So there we have it—another statement brought into question and found to be incorrectly expressed. What should have been said was: "plants in the family Proteaceae are sensitive to phosphorus when it is applied in the wrong form and the wrong concentration."

When phosphorus is applied in the correct form however, the results are very impressive with much increased growth, good leaf colour, firm stems, better yields of flowers, and more cutting material for propagation per plant.

As always, you will need to adjust these findings to your own production systems and do the necessary trials to verify these claims before achieving the results outlined above.

THE INFLUENCE OF RADIO COMMUNICATION TOWERS ON THE PROPAGATION OF FUCHSIAS

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Tamborine Mountain Plants specializes in fuchsias and these are grown from cuttings. Our main market is for potted plants in flower in the winter months. To feed this market, about 85,000 cuttings are struck in summer, during the months of December and January, each year. The cuttings are struck in 50mm tubes with a propagation mix consisting of peat and perlite, and the tubes are placed, 109 tubes per wire tray, on wire benches in an "open" area, and the cuttings are misted at regular intervals during the day. The "open" area consists of walls of solar-weave and the "roof", made of wire mesh supported by water-pipe, is covered with solar-weave over the newly-struck cuttings and with 50% shade-cloth over older cuttings. The nursery is supplied with bore-water.

In late February, 1986, a rapid deterioration of the fuchsia cuttings occurred, affecting first the stem tips and leaves, then the stem, and much later, the roots. Nearly 80% of all cuttings were affected. The immediate task was to identify the cause of this die-back but, even if it had been readily apparent, already the nursery's main market had been lost because no rapid striking of cuttings could make up for the two months required to reach the same stage of maturity. But the cause was not readily apparent, everything had been done in exactly the same way in 1986 as in previous years; the same propagation mix, the same bore water, the same fertiliser program and so on. Within a fortnight, we were able to rule out a microbial cause, so we knew we had to find a non-microbial

explanation. Leaf analysis revealed very high concentrations of zinc, but no boron. We were, at first, unable to suggest an explanation for either, but then we recalled that our neighbour had been repainting a large and very high nearby radio communication tower during February. Doesn't paint contain zinc? A hasty reference to an encyclopedia confirmed that some paints do contain zinc, and an examination of the roof of a shed near our common fence showed very clearly a pattern of paint spots, a pattern that was also found on the solar-weave and shade-cloth material covering the propagation area; in fact, we found paint spots quite some distance away from the fence. A phone call to a paint manufacturer yielded a very definite denial that paints are phytotoxic, and the advice to look at the pre-treatment methods used on the tower. The pre-treatment, consisting of high-pressure hosing with water or perhaps a solution had dislodged rather large flakes of old paint and these were found in various parts of the nursery. These were collected and sent for analysis, along with samples of new paint. The paint manufacturer was correct, new paint contained only 29 ppm zinc while the old paint contained approximately 100 times that for zinc, namely 2,800 ppm of which 2,400 p.p.m. was water-soluble. The liberal use of high-pressure water to remove the old paint had, in our view, resulted in the cuttings getting a misting with a solution containing in the region of 2,400 ppm zinc. This correlated with the initial leaf analysis readings of up to 1,000 ppm zinc, with an average of 650 ppm zinc, enough to kill just about any plant. In fact, a misting with just about any metal at 2,400 ppm would probably kill most plants.

But what of the zero boron readings in the initial leaf analysis? We were unable to offer any explanation for this and could not find any references to the effect of a boron deficiency on fuchsia cuttings. The bore water contained boron and was the same bore water used in previous years. Was it possible that somehow the high concentrations of zinc within the leaves had inhibited boron uptake and had the boron deficiency killed the cuttings? A computer search of the literature covering over 350,000 citations failed to reveal any studies linking zinc with boron.

We could not explain the boron deficiency but by autumn, we were sufficiently confident that we had suffered a transient phenomenon, to start afresh with new cuttings, albeit far too late to save the nursery from financial problems due to loss of its main market niche. Fresh cuttings were struck and, when they had become established, samples were sent for leaf analysis. The cuttings were not as vigorous as normal but they suffered few signs of die-back, and the leaf analysis revealed adequate levels of boron (about 28 ppm) and a still quite high level of zinc, probably because of the content of zinc in the mother plants.

In early summer of 1986, when a new cycle of propagation had commenced, cuttings of four fuchsia cultivars were selected for two

experiments. One experiment involved a hydroponic set-up using very high quality water "free" of boron. Some treatments were without boron as an additive whereas others had 10 ppm as an additive. Although the hydroponic system was not ideal, we can report that none of the cuttings in any of the treatments developed die-back. The second experiment involved misting zinc solutions onto the cuttings throughout the working day for five days a week for two weeks; within a few days, cuttings receiving the highest concentrations of zinc showed symptoms identical to those affected in the previous year.

The cause of die-back seemed to have been established; it was the zinc content in the high pressure water from the pre-treatment of the radio communication tower. But the boron levels in the leaves nagged at us. Had we overlooked something? The explanation in the end was mildly annoying—the sample used in the original analysis, though large enough to detect zinc, was far too small to detect boron.

The moral of our story is that, if your nursery is located near a radio communication tower or, indeed, any structure where high-pressure water is used to remove old paint, we suggest you consider relocating. More seriously and with hind-sight, this die-back problem presented a practical dilemma about where to go to get help. We would have like to have pressed an emergency button which would have immediately brought a team of experts to the nursery to collect samples for analyses for pathogens, for leaf analysis, for potting-mix analysis, for water analysis and for the analysis of whatever else might be considered desirable and hopefully, within a week, get them all together to pool their combined finds and wisdom, and suggest what to do.