THE ROD TALLIS MEMORIAL AWARD

This award was set up in memory of the late Rod Tallis, a young Sydney nurseryman who had been very active in IPPS. The award is offered each year in the State where the Conference is being held. Young people under 25 years of age in nurseries, educational institutions, and government departments who have an interest in plant propagation are invited to apply.

The applicants, who need not be members of IPPS, must outline why they should be given the chance to attend the IPPS Conference. They also have to present a biography and outline their interest in horticulture and plant propagation.

The winner of the award attends the Conference as a guest of the Society and must prepare a paper for presentation at the Conference. The winner also receives a book award. In 1990 Leisa Armstrong won this Award and presented the following paper:

VEGETATIVE PROPAGATION OF THE WESTERN AUSTRALIAN CHRISTMAS TREE, *NUYTSIA FLORIIBUNDA*

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INTRODUCTION

Nuytsia floribunda (Labill.) R.Br. is a tree to 15m high or, rarely, a prostrate shrub in coastal areas. (6, 12) *Nuytsia* is a monotypic genus, and is one of only three root parasites in the mistletoe family Loranthaceae (9). This species is the largest known parasitic flowering plant (10). The distribution of *Nuytsia* is limited to an area from the Murchison River at the northern tip of the southwest land division of Western Australia, to Israelite Bay in the southeast (9). *Nuytsia* is renowned for its spectacular displays of orange flowers (14) during the Christmas period, hence the tree's common name of "Christmas Tree". These attributes, together with the fact that the species is virtually unavailable commercially, give the tree great horticultural potential.

Propagation by cuttings is the standard nursery practice for producing large numbers of plants from a species which is difficult or impossible to establish from seed. Although *Nuytsia* seed is not difficult to germinate (1), very few seedlings survive beyond the first year of germination (11). Cuttings are also a quick method of obtaining plants that flower earlier (4). The vegetative material used is mature tissue.

Nuytsia seedlings undergo a lengthy juvenile phase of development. The established succulent seedling produces many xeromorphic sucker shoots. After several years the plant produces a strong dominant trunk, with adult foliage, which is capable of flowering. Sucker shoots continue to be produced by the adult tree; this is the major means of reproduction of the species. Since *Nuytsia* seedlings can take up to ten years or more before first flowering (2), determination of successful propagation methods may have commercial application.

The aim of this research was to determine a viable method, giving a strike-rate of 85% or better, for the propagation of this species by cuttings. Previous trials showed *Nuytsia* cuttings to exude a mucilage from all cut or injured surfaces. Hocking (8) suggested that soluble complex carbohydrates are contained in this mucilage. These carbohydrates support the proliferation of microorganisms which clog the xylem vessels, leading to the death of the cutting by desiccation (2). A range of surface sterilants, senescence retardants, and anti-oxidants were tested in an attempt to overcome the exudate problem but without success. Finally the technique of chilling the propagation material was employed.

MATERIALS AND METHODS

This research was carried out in the School of Biology glasshouse during 1988, on the Curtin University of Technology campus, Bentley, Western Australia. The bottom-heated propagation bench maintained a root-zone temperature of 25 $\pm$ 1.5 °C. Humidity was maintained at 90 $\pm$ 5% by a fogging device.

Cutting material was collected from a field site north of Perth (31° 21'S, 115° 35'E) that had been burned in the summer of 1985. Regrowth was vigorous with no evidence of disease or physical damage.

It had been observed in previous trials that sucker shoot tip cuttings produced less mucilage than cuttings taken from canopy material. Sucker tips, trimmed to 60 to 80mm, were used in this experiment. The cutting material was surface sterilized in 5% sodium hypochlorite solution for ten minutes and then rinsed thoroughly in deionized water.

After surface sterilization, 200 cuttings were stored at 4 °C for three days; another 200 were treated with various hormone formulations immediately upon returning from the field. The chilled cuttings underwent the same hormone treatments post-chilling, after being allowed to warm to ambient temperature.

Refrigeration at 3 to 4° C for two to three days has proved beneficial for stabilizing cuttings of some species (13). It is known that lowering the temperature slows normal metabolic processes. This would, therefore, reduce the stress induced in taking the cutting by slowing physiological responses, possibly stopping or reducing the production of mucilage. Improved rooting of some species after storage at low temperatures may also be attributed to an induced conversion of starch into sugars and so providing more sugars for the rooting process (13). Care was taken to avoid chilling injury and desiccation, which often occurs during cool storage, by wrapping the cuttings and ensuring that free water was always available.

Indolebutyric acid (IBA) was the only rooting hormone used in this trial. Previous experiments had shown *Nuytsia* to be sensitive to the hormone, naphthaleneacetic acid (NAA). The IBA was applied at 0, 1000, 2000, 3000 and 4000 ppm. There were 20 cuttings in each treatment.

Two methods of hormone application were tested, a 10% ethanol liquid dip, and talc. Talcum powder formulations have proven more effective for cuttings of some species (7). The cuttings treated with the liquid hormone preparation were dipped as shallowly as possible for five seconds only; these were allowed to air dry for a few seconds before being placed into the propagation medium. The cuttings treated with the talc hormone preparation were also dipped as shallowly as possible for five seconds only. Excess talc was tapped from the cuttings prior to being placed in the propagation mix.

The propagation medium was comprised of 2 parts composted pine bark:1 part granulated polystyrene. All cuttings were sprayed weekly with a fungicide solution.

RESULTS

Most unchilled cuttings produced mucilage and died within a week. Those in the chilled treatments survived much longer, many finally rooting. Rooting assessment was made weekly; after 12 weeks all surviving cuttings had rooted. The results are detailed in Table 1.

The highest percentage rooting of 90% occurred in the chilled 4000 ppm IBA ethanol quick dip treatment. The chilled cuttings treated with liquid hormone dips rooted more consistently than all other treatments.

Table 1. Results of the rooting success after 12 weeks in each treatment of the propagation trial.[1]

	Talc		Liquid	
	IBA (ppm)	Percent rooted	IBA (ppm)	Percent rooted
Chilled[2]	0	0%	0	10%
	1000	0	1000	50
	2000	0	2000	30
	3000	20	3000	80
	4000	10	4000	90
Unchilled (control)	0	40	0	20
	1000	0	1000	0
	2000	0	2000	20
	3000	0	3000	20
	4000	0	4000	0

[1] 20 cuttings per treatment
[2] chilled at 4 °C for 3 days

DISCUSSION

It appears that the main benefit of chilling was to prevent or reduce mucilage production. This mucilage is produced by the species in response to wounding (2). By chilling the cutting the physiological processes which occur in response to taking the cutting are slowed. It may also be that the healing of the base of the cutting was slowed. The production of callus is part of the healing process. Over-production of callus can inhibit rooting (5). Slowing the healing process may reduce the ultimate size of the callus produced. Callus production in the rooted cuttings appeared minimal. The superiority of applying rooting hormones as liquid dips to *Nuytsia* supports Ellyard's (3) recommendation for yielding optimum results for a number of Australian plant species.

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