

Graham Will – the father of radiata pine nutrition

By Bill Dyck

Early life

Graham Melville Will (BSc, MSc, DSc) passed away aged 92 on 25 February 2019 in Rotorua, where he lived most of his life. Born in Hastings on 17 November 1927, he used to recount his early memories of living through the big Napier earthquake.

Graham completed his BSc and MSc over a four-year period in Wellington at what was then the University of New Zealand. One can only assume that jobs for chemistry graduates were few and far between in the late 1940s because after graduation he became a drain digger for the Hastings City Council. This was probably the time when he dug his first soil profile, although he probably had no inkling as to what it was about to lead to.

FRI years

The Forest Service beckoned and Graham started working at FRI in 1950. The FRI Soils Group was basically Graham and two young technicians. As a soils and nutrition scientist working in forestry he was mainly on his own, and one suspects he had not really thought about radiata pine all that much when he was working on his chemistry degrees. However, he was very strategic in his approach and teamed up with the best forest soil scientists from around the world, particularly from Scotland, Sweden and the US. He formed strong professional relationships with them and they also became lifelong friends.

Graham was one of the individuals who had a chapter written about him in the book *Characters of FRI*. It describes him in this way:

It is probably fair to say that Graham Will is remembered by his erstwhile FRI colleagues as a man of high religious principle. It must have been hard going for a non-smoking, non-drinking, non-gambling vegetarian in the Forest Service of the 1950s, but Graham was always harder on himself than on other people, and good-natured tolerance always prevailed on both sides.



Nutrients and radiata pine

Graham and those who he managed and often mentored discovered a great deal about how nutrients cycled in radiata pine forests, the exact nutritional levels needed to ensure optimum tree productivity, and forest management techniques to guarantee that radiata pine forestry was truly sustainable and could be continued on the same site for rotation after rotation.

Graham was not one to sit in his lab or office and do experiments and write papers. Although he did publish a great number of these, instead he preferred to get out in the forest and work with forest managers to spread the word about how best to manage forest sites to ensure long-term productivity at minimal input costs. He was a very practical scientist.

FRI Bulletin No. 97 'Nutrient Deficiencies and Fertiliser Use in New Zealand Exotic Forests', published in 1985, summarised much of his work and that of others in his group and is still used today to guide management.

Ground-breaking research

His DSc was awarded in 1969 in recognition of the scientific achievements in the first half of his career at FRI. He carried out some ground-breaking research, often without involving cumbersome statistics. Graham was well-known for saying that, 'If you need statistics to prove something then it probably wasn't all that significant.'

Graham thought long term in much of his research and one of his earlier ground-breaking studies involved installing a large lysimeter in Compartment 69 of Kaingaroa Forest. This involved excavating a huge hole in the ground a couple of metres deep, and pouring a large concrete pad that was equipped with a drainage outlet so that drainage water could be collected and analysed.

The soil layers were carefully repacked to resemble the natural soil profile and radiata pine seedlings were



Doug Graham, Pat Hodgkiss with Graham on the wagon – hence the ‘Wills Fargo’

planted on top. Graham was interested in the fate of fertiliser, and once the trees were about 10 years old he fertilised them with radioactive nitrogen. Definitely pioneering work, and 25 years after planting the trees were harvested and analysed for their nutrient content, including traces of N¹⁵.

As part of this long-term thinking Graham also established a litter-raking trial, also in Compartment 69, in which a large 400 m² plot was raked every year to remove the needle litter and a control plot was left unraked. No statistics required! Graham reckoned that if you could not confidently measure and also see differences in tree growth after a rotation of litter raking, then there weren't any effects on the soil nutrient status and tree growth worth worrying about. The best thing about this trial was it gave the two dozen or so staff of the Soils and Site Productivity Group an excuse to have a staff picnic in the forest every year and rake up the pine needles.

Retirement and legacy

Graham was hugely respected and loved by his staff and colleagues and was given a big send off on his retirement in 1987, with scientists coming from all

over the world to wish him well in his next venture. At the event he was presented with a bound volume of his publications. A copy of the volume currently resides in the FRI (Scion) library and it provides a handy resource to see all the studies he did in one place.

New Zealand forestry (and indeed world forestry) owes a great deal to Graham, and the pioneering work he did investigating nutrient cycling in plantation forestry and developing the science and the techniques to manage site productivity and tree nutrition that are used today.

Graham did much more in his lifetime than just study soils and tree nutrition, but this short article cannot begin to describe that. Suffice to say that he dedicated his last three decades unselfishly working to establish the Tui Ridge Outdoor Centre near Rotorua. The amazing forests planted there are an everyday reminder of Graham.

Graham truly was the father of radiata pine soil and tree nutrition and his legacy will live on as foresters revisit the findings from his four decades of research, most of it published in journals, but now readily accessible on the internet for the current and future generations.