

## Breeding, Propagation, and Production of Clematis®

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### INTRODUCTION

The Guernsey Clematis Nursery Ltd. and Raymond J Evison Ltd. are two companies based on the small island of Guernsey situated just 50 miles north of the coast of France and 100 miles south of the coast of England (in the English Channel). The island itself is just 24 sq. miles. Its size and location gives it a very mild and moderate climate with a maximum summer temperature that seldom reaches 30 °C (85 °F) and winter temperatures that rarely drop much below freezing and never for prolonged periods. With the history of horticulture on the island and infrastructure in place, plus the beneficial climate, Guernsey became an excellent location for glasshouse production. The main disadvantage of growing on Guernsey is that of export, with an ever-increasing cost to transport goods from the island to mainland Europe.

The Guernsey Clematis Nursery Ltd. began in 1985, set up by its founder, Raymond Evison, for the production of young clematis. This has developed over the last 20 years to the nursery that now has 9 acres of glass (3.6 ha) with the majority of production carried out on Ebb & Flow benches with much automation and computer-controlled climate zones. The nursery now produces 3 to 4 million young plants annually, of about 200 species and cultivars, and exports to 18 countries worldwide.

His love for the genus has taken Raymond Evison around the world on plant hunting expeditions and prompted him to write a number of books dedicated to the promotion of clematis and their extensive diversity as a genus and their many uses in the garden. He has been responsible for the introduction of many species and cultivars and has a passion for clematis old and new that has earned him many awards and medals of recognition for his contribution to the horticultural industry including: The Victoria Medal of Honour by the RHS for his Outstanding Service to British Horticulture, Exporter of the Year Award by Nurserymen and Garden Centre Awards in London, The Lawrence medal for his exhibits at the Chelsea Flower Show, and an OBE by Her Majesty Queen Elizabeth II for his services to horticulture on Guernsey.

The company of Raymond J. Evison Ltd. was formed to carry out Public Relation activities including the sale of books that Raymond has written (and is writing) and to handle new introductions to the clematis market. Also in 1995 a joint venture between Raymond J. Evison Ltd. and Poulsen Roser A/S (a highly regarded rose breeder in Denmark) was formed with the purpose of breeding new clematis cultivars with a targeted programme to provide clematis to fit the desires and demands of a modern market.

Overall, it is the purpose of Guernsey Clematis Nursery Ltd and Raymond J. Evison Ltd. to use the advantages of climate and expertise of glasshouse production on Guernsey along with the extensive knowledge of the genus of clematis from Raymond Evison and the extensive experience of breeding from Poulsen Roser to

produce and provide a high quality clematis product consisting of new and improved cultivars designed for the modern home and garden.

## BREEDING

Parent plants are selected according to pre-set criteria of characteristics including colour, compactness, flowering ability, disease resistance, and others. "Father" (pollen donor) plants are set out in a grid opposite the mother (pollen receiver) plants as programmed. As a "mother" plant's flower bud matures and swells but before it opens, the sepals (modified leaf/petals) are removed and the flower is carefully emasculated to ensure that it couldn't self-pollinate. A bag is placed over the emasculated flower head to prevent the stigma from being pollinated accidentally by stray pollen or insects. A period of time is allowed for the stigma and ovary to continue to mature until such time that it is ready to receive pollen from the "father" plant. In autumn (fall) the seed heads are collected and stored until the time of sowing. Approximately 25–35,000 seed are sown from this programme every winter of which about 30% germinate, leading to 7–10,000 brand new cultivars of clematis for evaluation every year.

**From Pollination to Production in Eight Years.** The evaluation process is very time consuming. All new cultivars are grown under conditions that closely mimic commercial practices to ensure that the clematis are assessed under uniform conditions and in ways that will fit a commercial production programme. The plants are assessed at three stages, firstly focused on the flower and flowering ability, secondly grown on to a stage where they can be assessed on overall habit (compactness, time to flowering, foliage : flower balance), and thirdly at a more commercial level of propagation and pest and disease resistance. The joint venture partnership also allows for hardiness to be tested in a Danish climate. At each stage, less than 10% of the plants are selected and the remaining seedlings discarded so that at the end of an extremely extensive testing and trialling period of about 8 years, only about five cultivars may ever reach commercial release. It is important that thorough evaluation is part of the breeding programme so that new cultivars are released with confidence that they will perform reliably as expected and will supersede existing cultivars in appearance, successful both commercially for the grower and in the garden for the consumer.

Some of the aims of the programme have been to produce clematis with exceptional colour that are extremely floriferous, have the ability for continuous flowering, and with very compact growth suitable for production as a pot plant for the home or container for the patio. It is considered that the modern market for plants, including clematis, is demanding a product with instant impact for little input (growing skills) suitable for the conservatory or patio, with people having less time for gardening in the larger part of the garden.

This has led to the recent introduction of the following cultivars:

- Rosemoor™ clematis 'Evipo002': Exceptional red flower, very high impact plant.
- Wisley™ clematis 'Evipo001': A mass of flower ideal for growing with roses in the smaller garden.
- Cezanne™ clematis 'Evipo023': Flowering and re-flowering to provide a container plant in flower from May to September, impressive on the patio.

- The Boulevard Collection®, including Parisienne™ clematis ‘Evipo019’: Compact, free flowering, and high impact pot plant.
- The Garland Collection®, including Viennetta™ clematis ‘Evipo006’: Free flowering, long shelf life clematis that can be produced in flower virtually year round (excellent at Christmas), flowering in the house for 6–8 weeks continuously.

## PROPAGATION

The Guernsey Clematis Nursery Ltd. produces two key products (in the main), the first of which is a rooted cutting of about 13 weeks pruned at least once. The second is a 7-cm (3-inch) liner product potted on from the rooted cutting and grown for a further 5 months and pruned at least twice more. Most of the material for propagation is generated from the regular pruning of the commercial crop. The nursery endeavours to maintain the highest standards of production from beginning to end; therefore, from this very first stage of production, damaged or weak and nutritionally poor material is discarded and not used for propagation.

Internodal cuttings are then made with the use of razor blades taking uniform material from just 1–2 nodes of each stem. The made cuttings are dipped into a preventative fungicide and cold stored to ensure that they are turgid prior to sticking. They then are dipped into a rooting hormone powder and stuck into pre-prepared trays. The trays are filled with a 17 peat and 3 perlite (v/v, for aeration) mix and capped with a thin layer of sand to keep the moisture away from the foliage. These trays are mechanically filled with the peat mix to ensure uniform density throughout the whole tray and the whole batch. They are then automatically watered up to provide the correct amount of water to each tray. These are then checked weighed to ensure the correct amount of moisture has been added. Attention to detail and uniformity at this stage determines the quality of product achieved and uniformity of crop throughout the growing cycle.

The completed cutting trays are enclosed in a polythene tent, and the Ebb & Flow table moved into the rooting zone of the glasshouse. The tent itself helps to maintain the high humidity, the zone is controlled to a temperature of 21 °C (70 °F), shade screens are used to protect from direct sun, and thermal screens used to conserve night time heat. Overhead lights can also help to extend the propagation season so that cuttings can be made from late February until early October. Black-out screens prevent light pollution from the glasshouses to the surrounding neighbourhood.

After 4-weeks, the clematis generally have initiated roots and begin the weaning process by being transferred to the next zone, held at a lower temperature, and with holes cut in the polythene to reduce the humidity. After a further 4 weeks the rooted clematis are then transferred to the final weaning zone where the covers are completely removed and only a minimum-heating regime is maintained. A programme of feed and nutrition is applied with the watering from week 8 onwards.

The final 12- to 13-week product is then either knocked out of the trays and prepared for dispatch or potted on into the 7-cm liner for further production, again on Ebb & Flow tables, in controlled climate zones. Guernsey Clematis customers would take 7-cm liners to finish for next season’s sales, generally grown over a 9- to 12-month growing cycle.

The mobile bench (Ebb & Flow) system allows for the plants to be moved into optimal growing conditions and moved to work areas for production processes such as potting, pruning, and dispatch. All the tables are subirrigated by flooding, and all the water (run-off) is collected, cleaned with UV sterilisation, re-dosed with nutrients, and reused for up to 6 months. With this re-cycling system and a recent investment in a reservoir to collect the glasshouse roof rainwater run-off, the main Guernsey Clematis production nursery has become virtually self sufficient in its water use.

By keeping the plants off of the ground, and by subirrigating, the tops of the pots remain dry, helping in the prevention of disease. Guernsey Clematis operates an integrated pest management system throughout the whole nursery. With the use of bio-control agents and applications of beneficial nematodes in the propagation zones, the use of insecticides has been significantly reduced.

Environmentally, the nursery has reduced its oil consumption with the use of better glasshouse facilities and heat conservation techniques. Water is almost self-sufficient, and the use of pesticides significantly reduced. It is a continued aim to maintain good environmental standards.

With the uniformity gained from mechanisation and by focusing on the production procedures, Guernsey Clematis Nursery Ltd has been accredited with the certificate of ISO9001 (2000).

## **CONCLUSIONS**

The investment in the breeding programme and thorough evaluation of new cultivars is helping to maintain a leading edge in the market for clematis with new products and greater product standards addressing the needs of a demanding and difficult market. The investment in facilities and attention to detail in production is maintaining the high quality standard that Guernsey Clematis is building into its reputation. It is important that the nursery is recognised for both of these attributes, otherwise how will the product from Guernsey be differentiated from clematis from any other country? Guernsey is still a small island in the middle of the English Channel; it is important that the nursery maintains a good reason to be recognised on the world stage for the quality production of new and improved clematis cultivars.