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# Heartwood production and density of 22-year-old teakwood from fast-growth plantations: a comparative study across three locations in Brazil

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# Introduction

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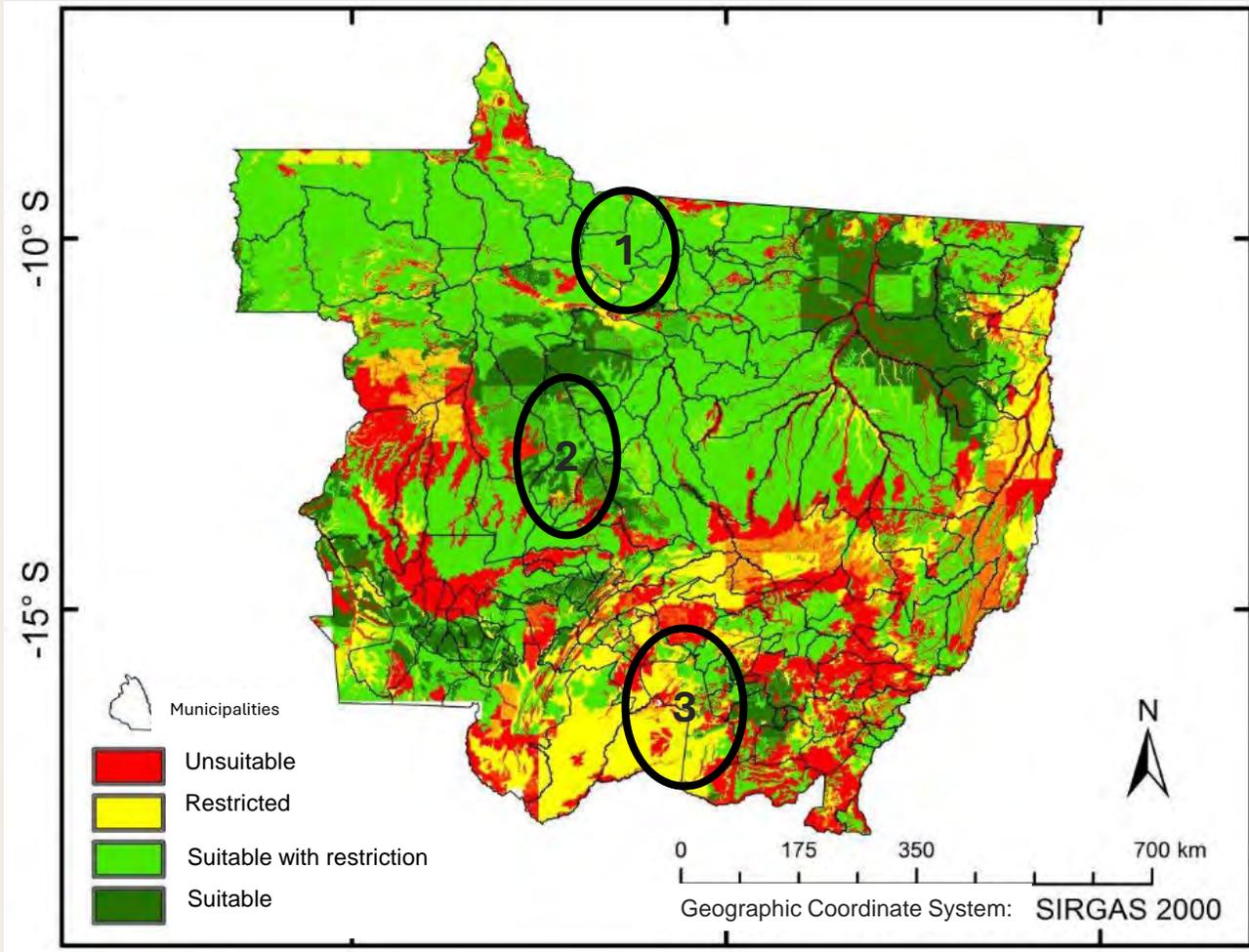


6% Teak Plantations – Latin America  
(261- 413 thousand hectares)



Brazil - 76 thousand  
hectares in 2022  
78% Mato Grosso state

# Introduction



Mato Grosso: 63% of the area is suitable or suitable with restrictions for teak plantations

- 1 – Suitable with restriction ✓✗
- 2 – Suitable ✓
- 3 – Restricted ✗

Climatic, edaphic, and physiographic zoning for *T. grandis* in Mato Grosso, Brazil (Medeiros, 2016).

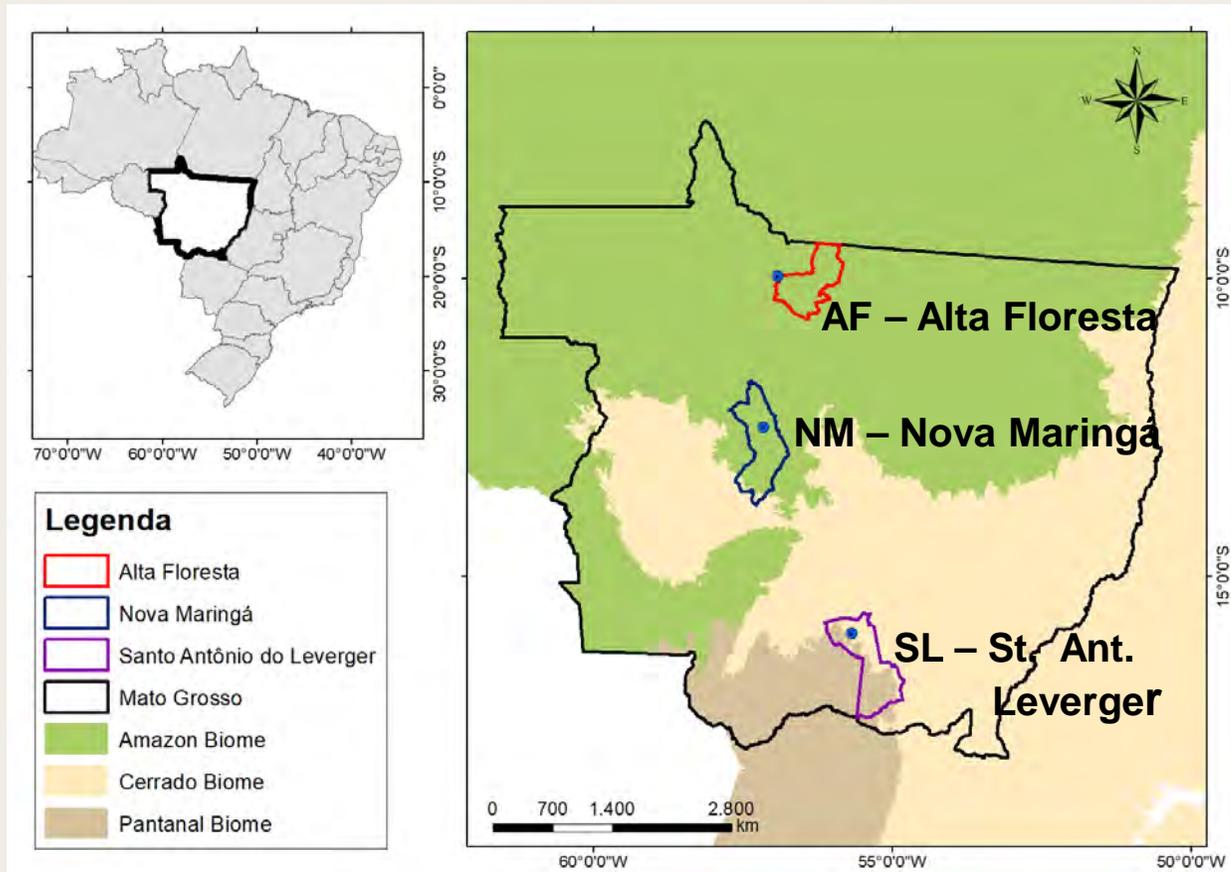
# Justificative and Objectives

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- The teak plantations are typically established by private investors and 20 and 25 years rotations
- How does the planting location affect the properties of the wood?
- What are the characteristics of teak wood from final harvest in Brazilian plantations?
- This study aimed to compare the diameter, heartwood percentage, and wood density of 22-year-old *Tectona grandis* trees from three planting locations in Mato Grosso, Brazil.

# Material and Methods

## Study Locations

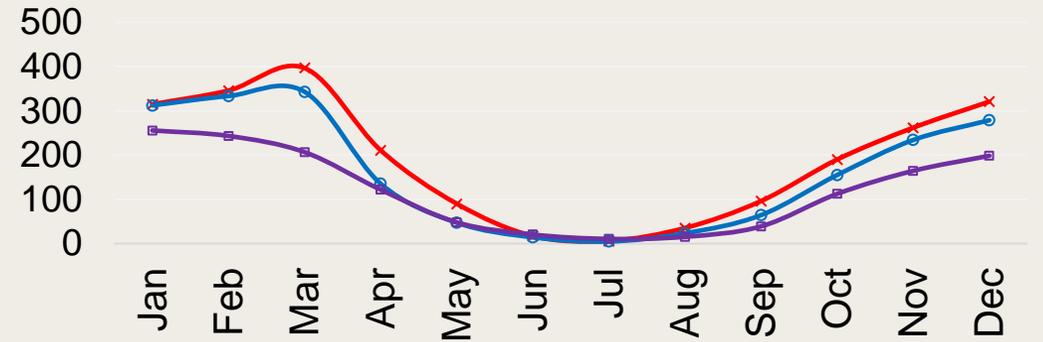


**AF**

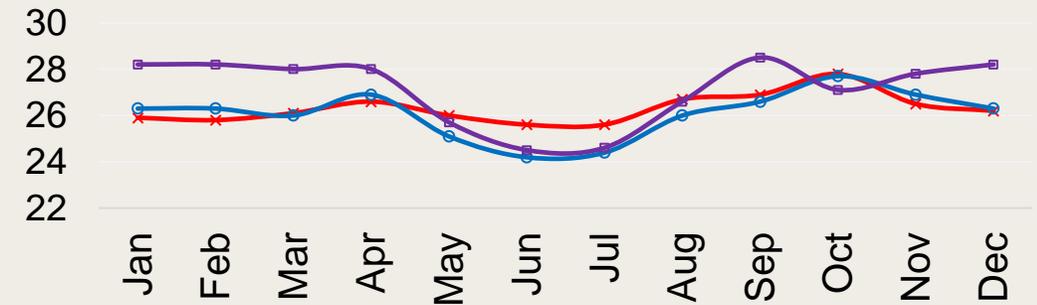
**NM**

**SL**

Precipitation (mm)



Average temperature (°C)



Loc.	Soil Atributtes (0-20 cm)			Anual precip. (mm)
	Ca	T	Type	
	cmol <sub>c</sub> .dm <sup>-3</sup>			
AF	3.9	7.8	Clay	2313
NM	5.7	12.8	Sand	2284
SL	0.7	4.3	Sand	1567

Calcium (Ca); Total cation exchange capacity (T)

## Sampling

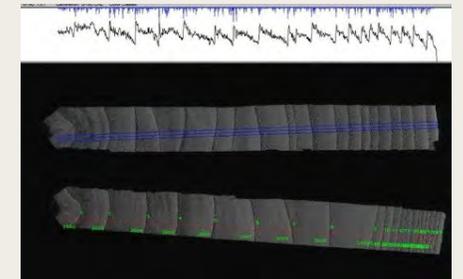
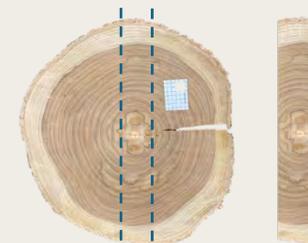


11.5 m  
9.2 m  
6.9 m  
4.6 m  
2.3 m  
0 m



- 5 trees per location
- Mean diameter
- 22-year-old seminal plantations

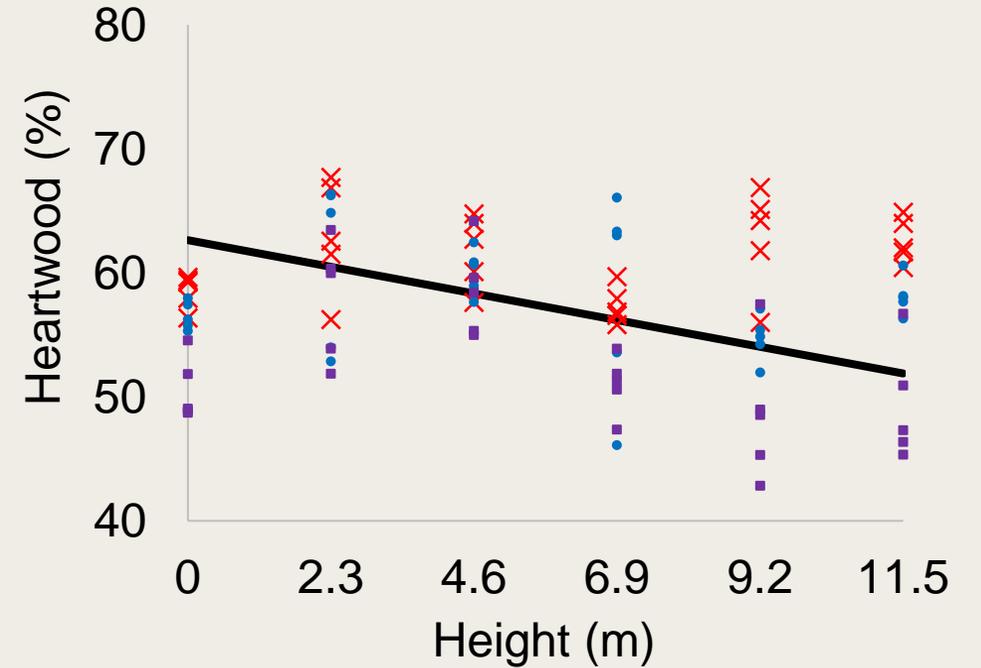
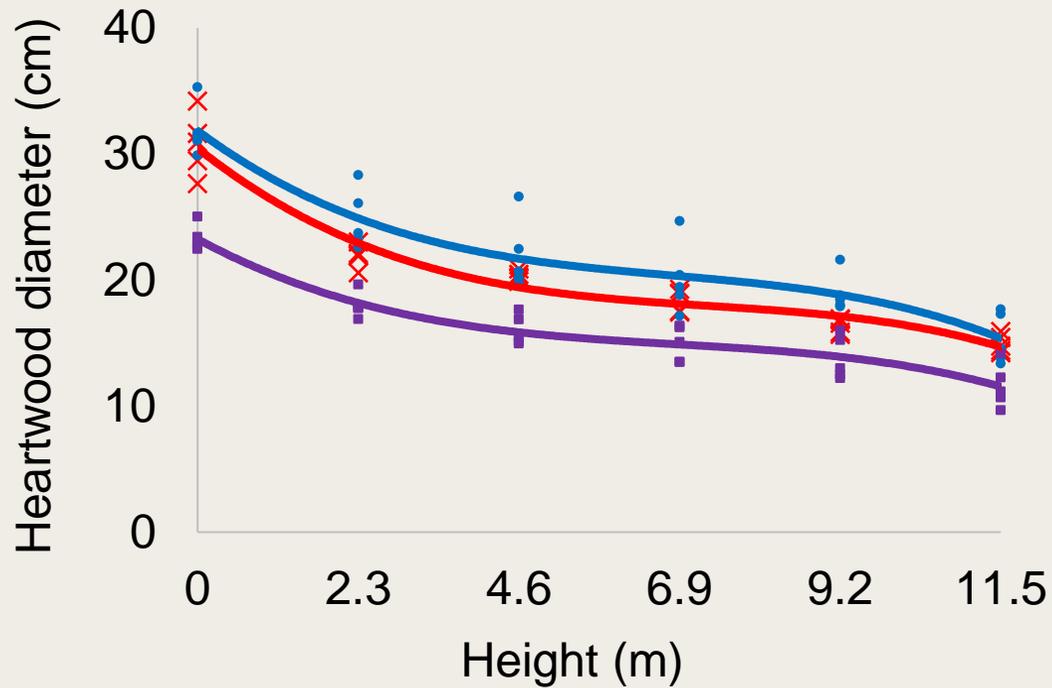
## X-Ray Microdensitometry



- Total/ Heartwood diameter
- Heartwood (%)
- Growth rings width
- Wood density

# Results

## Heartwood – Diameter and Percentage



0 m



2.3 m



4.6 m



6.9 m



9.2 m

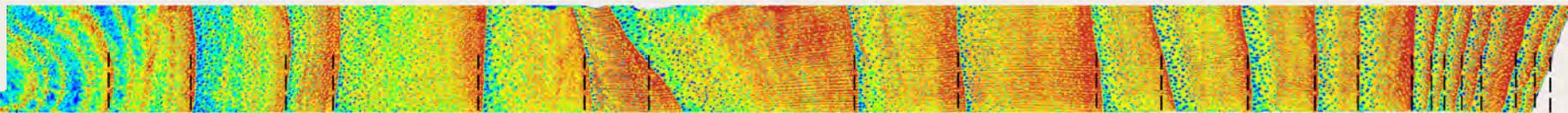


11.5 m

# Results

Growth rings and wood density

✓ Nova Maringá (NM) – Height: 2.3m

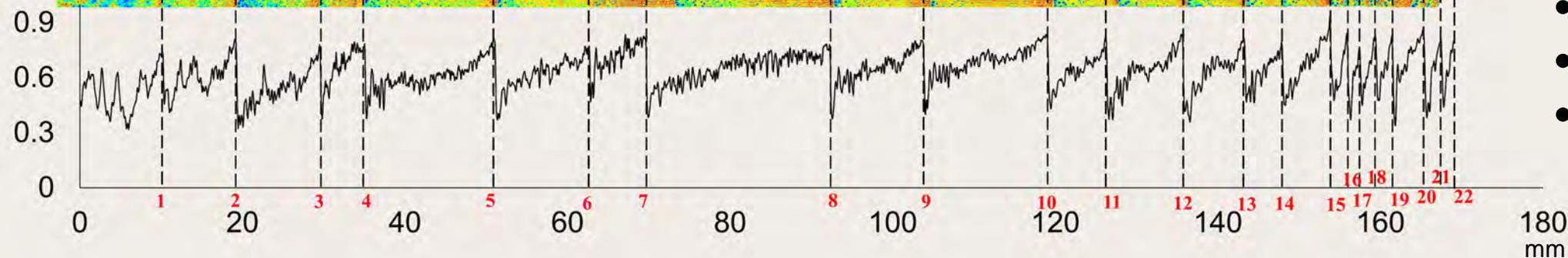


## Growth rings

- Min.: 1.33 mm
- Max.: 19.88 mm
- Mean: 5.96 mm

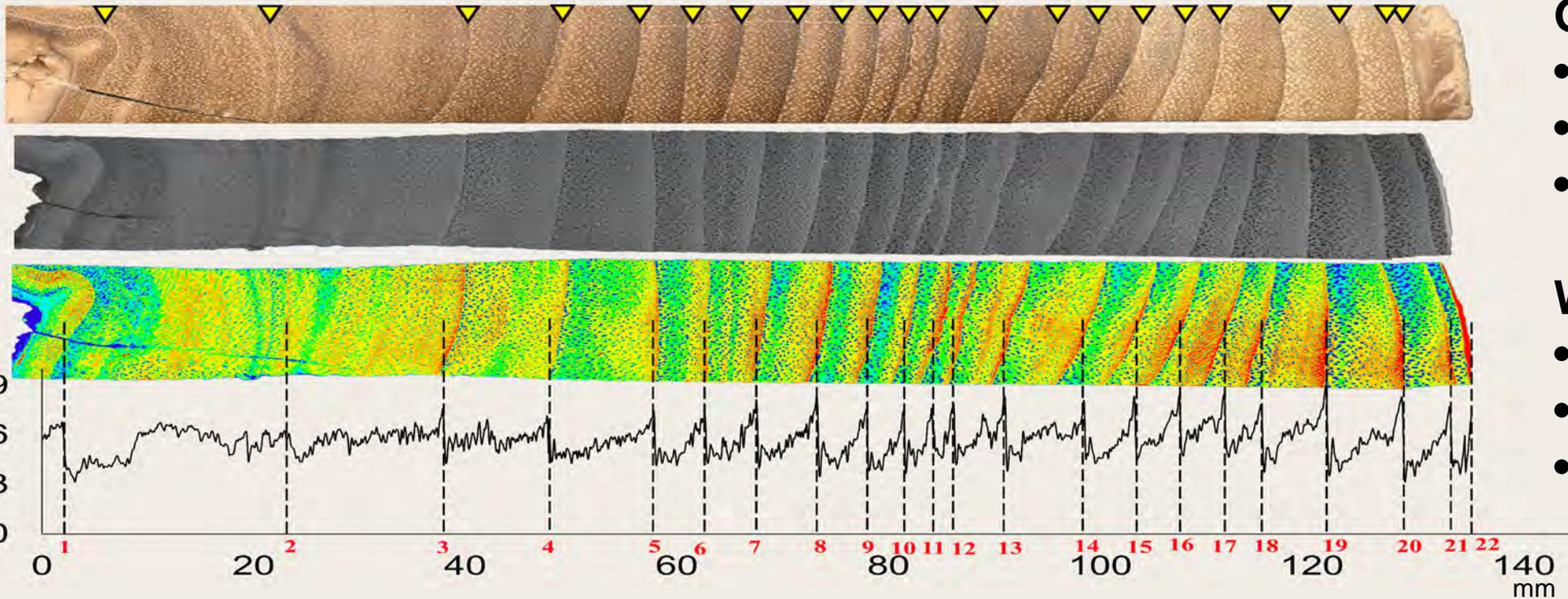
## Wood density

- Min.: 0.47 g.cm<sup>-3</sup>
- Max.: 0.70 g.cm<sup>-3</sup>
- Mean: 0.61 g.cm<sup>-3</sup>



# Results

Growth rings and wood density   Alta Floresta (AF) – Height: 2.3m



## Growth rings

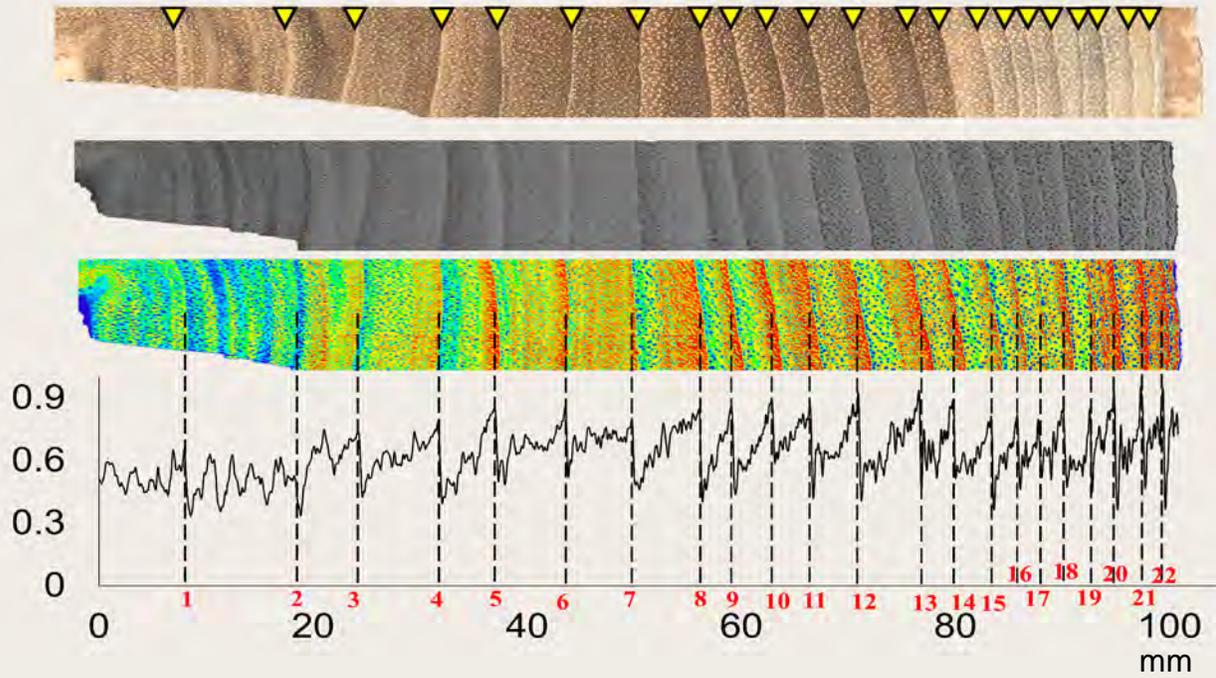
- Min.: 1.62 mm
- Max.: 19.68 mm
- Mean: 6.01 mm

## Wood density

- Min.: 0.48 g.cm<sup>-3</sup>
- Max.: 0.64 g.cm<sup>-3</sup>
- Mean: 0.56 g.cm<sup>-3</sup>

# Results

Growth rings and wood density ❌ Sto Antônio Leverger (SL) – Height: 2.3m



## Growth rings

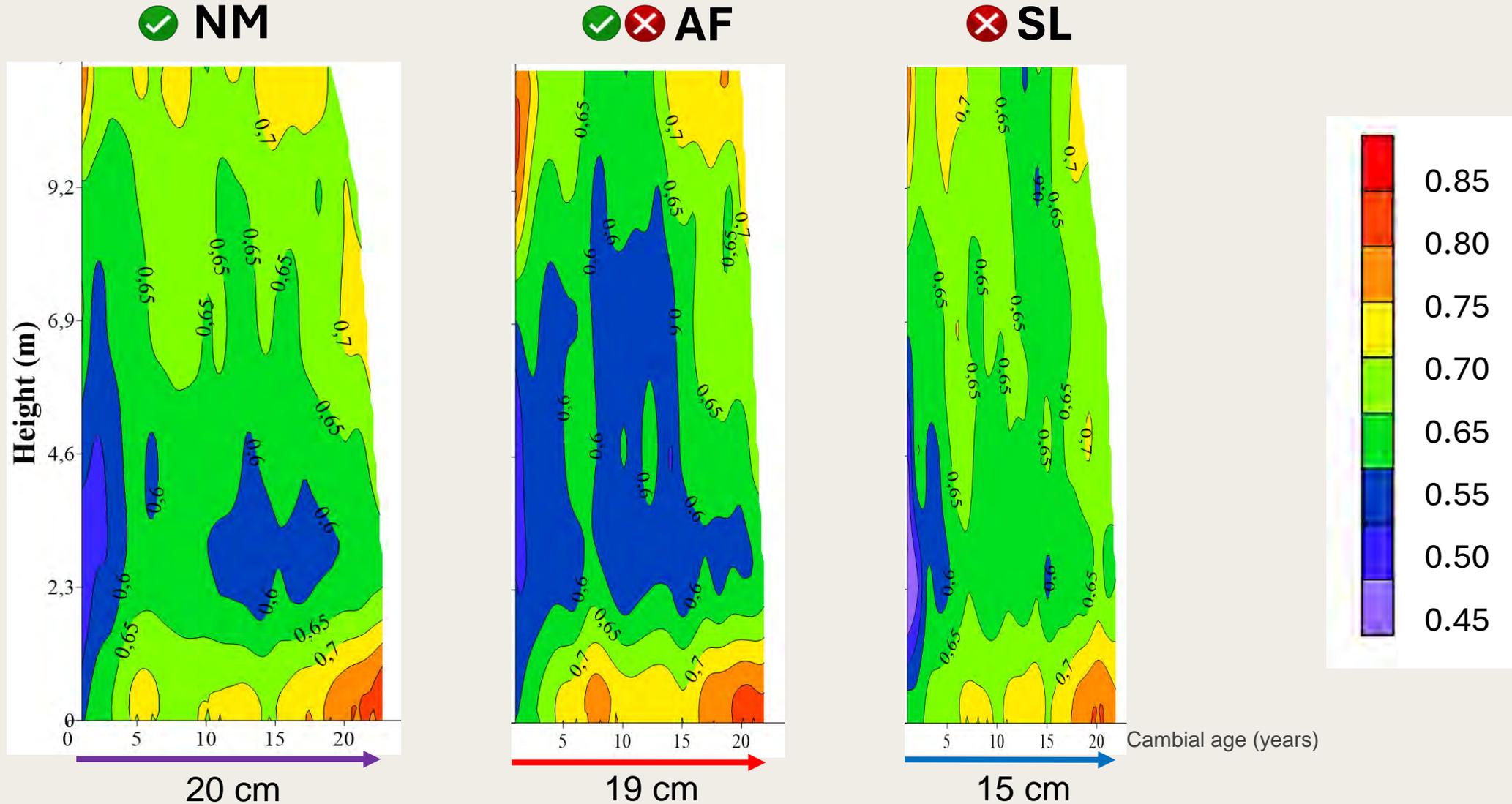
- Min.: 1.81 mm
- Max.: 10.20 mm
- Mean: 4.39 mm

## Wood density

- Min.: 0.33 g.cm<sup>-3</sup>
- Max.: 0.95 g.cm<sup>-3</sup>
- Mean: 0.65 g.cm<sup>-3</sup>

# Results

## Profile of longitudinal and radial variation of X-ray wood density



# Conclusions

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- The heartwood production is proportional to the diameter growth.
- The growth ring width is constant from the 10th ring onwards.
- The average density ranged from 550 to 650 kg.m<sup>-3</sup>.
- Wood density is higher at the base and apex, and lower near the pith, increasing towards the bark.
- Growth is not directly associated with wood density. Wood from SL is more homogeneous and denser. NM has higher growth with intermediate wood density. Wood from AF has a lower mean wood density.

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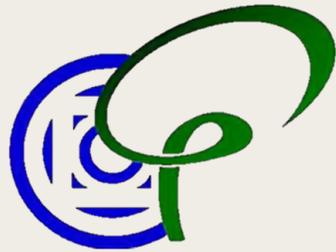
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## Acknowledgment



**Tack!**  
**Besök oss!**

**Thank you!**  
**Visit us!**

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