



Forest
Research
Institute

Impact of Thinning on Wood Density and Diameter Growth of *Corymbia* Hybrids in Silvopastoral Systems

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Corymbia Silvopastoral system

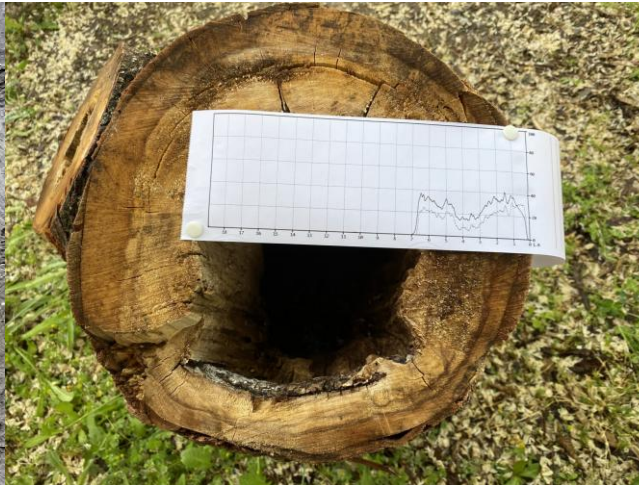
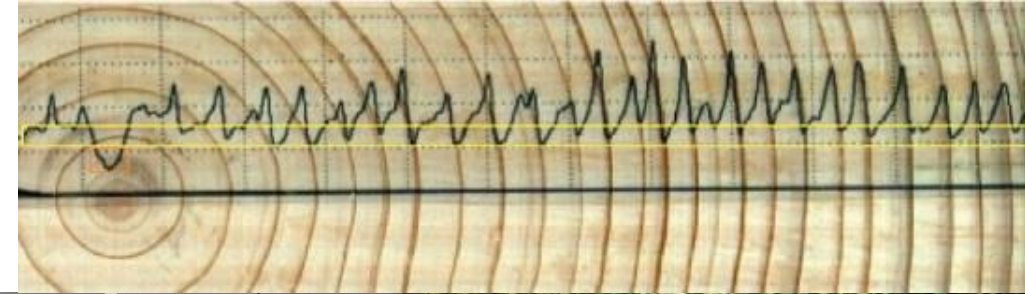


- Silvopastoral systems are an agroforestry type that integrates trees or shrubs, pasture, and livestock in a mutually beneficial manner
- Silvopastoral systems can be more profitable and sustainable production systems than traditional grazing
- Silvopastoral systems have been adopted as a solution to meet the increased demand for meat and timber products and improve biodiversity. However, the adoption of these systems is slow in Australia, particularly in the Australian tropics
- Understanding the impact of thinning on wood properties and growth metrics is essential for optimizing silvicultural practices in *Corymbia* hybrids, particularly within silvopastoral systems in tropical Australia

Resistance drilling, or micro drilling, is a non-destructive testing method

Is used to assess:

- Detect defects in wooden power poles
- Assess urban trees
- Wood structures
- Identify and count tree rings
- Wood quality (wood density and stiffness 2014+)



How it works?

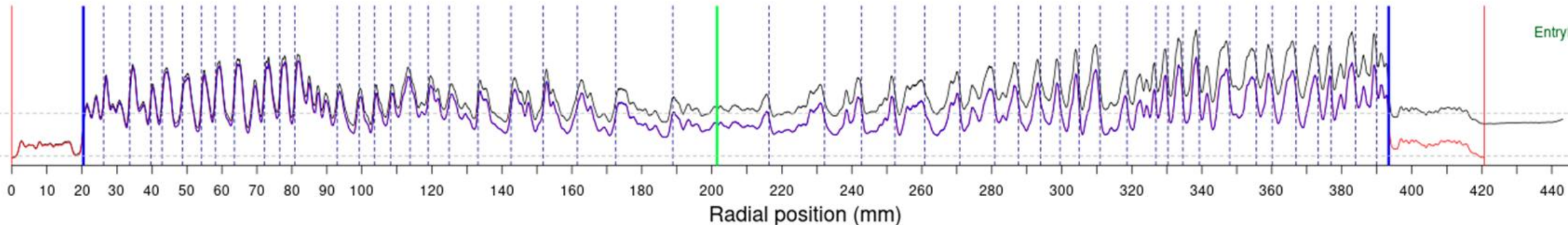


~3 mm diameter needle



Fixed rotational and forward speed

Measure amplitude (0 to 100%) at 0.1 mm intervals



Thinning treatments and experimental design



- *Corymbia hybrids* (*Corymbia torelliana* × *C. citriodora* subsp. *variegata*) planted 2008, Stanwell QLD.
- Thinning at age 13 to 100, 225, 300 stems/ha, plus unthinned (ca 550stems/ha) control.
- Alleys and scattered trees
- Measured 3 years post-thinning with IML RESI PD 500 (60 cm/min feed, 4500 RPM).



Two SPS systems: Alleys vs plantation (scattered trees)



Drilling with IML Resi PD 500



Taking 50 mm cores

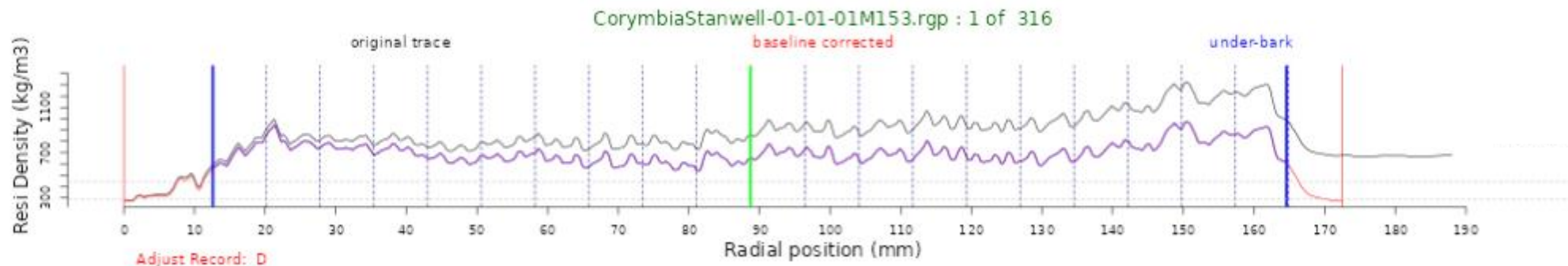


Taking wood samples close to Resi hole

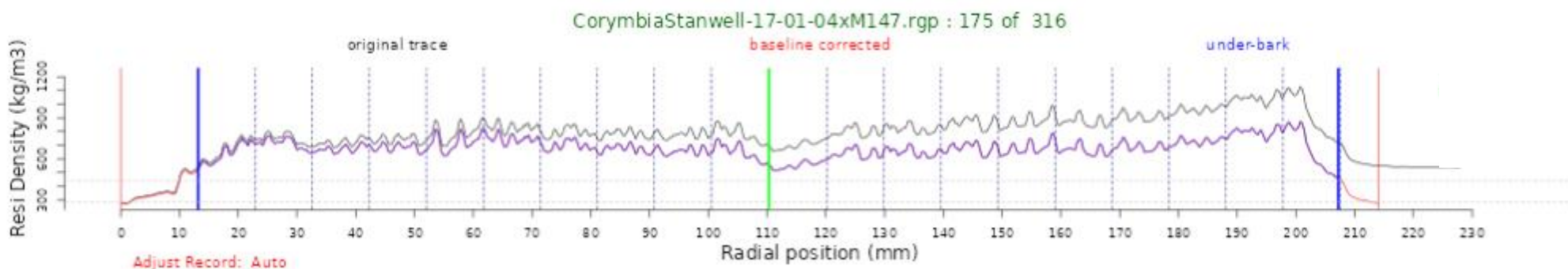


Typical *Corymbia* hybrid Resi traces

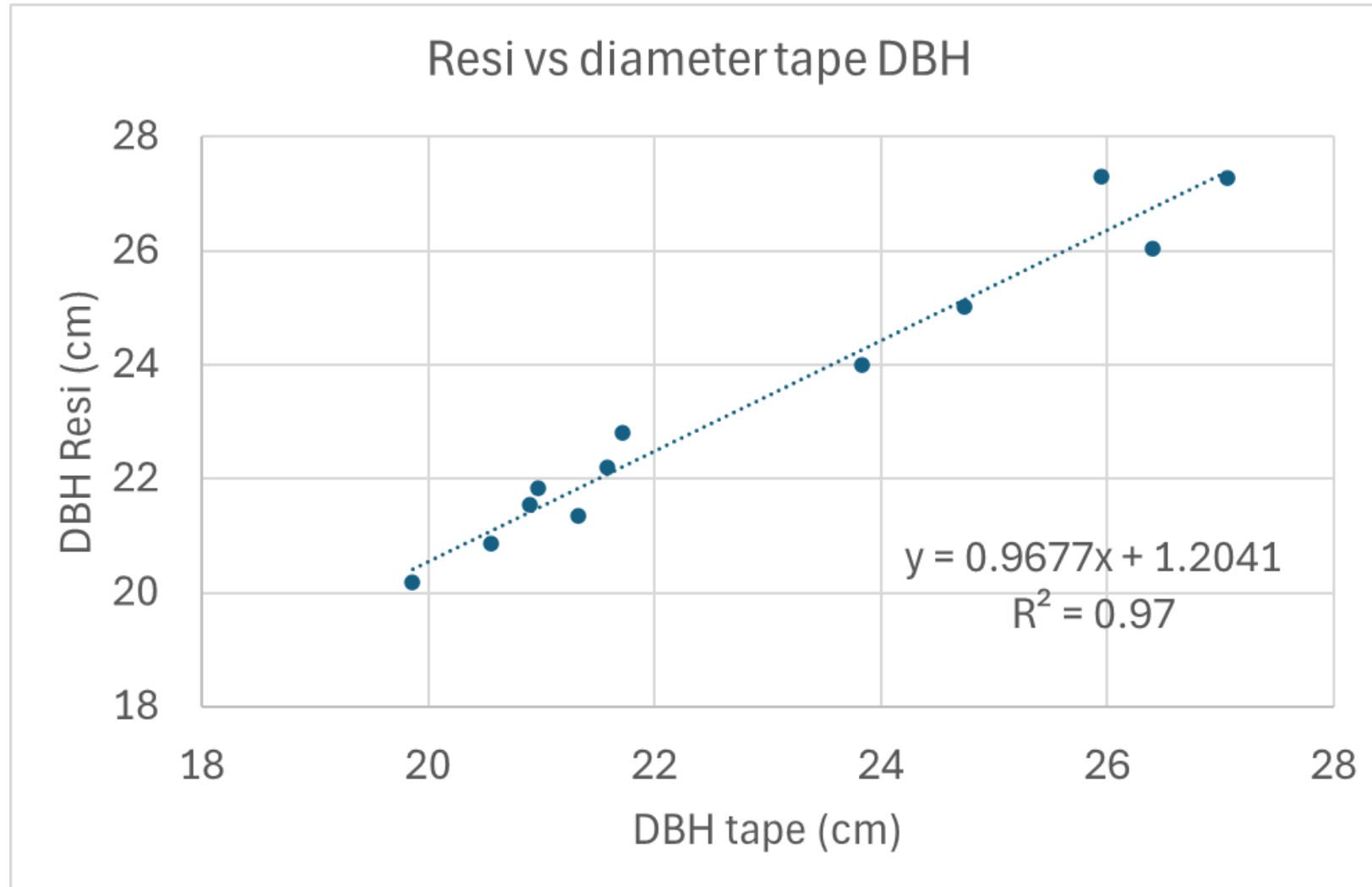
550stem/ha



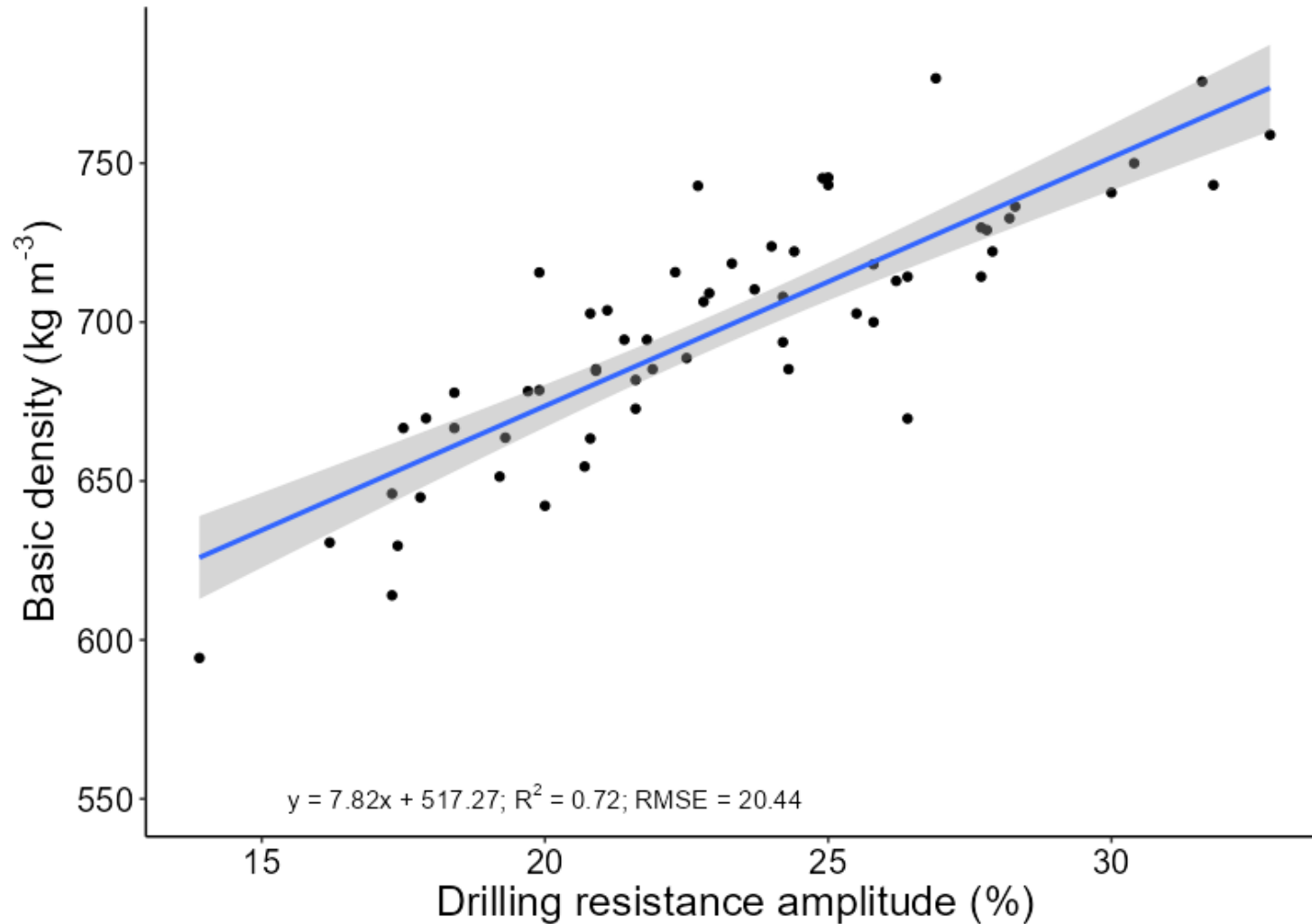
100stem/ha



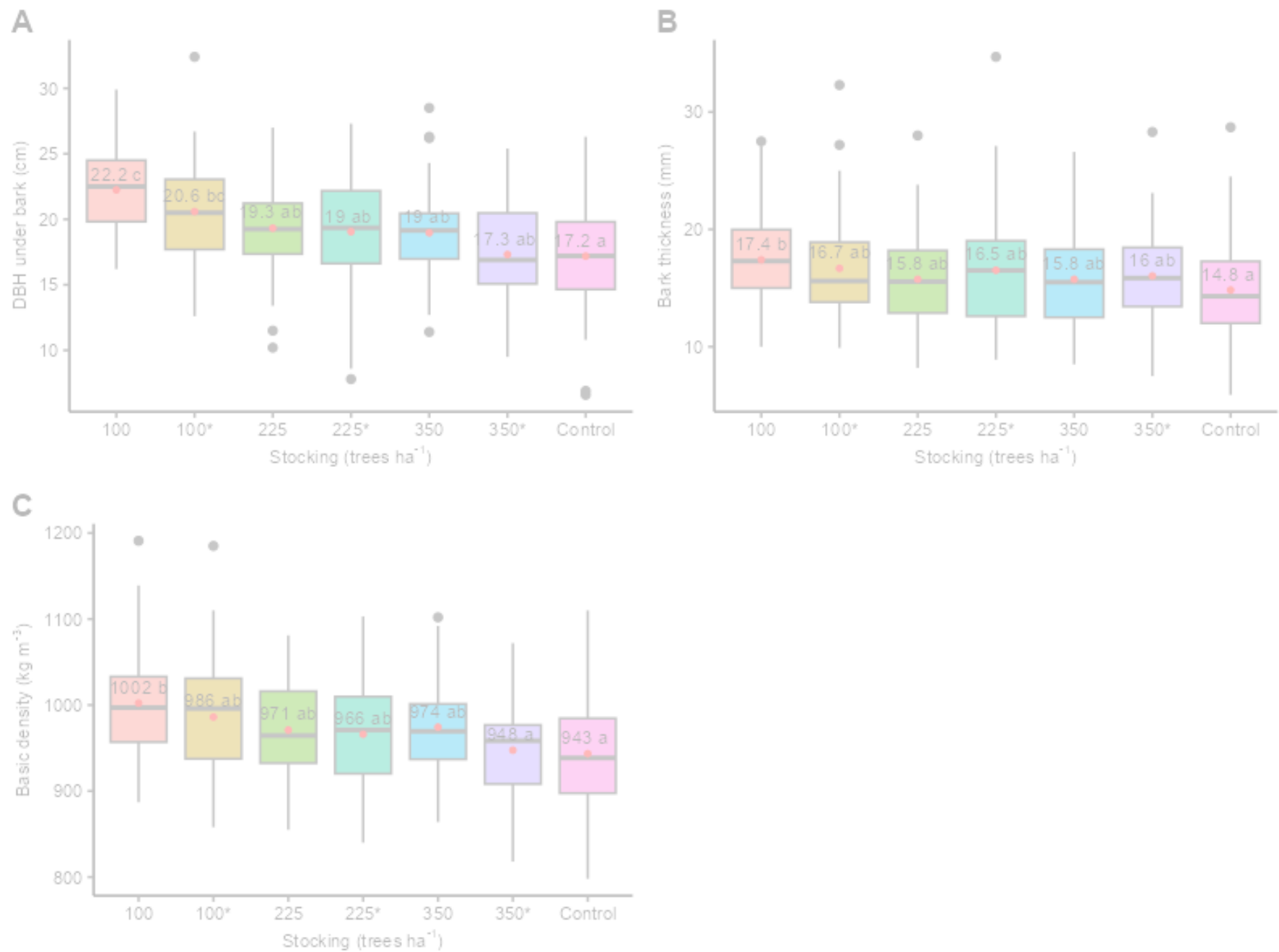
Resi can measure the diameter accurately



Drilling resistance explained **72%** of variation in basic density



Plot level data





- Basic density increased with thinning (control: 943 kg/m³; thinned: 971–1002 kg/m³); no significant differences among thinned stockings
- DBH (under bark) similar for control, 225, and 300 stems/ha (17.2–19.3 cm); significantly larger at 100 stems/ha (22.2 cm)
- Trees at 100 stems/ha showed both larger diameters and faster radial density increase
- Heavy silvopastural thinning results in better wood quality in *Corymbia* hybrids



- These findings suggest that lower stocking densities enhance both wood density and diameter growth in *Corymbia* hybrids
- Resistance drilling proved to be a reliable non-destructive tool for assessing wood basic density, supporting its application in optimizing silvicultural strategies for these hybrids in silvopastoral systems
- Resistance drilling can improve accuracy of carbon predictions in silvopastoral (and other) systems in Australia



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