

Maintenance of the container trees during the summer is restricted to cleaning up the stems by about mid-May to leave approximately a 2 ft. head. If it is done at this time the shoots can be rubbed out by hand, rather than having to use secateurs later in the season. Fan training of apples, plums, and cherries takes place during the summer.

Throughout the season a regular 10/14 spray programme is maintained against scab, mildew, caterpillars, aphids, and diseases such as willow canker.

Descriptive labels are attached to the trees before dispatch during the sales period, which extends from late August until the following May.

John Gaggini to John Hedger: Would you please elaborate on the propagation of *Salix caprea* 'Pendula'. What sort of wax do you use?

Hedger: *Salix caprea* 'Pendula', we graft onto *Salix smithiantha*, and for *S. purpurea* 'Pendula' we use *S. daphnoides*. We use low melting point paraffin wax for grafting which we obtain in one kilogram packets. Great care must be taken so as not to overheat the wax and burn the plant.

John Gaggini to John Hedger. What sort of take are you obtaining?

Hedger: About 95% with good rootstocks and scion materials.

Question to John Hedger: Do you establish the stocks in pots before grafting?

Hedger: Yes, they are established by inserting cuttings into 4 litre polypots during the previous year. They are, therefore, one year old and 6 to 7 feet high at grafting.

ANEMONE TUBER PRODUCTION IN SOUTHWEST ENGLAND

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Techniques for producing anemone tubers were developed at Rosewarne over the last 26 years in parallel with a breeding programme to produce a winter hardy strain of anemone. Since the de Caen anemone was not easy to propagate vegeta-

tively it was also necessary to study seed production and, in particular, methods of sowing.

The Saint Piran strain which became available in 1978 contains 9 individual groups which are grown in isolation until the final mass seeding prior to the sale of the tubers.

Although there have been certain modifications, this basic system continues to be used by the commercial producers, Wyvern Growers in Somerset.

Seed production. Cultural requirements such as rotation, manuring, soil preparation, depth and density of planting, weed and pest control are the same as for commercial flower production, as detailed in the revised edition of the Anemone Advisory Leaflet 353 of the Ministry of Agriculture, Fisheries & Food. However a rigorous programme of sprays and roguing is essential in order to produce good quality tubers for multiplication of stock or for sale.

In order to maintain the winter hardy strain, seed is saved from selected plants known to have produced good quality flowers from autumn to spring. Tubers of 2 to 3 cm size are planted in early June and flower from September onwards; the final selection and roguing takes place in late March. This ensures that plants are selected from the commercial situation, and the spring harvest provides for sowing in August. However, 3 to 4 cm tubers are used in the multiplication of the 9 basic groups and are usually planted in July.

Tubers are planted by hand or machine in drills 2.5 to 5.0 cm deep at a density of 148,000/ha (60,000/acre). Generous spacing minimises disturbance at roguing time and provides a free circulation of air and better disease control.

In the Rosewarne breeding programme pollination takes place under insect proof cages. The flowers are hand pollinated just before the buds open. There is no need to remove the stamen since the stigma ripens before pollen is shed.

Basic group seed is produced in the open but in isolation. Plots are at least 270 metres apart to avoid cross pollination. Tubers of the 9 basic groups are mixed before planting to produce Saint Piran seed. Cross pollination takes place and this natural hybridization results in an attractive range of colours of blue, magenta, red, bicolours, and white. The period from initial selection to the commercial tuber is at least 12 years.

It is unusual for a good seed head to develop if a flower is fertilized only by its own pollen; however satisfactory pollination can take place from older flowers on the same plant. The seed head takes 3 to 4 weeks to develop and ripen, at which

stage the head softens and bursts to release fluffy lint covered achenes. A good head may contain approximately 1,500 seeds of which up to 50% are viable. When seed ripens it can easily blow away and daily collection is, therefore, essential to avoid waste.

Although attempts have been made to harvest the seed mechanically, hand collection is preferable. Only the best heads are picked as they are about to burst. These are dried in trays under glass or in polythene tunnels, with heat being given in periods of wet weather. The seed is turned daily to speed the drying process and is finally cleaned, bagged, and stored in a dry, vermin-proof place.

Seed must be cleaned in order to avoid nozzle blockage at sowing time. Hand cleaning is expensive but equipment developed at Rosewarne and further modified by Wyvern Growers has reduced labour input and ensures that seed is ready to sow in July or August.

Seed yields vary according to season and for a commercial area of Saint Piran the range is 78 to 120 kg/ha and in an exceptional year 156 kg/ha. Yields also vary in the basic groups. Reds are usually less productive than magenta, blue, and bicolours. Allowing for roguing, yields may be as low as 58 kg/ha.

Tuber production. Studies of tuber-raising techniques commenced in 1961 with frameyard production. This technique is still being used to maintain basic groups and replacement material.

Seed is sown in frames at 5 grammes per square metre in August and the seedlings grow through the winter with the protection of lights from January to March when they are uncovered. By June or July the foliage dies down and lights are replaced to speed the drying process. Dried foliage is burned by flame gun. Tubers are harvested over a riddle, washed, placed in trays, dried, graded, bagged, and stored in a dry place until required for planting the following year.

Since 1965 tuber production was extended to off-Station areas where soils were thought to be relatively free from stones. The first trial occupied a few square metres of sandy land at Hayle and within the next 10 years the area increased to 1.2 ha. During this period many aspects of production were studied. Machinery was developed to remove stones and sowing in sand was replaced by the technique of sowing in alginate solution. Soil stabilising materials were tested to overcome erosion of sandy soils, and various types of shelter were compared. Wooden lath fencing proved to be the most effective and durable. Good weed control has been the key to success.

Work on pre-harvest treatments, tuber harvesting, cleaning and drying, made commercial production on a limited scale the next priority.

Assistance was sought from advisers and growers on suitable soil types in the South of England and tuber production trials were carried out in Sussex, Hampshire, and Somerset. The Yeovil sands in Somerset proved to be the most suitable of the sites tested and it is here that commercial quantities of tubers and seed are being produced.

Tuber production commenced in 1976 with 0.1 ha and by 1981 it has risen to 6.5 ha with an output of 2.9 million tubers/ha. Production is based upon the bed system and fluid seed spraying methods developed at Rosewarne, but considerable progress has been made in harvesting, cleaning, and drying. Seed is sown from July to August on prepared beds 1.8 m wide, using 24 to 42 kg of seed in 4,000 litres of a 10.5% solution of alginate/ha. The lower seed rate is used where irrigation is available. Shelter and soil stabilisers are not required since it is less windy and the soil finer textured than in the original trials in Cornwall.

Weeds are controlled with pre-emergence sprays of Paraquat, followed by Terbacil at 0.3 kg of the proprietary product per ha plus a repeat Terbacil treatment applied post-emergence in November. Although at present there is no label recommendation, this herbicide has given good weed control except where winter germination of mayweed has occurred. Trials are in progress to try and solve this problem.

A regular spray programme ensures that healthy stock is maintained in seed and tuber production areas. This is backed by regular inspections to ensure freedom from fungus diseases, such as *Colletotrichum* and plum rust and to reduce the spread of virus.

Flailing and sweeping of beds has superseded burning over, which was too slow for the commercial operation. The purchase and modification of a Dutch harvester has speeded the harvesting process.

Tubers are cleaned in fast flowing water and dried quickly in wire bottomed trays stacked over an air duct or in bulk bins. When dry they are graded into five sizes ranging from 1 to 2 cm, and over 5 cm, and bagged in batches of 5,000 before despatch. Tubers are now available for commercial and retail outlets through Lingarden Limited, Weston, Spalding, and Lincolnshire.

Maintenance of basic and replacement material — As commercial production has increased over the past 9 years the

areas at Rosewarne devoted to seeds and tubers have been reduced to those necessary for the provision of basic material and reserves in case of emergency. The whole of the work of maintaining the basic groups, and the breeding of replacements have now been taken over by the Somerset producers. Plant health, hardiness, flower yield and quality are still to receive the highest priority.

Development of the Saint Piran strain has improved the prospects of anemone flower production and provided opportunities to develop home and export markets for tubers. The success of this venture has combined the best elements of ADAS and specialist resources with grower co-operation.

Question to Mrs. Gill: Are anemones being grown in gardens apart from the southwest of England?

Mrs. Gill. Yes, they are grown in areas as far north as Perth in Scotland with protection, such as in cold greenhouses.

NEW NARCISSUS AND THEIR PROPAGATION

W. JAMES HOUGHTON

Tomlin Brothers Ltd.

Polgoon, Penzance, Cornwall

We owe the beauty of new cultivars of daffodils to the dedication of past and present hybridizers and daffodil lovers. During the last 100 years daffodils have been collected from the wild and crossbred, with the selections becoming better and more colourful with each generation.

In this world of daffodils the names of breeders that have given us the beauties that we enjoy today, to mention a few, are Reverend William Herbert, Edward Leeds, Peter Barr, Reverend George Engleneart, William Backhouse, The Brodie of Brodie, Guy Wilson, Lionel Richardson, P.D. Williams, and so many more very dedicated folk, including those hybridising today. At daffodil shows the results of their work can be seen in all its splendour. There are eleven distinct divisions of narcissi. Each year at shows a new cultivar more elegant than its predecessors will surprisingly come to light. It may be one of the large trumpets, a double, a small cup, tazetta, or a cheeky little rock daffodil.

Most of the new cultivars have been bred specifically for the show bench. Rosewarne Experimental Station, however, at