

WEANING AND GROWING-ON OF MICROPROPAGATED ROSES

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The technique of micropropagation is now proven for many types of nursery stock—especially roses of all types. Micropropagated roses are easy to prune; have no wild suckers; more flowers and, for the grower, make container production easy. These attributes have ensured the adoption of the technique for roses.

Two difficult stages in the production of micropropagated roses are weaning and growing-on. This paper will discuss how we at Micropropagation Services carry out the weaning and some of the recommendations we make following trials on the growing on of young plants. I will also discuss some of the problems of weaning and growing-on and how to overcome them.

WEANING

Many of the problems of weaning can be overcome by good horticultural practices and a propagator's attention to detail.

The quality of shoots produced in the lab, including the type of shoot, how it is handled, culture media, etc. all affect how the plants will grow on later. A good quality robust shoot 1 to 2cm in length with 2 to 4 well developed leaves has a good chance of survival even if the weaning conditions are not ideal.

Stage of transfer to compost is also critical in the same way as potting-on can be with conventional cuttings. Shoots are put on culture media containing a rooting hormone for just long enough to initiate roots but not long enough for them to grow, otherwise they can be damaged on transfer to compost.

A free-draining compost is essential to avoid waterlogging as well as a low nutrient level to prevent checking. Some nutrient is required as soon as roots have developed and liquid feed should be applied as soon as possible.

The weaning environment is critical, but does not need to be anything very special. We use conventional mist successfully, but timed/solar control with regular manual adjustment is so far the only way we have been able to obtain satisfactory control. Basal heat, 20 to 24 °C and air temperature of over 20 °C, works well and, for year-round production, supplementary lighting is needed to maintain a 16-hour day. In fact, conditions are used that are much the same as for rooting many softwood cuttings.

Disease control must be good, and a regular routine preventative spray for *Botrytis* is needed together with powdery and downy mildew control, once weaned. For *Botrytis* control we use a number of standard fungicides (i.e. Rovral, Benlate, Captan), used in rotation. The weaning process takes approximately 2 weeks under mist plus a further 6 to 8 weeks in a heated glasshouse and at least 2 weeks hardening off in a cold house—a total of 10 to 12 weeks. At that stage the weaned plant should have a well established and ideally ‘‘rootbound’’ plug, and a slightly woody and robust stem. The propagule is then ready for the rigours of the average nursery.

GROWING-ON: GENERAL

Successful growing-on of micropropagated roses needs attention to the following points:

A high quality propagule is most important. The young plant should be fully hardened-off after weaning with a good root ball to ensure that once potted it grows away vigorously and is not susceptible to root rots. It should be slightly woody so that if a cold spell is encountered soon after potting the plant is strong enough not to succumb to *Botrytis* or other moulds.

Compost for potting-on should be free-draining and have a high nutrient content, preferably supplied at least in part by a slow release fertilizer (see compost formulations, Tables 1 and 2).

Pests and diseases need to be carefully controlled. Roses are susceptible to a number of both but all can be adequately controlled with a routine preventative spray programme aided by good horticultural practices. Mildews will be difficult to control under protection if ventilation is poor. Aphid and red spider mite can also be problems when growing under glass, but are usually not so serious once plants are moved out onto nursery beds. Under high humidity conditions, inside or out, preventative measures against downy mildew need to be taken. This disease can cause stunting or spindly growth and lack of vigour, even without showing the obvious symptoms of leaf drop and purple/yellow spots on leaves. These spots will be angular, often bordered by the leaf veins.

Downy mildew is often mistakenly identified as blackspot, but because of the initial clean status of micropropagated roses any leaf spotting is more likely to be downy mildew unless there is already a source of blackspot infection close by. (More details of identification of these diseases can be seen in a paper at this Conference by David Rowell).

Preventative sprays for downy mildew are essential when growing roses intensively as, at present, there are no effective curative treatments and, like all diseases, prevention is easier and

better than trying to cure. Adequate control can be easily achieved by the correct preventative spray programme (e.g. Fongarid or Fubol).

Growing on as liners.

The best micropropagated roses in 3 litre pots are produced by potting into a liner pot first—(7cm square or 9cm round). If a final product in less than a 3 litre pot is desired, direct potting can be successful.

Liners are best potted under protection. September to April under cold glass or polythene tunnel, in May to September a shade tunnel, or just a sheltered area on the nursery is sufficient. Micropropagated roses respond to a compost with a high nutrient status, which is best provided by slow-release fertilizer with additional liquid feed after potting and at times when release is not fast enough. Our compost recommendation is shown in Table 1.

Table 1. Compost formula—liner stage

Ingredient	Quantity
Irish moss peat, medium grade	
Cambark 100	10% to 25% by volume
Magnesium limestone	2.4Kg/m ³
Fritted trace elements	0.3Kg/m ³
Osmocote (Ficote), 5-6 months	4Kg/m ³
Wetting agent (Aquagro)	

NOTE High level nutrient. Additional liquid feed may be needed as a 'start up' and at times of rapid growth.

It is very important to pot deeply at each stage of potting, this reduces wind rock and encourages the production of a 'crown' below the compost surface, ensuring frost hardiness. It also assists the natural bushiness of micropropagated roses. After approximately 8 weeks of reasonable growing weather the liner will be ready to pot on; it is best moved on promptly to prevent any check in growth. However, if desired, the liner can be held for quite a long period until a more convenient time for potting (e.g. over-winter). Micropropagated roses flower at a young age, even in liner pots—this has allowed a new market to be developed—the sale of roses as pot bedding.

Growing-on as container plants in pots of 3 litres or more.

Again a high nutrient compost is required (see Table 2). Pruning may be required at potting, cutting back to 4 to 6 in. to prevent wind rock. Containers should be placed on well-drained nursery beds or capillary beds, if available.

Micropropagated roses will at this stage start to show their natural bushiness with the production of numerous basal shoots. Saleable flowering plants can be expected 8 to 10 weeks after potting from liners. The two selling seasons, spring and late summer/autumn, are catered for by: 1) spring/summer potting of plugs, producing saleable plants for late summer/autumn or early the following spring, or 2) late summer/autumn potting into liners (over-winter liners), potting-on in early spring for late spring/summer sales.

Table 2. Compost formula—container stage

Ingredient	Quantity
Irish moss peat, medium grade	
Cambark 100	20 to 30% by volume
Grit	10% by volume
Magnesium limestone	2.4Kg/m ³
Fritted trace elements	0.3Kg/m ³
Osmocote (Ficote) 12-14 months	6-8Kg/m ³
Wetting agent (Aquagro)	

NOTE: High level nutrient. Additional liquid feed may be needed as a "start up" and at times of rapid growth.

FIELD GROWING

Initial trials on field planting of well-rooted plug plants has shown that a substantial plant can be produced within 12 months. This opens up the possibility of producing roses for the established traditional markets as "bare root" and/or "root wrapped" plants, or containerized field-grown plants. The latter may seem a retrograde step, but it may be economically advantageous to do so. The fibrous roots of micropropagated roses would lend themselves to being containerized rather better than those of the woody, non-fibrous roots of conventional budded roses.

GARDEN PERFORMANCE

If micropropagated roses are grown in the garden and pruned in the traditional way, they look, perform, and survive as well or better than budded plants. If, however, they are pruned more vigorously, by hedgecutter, flail mower, etc. they grow back more vigorously with more shoots and more flowers. Of course, micropropagated roses have the added advantage of not producing root suckers, and so they are much easier for the gardener, and/or landscaper to handle.

UNUSUAL WAYS TO USE MICROPROPAGATED ROSES

Pot-bedding. The property of micropropagated roses to flower at a young age, even in liner pots, has allowed a new market to be developed—the sale of roses as “pot bedding” plants. The vigour of micropropagated roses ensures good establishment and the gardener/landscaper will have fully established rose plants in the second season. All types of roses can be sold at this young size and perform very well.

Mail-Order. Micropropagated roses can be sold mail-order from a size of 3 to 4 in., allowing the maximum benefit of cheap distribution by post.

Hanging Baskets. Many of the new ground cover types make excellent hanging baskets when produced by micropropagation which maximises bushiness.