Using Nutrition Effectively During Propagation©

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INTRODUCTION

The benefit of incorporating controlled-release fertilizer (CRF) in the propagation media of woody stock from cuttings has been affirmed by extensive research over the last 2 decades, yet it is not universally adopted. This may be due to poor performance, in some grower evaluations, as a result of using inappropriate fertiliser formats, or application rates. Since trials on CRFs began, the use of multi-cell trays, and direct sticking into small tube pots, has become more common. These new techniques present extra challenges requiring special consideration. This paper outlines potential methods for achieving uniform distribution of the CRFs, in relatively small media volumes, at a rate that does not inhibit root development resulting from high initial salinity.

PRILL DISTRIBUTION AND SIZE

When using a CRF, uniform distribution is achieved using a small fertiliser prill format product at modest rate, or a regular prill size product at a high rate of incorporation. Extended longevity products, often characterized by a delayed or very slow initial rate of release, help reduce the salinity threat. Manufacturers suggest 9- to 14-month-longevity products for this reason, despite the propagation phase usually being much shorter.

The size range available in New Zealand is 44 prills/gram (the smallest), to 26 prills/gram (the largest). The application rate needed, but not necessarily recommended, to achieve uniform distribution for the given cell or pot volume using these products is:

- 50 cm^3 cell: largest 13 $kg \cdot m^{-3}$ to smallest use 8 $kg \cdot m^{-3}$.
- 100 cm^3 cell: 6.5 $kg \cdot m^{-3}$ to 4 $kg \cdot m^{-3}$.
- 5 cm tube: 3.25 $kg \cdot m^{-3}$ to 2 $kg \cdot m^{-3}$.

Rates above 5 $kg \cdot m^{-3}$ may generate excessive salinity with only one commercial product identified as safe beyond 5 $kg \cdot m^{-3}$.

At least one manufacturer claims: 17 or more prills per cavity equals good distribution, as a minimum. As with any brand of product, each prill may behave differently and only with several prills working in orchestration will the designed release pattern be achieved.

SALINITY

The following is a salinity tolerances guide using electro-conductivity (EC) as measured using a 1 : 1.5 ratio water extract method (Handreck and Black, 1984):

- Sowing < 0.7 mS (mille siemens)
- Direct sticking < 1.2 mS
- Potting off <1.6 mS
- Potting up <2.0 mS

Manufacturers' recommended rates for CRF incorporation in propagation media range from 2 to 5 $kg \cdot m^{-3}$. CRF brands have different initial rates of release, the fastest producing ten times more salinity than the slowest in the first 4 weeks in the

propagation media. The differential when measured after 10 weeks was still four times greater. For salinity control when seed sowing or direct sticking, incorporate a CRF brand with a high prill count per gram and a low initial release rate for the first 4 to 10 weeks. Use the following rates as a guide, varying the rate depending on the species being propagated:

- 1–3 $kg \cdot m^{-3}$ in open trays.
- 2–4 $kg \cdot m^{-3}$ in cells greater than 100 cm^3 and tubes using a 12- to 14-month longevity.

It is advisable to check regularly the effect these rates have on distribution and salinity for your fertiliser choice.

When potting off seedlings or rooted cuttings into tubes, use a CRF brand that can achieve good distribution at a rate that keeps salinity below 1.5 EC. This generally means no more than 4 $kg \cdot m^{-3}$ for most commercial products and no less than 2 $kg \cdot m^{-3}$.

MINI- AND MICRO-SIZED PRILLS

These formats are especially useful for fertilising fast-growing annuals from seed in small-cavity cell trays. Use for slow germinating or rooting woody stock is less common, as all mini or micro products are of short longevity, typically only 3 to 4 months, and generate high salinity levels quickly. If you use cell or cavity volumes of less than 100 cm^3 and greater than 25 cm^3, low rates of use are needed, to keep salinity low for slow stock. Using rates of 1.5 $kg \cdot m^{-3}$ to 2 $kg \cdot m^{-3}$ in a cell size of 40 cm^3 gives acceptable distribution and salinity. Mini and micro sized prills are also useful when top dressing or under-dressing to cell or tube pots as a method of deferring nutrient supply until root initiation is confirmed and the salinity threat is reduced (under-dressing means applying the fertiliser on top of the sand or capillary bed, and if used, underneath the cell tray). The fertiliser is moved by capillary action to the cells above.

COSTS AND CONCLUSION

A price premium for mini- and micro-sized prills exists of between 12% and 90% over regular-size fertiliser products. Mini-sized fertilisers may NOT be warranted, if you choose a regular-priced commercial product that already has a inherently small prill size, or if you propagate in tube pots (200 cm^3 or larger). There is a significant difference between the various branded products on offer both in their relative physical size and rates of nutrient release. Careful selection is critical if uniform distribution and safety are to be achieved in the range of multi-cell and propagation pots in use. You don't necessarily have to use premium-priced products, or high rates to achieve uniform results from controlled-release fertilisers in propagation.

Disclaimer This information is based on personal research and field experience and should be taken as a guide only.

LITERATURE CITED AND ADDITIONAL REFERENCES

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