

Table 4. Establishment (per cent) as related to season of planting for 'Janirek' cuttings

Collection day within each month	Sept	Oct.	Nov	Dec.	Jan.	Feb	Mar.
10th	—	0	40	53	61	35	0
20th	0	12	59	65	66	42	0
30th	0	33	62	63	58	20	0
Mean	0	15	53	60	61	32	0

Discussion

In reply to Bill Flemer, Brian Howard emphasised that cuttings should be planted 7"-8" deep and not shallowly. The following points were made in reply to questions posed by Donald Cook: (i) that a high concentration of hormone for a short dipping time produced the same effect as a low concentration for a long period dip; (ii) that uptake was affected by the moisture status of the cutting, significantly greater uptake being achieved when moisture tension of the cutting was high (i.e. the cutting had been allowed to dry out slightly) fresh cuttings needed a higher concentration of hormone than partially dried cuttings; and, (iii) that cuttings should be left to dry partially after treatment so that uptake through the base is enhanced.

Jim Wells enquired about the use of powders. Brian Howard intimated that East Malling has always used liquid formations because of the precision with which they could be used. He had a series of powders under observation but different factors were involved, one of the chief problems being in the cell penetration of the hormone; this could be affected by the use of wetting agents (e.g. alcohol, water, D.M.S.O., etc.) but was also related to the grade of the powder.

PLANNING A PRODUCTION FLOWLINE

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Each nursery produces a different product mix. For any particular plant there are several ways of propagation and any one of them can be correct within the disciplines that the layout, resources and skills impose on a particular nursery. So today you are not going to get definite solutions to your own problems —

rather I hope to stimulate thought and discussion which may help you with your own particular problems.

There is talk within the industry in the U.K. of over-production in some items. There is truth in this for some particular plants. Thus it becomes vital to produce plants which can be sold. Remember that if you produce 100 plants and you are expecting to make 15% profit you will only cover your costs when you have sold 85 of those plants all the profit lies in selling the last 15.

So our first requirement in planning our propagation is an accurate sales record. At Bransford we only have 3 years records but already it is beginning to show trends. We are selling proportionally less of the cheaper lines and more of the more difficult and more expensive items. Accordingly, we are adjusting our propagation programme.

You will note that at this point I have said nothing about the way in which the numbers wanted of a particular plant are to be produced. At home we produce a list with the required numbers of each variety and we then divide it into field and indoor propagation. Dealing with the indoor list — this is again divided into 1st and 2nd priority. A plant will go into 1st priority on two grounds.

1. It is an item where timing of propagation is vital.
2. Unsatisfied demand, or rather, a demand in excess of expectations.

A variety in the 2nd priority list can be one where there are alternative ways of propagation; e.g., if we miss propagation under mist in the summer then we can catch up with hardwood cuttings in the winter.

When deciding on a propagation programme, there are a number of very obvious limitations which must always be borne in mind. It must fit into the available propagation space. It must fit into the available labour. It must not produce more plants than there is room to grow on, but with the qualification that the aim should be to produce 110% - 125% of the plants required and to dump the poorer plants at some time. I am convinced that this is a correct way of doing it. It is never worth while trying to produce a good plant from a poor rooted cutting. Finally, there must be sufficient material of the correct type available.

So now we come to the provision of the propagation material. At Bransford, up until now, many of our cuttings come from stock beds planted out both to provide such material and as display areas — or from saleable plants. I am sure this is wrong. So what should we be doing; or rather, what are we now aiming to do?

We are in the process of clearing a fair-sized area close to our propagation block by fallowing for a full twelve months to remove all the perennial weeds. This is then due to be planted out with the best forms of each particular plant in rows. This should enable us to collect much more propagation material than we need, quickly. By cutting all the plants — shearing hard — we should be able to produce cuttings which are at the correct stage of juvenility and growth when we want them. And by putting fair numbers of plants out — more than are wanted — to produce the number of cuttings we require now we have, as it were, a deposit of cutting material to enable us to switch our programme quickly if our sales record tells us it is correct to do that. This area will be kept clean without the use of any residual weed-killers.

Again, you will note that there are built into what I have said, some qualifications. Such a regime will not suit all plants and we have to make provision in the correct way for these. I can think of azaleas, magnolias, rhododendrons, etc. which would obviously require shade, as an example; other limitations will no doubt occur to you.

Such a stock area has other advantages in that it should become easier to control pests and diseases because the plants are closer together. Also by rigorous selection it should be possible to maintain superior plants. I am sure that as an industry we pay far too little attention to the latent effects of virus diseases in the plants we produce. If we can maintain virus-free stocks of a plant, there will be very considerable benefits to be gained in growth rates, propagation percentages, and general livability.

It is also easier to control the feeding of a group of similar plants — to produce the right sort of cutting material — with the correct balance between nitrogen and other food elements.

Other things being equal we have, for the purposes of this talk, provided ourselves with a plentiful supply of the type of cuttings we want in the varieties needed and we come to the problem of putting on the so-very-necessary roots. Whilst we, like so many nurserymen, use mist for our propagation, I am becoming increasingly aware that plants have very differing water requirements over the period of propagation. We have found with the more difficult-to-root subjects that a lot of water at the beginning followed by a very considerable reduction in the later stages is of great benefit. To this end, an adjustable control unit is of much value and we shall be converting some of our older control units.

Within a range of plants there are large differences in temperature requirements for the undersoil heating. With this in mind, I think that there are advantages in small units perhaps of

only 3 or 4 sq. yards, each with its own control for heat and mist.

Whilst the design of the bench is a matter for the individual nursery, there are obviously certain basic factors to be considered. Firstly, let me put in a plea for flexibility.

1. Root cuttings directly into a rooting medium straight on top of the heat source.
2. Root cuttings in boxes or trays, over-winter in trays.
3. Root cuttings in individual pots.
4. Be converted easily and quickly to other purposes — such as a grafting case.

Such a bench must also provide drainage for water and air. Air circulation is far too often neglected and contributes to a large number of disease problems.

With cuttings in a bench in conditions of high humidity, disease is always close at hand and a regular programme of prevention is better than attempts at control.

The media to be used and the rooting hormones used are subjects which are obviously vital but I don't propose to do more than mention them. Other people closer to actual propagation are much more skilled than I in talking about them.

The handling of rooted cuttings is an area where I do feel more qualified. Firstly, at home we have been doing too much potting. Increasingly we are tending to put plants directly from the rooting bed into a container in which they can be sold. To do this there are certain very definite requirements in the compost. It must be sufficiently loose that relatively small, immature roots can penetrate it quickly and easily. It must be free draining to stop water accumulating whilst the container fills with root. And perhaps most importantly, it must have a very low salinity.

Some of the work which Arthur Carter and his people have been doing have shown that certain well known composts and fertiliser mixes can give large numbers of deaths during this establishment period. Over the last few weeks, we have potted some 7-8,000 conifers rooted last winter into 5" polythene bags. There are perhaps 20 deaths in all. In fact, there are less losses here than in a batch which, were in small pots for a year to develop a root-ball before potting on. You can only do this with a compost which has a very low salinity. If there are soluble salts in the compost, there will be deaths. So I would say either use Osmocote or a similar slow-release fertiliser, which does not begin to release feed for 3 weeks or so, or use liquid feed, giving the plants a period without feeding to establish themselves. One word of warning with Osmocote and rooted cuttings; we have

had considerable losses when we have mixed and stored the soil for a period before use, so allowing salinity levels to build up.

I am less catagoric about the container which should be used for rooted cuttings except to say that it could, with advantage, be considerably larger than is commonly employed — always with the proviso that there is sufficient growing-on room to take a larger pot. Try as far as possible not to mix types of containers. One of the worst mixes is clay and plastic pots, which need totally different water regimes

As far as possible, handle your rooted cuttings in bulk loads. Using 2½" pot as an example, one person can pick up 6 or perhaps 8 pots in his hands — 15 in a seed tray, but he is perfectly capable of lifting 30 plus if the correct sort of carrying tray is available.

The overall layout of the propagation area is important and at Bransford we have, after a period of developing like Topsy who just grew and grew, settled on a plan to which we can add for future expansion. It is important to be able to increase the overall size of a unit without too great a disturbance.

We have our propagation facilities at one end then follow this with a 64 x 20 glasshouse fitted with wooden sides. Each side will have 4 polythene tunnels running off at right angles. One side will contain plants which have to go towards the potting shed and the other will hold those plants which don't need to go through it for one reason or another. The main glasshouse contains a work area — flexible in position so that it can be moved round to any place wanted. It also has heaters for the polythene tunnels; most of the area is shaded with white polythene to enable us to wean plants from mist properly before moving them into polythene tunnels.

Eventually, the whole area will have concrete paths and we shall be moving plants around on trays on a close equivalent to a dinner trolley.

With this sort of lay-out, expansion of propagation space in one direction can be coupled up with the correct increase in growing area in the other direction.

Time obviously limits me but in consideration of a Flow Line, thought should also be given to the following items.

- Compost mixing
- Liquid feed systems
- Cyclic lighting
- Potting Machines
- Cold Storage

In conclusion, I want to introduce six words which were drummed into me some years ago in a work study course. They

are — “THERE IS ALWAYS A BETTER WAY.” So don't be complacent. In these days of rapidly escalating costs it is vital that we keep on searching for ways of producing plants more cheaply.

RECENT DEVELOPMENTS IN THE PROPAGATION OF RHODODENDRONS AT BOSKOOP

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Abstract Briefly, the propagation of rhododendron cuttings in Boskoop is described. A soil temperature of 20°C (68°F) proved to be the best. When the pH of the cutting medium, pure blond peat, is too low this can be raised by adding 1-3 g/l of a chalky compound. With only small losses one can make cuttings at the beginning of October. The best time proved to be the second half of November or the beginning of December.

After quick-dip treatment of 2,500 to 30,000 ppm, rooting was poor in comparison to the rooting of cuttings treated with a powder of 8% IBA + captan (83% spray material).

INTRODUCTION

Altering the words of a famous saying, I should like to say “What is in a rhododendron cutting”. We, in fact, do not know so much about it. By concluding and deciding, people all over the world try to solve problems; we also do so at the Proefstation voor de Boomkwekerij in Boskoop. With the aid of ideas gathered in literature and the conclusions of our own trials, still existing problems must be solved. Working with living plant material, growing each year in totally different circumstances, it has been seen in several experiments that repeats of the same propagation experiment in one year often produce almost identical rooting percentages.

Because it sounds less scientific, statistical analysis of one experiment for one year does not convince a Dutch nurseryman. The importance of a certain method must be proved over the years. For that reason we try to develop repetition over the years by making cuttings of as many cultivars as can be obtained in the same trial, sometimes the details are altered but the trial will be repeated till the regularity of the results has been proved. This means that every trial will be repeated at least three years in succession, for the second year's results could have been reached by chance.

Briefly, I will speak about the normal way of rhododendron propagation and mention some of the trials and the results ob-