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CAMELLIA PROPAGATION

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INTRODUCTION

The demand for camellias has increased over recent years as its potential as a garden/patio/conservatory plant has been recognised by a wider sector of the public. At the same time the traditional sale by length of often single stemmed plants has been replaced by a demand for younger well branched/budded material. Production of this type of plant has required close attention to detail at all stages of growth and a recognition that quality and type of cutting, together with their treatment both during and after propagation, has a major influence on establishment and subsequent growth. This paper reviews the various factors influencing the successful propagation of quality camellias which have been identified during our extensive experimental programme on camellia production at Efford EHS, which culminated in recommendations for an accelerated production schedule (1).

SOURCE OF CUTTING MATERIAL

A source of quality, well-graded cutting material provides the key to a successful propagation programme.

Growing plants: A major source of propagation material has traditionally been from the growing crop when stopped back in the autumn. However, material from this source is often variable and limits the scope for stopping during the season to improve branching.

Stock plants: Ideally cuttings should be obtained from stock plants either container-grown specifically for this purpose or from a stockbed area. This provides the opportunity for manipulation of growth to produce flushes of quality material and selection of graded cuttings. At Efford an area of stock camellias has been planted and has provided information on plant management to achieve this objective.

In the south of England stock plants can be grown outdoors but

chlorosis and "bleaching" of foliage together with hardening of growth can occur from too high light intensities (sunscald). Use of a 50% shade structure over the plants has eliminated the adverse affects of sunscald and has produced a marked improvement in growth and quality of cuttings. Further north greater stock protection will be required, either under plastic film or glasshouse structures.

Provided camellias are planted on a soil type suitable for calcifuge plants (pH range 5 to 5.6) then the fertilizer rates shown in Table 1 have given excellent growth under Efford conditions.

Leaflet 642 "Nutrition of Field-Grown Nursery Stock" gives fuller details.

Table 1. Recommended fertilizers for stock planted in the field (kg/ha).

	Fertilizers required before planting					Fertilizers required as annual top dressings in the first few years			
	Index before planting					Index before planting			
	0	1	2	3	over 3	0	1	2	over 2
Nitrogen[1] (N)	50	—	—	—	—	50	—	—	—
Phosphate (P_2O_5)	100	75	50	25	Nil	50	25	Nil	Nil
Potash (K_2O)	200	150	100	50	Nil	100	50	25	Nil
Magnesium[2] (Mg)	75	50	25	Nil	Nil	25	Nil	Nil	Nil

[1]Low pH maintained by use of ammonium nitrate (34% N).
[2]Similarly, Kieserite used as source of magnesium in preference to Mg-lime.

Regular pruning is important to maintain "juvenility" and produce uniform flushes of cuttings. With older plants (5 to 10 years) a "renewal pruning" is practised. In early spring the older third-year wood is cut hard back. The resulting growth from latent buds is extremely vigorous and unsuitable as cuttings. However, when these shoots are cut back by half in the second year a good flush of cuttings is produced prior to its removal in the third year.

Good hygiene in the stock area is also essential to ensure only healthy cuttings are taken on into propagation. A previous paper (2) outlined problems encountered from the disease, *Monochaetia karstenii* which, if allowed to build up unchecked, caused severe leaf drop and death of cuttings and young plants. Stock plants themselves are in the main unaffected by this disease but provide a major source of infection, spores overwintering on dead flowers, in stem lesions, and on damaged leaves. Regular stock inspection and removal of dead, diseased, or damaged material is important together with a routine fungicide programme with an application prior to taking cuttings. In trials, a formulation of prochloraz/manganese complex (Octave) has given reasonable control of the disease.

PROPAGATION

Type of Cutting: Ideally terminal cuttings should be used since they produce plants which branch more freely and grow away faster than those from leaf bud cuttings. The latter should only be used if material is scarce since plants from these cuttings may well take an extra year to produce as well as having poorer basal branching.

Trimming of leaves to increase density during propagation needs to be avoided if at all possible since the cut provides entry for the wound pathogen, *Monochaetia karstenii*. Some cultivars are more susceptible to the disease than others (i.e. Donation, Henry Turnbull) and, if space is limiting, some selection as to which cuttings are less likely to become infected if trimmed is possible.

Time of Taking Cuttings: Two main flushes of growth are produced each season, the first in April-June, followed by a second in late July-August, depending on site and season. This enables two batches of cuttings to be taken:

(a) July/August as the first flush of growth ripens.

(b) November-January from the second flush.

The summer strike is particularly suitable for the accelerated schedule or production of liners since cuttings can be potted during November into 70 to 90 mm pots which, if held under glass with a minimum of heat, become sufficiently established to pot on the following spring.

Propagation Environment: Control and handling cuttings under different environments is a subject on its own and can only be mentioned briefly in this review. Successful summer propagation can be achieved under intermittent mist, a closed mist system as developed by IHR Littlehampton, where the mist line is enclosed within a polythene tent, or under a fog environment. At Efford a pressurised air/water fog system is in operation (Macpenny) with propagation under a relatively "dry fog" produced by 10 to 25 psi water pressure/70 psi air pressure, though still maintaining a relative humidity (RH) in excess of 95%. Accurate control of RH is essential when using fog and results with an electronic humidistat (Nobel) have been good. These environments can also be used for the autumn/winter strike, but at this time of year a low plastic film tent supported just above cutting height gives excellent results, and reduces fuel costs (3). Shading during bright weather becomes particularly important for this latter system. Direct comparison of the various systems at different times of the year is still in progress.

Rooting Temperatures: Satisfactory results have been achieved for a range of cultivars with a minimum of 15°C maintained in the rooting medium. However, in some seasons a minimum of 18°C in the medium has improved the speed of rooting.

Rooting Hormones: Both powder and liquid quick-dip formulations have been trialled over several years with results somewhat variable between season and cultivar! Overall, quick-dips (lower 5 mm of stem held in solution for 5 seconds) have given as good and, in some instances, better results than the talc formulations. Trials are continuing but general guidelines are as follows:

Powders: Seradix No. 2 (3000 ppm IBA) used for summer propagation,
Seradix No. 3 (8000 ppm IBA) for winter propagation.

Quick-Dips: Both IBA (in 50% acetone) and Synergol (50% IBA, 50% NAA) have given good results. Rates of 1000 to 2000 ppm for summer propagation and 2000 to 4000 ppm for winter propagation have been used successfully, the higher concentration in each case being used for the more difficult rooting cultivars.

Rooting Media: Cuttings will root successfully in a wide range of media including mixes of peat, peat:grit, and peat:perlite. With these mixes it is important to provide a dilute liquid feed programme following weaning in order to maintain cutting quality. More recently the use of a peat:granulated pine-bark mix, together with the incorporation of a long term, slow-release fertilizer has enhanced root development and maintained cutting quality without any apparent adverse effects on rooting percentage. This improvement in cutting quality, compared with cuttings from similar mixes without nutrition, has improved establishment and early growth after potting.

The standard rooting medium in use at Efford at present comprises a 50:50 mix of medium Shamrock sphagnum peat:granulated pine-bark (Cambark fine) with a 12 to 14 month controlled release fertilizer incorporated into the mix (1.0 kg/m^3 for summer propagation under mist; 0.75 kg/m^3 for winter propagation under polythene).

Trials in progress are looking at the influence of proportion of bark in the rooting medium as related to longevity, and the rate of fertilizer incorporated. Higher rates of the 16 to 18 month fertilizers (2.0 kg/m^3) look promising.

Use of the direct sticking technique with 1 or 2 cuttings inserted in 70 mm pots in fertilized peat:bark mixes has also been successful for a range of relatively easy rooting cultivars (Tiptoe, Donation, Mattie Cole). Fuller details of nutrition during and after rooting and direct sticking results can be found in the 1985 IPPS Proceedings (4).

Liverwort has become a problem since using fertilized rooting media under high humidity environments. The problem may be

reduced or avoided by placement of fertilizer in the lower horizon of the rooting container instead of mixing throughout, and trials are in progress to compare cutting response to the two methods of incorporation. Screening chemicals for prevention of moss and liverwort during propagation is also in progress.

Pests and Diseases: Sciarid fly appears to be an increasing pest in the better aerated propagation mixes. Drenching with diazinon or fonofos (Cudgel) after rooting has now become a routine procedure.

Losses during propagation from diseases can be reduced by strict attention to hygiene reinforced by a routine fungicide programme. Mention of hygiene in the stock area, plus selection of healthy cutting material, and avoiding trimming of leaves during propagation has already been discussed. Routine inspection during propagation to remove dead leaves and cuttings is important to reduce colonisation by *Botrytis* and *Monochaetia* spores; the use of a clean water supply (mains) will reduce the risk of diseases such as *Pythium* and *Phytophthora* species.

The current fungicide programme in use during the propagation of camellias at Efford includes a rotation of benomyl (Benlate), prochloraz/manganese complex (Octave) and iprodione (Rovral) sprays at fortnightly intervals.

In conclusion, successful propagation of camellias not only includes consideration of factors influencing the rooting process but also how to obtain the best quality material to take into propagation as well as maintaining that quality after rooting. It has been demonstrated that cutting treatment during propagation can have a major influence on the quality of plants growing on and that well-graded quality rooted cuttings in active growth provide the best possible start to any production schedule.

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