NATURAL RESISTANCE TO MARINE BORERS OF NINE NORTH AND NORTH-EASTERN BRAZILIAN WOOD SPECIES*

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RESUMO

Durante 2 anos, 9 espécies nativas brasileiras foram expostas ao ataque de daninhos marinhos no porto de Recife/PE, para testar sua resistência natural. Paralelamente realizou-se análises da água no local da pesquisa, assim como em laboratório para verificar o teor de SiO₂ e de alcalóides das madeiras.

A madeira de Eschweillera luschnathi provou ser a mais resistente, apresentando após dois anos, apenas leves ataques na superfície. Bastante resistente foram também as espécies Manilkara longifolia e Goupa glabra.

O maior teor de SiO₂ foi constatado na Eschweillera luschnathi. Na espécie Diplodotropis purpurea foi constatada a presença de SiO₂ e alcalóide. Mas assim mesmo esta espécie apresentou apenas resistência medida.

As análises da água do porto tornaram evidente que de acordo com o aumento do teor de SiO₂ diminui o teor de sal.

Como daninhos foram identificados a Bankia fimbriatula e Martesia striata.

1. INTRODUCTION

This article evaluates the natural resistance of eight north and northeastern brazilian and one south brazilian wood species to marine borers. The goals of the present study were:

a) to get aquainted with the reaction of national wood species to marine enemis,

b) to establish a method with which to measure the resistance of wood against xilophagous in a natural water environment and,

c) to test a method of examining the intensity of attack by x-raying the samples.

2. MATERIAL AND METHODS

The following species were tested: Araucaria angustifolia (Bert.) O. Ktze. (Pinho do Paraná), Copaiera langsdorffii Desf. (Pau d'oleo), Diplodotropis purpurea (Rich.) Amsh. (Sucipira pardas), Eschweillera luschnathi Miers (Imbiri-ba), Goupa glabra Aubl. (Cupiuba), Manilkara longifolia (A.DC.) Dub. (Maçaranduba), Peltopyne confertiflora (Hayne) Benth. (Pau roxo), Tabebuia

avellanedac Lorentz ex Grisch (Pau d'arco) and Virola gardneri (DC.) Warb. (Urucuba). The studies were made in the estuary of the river Capibaribe in the port of Recife from december 1975 until december 1977. They were made according to a method devised by the National Laboratory for Civil Engineering in Lisbon. Ten (10) samples of each species measuring 5cm x 5cm x 15cm were used. A frame with the samples was immersed in 1,5m of water so that during low tide the samples were above the water (Photo 1). Exery six months the samples were examined.

Analysis of the SiO₂ and alcaloid content of the wood samples were made in the laboratory and the silica — and salinity values of the por water were also analysed. The grade of attack by xilophagous was checked by x-raying the wood samples.

3. RESULTS AND CONCLUSIONS

After 12 months 8 species were attacked. Only the samples of Eschweillera luschnathi still were resistant to the attack by marine borers. (Photo 3 and Table 1). After 18 months this species also


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showed slight signs of superficial damage and after 24 months immersion the transversal surface showed signs of attack. Apart from *Eschweileria luschnathii* the only other species showing limited signs of attack were *Manilkara longifolia* and *Goupiia glabra* (Photo 4 and Table 1). The resistance of other brazilian wood species of the genus *Eschweileria* has already been mentioned in the literature (FOUGEROUSSE, 1971). Adding *E. luschnathii* to the list confirms that this genus includes several species with high resistance to marine xilophages.

Xilophages of the species *Bankia fimbriatula* Roch & Moll (Teredinidae) and *Martesia striata* L. (Holadidae) and two further, as yet not identified species, were found in the wood samples. There was no literature found mentioning the identified species as occurring along the brazilian coast. A relation between wood resistance to marine borers and the SiO₂ content of the wood was evident with a greater resistance occurring in these species with a higher SiO₂ content (Table 2). But it was not possible to determine how high the content of SiO₂ has to be to exclude damage. The highest SiO₂ content was found in *Eschweileria luschnathii* which had 0.266%. *Diplotropis purpurea* was the only species that also had alcoid-content. Nonetheless this species had average attack after 2 years (Table 1).

The results of the water analysis during the research period showed no apparent annual cycle in the silica or salinity values (Figure 1). It was found that with an increasing silica-content of the water the salt content decreased.

It was not possible to observe how this affected the intensity of the xilophages attack, but future research will be concentrated on this fact.

### 4 SUMMARY

During 2 years 9 brazilian wood species were exposed to attack by marine borers in the harbour of Recife, Pernambuco to test their natural resistance. At the same time the port water at the site was examined and laboratory analysis of the SiO₂ and alcoid content in the wood were made.

The highest level of resistance was found in the species *Eschweileria luschnathii* which only showed slight superficial attack after 2 years. The species *Manilkara longifolia* and *Goupiia glabra* were fairly resistant. *Eschweileria luschnathii* also had the highest SiO₂ content. In *Diplotropis purpurea* SiO₂ and alcoid were found. Nonetheless this species only showed average resistance. The water analysis showed that with increasing silica-content the salinity decreased.

*Bankia fimbriatula* and *Martesia striata* were identified as the damaging xilophages.

### 5. LITERATURE


2. FOUGEROUSSE, M. & LUCAS, S. — Emploi de la radiographie dans les recherches sur la pathologie et la préservation du bois en milieu marin. Centre Technique Foresties Tropical. (s.n.t.).


QUADRO 1 — RESISTÊNCIA DAS MADEIRAS SUBMERSAS NO ESTUÁRIO DO RIO CAPIBARIBE NO PORTO DE RECIFE

(TABLE 1) — Natural resistance of the wood species submerged at the banks of the river Capibaribe in the harbour of Recife

<table>
<thead>
<tr>
<th>NOME LATINO (Latin name)</th>
<th>NOME VULGAR (Local name)</th>
<th>12 MESES (12 months)</th>
<th>24 meses (24 months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Araucaria angustifolia</td>
<td>Pinho do Paraná</td>
<td>destruída</td>
<td>destruída</td>
</tr>
<tr>
<td>Copaifera langsdorfi</td>
<td>Pau d’oleo</td>
<td>muito atacada</td>
<td>destruída</td>
</tr>
<tr>
<td>Diplotropis purpurea</td>
<td>Sucupira parda</td>
<td>pouco atacada</td>
<td>medianamente atacada</td>
</tr>
<tr>
<td>Eschweileria luschnthii</td>
<td>Imbiriba</td>
<td>sem ataque</td>
<td>medianamente atacada</td>
</tr>
<tr>
<td>Goupiia glabra</td>
<td>Cupiuba</td>
<td>pouco atacada</td>
<td>pouco atacada</td>
</tr>
<tr>
<td>Manilkara longifolia</td>
<td>Maçaranduba</td>
<td>pouco atacada</td>
<td>pouco atacada</td>
</tr>
<tr>
<td>Pelogyne confertiflora</td>
<td>Pau roxo</td>
<td>medianamente atacada</td>
<td>pouco atacada</td>
</tr>
<tr>
<td>Tabebuia avellanedae</td>
<td>Pau d’arco</td>
<td>medianamente atacada</td>
<td>medianamente atacada</td>
</tr>
<tr>
<td>Virola gardneri</td>
<td>Urucuba</td>
<td>muito atacada</td>
<td>destruída</td>
</tr>
</tbody>
</table>

Pouco atacada = (little attack) = até 10% da superfície útil atacada
medianamente atacada = (medium attack) = até 40% da superfície útil atacada
muito atacada = (severe attack) = até 75% da superfície útil atacada
destruída = (destroyed) = mais do que 75% da superfície útil atacada

QUADRO 2 — VALORES DE SILÍCIA NAS MADEIRAS ESTUDADAS (%)

(TABLE 2) — (Contents of SiO₂ in the tested wood species)

<table>
<thead>
<tr>
<th>ESPECIE (Specie)</th>
<th>NOME VULGAR (local name)</th>
<th>SiO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copaifera langsdorfi (Desf.)</td>
<td>Pau d’oleo</td>
<td>0,004</td>
</tr>
<tr>
<td>Manilkara longifolia (A.DC.) Dub.</td>
<td>Maçaranduba</td>
<td>0,006</td>
</tr>
<tr>
<td>Virola gardneri (DC.) Warb.</td>
<td>Urucuba</td>
<td>0,007</td>
</tr>
<tr>
<td>Araucaria angustifolia (Bert.) O. Ktze.</td>
<td>Pinho do Paraná</td>
<td>0,008</td>
</tr>
<tr>
<td>Tabebuia avellanedae Lorentz ex Griseb</td>
<td>Pau d’arco</td>
<td>0,010</td>
</tr>
<tr>
<td>Diplotropis purpurea (Rich.) Amsh.</td>
<td>Sucupira parda</td>
<td>0,012</td>
</tr>
<tr>
<td>Goupiia glabra Aubl.</td>
<td>Cupiuba</td>
<td>0,018</td>
</tr>
<tr>
<td>Pelogyne confertiflora (Hayne)</td>
<td>Pau roxo</td>
<td>0,019</td>
</tr>
<tr>
<td>Eschweileria luschnthii Mers.</td>
<td>Imbiriba</td>
<td>0,266</td>
</tr>
</tbody>
</table>

OBS.: % SiO₂ em madeira com 0% de teor de umidade
(% SiO₂ in timber with 0% water contents)
Figura 1 — Variação da temperatura, salinidade e conteúdo de Silica na água durante o período de observação.

(Figure 1): (Variation of temperature, salinity and contents of silica in the water during the period of observation)

Moldura com os corpos de prova no estuário do Rio Capibaribe no porto de Recife.
(The frame with the test samples located at the bank of the river Capibaribe, in the port of Recife)
Secção de estaca de “Eschweilera luschnathii” (Imbiriba) após 18 meses de imersão utilizada na construção da ponte rodo-ferroviária no porto de Recife.

(Section of a bridge pole form “Eschweilera luschnathii after 18 months of submersion in the port of Recife).

Corpos de prova das madeiras após 12 meses de imersão.
(Testsamples after 12 month of submersion).
Corpos de prova das madeiras após 24 meses de imersão.
(Testsamples after 24 months of submersion).