

Conclusions — Although most consider the short period in the spring the only time to take cuttings, you may, if you are a good propagator and have the knowhow, have success at later dates.

## PROPAGATION OF *CLEMATIS*

RAYMOND J. EVISON

*Treasures of Tenbury Limited*  
Tenbury Wells, Worcestershire, England

Clematis propagation in the United Kingdom is generally carried out by the use of cuttings, grafting, seed, or division of roots. My company only uses three methods, that of propagation from cuttings, seed and division; species are generally the only ones produced from seed. Seed is acquired from plants growing in our garden. Quite a number of species do not come true from seed and produce variations, these variations are acceptable in general commerce. The species which are produced from seed are as follows; *Clematis afoliata*, *C. campaniflora*, *C. hirsutissima* var. *scottii* (syn. *C. douglassii* var. *scottii*), *C. fargesii* var. *soulei*, *C. flammula*, *C. integrifolia* 'Rosea' *C. integrifolia* 'Olgae', *C. viorna*. *C. vitalba* and *C. viticella*. The herbaceous types are produced from divisions. Selected clones of the above species are increased from cuttings, however, in most cases they prove to be difficult. *Afoliata* can also be propagated by layering on a commercial scale. All other species and cultivars are reproduced from cuttings.

**Stock Plants.** Stock plants are only used for new species or cultivars and other clones which are very difficult to root from cuttings. In general stock plants produce cutting material which is too large for the type of commercial production methods that I use.

**Cutting Material.** Cutting material is harvested from young plants 6 weeks after the plant has been potted in a 7 cm pot, this material is strong and healthy and is the ideal juvenile material, producing the right size of cutting for production requirements.

**Method of Taking Cutting Material.** Cutting material is removed from young plants using a new, one-sided razor blade per variety. A new blade is used to prevent unapparent disease infection being passed from one variety to another. Cuttings are placed inside a container which is lined with a Captan soaked cloth. The position where the young plants are cut to give the cutting material varies from cultivar to cultivar. Generally, two fully matured nodes with correctly formed leaves remain, dis-

counting any juvenile leaves. In some cases only one fully matured node need remain. The cutting material is then transferred from the growing house to the preparation room and placed in a cool location, all material being completely covered and not exposed to sunlight.

**Method of Making Cuttings.** It is very important to handle all cutting material with great care, avoiding contact with the leaves if at all possible. At no time should material be exposed to sunlight, except when the cuttings are actually being made. As clematis grow very rapidly and cutting material in most cases becomes entangled, it is important when the cutting is being selected from the vine that the bottom-most node on each stem is used first. It is also important not to handle the leaves, only the stem, node or leaf petiole. The cutting shape and size is important for my particular method of growing on. The internodal cutting consists of one leaf petiole and leaf, the other being removed, on some occasions the remaining leaf is reduced in size. The stem is cut 0.5 cm above the node and 3.5 cm below the node. The prepared cutting is placed immediately in a holding tray, which is lined with a Captan soaked cloth. When about 150 cuttings have been prepared they are transferred to a dipping container; this container is immersed for 5-10 sec in a Captan solution and afterwards the cuttings are completely covered, keeping the sunlight away from the foliage. It is very important to keep all work benches clear of unwanted material and that a clean surface is used for preparing cuttings.

**Insertion of Cuttings.** The cuttings are inserted in a compost which consists of one part loam, one part peat, two parts grit and two parts of fine screening sand. The peat and loam are passed through a 0.5 cm mesh sieve and all materials are thoroughly mixed. Pea gravel (1 cm) is placed in the bottom of 6 cm deep seed trays which will give adequate drainage during rooting. The seed tray is filled with the compost and lightly firmed; a thin layer of screening sand is placed on top of the firmed compost. All the prepared boxes are covered with damp hessian [burlap] to keep the compost in a moist condition. Although there is no specific pattern for insertion of the cuttings, the spacing of each cutting should be no closer than 1 cm from the next node. All cuttings which are pushed into the compost should be arranged to give even foliage distribution throughout the cutting tray. The cutting should be inserted until the node is just below the surface of the compost. A conglomeration of foliage will lead to micro-climates and botrytis. The number of cuttings per tray varies depending upon the cultivar, generally only 110-125 cuttings are placed in each tray. The rooting hormone which is used is May and Baker Seradex No. 2. As soon as the tray is full of cuttings it is placed on the propagation

bed, making sure that the bottom of the tray makes firm and even contact with the sand bed. Again great care must be taken when maneuvering the tray into position taking extreme care not to damage any leaves from surrounding trays. When the tray is placed on the propagation bed the tray is given a light watering at the end of a cutting period, either morning or afternoon. The cuttings are then watered in, using a watering can with a coarse rose. The solution used is a mixture of Captan and water. When cutting propagation is underway, I use a team of approximately six people. They will average 1,000 cuttings per person per 6 hr day; this includes the person collecting the cutting material and the insertion of the cuttings.

**Propagation House Conditions.** The propagation beds consist of ground level beds with adequate drainage which is underneath a layer of closed cell polystyrene sheeting of 2.5 cm thickness. Five cm depth of fine sand is placed beneath electric heating cables and 5 cm of sand above the cables. The bed temperature is kept at 75°F (24°C) approximately. No weaning is carried out unless the cuttings have been rooted during the late autumn months, weaning is then carried out on a gradual basis. The air temperature of the propagation house is kept at a minimum of 60°F (15°C) and a maximum of 90°F (31°C). It is important to keep a good circulation of air throughout the propagation house.

**Shading.** Direct sunlight must be avoided on all cuttings until they are fully rooted. Various types of shading 40-75% shade is used depending upon sunlight conditions throughout the various months of the year.

**Misting.** I use a manually controlled mist system. The frequency and amount of mist depends upon weather conditions. Generally in good sunny conditions the cuttings are misted each hour with a fine mist of 15-20 sec duration. All cutting material must be allowed to dry off before nightfall. All concrete pathways and areas where plants are not in position are kept moist, giving a high humidity level in the propagation house.

**Watering.** The mist system used is not sufficient to compensate for evaporation and water taken up by rooted cuttings. Slight irregularities in misting will give different conditions to each tray even with the good misting pattern, therefore, at the beginning of each day all cutting trays are checked for watering. This may seem costly, but with the amount of cuttings per tray and the total value that they will realize, the time spent in labour is well compensated.

**Disease in Propagation.** The only problem usually experienced is the buildup of fungicidal spores when leaves touch

each other, or from damage during preparation. A drench of Captan is used at 2 week intervals as a preventative. A dusting of a material called Botrilex is used alternate weeks with the Captan drench. However, it is still necessary for the propagator to remove dead or damaged foliage at weekly intervals to prevent any large buildup of botrytis or other disease.

**Growing On.** In general, cuttings root within about 21 days. They are then allowed to grow on for a further 5 weeks, allowing the leaf axil buds to start into growth before potting. It is very important that selection and grading is adhered to before potting. Only strong healthy cuttings which are producing top growth should be used. These are removed from the cutting tray by tipping the contents of the tray out onto a clean bench surface in one block if at all possible. The rooted cuttings should be removed from the tray by selection using thumb and finger lightly pulling at the node and easing the root system out of the compost. All roots are trimmed to a length of 7.5 cm from the tip of the node to the bottom of the root system. The cuttings are then potted by a Dutch Javo Potting Machine into a 7 cm square pot using a compost which consists of approximately 65% peat, 15% loam and 20% grit and sand.

The fertilizer used is Vitax Q4 at the rate of 4 oz/bu. The pH of the compost after mixing is approximately 5.7. The compost is mixed in an adapted agricultural meal mixer. The rooted cutting when potted is placed in a carrying tray which in turn is placed in a polythene tunnel-house (5 × 16M) with 10,000 plants per house. When potting some species which have a very fine fibrous root system, it is important to take great care when handling them because they are generally very fragile and will fall away. It is important with these fibrous rooted species that the soil conditions are not allowed to become too dry or too wet for excessive periods during the winter months.

**After Care.** The polythene tunnel-house is kept closed for about 3 weeks after potting the cuttings in order to keep a high humidity level and is only vented during very hot conditions, when the temperature inside the polythene tunnel-house exceeds 90°F (31°C). During hot weather the potted cuttings are misted 20-30 sec each hour. Six weeks after potting the rooted cuttings will have produced approximate 30 cm of growth. This new growth produces the next batch of cutting material. After this, the plants are allowed to grow on for a further 6 weeks, during which time each plant is caned and tied into position. A liquid feed program is carried out through this growing period. In most cases two or even three new stems are produced giving a compact bushy plant.

**Other Pest Control.** Other pests usually experienced are aphids, slugs and mice — the latter two during winter conditions can be very damaging to newly formed leaf axil buds and young growth. Their control is very important. Mildew occurs very occasionally.

**To Conclude.** A propagation schedule will read in this manner: A cutting is prepared, allowed to root and grow for 8 weeks after preparation of the cutting, it is then potted and allowed to grow for 6 weeks when it is pruned giving the next batch of cutting material. The plant then grows for a further 6 weeks producing a strong healthy clematis, it is harvested and dispatched. Rooted cuttings are potted from late January onwards. The January potted cuttings are kept at a minimum of 50°F (10°C) by warm air heaters. When new growth appears, approximately 2-3 weeks after potting, supplementary lighting is used to give a 14 hr day. The light used is of a very simple nature, three fluorescent milk white tubes 2.5 metres in length per tunnel-house, this gives sufficient daylight extension and is a great advantage. It is very important to ensure that late flowering cultivars are potted before the middle of August, otherwise they do not become fully established, or what is termed “integrated cutting”, before the winter. Early flowering cultivars and species may be potted as late as mid September with the understanding that the air temperature is kept at 50-55°F (10-12°C) using supplementary heating, and lighting with the daylength again kept at approximately 14 hr minimum. I produce some 250,000 young clematis plants annually by these methods.

The morning session adjourned at 11:30 a.m. and at a luncheon meeting in the Jupiter Room, Dr. Alvan Donnan of Oakdell Inc. Apopka, Florida gave a slide presentation concerning commercial propagation of foliage plants by tissue culture.