

# Dimensional changes of three *Eucalyptus* woods subjected to two-step impregnation-heat treatments

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## Introduction

Wood is an organic and renewable material with many applications, which reflects in its use. This material could be found in building, pulp and paper, bioenergy, production of panels and furniture industries. Nevertheless, intrinsic characteristics limit the use of wood, such as hygroscopicity and anisotropy, and susceptibility to biodeterioration. Thus, alternatives to protect wood against these limitations are needed. Wood impregnation with natural products is an important alternative to improve its properties and to support different applications in the market. Moreover, the use of natural products is important to satisfy demands of sustainable products. In this study, a thermoplastic adhesive containing rosin - a promising material extracted from pine resin - was used in the wood impregnation. This byproduct of pine resin is an alternative to improve different characteristics, especially wood hydrophobicity. This study aimed to evaluate the effects of two-step impregnation-heat treatments in the dimensional stability of *Eucalyptus cloeziana*, *Eucalyptus grandis* and *Eucalyptus saligna* woods.

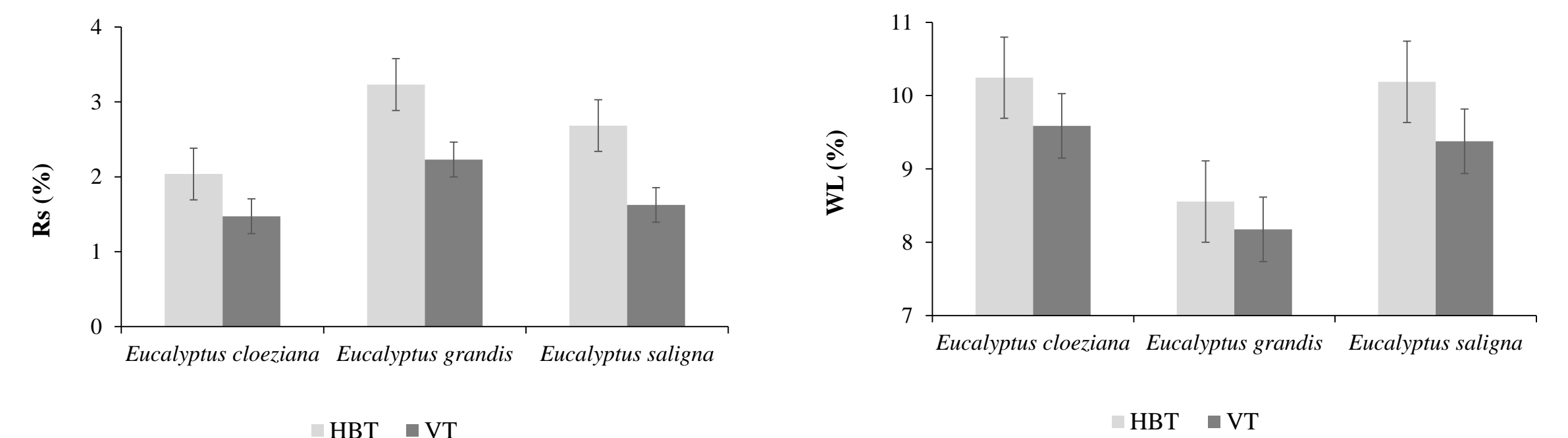
## Experimental Material and methods



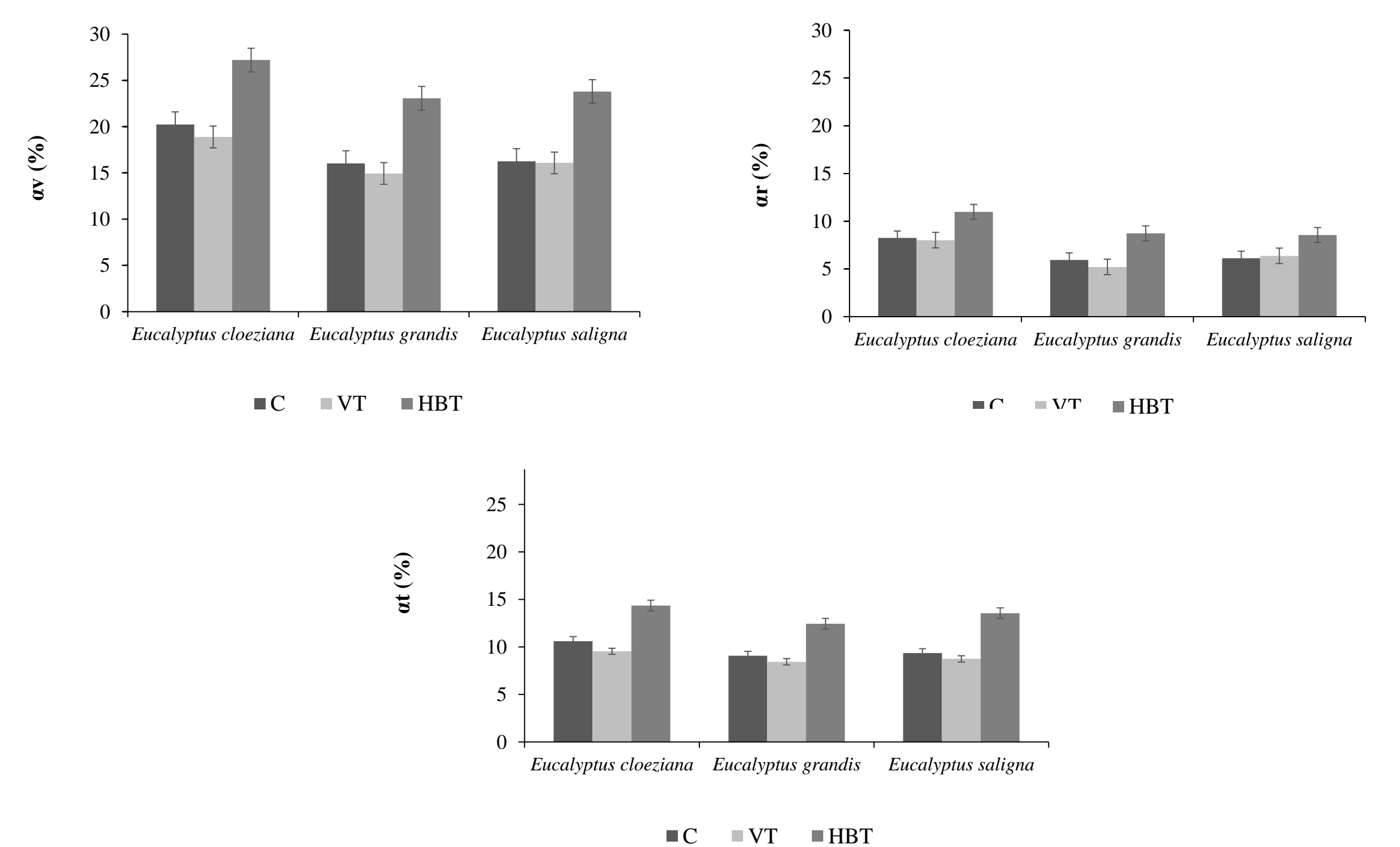
*Eucalyptus cloeziana*, *Eucalyptus grandis* and *Eucalyptus saligna* trees were cut from homogeneous plantation located in the state of Rio Grande do Sul, Brazil. The first log of each tree was cut and wood samples with 15 x 15 x 15 mm were prepared. All the wood samples were kept in a climatic chamber (23°C of temperature and 50% of relative humidity) to reach the equilibrium moisture content.

Two-step impregnation-heat treatments were performed. The first step was the wood impregnation with rosin-based thermoplastic adhesive using two methods: vacuum system (VT) and hyperbaric pressure at 6000 bar (HBT). Thermoplastic adhesive was supplied by SONAE Industry (Aveiro, Portugal). The adhesive was diluted in toluene (concentration of 8.2% w/v).

## Results and discussion



**Figure 1:** Average values of retention of solution (Rs) and weight loss (WL) of *Eucalyptus* woods. Error bars correspond to standard deviation.



**Figure 2:** Average values of volumetric, radial and tangential swelling of *Eucalyptus* woods. Error bars correspond to standard deviation.

## Conclusions

- In general, two-step impregnation-heat treatments did not significantly improve the dimensional stability of *Eucalyptus* woods.
- HBT treatments were interesting to increase the retention of solution. Nevertheless, use of hyperbaric pressure may have affected wood anatomy, which influenced in dimensional stability of wood.
- VT treatments resulted in slight increase – especially for volumetric swelling - of dimensional stability of *Eucalyptus* wood. Increase of time of impregnation is recommended to improve the effect of two-step treatments.