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In experiments with M. villosa, M. excelsa (cv. Rangitoto and cv. Scarlet Pimpernel), M. polymorpha and M. carminea, partial rejuvenation was obtained in vitro with explants from new shoot growth on plants with adult foliage. The explants had a high potential for root regeneration and developed juvenile foliage. Within 6 months of transfer to soil, bud break on these plants showed mature adult foliage. 1 ref.

CONSIDERATIONS OF JUVENILITY AND MATURITY IN THE MICROPROPAGATION OF THE METROSIDEROS SPECIES

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Abstract

The *Metrosideros* species are flowering woody plants, growing predominantly in the Pacific region. Propagation has been by cutting grown material from adult foliage, but rooting percentages have been variable. The *in vitro* propagation shows a transition between the adult and juvenile stages as follows. Acclimation of mature adult foliage under high temperature and low light conditions produces soft young growth. Under *in vitro* conditions these explants rejuvenate with a high potential for root regeneration. Within six months of transfer to soil, the bud break on these plants shows mature adult foliage.

The micropropagation of *Metrosideros excelsa* cv. 'Rangitoto', *M. excelsa* cv. 'Scarlet Pimpernel' *M. carminea* (from New Zealand), *M. polymorpha* (from Hawaii) and *M. villosa* (from Tahiti), all show this transition.

1. Introduction

Some plants exhibit a definite juvenile, and a mature adult stage in their growth pattern. These stages are often indicated by an alteration in the leaf form. The plant environment may affect the duration of the juvenile stage, soil type, and climatic conditions, (particularly light and moisture) both play their part.

M. villosa has been introduced to New Zealand from Tahiti. In the seedling plants, the leaves are glabrous, while in the adult the leaves are tomentose on the under surface.

M. excelsa cv. 'Rangitoto' and cv. 'Scarlet Pimpernel' are trees endemic to New Zealand. Leaf development follows a similar pattern to the above.

M. polymorpha bears the national flower of Hawaii. The new growth of the adult foliage has a reddish tinge.

M. carminea is endemic to New Zealand. The

juvenile form is a climbing vine and the leaf tips are obtuse. At the adult flowering stage, it branches into a shrubby habit, and the leaf tips are acute.

Cuttings taken from adult *Metrosideros* are difficult to root.

2. Material and methods

Cutting grown plants with adult foliage were held in an acclimation area at 25°C under low light conditions of 1 000 lux. They were sprayed with a benlate and thiram fungicide mixture. Cuttings 1-2 cm in length were taken as explant material from the new shoot growth. Disinfestation included a dip in 95% ethanol, followed by 20 mins in 0.6 % sodium hypochlorite, and three rinses in sterile distilled water. Cultures were incubated at 25°C, light at 2 000 lux for 16hr/day.

New shoots were subcultured and produced multiple shoots from the base. These shoots were rooted *in vitro* on a medium containing indole butyric acid.

The transfer to soil was completed in a humidity tent with a low pressure fogging system. The potting mixture used was bark 50%, peat 25%, and pumice sand 25% with a general nursery stock fertiliser.

3. Results

Under *in vitro* conditions the leaves altered form and many stems developed anthocyanin pigmentation. (table 1)

Rooting of these shoots was excellent (greater than 95%). Six months after transfer to soil the bud break on the plants began to show adult foliage characters.

Cuttings of the greenhouse grown plants taken at 6 months also rooted readily.

4. Discussion

From the *Metrosideros* species described, we are now able to select trees showing superior qualities (flowering or habit) that are worthy of mass clonal propagation.

Under *in vitro* conditions the shoots developed juvenile characteristics and gave excellent rooting percentages. Six months after transfer to soil, the plants began to exhibit a return to the adult phase. The seedlings of *Metrosideros* species often have a juvenile phase lasting several years, thus the rejuvena-

tion shown by these plants *in vitro* was only partial.

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References

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Table 1 - The transition between the juvenile and mature foliage forms of the *Metrosideros* species investigated.

	Adult foliage	In Vitro	Nine months after transfer
M. villosa	leaves tomentose	leaves glabrous	leaves tomentose
M. excelsa cv. 'Rangitoto'	leaves tomentose	leaves glabrous	leaves tomentose
M. excelsa cv. 'Sc. Pimpernel'	leaves tomentose	leaves glabrous	leaves tomentose
M. polymorpha	leaves reddish	leaves green	leaves reddish
M. carminea	leaf tips acute	leaf tips obtuse	leaf tips acute

IMPROVEMENTS IN APEX CULTURE IN *VITIS* SPECIES

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Abstract

Apex or meristem culture of *Vitis* species often remains difficult and uncertain (Galzy, 1972). Apex grafting on hypocotyls of grapevine seedlings was a first improvement in the regeneration rate and in the effectiveness of virus elimination (Bass et al., 1976). In 1978, Barlass et al. described a simple and rapid method allowing development of numerous buds from a single fragmented apex. We applied this method for micropropagation of various *Vitis vinifera* (Chardonnay, Klevener de Heiligenstein...), rootstocks (Kober 5 BB...) and hybrids (LN 33).

The addition of animal serum to the culturing media facilitates the development of grapevine meristems (0,1 mm - 1-2 leaf primordia). It greatly increases the number of meristems developing into plantlets as well as the rate of their differentiation.

Applications of this technique for grapevine virus elimination and for rapid multiplication are described.

Introduction

The number of woody plants which have been successfully propagated by *in vitro* culture is very small compared to herbaceous plant species. *In vitro* culture is a useful tool for rapid propagation of grapevine and for the study and the elimination of grapevine virus diseases.

In 1972, Galzy attempted to culture small grapevine apices but she came up against difficulties due to the great number of culture media used. Apex grafting was the first improvement for eliminating virus diseases which are not eliminated by traditional methods. Barlass and Skene (1978) described a new method of *in vitro* propagation which produces in 3 months approximately 8,000 plantlets from a single fragmented apex. In this paper we report some results on apex grafting and micropropagation. We also describe a new method of meristem culture based on the addition of animal serum to the culture medium.

Materials and methods

Micrografting: Virus-infected grapevines cultivated in tin cans for 6 months or more were treated in heat chambers at 38 +/- 1°C for periods ranging from 60 to over 600 days (Bass, 1976). The growing shoots were cut off. After disinfection, the apical meristematic zones were dissected aseptically and grafted on the top of the hypocotyls of grapevine seedlings. When roots and scion had developed enough, the plantlets were kept in greenhouse before replanting outdoors.

Micropropagation: Shoot tips were removed from glasshouse grown grapevines or from grapevines developed in thermotherapy chambers (38°C). After sterilization in a calcium hypochlorite solution and rinsing in sterilised water the shoot apices (1mm length, 4-5 leaf pri-