

jects bed temperatures of around 19° to 20°C are maintained and we don't mind if the air temperatures rises into the 30's°C, provided the humidity is high. In the winter (from September to March) supplementary lighting, a minimum of 16 hr up to 24 hr a day, is given.

4) Ventilating the case. This is the most critical period of the weaning process. Air is admitted gradually, increasing the shade if necessary during the first few days. If the substrate appears to be drying then a light watering is given. Subsequent waterings usually contain a feed. A further fungicide spray is given at this stage, too. Gradually the amount of ventilation is increased, humidity and shading reduced. Once the young plants are sufficiently hardened and growing well they are transferred to their growing-on areas. The conditions and treatment subsequently will, of course, be appropriate to the individual crop's needs.

WEANING PLANTS FROM TISSUE CULTURE

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I would like to relate my experiences with the weaning from tissue culture of the following classes of roses: Hybrid Tea, Floribunda, Miniature, and Rugosa, as well as the following herbaceous plants: *Bergenia* (cultivars), *Hosta*, *Linum*, *Potentilla*, *Rodgersia*, and *Dicentra*.

Plants received from the laboratory must be in first class condition, free from infection, all clean with a good root system of even size and ideally be kept in a cool room for two days prior to potting into soil.

Compost should be nice and open — a fairly coarse peat containing sand and grit, or alternatively, 40% perlite. I have been very pleased with roses grown in a compost containing Enmag.

It is essential that compost be well soaked prior to pricking off plants. Two days prior to planting we drench the compost with Cryptonol at 12 fl. oz in 25 gal. water.

ROSES

Containers for roses are AP40's or Propapak's which we find are good, practical modules to use, although we are unable to sterilise them for second time-around and have, there-

fore, been taking a close look at Hassey trays. Rooting in Propapaks seems to occur around the edge, whereas with Hassy trays it appears to be more compact and forms a better module.

When pricking off from tubes into soil, one must not fall into the old nurseryman's trap and plant everything; one must be selective and any tube with slight infection must be destroyed. Most plants produce a complete new root system once inserted in the soil. Trays of plantlets are placed on the usual sand bed, 2 in. deep within a greenhouse and covered with milky polythene.

We try to avoid watering overhead for at least a week after standing down trays and spray twice a week with Rovral overhead — although I question the effect of Rovral on rooting and feel Benlate more beneficial to rooting, although recently we have tried a drench of Cryptonol in preference. It is essential to pick off all dead and diseased foliage weekly. For general pest and disease control, we now use fogging machines.

Roses generally root through after ten days from pricking off. Unless we achieve at least 85% good quality plants we feel we've failed and it is uneconomic. After three weeks roses can be potted into 5 in. pots, again into a good, open compost containing Enmag. It is essential once roses are established in the pot to stop down to one leaf above the soil. To give a good saleable container rose by autumn, it is vital to wean in March/April from the laboratory, the final potting taking place in June/July.

Some rose cultivars like 'Elizabeth of Glamis', 'Orange Sensation' and 'Grandpa Dickson' produce a number of shoots from the base naturally, whereas 'Peace', 'Fragrant Cloud' and 'Wendy Cussons' seem very reluctant to break naturally.

The problem with most hybrid tea and floribunda roses appears to be that once they produce bloom in abundance they become top-heavy and flop, in spite of the fact that they have a great root system. It is vital to stop twice, usually in July and in August.

Unless regular stopping is done, in no way will a rosebush reach a saleable size and standard that is expected by the garden centres of today. Very few cultivars break naturally.

Roses produced from tissue culture and planted in a bed alongside roses produced from budding in the field, during the very bad winter two years ago, survived the winter much better than the field roses, kept their foliage much longer, came into flowering a fortnight earlier in the spring, were free from suckers and disease and by the second year were as big in size as their counterparts.

In most cases roses appear to resist most of the effects of the elements better on their own roots than do cultivars on rootstocks.

HERBACEOUS PLANTS

If the plants selected from the tubs are of good quality, well-rooted, uniform, and not too leggy, they will resist all problems and wean very easily. The biggest problem with herbaceous plants is "damping off".

We first used Jiffy 7's net-covered peatballs for herbaceous plants, but found problems with "damping off", and when plants in this module are potted on they appear to have difficulty in rooting through the net.

Experience has shown that herbaceous plants root very well in Propapaks or AP40's on sand beds in a good open compost without Enmag, although for most of our contract growing we find growers prefer herbaceous plants in 2¼ in. Jiffy Pots, as these provide a better and bigger growing module for transplanting.

With 2¼ in. Jiffy Pots we use a compost which contains up to 40% perlite or Silvaperl to provide good drainage and aeration at all times, because the pot appears to get too wet, causes "damping off", and algae tend to survive. Compost also tends to seal over in these pots if they are dry for long periods.

It was felt that herbaceous plants would be better grown on slatted benches during the spring and summer, but results have shown that plants grow much better on sand beds during the summer months and certainly herbaceous plants do better under capillary watering than overhead watering.

Milky polythene must be removed off plants as soon as they are established (approximately after 7 to 10 days). We use milky polythene to reduce light, as the sand beds are situated in alloy tomato glasshouses where high summer light is a problem.

Herbaceous plants from tissue culture establish much better and quicker out-of-doors, even during inclement weather, as they have a superior root system to those produced by the usual propagation methods. With herbaceous plants from tissue culture it is possible to programme more easily and to crop over a longer flowering season.

MICROPROPAGATION DISCUSSION

A question was asked on whether the amount of hand labour required would be the downfall of micropropagation as a technique unless something could be done to mechanise

operations. The speakers felt the ultimate answer would be to go back to single cell or liquid culture but this was some time in the future. In the short term some effort was needed to study the technique from a horticultural angle and adapt from the research methods; at present the most promising stage for mechanisation was during weaning from culture to the growing medium, using a system such as the NIAE bandolier.

Rhododendron yakusimanum was difficult to micropropagate. The problem was the hairs which made it difficult to clean without damaging the tissue and, if this happened, then the culture died. Young material had few hairs but if it was taken right back to the meristem then it was difficult to get it to respond. If buds are used from hybrids there is a good response, but bud tissue from *R. yakusimanum* itself will die. This seems to be a possible technique for distinguishing the species from the hybrids.

RESULTS OF THE IPPS QUESTIONNAIRE ON THE PROPAGATION OF SOFT AND SEMI-RIPE CUTTINGS

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At the 1981 G.B. & I. Annual Conference, the topic of "Work Rates" was discussed at considerable length. It was suggested that an attempt be made to determine average commercial rates for a range of key nursery tasks.

Subsequently, in May, 1982 our Vice-President, Michael Dunnett, devised and sent out a questionnaire to selected members of the Society on the subject of "Propagation of Soft and Semi-ripe Cuttings". The instructions were, "to select any one week between 1st June and 30th October 1982, and record the number of cuttings which you take and insert during this period".

A recording sheet was provided for the relevant information, together with the questionnaire to be completed. Eighteen nurseries responded.

QUESTIONNAIRE

The questionnaire asked the following:

1. a) Total number of cuttings taken
- b) Number of workers used