

Structural Assessment and EDS Analysis of Uruguayan Wood Impregnated With Zinc Borate (ZnB)

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Ammoniacal solution of zinc borate (ZnB) can present fire retardant and protection against microorganisms properties once it is applied to wood [1]. Recent studies have evaluated the behavior against fire of *Eucalyptus grandis* samples grown at the north region of Uruguay, showing a lower burning rate when it is impregnated with ZnB [2]. On top of that, the morphology of the surfaces exposed to flames present high degree of deformed fibers when the sample was not treated in the solution. Presence of ZnB is found on the surface of the treated and then burned samples [2].

This study evaluates the morphological differences between samples of *Pinus taeda* and *Eucalyptus grandis* subjected to burning resistance tests. Samples with and without ZnB impregnation process were compared using Scanning Electron Microscopy (SEM) and X-ray Energy Dispersion Spectroscopy (EDS). Weight and atomic ratios of Zn against the rest of inorganic elements, for burned and solely treated samples, were obtained using EDS [3].

It was observed that the surface of treated wood (figure 1b) is prone to milder structural damage than untreated wood (figure 1a), this is revealed by the sustained orientation of fibers and the absence of cracks, that are presented on burned samples of untreated samples. The EDS analysis reveals a higher concentration of Zn on the surface of *E.grandis* after burning tests (table 1), while the distribution of Zn after flame exposure is more homogeneous on *P.taeda* samples (figure 1c).

Based on these results, we conclude that ZnB treatment has a positive effect on the fire response of the woods studied. Part of the research has been funded by the CSIC (Comisión Sectorial de Investigación Científica) of UdelaR (Universidad de la República, Uruguay) [4].

References

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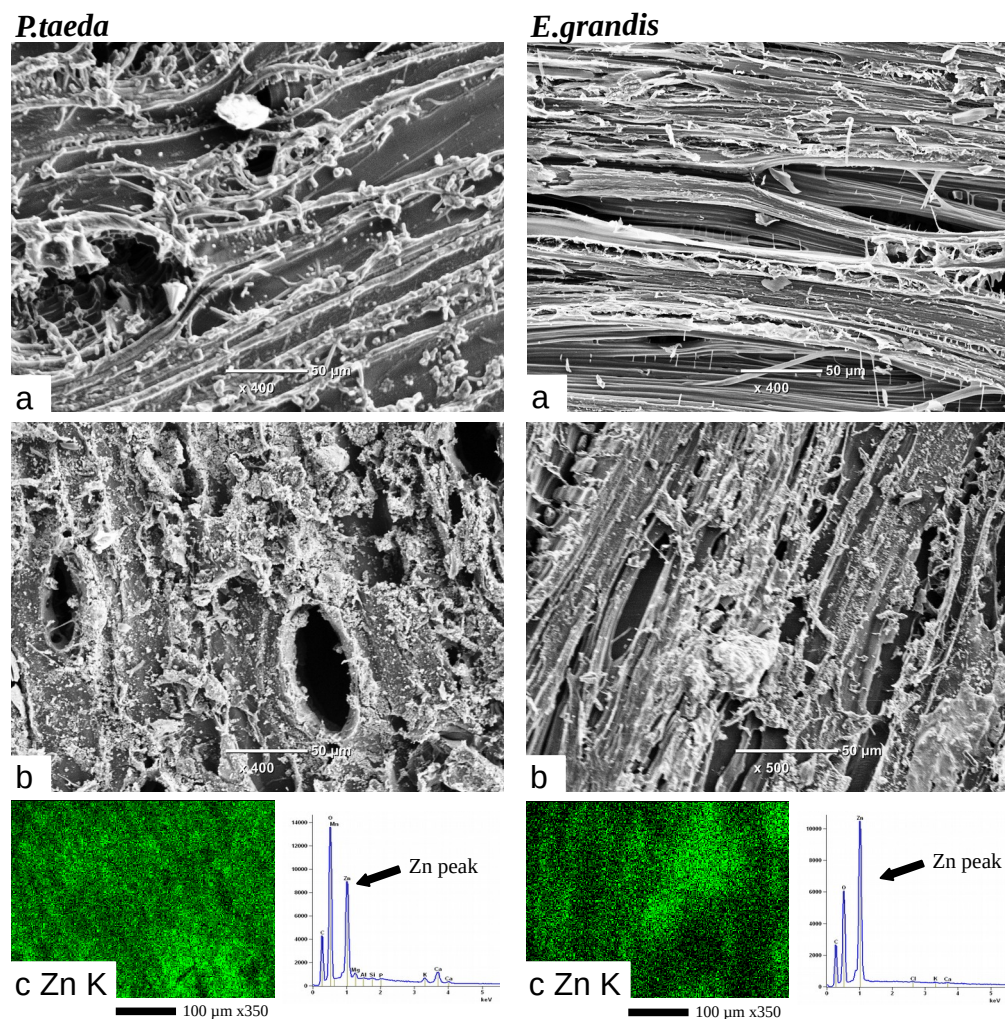


Figure 1. SEM images of tangential slices of *P.taeda* and *E.grandis*: (a) untreated wood after fire exposure, (b) ZnB treated wood after fire exposure, (c) Zn mapping of pictures depicted in (b) and EDS spectra.

[Zn]	<i>P.taeda</i>		<i>E.grandis</i>	
	% weight ± SD	% atomic ± SD	% weight ± SD	% atomic ± SD
a	0	0	0	0
b	70.37 ± 0.16	55.09 ± 0.076	95.70 ± 0.29	82.12 ± 0.10
Initial*	80.20 ± 0.07	64.23 ± 0.04	93.90 ± 0.40	88.62 ± 0.14

Table 1. Zn concentration obtained with EDS: (a) untreated wood after fire exposure, (b) ZnB treated wood after fire exposure, and (Initial*) Zn ratio in impregnated wood without exposure to flame.