

THE USE OF PACLOBUTRAZOL IN THE ROOTING MEDIUM OF MICROPROPAGATED PLANTS

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Abstract. Paclobutrazol, a plant growth retardant, may be used in the rooting medium of micropropagated plants to prepare the plants for transfer to soil without acclimatisation. The following plants have been subjected to varying strengths of paclobutrazol in the rooting medium, *Metrosideros* spp., *Eucalyptus ficifolia*, *Mandevilla* 'Alice du Pont', *Rhododendron* 'Anna Rose Whitney' and *Morus nigra*. The results show an individualistic response with respect to root growth but all plants that were transferred to soil without acclimatisation grew successfully.

INTRODUCTION

Plantlets cultured *in vitro* on agar-based media in a humid atmosphere wilt rapidly when transferred to normal greenhouse conditions. Hence it is usual practice to acclimatise the plantlets in a humid environment for 2 to 4 weeks until new roots and shoots have grown.

The effects of paclobutrazol have been reported to include an improvement in stomatal physiology, an increase in the deposition of epicuticular wax, reduced wilting in response to water stress, and a strengthening of shoots and roots. The use of paclobutrazol in the rooting medium of micropropagated plants can eliminate the need for an acclimatisation period, and plantlets may be transferred to soil in a normal greenhouse or to field conditions (1).

MATERIALS AND METHODS

The product Cultar (23% w/w paclobutrazol; ICI) was diluted and added to the normal rooting medium of each plant at rates of 0, 0.5, 1.0 or 2.0 mg/l paclobutrazol. This was autoclaved at 121 °C for 20 min.

The following plants were treated: *Metrosideros collina* 'Springfire', *M. collina* 'Tahiti', *M. excelsa* 'Parnell', *M. excelsa* 'Scarlet Pimpernel', *Eucalyptus ficifolia*, *Mandevilla* 'Alice du Pont', *Morus nigra*, and *Rhododendron* 'Anna Rose Whitney'.

RESULTS

The rooting percentages of each plant in their normal rooting medium and with different levels of added paclobutrazol, are shown (Table 1).

Table 1. Effect of paclobutrazol concentration on rooting of plants.

| Plants tested | Percent of plants rooted | | | |
|---|--------------------------|-----|-----|-----|
| | Paclobutrazol (mg/l) | | | |
| | 0 | 0.5 | 1.0 | 2.0 |
| <i>M. excelsa</i> 'Scarlet Pimpernel' | 100 | 90 | 95 | 90 |
| <i>M. excelsa</i> 'Parnell' | 100 | 90 | 100 | 61 |
| <i>M. collina</i> 'Springfire' | 100 | 95 | 100 | 100 |
| <i>M. collina</i> 'Tahiti' | 100 | 95 | 100 | 95 |
| <i>Eucalyptus ficifolia</i> | 100 | 13 | 4 | 2 |
| <i>Mandevilla</i> 'Alice du Pont' | 80 | 80 | 90 | 100 |
| <i>Morus nigra</i> | 70 | 0 | 10 | 0 |
| <i>Rhododendron</i> 'Anna Rose Whitney' | 0 | 0 | 0 | 0 |

Metrosideros excelsa 'Scarlet Pimpernel' and *M. excelsa* 'Parnell' showed similar reactions. On media with paclobutrazol added (in comparison with the control) the roots took longer to initiate and grow, the root length was variable and the stem internodes were shorter. The plants survived transfer to normal glasshouse conditions and after three months all plants were growing well.

For *M. collina* 'Springfire' and *M. collina* 'Tahiti' on media with paclobutrazol added the roots took longer to initiate and grow (in comparison with the normal rooting medium), but these were thicker and shorter. The stem internodes were also shorter. The plants survived transfer to normal glasshouse conditions and after three months there were a few losses but the remainder were growing well.

When paclobutrazol was added, the rooting percentages of *Eucalyptus ficifolia* and *Morus nigra* were so poor that the experiment was discontinued and no plants were deflasked.

For *Mandevilla* 'Alice du Pont' the greater the paclobutrazol concentration the longer and thicker the roots and the shorter the stem internodes. The plants survived well the transfer to normal glasshouse conditions. After three months the internodes remained short, the shoot tip buds were compacted and growth was limited. Since vigorous growth after deflasking is essential in a climbing plant, it was felt that the addition of paclobutrazol was unsuitable.

The use of paclobutrazol in the shoot elongation medium did not encourage root growth in the *Rhododendron* hybrid. Stem internodes were shortened and treated plants were half the height of the controls. Almost all plants survived the transfer to normal glasshouse conditions. After three months plants that received 0.5mg/l paclobutrazol were the strongest, i.e. taller with better leaf area.

DISCUSSION

By using paclobutrazol in the rooting medium of micropropagated plants, there is no need for acclimatisation in a humid environment at deflasking, and plants can be transferred to soil in normal glasshouse conditions. This may be a useful alternative where humid fog space is at a premium or where a customer does not have sophisticated deflasking areas.

However, the response to the addition of the paclobutrazol *in vitro* is individualistic, rooting percentages vary, and every kind of plant must be trialled and assessed for suitability to this technique.

LITERATURE CITED

- 1 Roberts, A.V , E F. Smith and J Mottley 1989. The preparation of micropropagated plantlets for transfer to soil without acclimatisation *Molecular Biology 6* J Walker (ed) Humana Press