

Editor's Note. Professor John Walker contributed a provocative paper "Breeding - getting the most from radiata pine" to The May issue of The Tree Grower. This was distributed together with the May edition of the Journal. Both Wink Sutton and Rowland Burdon have responded.

The Wood Quality in Tree Breeding Quandary

W.R.J. Sutton

It is easy for Dr Walker (an academic and not an expert in tree breeding) to advocate very early tree selection (as early as age 2) as a means of improving the structural properties of radiata pine. I am not qualified to comment on the feasibility of selecting trees at such an early age. However, a lifetime in silvicultural research and of thinking about what wood properties offer the best long-term export prospects for our radiata pine has convinced me that the issue is much more complex than Dr Walker's simple view.

Is it possible to change a single wood property without unforeseen consequences in other wood properties? The early radiata pine tree breeders offered growers trees that had a reduced tendency to malform and that could grow faster (less trees needed to be planted and those trees would have more volume and/or be grown on shorter rotations - resulting in lower growing costs and greater returns). Tree breeders were able to dramatically reduce the incidence of malforms and to grow trees faster but the average wood density was generally lower. Having faster growth was more complex than just breeding from fast growing parents. It may be possible to select trees that will have superior structural properties but we must be sure other wood properties are not adversely affected.

As I have said elsewhere, radiata pine is a satisfactory but not a superior structural timber. In the global market for structural timber radiata pine compares unfavourably with trees species such as Douglas fir or the southern pines. On the other hand radiata pine has excellent finishing (and peeling) wood properties while the superior structural timbers are generally not premium finishing timbers, especially if the rings are wide.

These differences in wood properties can be partially explained by considering variations across the annual ring. Radiata pine is an excellent finishing timber because of the small difference between the density of the earlywood and the latewood as well as the gradual transition between the two. Because of the small variation in wood density radiata pine is not a stiff wood but is relatively strong. In contrast, superior structural timbers are stiff but are more brittle - the result of the low density of their earlywood. The wide variation in wood density across the annual ring means these tree species tend to have poor wood finishing properties, especially when fast grown. If we improve the stiffness of radiata pine it might be at the expense of its excellent finishing properties.

We must be careful that in breeding a stiffer radiata pine we don't decrease suppleness and breed trees that can't withstand a strong wind.

There is also the major question of what management regime should be used to maximise structural grades. Regimes developed for pruned radiata pine may not be appropriate particularly as these specially bred trees will probably not be pruned.

I am at a loss to understand why we would want to improve radiata pine as a structural timber, especially if there is a risk of decreasing its wood finishing qualities. In a global market quality structural timbers do not command premium prices - they are essentially commodity grades. I am yet to be persuaded our radiata pine would be more saleable globally if we improved its structural wood quality.

I have long maintained that the future of our radiata pine is as a quality finishing timber. The prime reason we prune is to enhance this wood quality.

The tragedy for New Zealand is, with a few exceptions, that we have largely failed to exploit this wood finishing advantage. Have we really tried to market and promote our plantation grown wood (and therefore a renewable resource) as a superior joinery and furniture timber? Some may disagree but I contend we haven't made the most of this advantage of our radiata pine. For exterior use (weatherboards and joinery) stability is more important than wood density. Low-density wood (cedar and redwoods are good examples) may increase wood stability. There should be more research on this aspect but it could be that in trying to improve radiata pine's structural properties we may be heading in the wrong direction. Increasing the wood stability of radiata pine (with possibly a lowering of wood density) might be far more advantageous for New Zealand.

What ever direction or directions tree breeding might take we must be aware that before any major investment is attracted to pursuing a new breeding goal for radiata pine we must have proof that the specially-breed radiata pine will preform as expected and that there will be no major change in other wood properties. Investors will need proof that the new breed of radiata pine will produce trees of the quality expected. It may take a rotation to test such a new breed but not to have done so and to have fully assessed any downsides could eventually prove disastrous for investors.