PLANT PROPAGATION IN AUSTRALIA

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The population of Australia is just under 16 million. Of that, nearly 10 million or almost ⅔rds live close to the East Coast—from Brisbane south to Adelaide. Of that 10 million, 8 million are in four state capitals (Brisbane, Sydney, Melbourne, and Adelaide). To further emphasise our skewed demography may I add that there are over 6 million people in Sydney and Melbourne alone.

From these figures you will understand that the significant market for greenstock, and indeed most other goods, is in the south-east of Australia. If I tell you that there are a further 1 million people in Perth you will also understand that the rest of the continent is not exactly crowded.

In Perth there are some excellent nurseries in the hot, dry climate that is ideal for much nursery growing. Fortunately for nurserymen in the Eastern States, Perth is remote, being separated from the rest of Australia by some 2,500 km of the Nullarbor Plains (nul arbor = no trees), though a small amount of high quality stock is sent east as back-loading on what would otherwise be empty trucks.

The wet tropics in "Crocodile Dundee" country around Darwin and on the east coast near Cairns provide hot, humid, glasshouse conditions in the outdoors. One grower even uses fans to draw air from under his shade covers. Brisbane, and the north coast of New South Wales, are ideal for growing house plants and, indeed, large quantities are shipped south by the local growers.

After these introductory remarks I will now focus on propagation in Victoria, my home State and the area with which I am most familiar. However, what I have to say about propagation in Victoria would apply generally, to Perth and Adelaide and, to a lesser extent, in the more humid climate of Sydney.

The climate of Victoria is similar to that of California. Hot and dry in summer, day temperatures are commonly in the nineties and most years have many days well over 100°F. Winters in Melbourne bring frost and some overcast foggy conditions. Inland the frosts are crisper and fog rare.

STRUCTURES

Although some new propagation houses have been built recently using glass, most nurserymen are favouring plastic houses of various types and constructions. Because of the extremes of climate (Melbourne is noted for experiencing all four seasons of the

year in one day) both cooling and heating are important. Extractor fans are common, so too are plastic tubes. All the traditional forms of heating can be found. In our own case we have turned an oil heater upside down and blow hot air under the benches.

I should add that we find a large range of Australian natives are more prone to fungal attack than most commonly grown ornamentals of exotic origin. For this reason we like fans moving air about and we tend to keep our propagation houses as dry as possible.

A novel glasshouse was designed by a commercial airline navigator who grows orchids. The design theory is based on the light transmission properties of glass; that is maximum light and heat is transmitted when the sun rays strike the glass at 90°, less and less light penetrates as the angle of incidence reduces.

To erect this type of house get out your compass then align the house to face due north—the direction of our midday sun.

The saw-tooth roof in this house is made from opaque asbestos cement sheeting except for the north-facing vertical glass which transmits a greater percentage of available sunlight in winter when the sun is low in the sky but tends to block its passage as the sun rises higher in the sky in summer months. The angle of overhang of the glass on the saw-tooth sides is designed to behave similarly in respect of sunlight striking the walls.

An interesting house was built by the South Australia State Government for its forestry people at a cost of around $120,000, of which $45,000 was spent on the solar heating. Heat from the collectors is stored in water that is circulated in pipes through the concrete floor of the house.

The theory is that there will be enough heat collected and stored in the warm months, supplemented with some winter sunshine, to provide heat in the cold periods. Production from this nursery consists of Australian native evergreen trees and shrubs in liners and, as such, would only need minimal heat to maintain at least some growth.

FOGGING

A limited number of fogging systems have been installed in Australia. In March of 1986 we installed a system using sonic nozzles of U.S. origin. These operate around 60 psi air pressure but they rely on a large volume of air as a result of which we require a 7½ h.p. compressor to run the 12 nozzles installed in a 4 bay house measuring 80 ft × 60 ft. The water pressure is around 5 psi.

We had a lively discussion at our 1986 I.P.P.S. Conference in Adelaide about the temperature which fog houses could be allowed to reach without damaging cuttings in almost 100% relative humidity.

I personally had been introducing a minimal amount of ventila-

tion to prevent the temperature exceeding 95°F. A member from western Australia reported that he never ventilates his house (which not uncommonly reaches 117°F) with excellent results. We recognised that there could be a difference between ambient and plant tissue temperatures, but because high temperatures are sometimes sustained for long periods and because little, if any, evaporation occurs on the leaf surface, we assumed that tissue temperature would eventually approach that of the house. Unfortunately we did not have a plant physiologist with us who could explain what happens to cuttings in extreme conditions and our discussion was little more than speculation.

MEDIA

Most growers are using soil mixes comprised of bark and or sawdust, often supplemented with a small proportion of sand or sandy loam. Slow release fertilizers are normally used.

In Victoria, many nurseries pasteurise or sterilize to some degree and, indeed, a lot of Dr. Ken Baker's work was developed in Melbourne. At Plant Growers Australia, we use an air-steam mix to pasteurise cutting media. The sandy loam fraction of our potting and tubing mixes is pasteurised using live steam blown into slowly turning concrete agitators. Bark and fertilizers are added later. Suppliers of pre-mixed media to the nursery trade rely on methyl bromide treatment.

PROPAGATION

Our production centres around evergreen ornamentals, but excludes azaleas, rhododendrons, and camellias. We grow over 400 cultivars per year, of which about 300 are Australian natives.

About 92% of our production is from cuttings, 6% from seed, and 2% from tissue culture.

In cutting propagation, most material is collected from our own container plants or other clean stock. It is cut, stripped, soaked in fungicide, rinsed and drained, dipped in powder or liquid hormone and then stuck in community trays. Media used are sand and peat, perlite and peat, and more recently trials using perlite and fine composted pine bark have shown favourable results for some plants.

We have done many trials with media and hormones over the years and have found that in a 3:1 perlite/peat medium and a 4000 ppm IBA in talc hormone to be suitable for most of the plants we grow.

Many cultivars are placed on beds heated by electric cables. The trays are subsequently moved onto wire mesh benches for hardening off and, hopefully, aerial root pruning.

We buy tissue culture plants in culture vessels, transfer both rooted and unrooted plantlets initially into a fog house. Seed is

raised in conventional misting poly houses.

A regular fortnightly fungicide program is carried out. All cutting and most tube stock are drenched or misted on alternate fortnights with different fungicides. Insecticides are used only when needed.

To promote uniform plant growth, tube stock is graded and pruned before potting.

MECHANISATION

Not only are wage rates high by U.S. standards, so too are the loadings for holiday pay, workcare, payroll tax, etc. As a result there is strong financial incentive for growers to mechanise production wherever possible. Potting machines are found in most production nurseries.

Our potting is mechanised and we also use a small tubing machine for transplanting a high proportion of the rooted cuttings from the community trays into 2 and 3 in. tubes. Cuttings with brittle roots are transplanted by hand.

INNOVATIONS

Peter and Lois Smith, whom many of you know, operate the Sunraysia Nursery, just over the river from Mildura on irrigation country that is an important citrus, grape, and stone fruit production area. Among other lines, Peter produces vast numbers of grapevine plants. For many years he has used techniques whereby he unites a scion to an unrooted rootstock and provides conditions in which the roots developed simultaneously with the graft union.

I found his latest method very exciting and he has agreed to let me tell you about it. Thin-walled plastic tubes measuring about 12 × 1 in., complete with interior root-trained ridges, are filled with a very lightweight cutting medium. The rootstock and scion are united with the help of a grafting machine and this two-part piece of wood is inserted half way into the plastic tube which, in turn, is placed in an appropriate environment for nature to take its course. Peter tells me that he has significantly reduced his production costs, but the good features do not stop there. When planting, the growers go into the paddock with a tractor-mounted sprayer rigged up to give a controlled waterjet which is used to blast planting holes. Another person takes the vine, runs a knife vertically down two sides of the plastic tube, which is then holding everything together, and places the plant with its roots still undisturbed into the hole.

After back filling, the two strips of plastic are gently removed. I am not experienced in grape production or field planting but the method captured my interest.

WEED CONTROL

Our annual nursery crop is about 1 million plants, grown in 6 and 8 in. containers. Very few are sold in less than 5 months from potting and the man-hours spent in weed control would be the equivalent of approximately 60% of one person's time over a full year.

The practice we follow can best be described as discipline based on a very simple premise, namely that the pot next door is the greatest source of weed seed, and we act accordingly. Indeed, we go a little further by preventing seeding of weeds anywhere in the nursery grounds. The boundary is fenced and where possible the outside area is slashed to minimise seed drift and prevent seeding anywhere in the nursery grounds.

Before new crops are put out, the bays are checked and granular herbicide is often lightly applied, though this becomes less necessary after a few years of no seed. Because we pasteurise all potting soil we initially eradicate all but hard-coated weed seed.

PLANT PROPAGATION IN NEW ZEALAND

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It must be recognised that the establishment of the nursery industry in New Zealand by those nurserymen who arrived in the first two decades of the colony's history involved experiences that tested their skills and abilities to the maximum. Very few of them arrived with possessions such as bank accounts or other tools of trade to establish an industry in this new country.

When one studies the early days of the New Zealand nurserymen, it appears that most commenced their business as market gardeners, slowly moving their production in varying directions to the market demands of their districts. Those pioneers who arrived with tree seeds, cherry stones, apple and pear pips, and other horticultural plants combined the growing of one and another and slowly made a beginning of an industry in New Zealand. This, of course, was only one part of the story, because along with the production of plants came the potential customers. These were the farmers grappling with the land and the new problems of a land that was just beginning. A problem to overcome was a shortage of cash, so a system of barter was adopted between the man who produced from the soil, and the merchant in his office and warehouse. In these