

## **Bending stiffness and strength comparison of Douglas-fir and radiata pine.**

A comparison has been undertaken between Douglas-Fir and radiata pine in terms of bending stiffness and strength. The information presented represents data collected by Ensis, which is now part of SCION (formally known as Forest Research). It is not intended to show the complete picture of bending stiffness and strength across New Zealand. It is accepted that variations will exist with a location however distinct differences between Douglas-fir and radiata pine are apparent.

### **Data Used**

#### Radiata Pine

The data shown was generated from a government funded in-grade study undertaken in 1999, in which six visually grading sawmills around New Zealand supplied a mix of No 1 Framing, No 2 Framing and Box grade timber in two sizes, 90x45 and 190x45, 100 pieces per size. Only the 90x45 data is used for this comparison. The bending strength and stiffness data is based in timber in the dry condition.

#### Douglas Fir

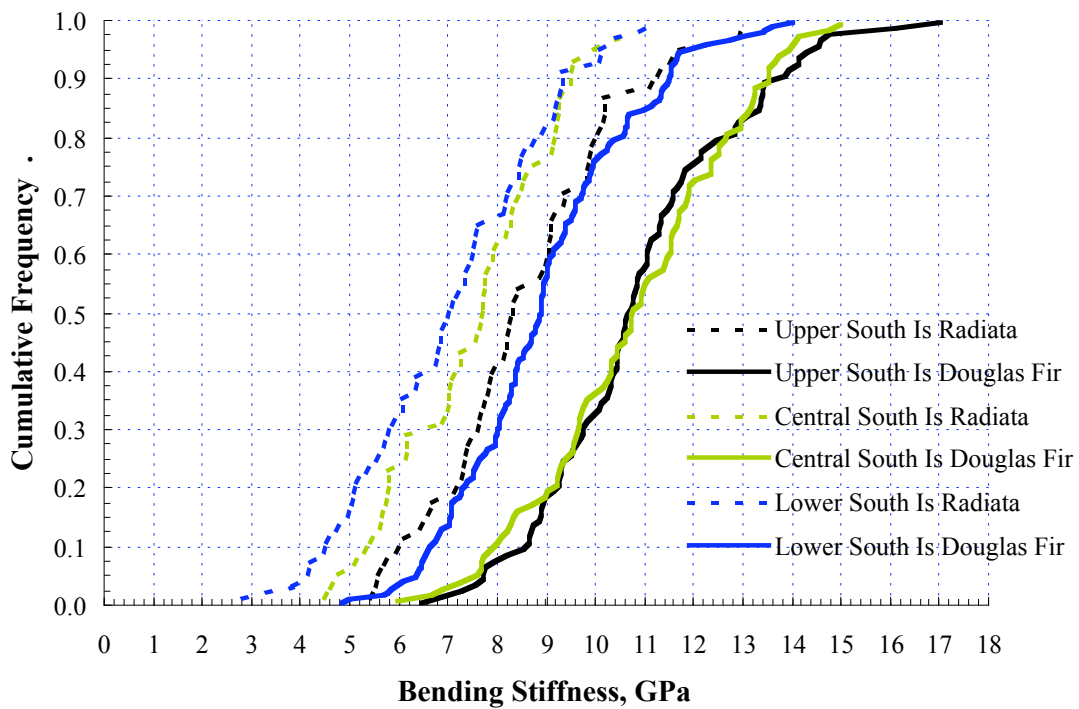
This data was collected from timber supplied to Ensis by visually grading sawmills for a bending stiffness and strength evaluation. The bending strength and stiffness data only presents 90x45 timber in the dry condition.

Cumulative frequency plots show comparisons for bending stiffness and bending strength when separated into lower, central, upper North and South Island sites.

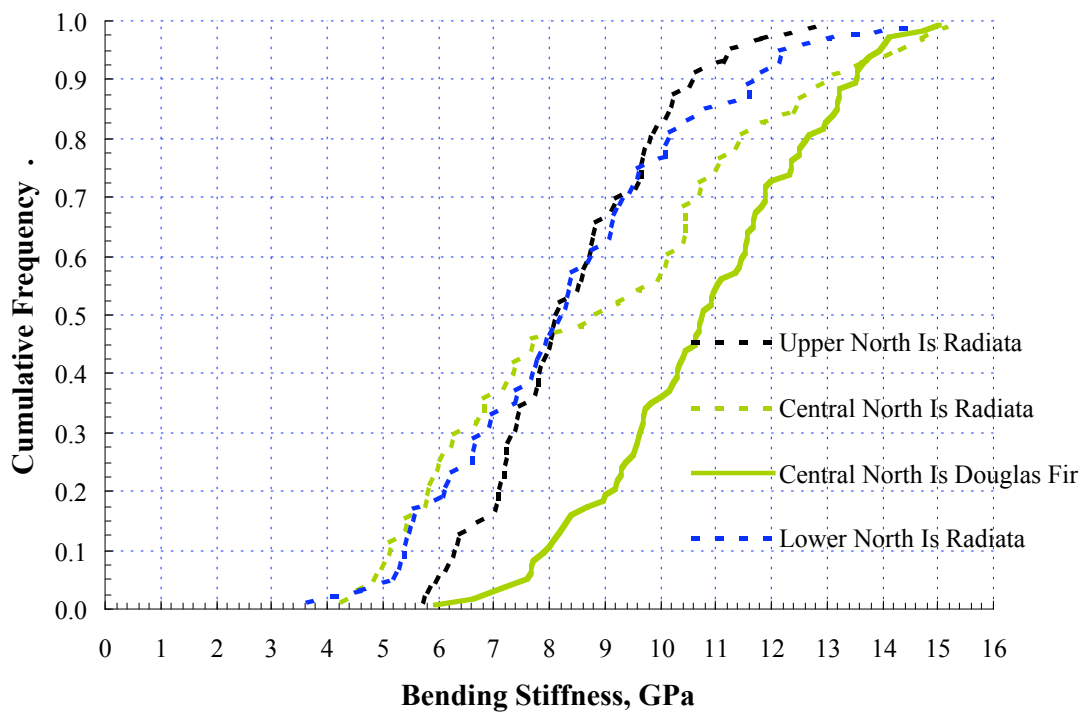
### **Summary**

- For the same general location, Douglas-fir shows a higher bending stiffness (varying between 1.5 to 3 GPa) compared to the equivalent radiata pine. In general it can be stated that for any given region Douglas-fir is typically 2 units of GPa stiffer than radiata pine. These results are consistent with other more detailed studies of individual stands of radiata pine and Douglas fir.
- The range in bending stiffness (highest to lowest) is similar for both species.
- For bending strength at the fifth percentile level (around the level at which strength is set) Douglas-fir shows a higher strength than radiata pine. At the average strength level there is little difference between the species.

Figure 1 shows a comparison of bending stiffness between Douglas-fir and radiata pine for Upper, Central and Lower South Island Sites. Figure 2 shows the same comparison for the North Island.

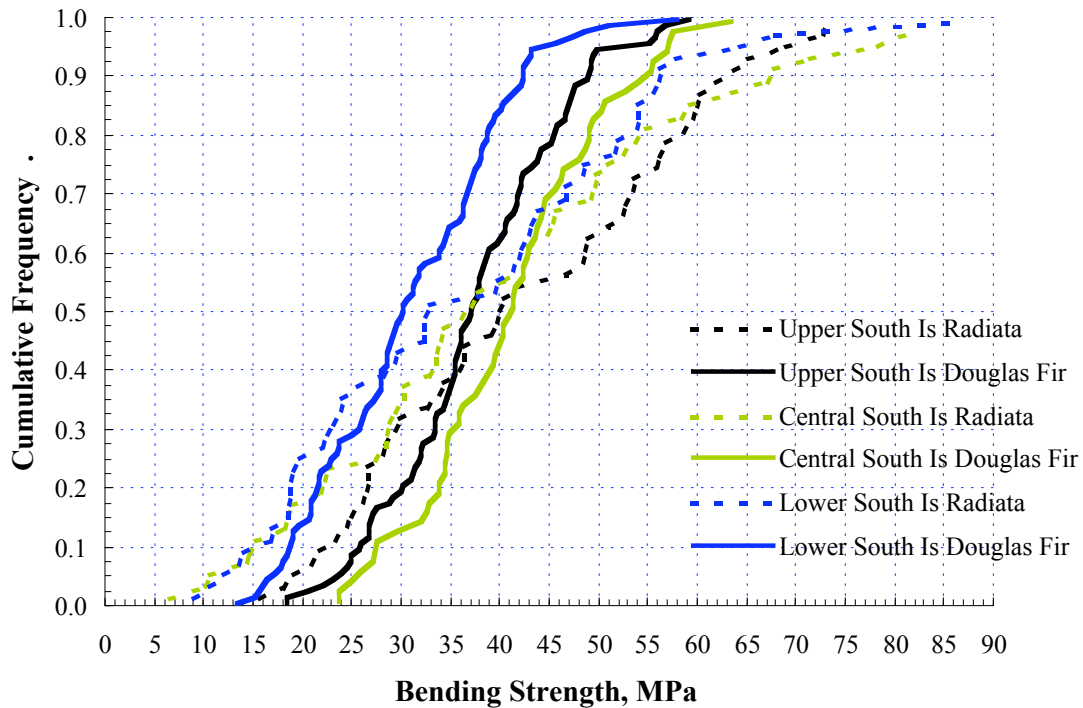


*Figure 1. South Island Bending Stiffness Comparison*

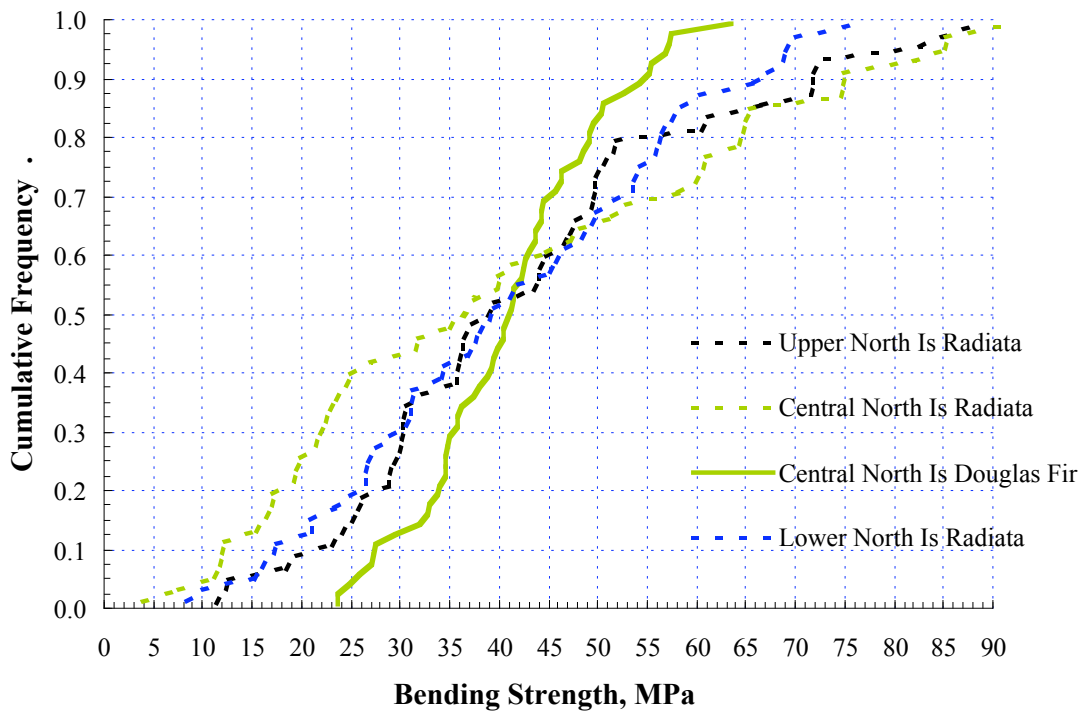


*Figure 2. North Island Bending Stiffness Comparison*

Figure 3 shows a comparison of bending strength between Douglas-fir and radiata pine for Upper, Central and Lower South Island Sites. Figure 4 shows the same comparison for the North Island.



*Figure 3. South Island Bending Strength Comparison*



*Figure 4. North Island Bending Strength Comparison*