Tubing Up. The mixture used is 2 peat, 3 soil, 1 river sand, 1 coke breeze (screened) plus Osmocote (or Magamp). Seedlings are then pricked out into tubes 5 × 9 cm. This takes place usually in late spring or early summer. Place the tubed seedlings outside in semi-shade until they are established before placing in full sun.

Topdress with superphosphate and dolomite, then spray with Euparen for fungus control and Menazon for insects. This usually gives plants 25 to 40 cm in height when fully grown in tubes. They then can be grown on in containers or open ground. I find it a good policy not to grow eucalyptus in glasshouses or tunnel houses on account of the development of fungus diseases, except for seed germination of some species in early spring to maintain an even growth.

Eucalyptus suited for Southland's Climate. Southland has a rainfall of approximately 110 cm on the coast and 62 cm inland per year and a good number of frosts, sometimes down to −6°C (21°F). But frosts can be very consistent from autumn until late spring, with heavy falls of snow inland in some years.

Eucalyptus species that are growing in Southland are:

E. amygdalina
E. archeri
E. barberi
E. cinerea
E. coccifera
E. cordata
E. crenulata
E. dalrympleana
E. delegatensis
E. fastigiata
E. fraxinoides
E. glaucescens
E. globulus
E. globulus 'Compacta'
E. gunnii
E. johnstonii
E. leucoxylon 'Rosea'
E. macarthuri
E. maidenii
E. morrisbyi
E. nicholii
E. niphophila
E. nitens
E. nitida
E. nova-anglica
E. ovata
E. pauciflora
E. pauciflora var. *nana*
E. perriniana
E. polyanthemos
E. pulchella
E. pulverulenta
E. regnans
E. rodwayi
E. rubida
E. smithii
E. stellulata
E. st. johnii
E. subcrenulata
E. tenuiramis
E. urnigera
E. vernicosa
E. viminalis

DEVELOPING A TREE AND SHRUB PROPAGATION UNIT IN THE "DEEP SOUTH"

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At the beginning of this year we brought out an established nursery at Lorneville, a few kilometres north of the Invercargill city boundary. Because it was obvious that we needed more room for propagating, owing to the increasing demand for trees and shrubs, this appeared to be the ideal location to build an entirely new propagation unit where we had room to expand as required. The main advantages offered at this new site were the excellent water supply, the existing good hedge shelter belts, and the extra acreage which would allow for proposed container blocks as well as additional glasshouses for propagation, etc. I will discuss the initial development stage that has already taken place and the further proposed stages.

Stage I. This started with choosing and clearing a site for our propagation unit, and then drilling for a new water well. The existing two bores were not sufficient for our plants. A good water supply was found and a six-inch Aturia submersible pump was chosen with a pumping flow of 51 psi, at 3900 gallons per hour (62 gallons per minute).

Choosing the Greenhouse. An important factor in a greenhouse is the retention of the "glasshouse effect". To achieve this the sheathing used on the Fletcher greenhouse gives ample visible light during the day and resists the passage of heat during the night or during cold periods. So, after careful consideration, a 60 × 80-foot two-span Fletcher Brownbuilt greenhouse was chosen. The modular basis system of construction was also favoured for its galvanized steel framework, completely eliminating the chore of painting.

The greenhouse is covered with "*Durolite* f" panels (a surface-protected glass fibre reinforced translucent sheeting). "Durolite f" resists the passage of heat better than glass for two reasons. Firstly, "Durolite f" allows only half as much heat through as a sheet of horticulture grade glass, which means the cost of winter heating will be lower. The "Durolite f" sheeting used on the Fletcher greenhouse is shatterproof and impact resistant and its use has eliminated the most common hazard associated with glasshouses — wind damage caused by negative pressure. Also, "Duroflite f" admits less ultraviolet light than glass, so the need for shading in summer is eliminated.

Heating and Ventilation. The greenhouse is heated by a hot air "Tropical Vented Space Heater" with a heat output of 208,000 BTU per hour. This unit is run by electricity and fueled by either diesel or kerosene oil.

The greenhouse has its own side and ridge vents but we feel there is a need for extra ventilation as well. A fan ventilation system has been proposed for the future which would consist of two extractor fans, each 800 mm in diameter operating at 700 R.P.M. This pair of fans will give 15 changes of air per hour. At present we can cool the greenhouse with the space heater on a cooling cycle.

Propagation Heating Beds. After completion of the greenhouse construction, propagation heating beds were set out. These beds have been raised off the ground level about 12 inches. Three heat beds, plus a "weaner bed", have been constructed, each 80 feet in length and 3-1/2 feet in width. Each bed is divided into three sub areas for control purposes. These beds at present hold 41,000 cuttings in hygiene trays and when all beds of this Stage I are complete, they will hold approximately 56,000 cuttings.

On the basis of 10 watts per square foot of heating being necessary, we use 1050 watts per sub area. Each sub area is controlled by its own thermostat housed in a corrosion resistant box with cable terminal blocks, control switch and indicator lamp.

Reflective building paper was laid at the bottom of the beds for insulating, then Simplex type soil heating cables were embedded in six inches of coarse sand. Simplex type soil heating cables were used because of their reliability and low cost compared to the Pryotenax cable set in concrete which is expensive, particularly if a failure occurs. A large bed has been made in the middle of the greenhouse for our *Cedrus* grafting. This bed is filled with a mixture of sawdust and coarse sand into which we plunge the grafts.

Misting. Our mist line is electronically monitored by the "Aquatron Electronic Mist Controller" and associate sense electrode. This provides ideal mist values exactly in accordance with plant transpiration and evaporation.

Stage II. Fifteen irrigation blocks have been planned, six of which are completed and now in operation. We have based the sprinkler requirements on the "Perrot type ZA 30" fitted with the adjustable "jet breaker". While this sprinkler is smaller in terms of coverage than the type we use at our open ground nursery, we find that it is better suited to a wide range of plant sizes, with particular reference to smaller trees.

Electronic Control. To bring these 15 irrigation blocks into working order through the solenoid valves we have had an "automatic electronic irrigation controller" made which has provision for 15 channels, each channel representing one irrigation block. These channels may be pre-set to provide timing from 5 to 60 minutes, or they can be used manually if necessary. There is also a frost protection circuit which will bring one or two channels under frost conditions. The fertilizer irrigation control system allows liquid fertilizer to be mixed with the irrigating water on a separate 15 switches, one for each channel and selected as required.

Stages III & IV. This will see the completion of the irrigation blocks — the future addition of carbon dioxide enrichment to the plants in the greenhouse, controlled by our heating unit, and the construction of a large drive through the shade house. Future plans are laid down for the provision of a propagation room, bagging, packing and dispatch, office, etc., all contained within one building next to our greenhouses. So what appeared to be a major undertaking 9 to 10 months ago is now well on the way to being a productive and worthwhile venture.

PROPAGATION OF *ENSETE VENTRICOSUM* – (MUSA ENSETE) — PURPLE FORM

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Plants of most *Musa* species are propagated by division, the exception being *Ensete ventricosum* (*Musa ensete*) which does not normally produce divisions, but does flower and set seed which germinates in prolific quantities if conditions are right. In New Zealand, however, a purple variety of *Ensete ventricosum* has not been known to flower and therefore the only known method of propagation is by mutilation of the bud tip which causes an artificial means of divisions or, in other words, meristem culture on a large scale.

Removing the Leaves. The parent plant must be of reasonable size and should have a stem not less than 10 cm diameter at the base. The top foliage should be removed by cutting through the stem about 30 cm up from the base. Then begins the delicate operation of removing all the leaf bases to expose the crown and the growing tip. In a plant with a 10 cm diameter stem, the crown would be about 3 to 4 cm high. The leaves are removed partially by tearing and partially by cutting with a sharp knife. It is often difficult to tell where the leaf ends and where the crown begins and it is only by experience that this knowledge is gained. When all the leaf bases have been removed, the mound of the crown will be exposed with the small growing tip appearing as a sharp point in the centre.

Preparing the Crown. The crown should be scraped clean of any vestigal leaf bases and the growing tip removed. This involves cutting out a saucer shaped depression about 3 cm across and 2 cm deep. All soil should be carefully washed from the roots and any long or damaged roots trimmed back. The crown should then be placed in a container of sphagnum moss. The moss should not be packed down, otherwise it becomes too