanise appear to be rather half-hearted, the essential requirement being the utmost intensive use of every available inch of land. Labour mostly takes one man to the acre and holdings have their own intensive propagation units — mist and double-frame techniques are to be seen side by side; grafting and layering complete the picture of intensive propagation techniques on nearly all the holdings. It is not only the intensity of the production but its complexity also that deters mechanical methods — so many kinds and cultivars are grown, and the careful selection of the right clonal stock is a characteristic of the Boskoop growers. Yet how long will rising labour costs enable these excellent standards to be maintained at a price the importing country will pay?

For Boskoop's life blood is the export market — over 90% of its products go abroad — and some of the exporters in Boskoop handle the production from other Dutch nursery districts. The Boskoop man sells his products — he travels to seek his market and is not satisfied to sit at home and wait for the orders to roll in.

The Experimental Station

This is an association, founded by nurserymen and governed by a representative Board of all Dutch nursery organisations. It is financed by subscription of members and by grants of the nursery organisation, the government and the municipal authorities. As with all Dutch research stations, research, advice and horticultural education is close knit and the Director is in charge of all three functions.

After a greeting from the Director and a brief summary of the nursery industry in the Netherlands the party was addressed by Mr. Van Elk of the Scientific Staff. He remained our guide throughout the remainder of the day.

The Station has some 15 acres of land of which part is planted up as an "Arboretum" — a collection of plants and selected clones, truly named and available for constant comparison. A coding scheme exists —

- *** — Best variety for continental conditions.
- ** — Less good but acceptable.
- * — Less good but acceptable.
- S — Suitable for special purposes or markets only.
- O — No good. Should not be propagated.

Students, we were told, during their 3 years of training at Boskoop must know all the generic names by the end of the first year, the specific names in their second year and the cultivars by the time they finish!

There was a long discussion with Mr. Van Elk on the use of herbicides in Boskoop. Simazine appears to be used widely. Very heavy dressings by our standards are often applied on the highly organic soils, but where the organic matter falls to 5%, the rates are similar to those in Britain (about 1½ lbs. active ingredient per acre). In the southern areas of the Netherlands, on the sandy soils, if the organic matter content falls below 3% growers are warned that they use Simazine at their own risk. Atrazine, still rather in the experimental stage, is less dependent on weather conditions than Simazine but they are looking to further work on its effect on newly-planted stock before making recommendations. Lenacil does not work as well as Simazine and is not much used. Rosaceous shrubs have been damaged by Dichlobenil and Chlorthiamid. Paraquat is used in very much the same way as in Great Britain. The party had a detailed tour of the glasshouses on the Station. Each member probably noted his own particular interest; it is indeed impossible to record in any brief report all the information that was made available on this occasion.

The work on rhododendrons was particularly interesting. Experiments are in progress to improve the techniques of propagation by cuttings instead of grafting. Some interesting hybridisation is being done with some 3,000 to 5,000 seedlings per year. By using artificial light (100 watts/m²) they hope to cut down the breeding cycle from 7 to 3 years. Some new ten-

der species have been introduced which they hope will provide a real breakthrough in new form when hybridized — we saw one such introduction, *R. leucogigas*, which had been collected 1700 m. up in Dutch Guiana. Interest was shown in deciduous azalea cuttings being taken very early from forced plants and illuminated at 100 watts/m².

Amongst the other points noted were: (1) Birch grafting — *Betula verrucosa* (*B. pendula*) and *B. v.* 'Laciniata' were both giving difficulty owing apparently to infection after the union had taken place. (2) *Malus* 'Katherine' grafted under glass; it appears that the ornamental *Malus* are grafted on apple seedling stocks, from seed obtained from the French cider industry. (3) *Cornus controversa* 'Variegata' grafted onto *C. alba* 'Argenteo-marginata' ('Elegantissima').

Nurseries of Fa. Th. Streng and Fa. J. Streng

Here were two of the typical small family nurseries — about a hectare each in a long strip of land rarely more than 30m wide. We looked at the propagation house used with mist in the summer months on conifer cuttings, but with a humidifier in winter; alternatively in very dull weather the cuttings were just cased over in plastic. The house had a wide range of *Chamaecyparis*, *Juniperus*, *Metasequoia* and *X Cupressocyparis leylandii*. A separate house was full of grafted material amongst which was a healthy batch of beech, grafted some weeks ago on to bare rootstocks and balled in peat moss before being plunged into the grafting beds. *Betula* had also been grafted but did not look so well, suffering from the same trouble as was noted at the Research Station. A good batch of *Juniperus virginiana* stocks had been brought in and were awaiting grafting. We noted also *Berberis linearifolia* 'Orange King' being taken out of the grafting house for the cold frames; it is apparently still impossible to root this successfully from cuttings. The third house we inspected was used for over-wintering small plants and we especially noted several varieties of *Acer* and *Pieris* which were now starting to grow away well.

The stocks of young *Abies*, *Acer* and various other plants potted up for grafting next summer and the following spring were of excellent quality. We were impressed, too, by the good range of *Rhododendron impeditum* and other similar dwarf forms. More unusual to British eyes was the very wide range of blueberries (*Vaccinium*) grown mainly for the German market.

On the nursery of J. Streng there was a house crammed with camellias. A very large number of small plants raised from leaf-bud cuttings and planted in Jiffy-Pots had been placed on high staging under which stood the stock plants — yet another example of Dutch intensive growing.

During a discussion at this nursery of the economics of the small producer in Boskoop, Mr. Van Elk made it clear that he did not consider that the financial remuneration was ade-

quate and mechanisation would be difficult though it must come increasingly in the future. He thought both planting and potting machines would be used. An interesting and surprising piece of information forthcoming was that the water in the canals generally had too high a salt content to be used on container-grown plants.

G. Kooy and Zn.

This holding was unusual in that it specialised in herbaceous plants; the range of plants grown was wide but traditional for there seems to be little work done in the introduction of new herbaceous material. Again most of the operations were done by hand, with hand hoeing more widespread than herbicide application. We noted phlox propagated by root cuttings taken direct outside and planted out in early April. The most interesting aspect of this nursery was the extensive use of cold stores which enabled planting to be carried out in sequence almost the entire year through again ensuring maximum land usage. The stores are maintained at about 0° to 0.5°C and incorporate humidity control for an air humidity above 96% is required. All herbaceous plants which normally die down in winter can be stored for late planting when soil conditions are ideal; fast growing, leafy material does not store well.

F. J. Grootendorst

Here was a nursery with many modern features, and with a propagation and production area recently built. This comprised a 3-span propagating house, each span partitioned off from its neighbor. On the northern end of the propagating house was a working shed for grafting and potting which also acted as an access corridor to each of the three portions.

At the southern end was a double-span, growing-on house, which also acted as an access corridor to the propagating house.

The working shed was well equipped with ample fluorescent lighting and a well designed fixed bench, running the entire length. Swivel chairs adjustable for height and having a movable backrest were provided for the grafters.

The propagating house was constructed of western red cedar and incorporated the Boskoop system of double glazing. The inner layer of glass, consisting of sheets butted against each other and held by retaining laths some $\frac{5}{8}$ ins. away from the outer conventional lapped sheets. The inner sheets could be fairly easily removed for cleaning by unscrewing the retaining laths, but this tiresome and time consuming job had not been carried out on most of the units we had visited. At Grootendorst's the glass had not yet been up sufficiently long to be very dirty.

The propagating house was shaded by rolled laths pulled up and down by pull wires. This system replaced the laborious method of manually rolling out laths as seen in some units including the Experimental Station. The propagating house had

soil level and waist level benches, one portion being devoted to mist propagation, using a Danfos unit. The other two portions appeared to be equipped for closed cases. The size of each portion was approximately 20 ft. x 60 ft..

The two-span growing-on house was single-glazed, mainly constructed of metal; each span was approximately 15 ft. x 60 ft.

Crops

Chamaecyparis obtusa 'Nana Gracilis' was being grafted in the working shed.

The mist house contained many rhododendron cuttings; these were inserted into pure peat, given a heavy wound and treated with Rhizopon (powder formulation of rooting hormone). Rooting had not yet occurred in many cases, indicating that they were struck later than is normal in the U.K.

Other portions of the propagating house contained grafts, including *Juniperus* and *Quercus*. Potted-off *Juniperus virginiana* seedlings and *Juniperus chinensis* 'Hetzii' from cuttings were being used as understocks. The *Quercus* were all grafted on to bare-root stocks, the roots of which had previously been wrapped in sphagnum moss. The side graft was used. Types worked on *Q. robur* and *Q. coccinea* were seen.

The growing-on house contained potted plants of *Actinidia kolomikta* raised from cuttings taken in May or June and *Aristolochia siphon* propagated from grafts on own roots. With the latter method we were told that the polythene must be raised on wire hoops well above the grafts to avoid damping off. The pots used were plastic square pots giving good economy of space. An efficient staking system involving a 4 ft. cone supported by nylon strainer cords at the top was used.

Discussion with Tony Ogden, an ex-student from the West of Scotland College who had worked here two years, revealed that the potting composts were all brought in; one having a relatively low fertility level was favoured for understocks.

(Note: The Editor is grateful to the President, Vice-President, Secretary and to Mr. A. D. Weguelin for supplying most of the information on which this account is based)

SIMPLE CO-ORDINATED PROPAGATION EXPERIMENTS

At the Regional Annual General meeting at Hadlow in September, 1969, members expressed a wish to undertake among themselves simple propagation experiments, co-ordinated in such a way as to provide information on both general principles and specific details of technique. If successful, this venture could become a permanent and useful feature of the Society's work and could be geared to the particular needs of members.

Dr. B. H. Howard of the East Malling Research Station, Nr. Maidstone, Kent, has accepted the Region's invitation to