Is Nutrition in Propagation Media a Con?©

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INTRODUCTION

The successful root development and establishment of cuttings can be increased by the incorporation of low to moderate levels of controlled release-fertiliser (CRF) in the propagation media prior to sticking (Hartmann et al., 1997) or at root establishment (Janick, 2001). However, the technique of including CRF in propagation media or applying CRF to the tops of their trays or cells after root initiation even though detailed in industry standard text books on growing media (Handreck and Black, 1984), is still not widespread standard practice within New Zealand or Australia. There is still a belief that nutrition in propagation media is not desirable and could be a hindrance to root development and/or will encourage more top growth than root growth (as indicated in a strawpole taken by a show of hands at the start of this presentation at the IPPS Conference, Hobart, 2009, unpublished data). It was therefore decided to re-evaluate the benefits (or not) of CRF incorporation into propagation media for four species and where possible look at the effect on top growth versus root growth.

TREATMENTS

Four species were selected for propagation as shown in Table 1.

Table 1. Propagation details and container types for four different species.

Species	Propagation date	Cutting type	Harvest date	Container type
Trachelospermum jasminoides (star jasmine)	8/1/2009	Tip/nodal	4/5/2009	Trays + cells (60 ml)
Buxus 'Green Gem'	6/1/2009	Tip (plus wound)	6/5/2009	Trays only
Corokia × *virgata* 'Geenty's Ghost'	8/1/2009	Tip/nodal	6/5/2009	Cells (60 ml) only
Syzygium 'Ventenati'	8/1/2009	Tip/nodal	4/5/2009	Trays only

Around 100 cuttings for each treatment were taken from containerized stock and direct stuck into either 5.5-L propagation trays or 60-ml cells or both, depending on current practice at Rainbow Park Nurseries for these species. Propagation media consisted of Southland peat and pumice (1 : 2, v/v) with the addition of Dolomag, lime, and Osmocote Exact Lo-Start 12-14 month at 2 $g \cdot L^{-1}$. The pH of this mix was 5.5. All trays were put on heated beds at 21 °C with overhead mist.

All four species were harvested at approximately 17 weeks. At harvest individual cuttings were carefully lifted from the trays and cells, assessed as to whether they had rooted, and subsequently counted. In addition, the cuttings were weighed to

calculate individual fresh weights after they had been thoroughly washed to remove all media.

RESULTS AND DISCUSSION

Percent Rooted Cuttings. All rooted cuttings were counted and the actual percentages that rooted are given (Fig. 1). This figure also groups together the result by container type. The first section of the figure gives results from cuttings that were direct stuck into 5.5-L trays while the second section of the figure represents results from cuttings direct stuck into 60-ml cells.

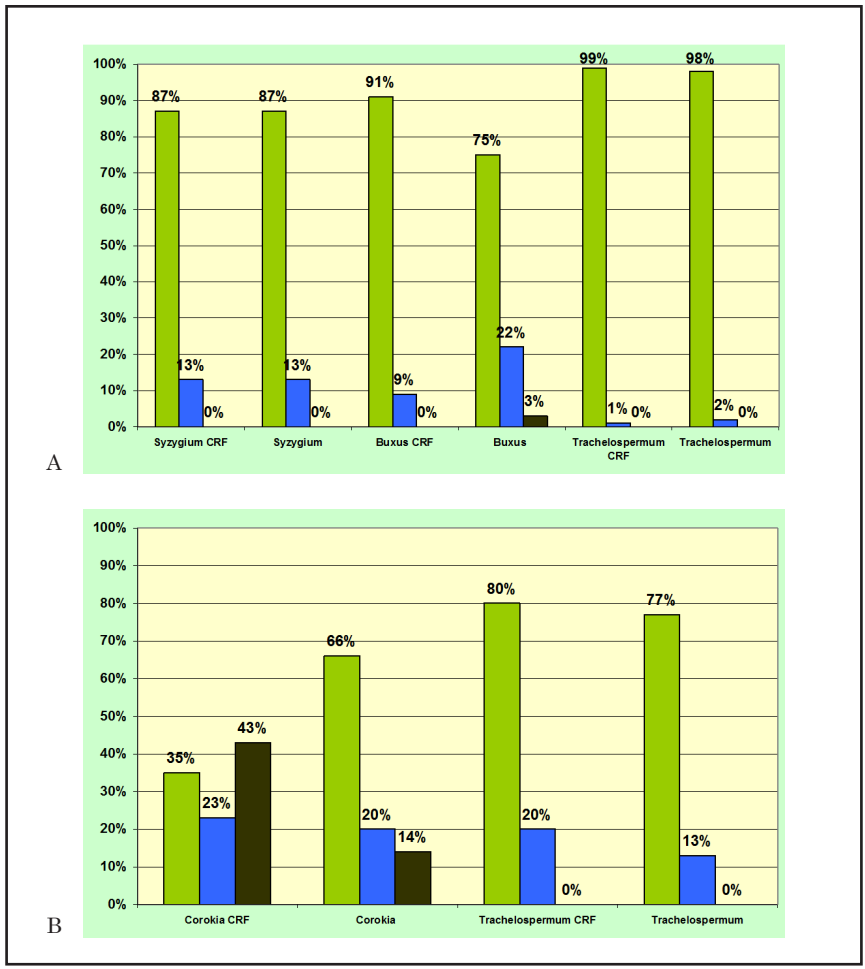

Figure 1. (A) The effect of control-release fertilizer in propagation media on root formation in *Syzygium*, *Buxus*, and *Trachelospermum* in 5.5-L trays, and (B) in *Corokia* and *Trachelospermum* in 60-ml cells.

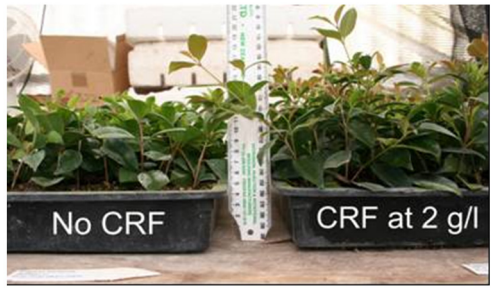

Figure 2. *Syzygium* in propagation media without controlled release fertilizer (CRF) on the left and with CRF on the right.

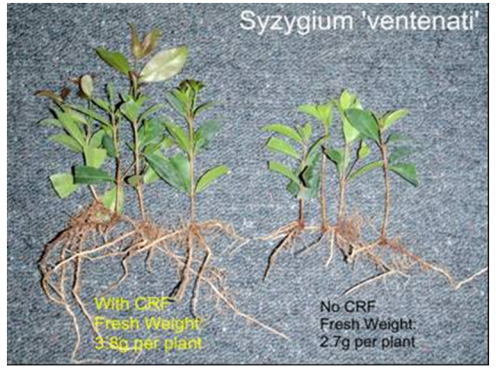

Figure 3. *Syzygium* rooted cuttings with controlled-release fertilizer (CRF) on the left and without CRF on the right.

Overall root initiation (rooting %) of cuttings was unaffected by whether there was CRF in the media or not, as surmised by IPPS members in a show of hands at the conference. *Buxus* appears to be an exception with 91% rooted cuttings in CRF versus 75% without CRF. In contrast, the percent of *Corokia* cuttings that rooted in the 60-ml cells appeared to negatively respond to CRF. However, the results for *Corokia* are difficult to interpret because of two variables that would have impacted the 60-ml cells versus the propagation trays. The first variable was a malfunction of the mist unit (flooding) around 1 month after propagating, and the second variable was the use of standard-sized CRF, which is not appropriate for a 60-ml cell due to poor distribution of prills. Both of these factors, and the prill distribution in particular, would have increased the variability in results from the 60-ml cells and therefore this part of the trial would need to be repeated for more accurate conclusions.

Container type does appear to be a factor in the general performance of cuttings, with the 5.5-L "hygiene trays" or "flats" being preferable to 60-ml cells in cutting performance. For example 80% (with CRF) and 77% (no CRF) *Trachelospermum* cuttings rooted in 60-ml cells versus 99% (with CRF) and 98% (no CRF) in trays.

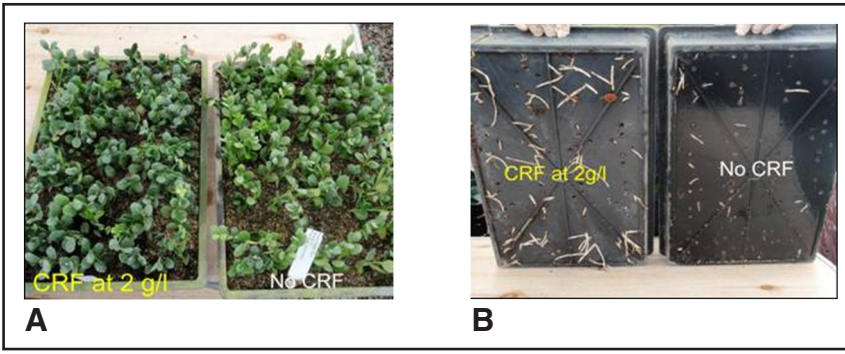

Figure 4. *Buxus* trays from the top (A), and underneath (B) with controlled-release fertilizer (CRF) on the left versus no CRF on the right.

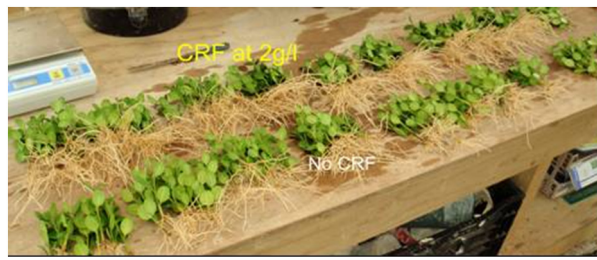

Figure 5. *Buxus* showing total harvest of rooted cuttings with controlled-release fertilizer (CRF) on the top versus no CRF on the bottom before weighing.

Fresh Weights of Cuttings from Trays. Fresh weights of rooted cuttings improved significantly when CRF was added to the media of the cuttings grown in trays. Fresh weights of *Syzygium* rooted cuttings in CRF increased 41% from 2.7 g to 3.8 g, *Buxus* rooted cuttings increased 45% from 1.9 g to 2.8 g, while *Trachelospermum* rooted cuttings increased 23% from 1.1 g to 1.3 g. These increases were all compared with rooted cuttings in trays without CRF (Table 2 and Figs. 1–4).

Table 2. Fresh weight of rooted cuttings with and without controlled-release fertilizer.

	Average fresh weight of propagation-tray cuttings (g)		
	No CRF[z]	With CRF	Weight increase (%)
Syzygium 'Ventenati'	2.7	3.8	41
Buxus 'Green Gem'	1.9	2.8	45
Trachelospermum	1.09	1.34	23

[z] CRF = controlled release fertilizer.

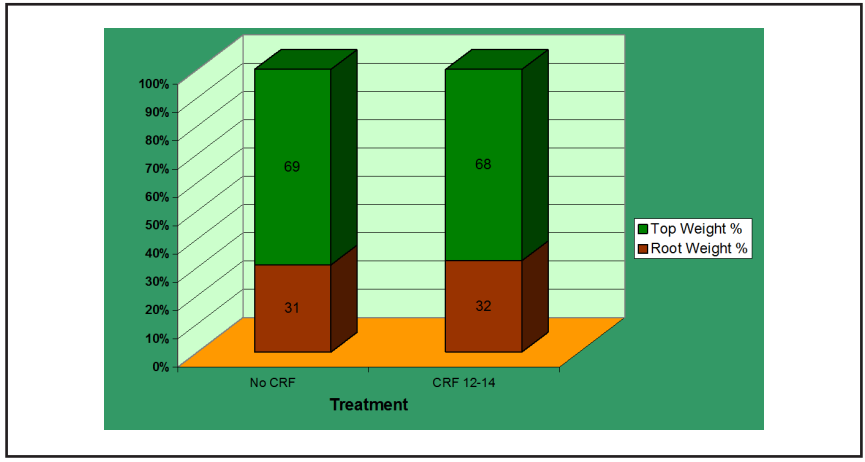

Figure 6. Proportional representation of total fresh weight for tops versus roots of *Trachelospermum* rooted cuttings.

Fresh Weight Difference of *Trachelospermum* Shoot versus Root. As previously stated, there was a 23% total increase in fresh weight from 1.09 g per rooted cutting in no CRF to 1.34 g with CRF. For this crop we cut the roots from the tops to determine whether there was any differentiation in fresh weight gain between the tops of the cuttings and the roots. That is, was there any difference in proportioning of fresh weight into top growth of the cuttings grown in CRF versus those cuttings grown without CRF?

Figure 6 shows that there was no significant difference in the proportion of root-to-shoot between treatments. That is even though the rooted cuttings in CRF weighed more, this increase in weight was still evenly proportioned between root and shoot. For the *Trachelospermum* grown in no CRF, 31% of total fresh weight was in the roots and 69% in the tops compared with 32% in the roots and 68% in the tops with CRF.

Fresh Weights of Rooted Cuttings Grown in 60-ml Cells. The differences between fresh weight of cuttings in 60-ml cells with or without CRF was minimal, with only 8% increase in fresh weights for cuttings grown in CRF versus those grown in no CRF for both *Corokia* and *Trachelospermum*. This is understandable, as standard-sized CRF is not suitable for cells because the distribution of prills becomes an issue and therefore an added variable.

Table 3. Fresh weight of rooted cuttings with and without controlled-release fertilizer (CRF) F in 60-ml cells. (note that a mini-prill should have been used).

	Average fresh weight (g) of cell tray cuttings		
	No CRF	CRF	Increase (%)
Trachelospermum	1.09	1.34	8
Corokia 'Geenty's Ghost'	1.26	1.36	8

SUMMARY

The percentage of cuttings that rooted in the trays was generally not affected by whether or not CRF was incorporated into propagation media for *Trachelospermum*, *Buxus*, and *Syzygium*. This supports other standard text books on propagation and the use of CRF nutrition in the media (Hartmann et al., 1997). However *Buxus* did show a higher percentage rooting in CRF.

Establishment of the cuttings measured by fresh weight of the rooted cutting was improved markedly where the cuttings were stuck into 5.5-L trays using CRF. Fresh weights of rooted cuttings in CRF increased from 2.7 g to 3.8 g for *Syzygium* (41%), 1.9 g to 2.8 g for *Buxus* (45%), and 1.1 g to 1.3 g for *Trachelospermum* (23%) versus the fresh weight of cuttings taken from trays without CRF. In contrast, *Corokia* and *Trachelospermum* rooted cutting fresh weights from the 60-ml cells increased by only 8%. This relatively small increase in fresh weight from these cells versus from the trays is understandable as the CRF in the media was incorrect for the small cell size. The correct CRF for 60-ml cells should have been the mini-sized prill, as this would have given a better distribution of prills between cells.

The proportion of increased fresh weight of rooted cuttings that was divided up between the top and roots remained similar for *Trachelospermum* between those cuttings grown in CRF versus those cuttings grown without. Although the rooted cuttings in CRF weighed more, this increase in weight was still evenly proportioned (30/70) between root and shoot.

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A special thanks to my boss John Walsh at Scotts who was very generous in allowing me the time to put this all together and for Greg Neighbour who pointed me in the right direction as to the purpose of this trial and told me to "keep it simple," which I know why because even simple can be complex!

LITERATURE CITED

Hartman, H.T., D.E. Kester, F.T. Davies Jr., and **R.L. Geneve.** 1997. Plant Propagation: Principles and Practices. 6th ed. Prentice Hall Inc., Upper Saddle River, New Jersey.

Handreck, K., and **N. Black.** 1984. Growing media for ornamental plants and turf. University of New South Wales Press, Sydney.

Janick, J. 2001. Horticultural science. 4th ed. W. H. Freeman and Co., New York, New York.