The severed stems are then washed in Captan fungicide and planted in a tray to develop shoots and leaves — as in C, Figure 1. These basal stems will develop shoots and continue to grow into normal plants. As an added bonus, these stems can produce a number of shoots, which are then split into separate plants — D, Figure 1. After splitting, these plants are washed in Captan fungicide and planted out in the normal manner.

This technique for growing cordylines is very satisfactory with *Cordyline australis*, *C. kaspar*, and *C. pumilio*.

The timing of the year could be an added advantage. Any losses I have had with the basal stems have been during the cooler winter season when some have decayed. I would, therefore, recommend that this procedure be carried out during a period of favourable growth — particularly early spring. Also, during this period these basal stems should not be kept waterlogged. They should be in a relatively free-draining, well-aerated mix.

To summarize, this technique for growing cordyline species and cultivars is highly satisfactory, and once sufficient plants are available, it is also very efficient — 200% to 300% increase can be achieved.

PRODUCTION OF CONTAINER-GROWN NEW ZEALAND NATIVE PLANTS FOR REVEGETATION

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The concept of revegetation is a relatively recent one, having its basis in the environmental awareness which has developed over recent years. The advantages of retaining or re-establishing native revegetation around water shed areas, on very steep hillsides, or in unusable gullies are becoming increasingly appreciated. Environmental awareness has also led to the planting of natives plants on a large scale for conservation purposes and aesthetic reasons.

In response to this trend, a range of native plants was grown to test the feasibility of producing plants for revegetation. The initial response was most encouraging and now plants grown specifically for revegetation are an important part of our nursery production.

REVEGETATION PROCEDURES

The majority of revegetation projects this nursery has been involved in have consisted of planting native plants into an open grassland type environment. The procedure to re-establish a natural native bush cover in this situation is a lengthy one involving the planting of a nurse crop.

Stage one involves clearing the land and planting:

1. The area is first cleared of all exotic weeds such as gorse, *Ulex europaeus* L.; and blackberry, *Rubus fruticosus* L.; by mechanical or chemical means.

2. A 2m x 2m grid pattern is then spot sprayed with Round-up (glyphosate).

3. Nursery grown plants are planted in the sprayed spots when the grass or weeds have died down.

4. Plants need to be released from weed growth once or twice during the following summer.

Stage two takes place in the following years when specimen trees are interplanted between the now well-established nurse crop.

PLANT MATERIAL

For revegetation to be successful, the species used for stage one of the project need to have certain qualities:

1. They must be fast growing, early colonisers in natural regeneration, so that they quickly establish a canopy to suppress weed growth.

2. These plants should naturally attract birds so that natural self-seeding of other species occurs.

3. The species selected for revegetation must be capable of growing in the open, often in an unsheltered situation.

4. Preferably, the species used should be ones that occur naturally in the district.

After considering these qualities, a range of 12 kinds of plants is now grown for revegetation at our nursery. (Table 1).

SEED PROPAGATION

Most kinds of plants that are produced for revegetation purposes are propagated by seed. An exception to this was a special project undertaken for the Mount Maunganui Borough Council to produce plants for revegetating part of Mount Maunganui, using cuttings taken from material presently growing on the site, in order to maintain genetic purity.

Production by seed is preferable for two reasons — *Firstly*, large numbers can be produced at relatively little cost and,

secondly, for revegetation purposes it is desirable to have some genetic variation in the plant material. Care is taken to have a number of different seed sources, as clients often require plants from one particular source because of the problem of genetic pollution (4).

Table 1. New Zealand native species grown for revegetation.

Species	Seeding Time (in Southern Hemisphere)	Suitability
Aristotelila serrata	January	Very Good
Coprosma Robusta	April	Excellent
Cortaderia toetoe	February	Good
Dodonea viscosa	March	Good
Hebe stricia	May	Very Good
Leptospermum ericioides	May	Excellent
Leptospermum scopiarum	June	Excellent
Melicytus ramiflorus	April	Very Good
Phormium tenax	April	Good
Pittosporum eugenioides	April	Good
Pittosporum tenuifolium	May	Excellent
Pseudopanax arboreus	April	Good

Many New Zealand native plants show considerable variation from one district to the next, *Leptospermum ericoides* being a prime example. There is increasing concern that only the particular genetic strain growing in the area being revegetated be used for any revegetation project.

Seed collection time varies from mid-January to June (mid-summer to early winter); see Table 1. Seed is collected by nursery staff from trees of good quality, health and form, growing in the wild. The seed is separated from fruit material and sown immediately after collection into trays of a standard seed raising mix. (N.Z. Nursery Research Centre, 1984). Seeds are covered with 3 to 5 mm of seived potting mix and are well-watered. Seed trays are then placed in an unheated greenhouse to germinate.

Germination takes from 2 weeks to 4 months, depending on the species. Germinated seedlings are pricked out into a seedling mix (N.Z. Nursery Research Council, 1984). The seedlings are spaced at 70 per tray to make maximum use of available space and so reduce costs. At this stage they are placed in an unheated tunnel house for 6 to 8 weeks, following which they are moved into a shade house covered with 30% shade cloth.

POTTING

Potting of revegetation grade plants was initially done into a PB2 planter bag. However, the requirements of many clients for a smaller container for ease of transport to project sites and to reduce transport costs, resulted in the development of a

smaller bag. The bag now used is made of 50mμ polythene film and measures 200 × 80 × 80 mm. Plants appear little affected by this smaller bag and clients have responded favourably.

Potting is done by hand using a team of workers. The plants are removed from the seedling trays by cutting the potting mix and roots into cubes, the complete cube being planted as one would plant a liner taken from a tube.

A standard soilless potting mix is used of 40% peat, 30% ground pine bark, and 30% coarse sand. Fertilisers are included in the potting mix and no further fertiliser is added while the plants are in the nursery (Table 2). Plants are placed on standing areas which are covered with Sarlon weed mat and have overhead sprinkler irrigation. Potting is timed to allow 4 to 6 months growth before plants leave the nursery. Minimum height for a revegetation plant leaving the nursery is 30cm with 45cm being average. Some pruning is done of fast growing species to keep them compact, but this is kept to a minimum to reduce cost, and is usually done with a pair of hand shears.

Table 2. Growing mixes.

Use	Composition	Fertiliser Per M^3
Seed Germination	50% peat	750 gms. superphosphate
	50 coarse sand	400 gms. potassium nitrate
		3000 gms. dolomite lime
		150 gms. F.T.E.
Seedling Mix	35% peat	1500 gms. Osmocote (14-6.1-11.6)
	15 ground bark	
	50 sand	720 gms. calcium ammonium nitrate
		560 gms. superphosphate
		3000 gms. dolomite lime
		150 gms. F.T.E.
Tree Mix	40% peat	4 Kgs. dolomite
	30 ground bark	1 Kg. superphosphate
	30 coarse sand	1 Kg. calcium ammonium nitrate
		4 Kgs. Osmocote (18-4.8-8.3)
		150 gms. F.T.E.

SPRAY PROGRAMME

Seedlings are sprayed regularly every 14 days using Ridomil MZ 72 (metalaxyl), Phaltan (folpet), or Benlate (benomyl). With each spray, Wuxal foliar feed is included.

During the growing season the plants are subjected to the normal nursery spray programme. This alternates Phaltan (folpet), Mancozeb, and Benlate (benomyl). When the need arises

an insecticide is included, usually Attack (pirimiphos-methyl, plus permethrin).

WEED CONTROL

All weed control is done chemically using Ronstar (oxadiazon) applied with a small garden sprayer as a basal spray. Ronstar is applied as soon after potting up as possible, but after plants have been placed in the standing out area. The rate used is 30 ml per 100 litres of water, which is ⅓rd the normal application. This has been found to give effective weed control for up to six months.

CONCLUSION

Because revegetation plants are required in large numbers for any one project, it is essential that cost be kept to a minimum. The techniques outlined have been developed to keep labour input low and thus keep the cost per unit down. However, quality cannot be sacrificed for quantity and it is important that the plants be sturdy enough to meet the rigorous demands of harsh planting sites.

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TISSUE CULTURE: IS IT THE ULTIMATE IN ASEXUAL PROPAGATION?

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The New Zealand's locality and consequently its climatic conditions make it idealy suited to grow a large range of plants. With the added advantage of having an out-of-season market in the Northern Hemisphere, the horticultural industry has grown rapidly in the last few years. Typical "Kiwi ingenuity" has prompted the successful production of many different