OBSERVATIONS ON WATERING CONTAINER-GROWN CITRUS

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This report is based on observations made in our citrus nursery, where the media, containers, and nursery methods differ very little from other nurseries. The major difference is that the crop is for orchard rather than ornamental planting.

Our citrus plants take from 9 to 10 months to develop and most of the trees are sold within 24 months. Seasons are important to the orchardists who plant the trees.

The medium used in our propagation is 80% eucalyptus hardwood sawdust and 20% sand, plus Nutricote and other nutrients required for normal plant growth. Containers are both overhead and hand-watered.

The Problem. A problem developed in our production so that trees were not meeting our sales schedule. There was no lack of bud burst, but there was a following lack of shoot length and development.

Often 3 or 4 leaves would shoot out from a bud, and one month later these leaves would begin to show chlorosis and nutritional disorders, often followed by tip abortion and senescence for long periods of time, even over the summer growing period. The fact that older plants in the same house had dinner-plate leaves that were dark green tended to suggest that the medium and its nutrient status were not to blame.

It was not a question of dead trees, or trees not acceptable for sale, but rather the trees were slow to reach their minimum saleable height, thus taking up valuable nursery space and reducing cash flow.

Seedling stocks were checked and their vigour observed, and the budwood was checked without finding any clues. It, therefore,

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[1] Jeremy Tolley, Nursery Manager of Tolley's Nurseries Pty.Ltd., was killed in a car accident on Friday, 10th April, 1987 aged 26.

He was a born propagator, and in his own garden and shadehouse took a keen interest in all types of plants and flowers. His professional field was citrus propagation and horticultural management planning.

He attended Cal Poly University at San Luis Obispo, California, in Ornamental Horticulture, until forced by illness to return to Australia. On recovery three years later he joined his parents in the family company as Nursery Manager, handling his section with his own innovative flair.

He was a keen sportsman, and was Riverland Solo Speedway Champion. He also was a "Golden Gloves" boxing champion.

He attended IPPS meetings in California and Hawaii, after becoming a member, and gave his first address in Adelaide in 1986.

appeared that these problems were being caused by another of our nursery practices.

The Solution. In an attempt to solve the problem, some of the trees were put in a separate area during early summer, and signs were erected saying, "DON'T WATER."

In the month following this treatment, re-greening of the leaves occurred, and later buds on both rootstock and scion commenced growth. The resultant shoots were of good caliper and length. Some of the original trees were kept as controls, the only difference between the two groups being watering practices.

The normal practice in a saline water area is to have a free draining mix to facilitate leaching. These words, "free draining," were most of our problem. The mix had a high porosity, and a large air volume.

Our normal watering practice to leach out salts was to put on sufficient water to ensure run-off out of the bottom of the pot. My findings were that after such a watering event the pot remained about 80% saturated for up to 60 hours. This meant that most of the volume of the mix had no oxygen, other than dissolved oxygen for the roots.

*Proof of this was the level of root destruction. Most well-*developed container plants have roots at the bottom, at the surface, and some roots evenly distributed throughout the container. In our containers all the bottom roots were rotted off and there were only roots in the top 3 or 4 inches. This area drained gravitationally more quickly.

The total amount of water available to the plant in the four litre bags filled with our mix was one litre just after watering. It is still one litre a week later if the plant is not using it. The evaporation rate of water from the surface of a pot in a polyhouse is very small.

We now water every 10 to 14 days even in temperatures of 30 to 40°C. Our nursery watering schedule is on a minimum replacement basis with pH and EC changes being the only cause for saturation watering.

I have found a relationship among high frequency watering, the amount of root caliper, and the long wet/dry cycle. The roots of frequently watered plants tend to be fine and web-like, rather than the thick, corky roots of plants grown in the field, and by the wet/dry cycle watering. I have no quantitative data on this other than my observations of the root systems of nursery and field-planted stock, but I am sure that it is important in growing good, healthy container plants.

The intelligent application and management of water has improved plant growth, saved time, and increased profitability in our nursery.