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WOOD SPECIES USED IN CRAFT BOATS IN PARÁ STATE – BRAZIL [1]

ESPÉCIES MADEIREIRAS UTILIZADAS EM BARCOS ARTESANAIS NO ESTADO DO PARÁ - BRASIL

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ABSTRACT - The fishing activity in the Northern region of Brazil is important for the sustenance of several families; to perform this activity, small boats are used, produced in small yards that have native wood as the main raw material. This study aimed to identify and characterize macroscopically the wood of the species used in boat production in three Brazilian municipalities of the State of Pará: Abaetetuba, Colares and Vigia. For wood identification and study, macroscopic anatomy techniques were used, and at the end, the collected samples were compared with those in the collection of the IAN/EMBRAPA Xylotheque. 19 species were identified, distributed into 13 families and 18 genera. There is a large number of species used in boat production; however, the commonly used species are *Caryocar villosum* and *Lecythis pisonis*.

Keywords: Amazon rainforest; macroscopic identification; secondary xylem.

RESUMO - A atividade pesqueira na região norte do Brasil é importante para o sustento de várias famílias. Para desempenhar esta atividade, são utilizados barcos de pequeno porte, produzidos em pequenos estaleiros que utilizam madeira nativa como principal matéria prima. Este trabalho teve como objetivo identificar e caracterizar macroscopicamente o lenho das espécies utilizadas na produção de barcos em três municípios brasileiros do Estado do Pará: Abaetetuba, Colares e Vigia. Para o estudo do lenho e identificação utilizaram-se técnicas de anatomia macroscópica e ao final realizamos a comparação das amostras coletadas com as contidas no acervo da Xiloteca IAN/EMBRAPA. Foram identificadas 19 espécies, distribuídas em 13 famílias e 18 gêneros. Há um amplo número de espécies utilizadas na produção dos barcos, no entanto, as comumente utilizadas são as espécies *Caryocar villosum* e *Lecythis pisonis*.

Palavras-chave: Floresta amazônica; identificação macroscópica; xilema secundário.

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1 INTRODUCTION

The Amazon region has several navigable rivers (Teixeira et al., 2017). Therefore, river transport is used by the population for fishing, transportation and commerce, guaranteeing the survival of communities that are difficult to access.

Wood is the main raw material in the manufacture of boats used in Amazon rivers, being selected by artisans according to their hygroscopicity, resistance against xylophagous agents and workability, by daily and empirical observations, passed through the knowledge over generations. Therefore, the precise species selection is fundamental for a correct and safe boat manufacture (Walter et al., 2017).

The correct identification of species, especially the use of the scientific name, allows us to understand how the species being used and provide management plans that can reduce the pressure on these species. Among the forms of identification by anatomy wood is macroscopic identification.

Macroscopic wood identification is the fastest method for the first identification or evaluation of traded wood (Alves et al., 2012); and is based on transverse, radial and tangential plane observations to the eye or with the aid of a magnifying lens up to ten times (Zenid e Ceccantini, 2007). The transverse plane provides the most useful diagnostic information on the type, distribution, and arrangement of axially oriented (vessels and axial parenchyma) wood tissues, including important characteristics of the growth ring (Ruffinato et al., 2015).

This study aimed to identify and characterize macroscopically the wood of the species used in boat production in three Brazilian municipalities of the State of Pará: Abaetetuba, Colares and Vigia.

2 MATERIAL AND METHODS

2.1 Study area

The municipalities of Colares, Vigia and Abaetetuba, all located in the State of Pará, are large boat producers. The selection of artisans or shipyards occurred according to the greater ease of access to the work environment and by indication of people from the community. The samples were collected in one, two and three shipyards in Colares, Abaetetuba and Vigia.

2.2 Sample collection

In the total were obtained 33 samples. The wood samples were obtained from the residues and pieces of sawn wood used in boat production. At the site, owners or employees were asked to identify the collected samples with common name and specify their use in boats.

2.3 Identification and macroscopic description

Four specimens were prepared at dimensions 2x2x2 cm of each sample collected. The specimens were analyzed and described macroscopically observing the transverse, longitudinal tangential and radial planes, using a 10 X magnifying glass and a stereomicroscope. The descriptions followed the recommendations of IAWA COMMITTEE (1989) and COPAN. After description and identification, the samples were compared with those from the collection of the wood collection or Xylarium of the Brazilian Agricultural Research Corporation (Empresa Brasileira de Pesquisa Agropecuária - EMBRAPA - Amazônia Oriental - Belém, Pará).

The macroscopic anatomical images were capture in the transversal and tangential planes, with a digital camera with 8.2 megapixels, coupled to a Stemi sv 11 Zeiss Stereomicroscope.

3 RESULTS

Nineteen species distributed into 13 families and 18 genera were identified (Table 1). The same species was collected under a different common name. Twelve species were identified in Abaetetuba and 9 species in both Colares and Vigia. However, in Vigia, the number of collections was greater when compared to Colares, where the production is not so constant, concentrating on few artisans who work alone.

Table 1. Wood collected in shipyards in the cities of Colares (A), Vigia (B) and Abaetetuba (C), in the State of Pará.

Tabela 1. Madeira coletada em estaleiros nas cidades de Colares (A), Vigia (B) e Abaetetuba (C), no Estado do Pará.

Popular names indicated by artisans	Species identified	Botanical families	Origin*		
			A	B	C
Not identified at the site	*Artocarpus* sp.	Moraceae	X		
Arara	*Aspidosperma* cf. *album* (Vahl) Benoist ex Pichon	Apocynaceae			X
Muiracatiara	*Astronium* cf. *gracile* Engl.	Anacardiaceae			X
Tatajuba	*Bagassa guianensis* Aubl.	Moraceae		X	X
Pau D'arco	*Caryocar* cf. *villosum* (Aubl.) Pers.	Caryocaraceae		X	
Piquiá	*Caryocar glabrum* (Aubl.) Pers.	Caryocaraceae	X	X	
Piquiá	*Caryocar villosum* (Aubl.) Pers.	Caryocaraceae		X	X
Not identified at the site	*Caryocar villosum* (Aubl.) Pers.	Caryocaraceae	X		
Angelim-vermelho	*Dinizia excelsa* Ducke	Fabaceae			X
Prauúba	*Dinizia excelsa* Ducke	Fabaceae	X		
Sucupira	*Diplotropis racemosa* (Hoehne) Amshoff	Fabaceae			X
Louro-tamanca	*Euplassa pinnata* (Lam.) I.M.Johnst.	Proteaceae			X
Cupiúba	*Goupia glabra* Aubl.	Goupiaceae		X	X
Bacuri	*Lecythis pisonis* Cambess.	Lecythidaceae	X		
Sapucaia	*Lecythis pisonis* Cambess.	Lecythidaceae	X	X	X
Anuerá	*Licania* cf. *heteromorpha* Benth.	Chrysobalanaceae	X		
Sapucaia	*Manilkara amazonica* (Huber) Standl.	Sapotaceae		X	X
Itauba	*Mezilaurus* cf. *itauba* (Meisn.) Taub.	Lauraceae			
Itauba	Not identified	-		X	X
Timborana	*Pseudopiptadenia* sp.	Fabaceae		X	
Not identified at the site	*Qualea* sp.	Vochysiaceae	X		
Tamanca	*Schefflera morototoni* (Aubl.) Maguire et al	Araliaceae	X		
Louro-vermelho	*Sextonia rubra* (Mez) van der Werff	Lauraceae		X	
Acapu	*Vouacapoua americana* Aubl.	Fabaceae			X
Sucupira	*Vouacapoua americana* Aubl.	Fabaceae			X

*A- Colares, B - Vigia and C - Abaetetuba

The macroscopic description of the species used in the construction of craft boats is described below and, in Figures 1 and 2, are the photos of all samples collected in the 3 shipyards.

Artocarpus sp.

Hard wood to cut, heartwood with a strong yellow color. Axial parenchyma aliform lozenge and vasicentric, showing short confluences involving three or more pores. Pores visible to the naked eye, solitary and multiple of two, many clogged with an orange substance; frequency of approximately two pores per mm^2, diffuse porosity. Rays visible to the naked eye in the transverse plane, and not visible in the tangential plane. Indistinct growth layers, even under a 10x lens (Figure 1, A and B).

Aspidosperma cf. *album* (Vahl) Benth.

Moderately soft wood to cut, yellow heartwood, tending to orange. Axial parenchyma not very contrasted, vasicentric and unilateral, aliform lozenge with short wings, diffuse apotraqueal. Pores

visible to the naked eye, mostly solitary, in diagonal arrangement, few obstructed by a whitish substance, approximately seven pores per mm^2, diffuse porosity. Rays visible only under 10x lens in the transverse plane and not visible tangential plane. Growth layers, marked by tangential fibrous zones (Figure 1, C and D).

Astronium cf. *graveolens*

Hard wood to cut, light brown heartwood. Axial parenchyma indistinct under 10x lens. Pores little visible to the naked eye, solitary and multiple of two, obstructed by a whitish substance and tyloses; frequency of approximately five pores per mm^2, diffuse porosity. Rays visible to the naked eye in the transverse plane and not visible the tangential plane. Growth layers marked by tangential fibrous zones (Figures 1, E and F).

Bagassa guianensis Aubl.

Hard wood to cut, dark yellow heartwood. Axial parenchyma indistinct under 10x lens. Pores visible to the naked eye, mostly solitary, few multiples of two, some obstructed by a yellowish substance or linden; frequency of approximately three pores per mm^2, diffuse porosity. Rays visible to the naked eye in the transverse plane and not visible in the tangential plane. Growth layers marked by darker tangential fibrous zones (Figure 1, G and H).

Caryocar glabrum (Aubl.) Pers.

Heavy wood, hard to cut, light beige heartwood. Diffuse and diffuse in aggregate apotracheal axial parenchyma, forming short extensions. Pores visible to the naked eye, predominantly multiple of two, some up to four, mostly obstructed by tyloses; frequency of two to three pores per mm^2, diffuse porosity. Rays visible only under 10x lens in the transverse plane and visible in tangential plane. Slightly differentiated growth layers marked by tangential fibrous zones (Figure 1, I and J).

Caryocar villosum (Aubl.) Pers.

Hard wood to cut, yellow-burnt heartwood tending to brown. Diffuse and diffuse in aggregate apotracheal axial parenchyma, forming irregular fine lines, sometimes visible to the naked eye. Pores visible to the naked eye, solitary and multiple of two to three, mostly obstructed by tyloses; frequency of two to three pores per mm^2, diffuse porosity. Rays visible only under 10x lens in the transverse plane and visible in tangencial plane. Growth layers marked by tangential fibrous zones (Figure 1, K and L).

Dinizia excelsa Ducke

Wood hard to cut, brown heartwood, tending to rosy. Lozenge and winged aliform axial parenchyma, forming long oblique irregular confluences, involving two to four pores, besides the presence of marginal parenchyma. Pores visible to the naked eye, solitary and multiple of two and three, obstructed by a whitish substance; frequency of four to five pores per mm^2, diffuse porosity. Rays visible only under 10x lens in the transverse plane and not visible in the tangential plane, but some irregular storied rays are perceptible. Growth layers, marked by tangential fibrous zones (Figure 1, M and N).

Bowdichia cf *racemosa* Ducke

Hard wood to cut, dark brown heartwood, fibrous aspect. Aliform lozenge axial parenchyma, vasicentric, forming short irregular oblique confluences. Pores very visible to the naked eye, predominantly multiple of two and three, in radial arrangement, some obstructed by a whitish substance and apparently oily dark substance; frequency of approximately three to five pores per mm^2, diffuse porosity. Rays visible to the naked eye in the transverse plane and visible in the tangential plane. Insdistinct growth layers, even under lens (Figure 1, O and P).

Euplassa pinnata (Lam.) I.M.Johnst.

Wood moderately hard to cut, brown heartwood. Axial parenchyma in lines/scalariform. Pores barely visible to the naked eye, solitary and multiple of two, in tangential arrangement, frequency of two to four pores per mm^2, diffuse porosity. Very broad rays visible to the naked eye in the transverse plane and visible in the tangential plane. Indistinct growth layers, even under lens (Figure 1, Q and R).

Goupia glabra Aubl.

Wood hard to cut, brown heartwood. Diffuse apotracheal axial parenchyma. Poros visible to the naked eye, mostly solitary, few in diagonal arrangement, some obstructed by a dark substance with oily appearance, presence of scalariform perforation plates visible under lens, frequency of four to six pores per mm^2, diffuse porosity. Rays visible only under 10x lens in the transverse plane and not visible in the tangential plane. Growth layers marked by darker tangential fibrous zones (Figure 1, S and T).

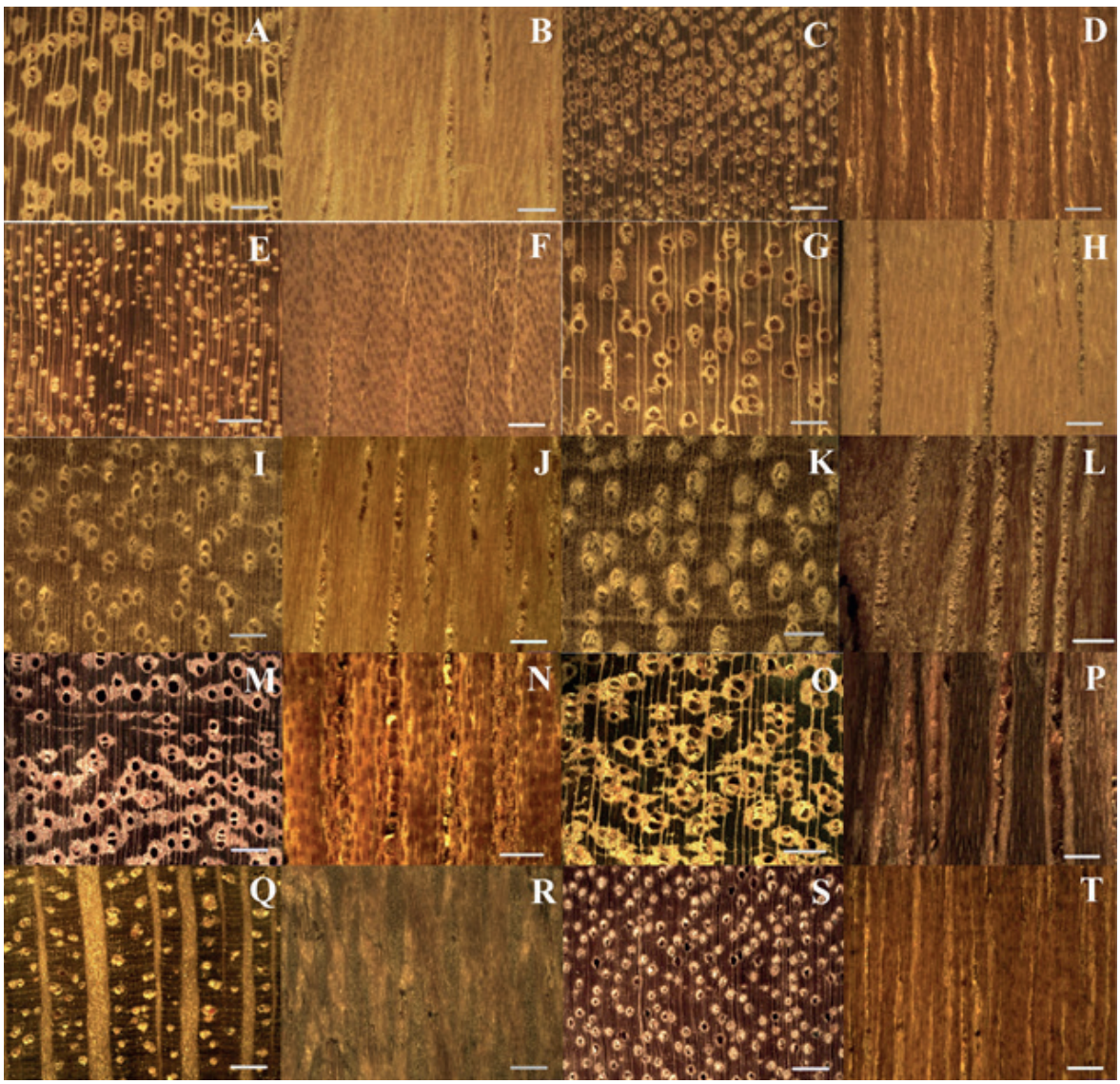

Figure 1. Macroscopy of transverse and longitudinal tangential planes of species found in the cities of Abaetetuba, Colares and Vigia, in the State of Pará. Increase 1.5. Scale 1.5 mm. A and B - *Artocarpus* sp; C and D - *Aspidosperma* cf. *album*; E and F - *Astronium* cf. *graveolens*; G and H - *Bagassa guianensis*; I and J - *Caryocar glabrum*; K and L - *Caryocar villosum*; M and N - *Dinizia excelsea*; O and P - *Bowdichia* cf. *racemosa*; Q and R - *Euplassa pinnata*; S and T - *Goupia glabra*.

Figura 1. Macroscopia dos planos transversal e longitudinal tangencial das espécies estudadas. Aumento 1.5. Escala 1,5 mm. A e B - *Artocarpus* sp.; C e D - *Aspidosperma* cf. *album*; E e F - *Astronium* cf. *graveolens*; G e H - *Bagassa guianensis*; I e J - *Caryocar glabrum*; K e L - *Caryocar villosum*; M e N - *Dinizia excelsea*; O e P - *Bowdichia* cf. *racemosa*; Q e R - *Euplassa pinnata*; S e T - *Goupia glabra*.

Lecythis pisonis Camb.

Wood hard to cut, brownish-orange heartwood. Axial parenchyma in slightly wavy lines, tending to form the reticulate parenchyma. Pores visible to the naked eye as white dots in the transverse plane, solitary and multiple of two, in radial arrangement, obstructed by a whitish substance and tyloses, frequency of two to three pores per mm^2, diffuse porosity. Some samples had traumatic resin canals and can be seen in all three planes. Rays not visible to the naked eye in the transverse plane and visible in the tangential plane. Growth layers marked by tangential fibrous zones and by the approximation of axial parenchyma lines (Figure 2, A and B).

Licania cf. *heteromorpha* Benth.

Wood hard to cut, dark brown heartwood. Axial parenchyma in slightly wavy lines. Pores visible to the naked eye, mostly solitary; frequency of approximately three pores per mm^2, diffuse porosity. Rays barely visible, even under lens in the transverse plane and not visible in the tangential plane. Growth layers marked by tangential fibrous zones (Figure 2, C and D).

Manilkara amazonica (Huber) A. Chev.

Wood hard to cut, brown heartwood tending to reddish. Axial parenchyma in wavy lines, eventually interrupted. Pores visible to the naked eye, mostly multiples of three, some to four, in radial arrangement; pores obstructed by a whitish substance; frequency of five to seven pores per mm^2, diffuse porosity. Rays visible only under 10x lens in the transverse plane. Growth layers marked by tangential fibrous zones (Figure 2, E and F).

Mezilaurus cf. *itauba* (Meissn.) Taub.

Wood hard to cut, dark brown heartwood tending to yellowish-green. Axial parenchyma undifferentiated under 10x lens. Pores little visible to the naked eye, most multiple of two, three or more, presence of tyloses, radial arrangement; frequency of approximately seven to eight pores per mm^2, diffuse porosity. Rays visible to the naked eye in the transverse plane and not visible in the tangential plane. Growth layers barely differentiated, marked by tangential fibrous zones (Figure 2, G and H).

Pseudopiptadenia sp.

Wood hard to cut, light brown heartwood. Vasicentric paratracheal axial parenchyma. Pores slightly visible to the naked eye, solitary and multiple of two and three, in radial and diagonal arrangement, some obstructed by a substance of dark color, apparently oily, frequency of four to six pores per mm^2, diffuse porosity. Rays barely visible to the naked eye in the transverse plane and not visible in the tangential plane. Growth layers marked by tangential fibrous zones. Some blackish deposits were observed in the radial and tangential planes (Figure 2, I and J).

Qualea sp.

Wood hard to cut, dark brown heartwood. Paratracheal parenchyma poorly contrasted even under 10x lens, winged aliform, forming few short confluents. Pores hardly visible to the naked eye, solitary and multiple of two and three, some obstructed by tyloses; frequency of approximately five to six pores per mm^2, diffuse porosity. Rays visible to the naked eye in the transverse plane and not visible in the tangential plane. Growth layers marked by darker tangential fibrous zones (Figure 2, K and L).

Schefflera morototoni (Aubl.) Maguire, Steyerm. & Frodin

Wood soft to cut, whitish to light gray heartwood, showing visible brightness in the radial plane. Indistinct axial parenchyma under 10x lens. Pores visible to the naked eye, solitary and multiple of three, some obstructed with a substance of dark color, possibly due to the fact that the collected samples have numerous holes caused by xylophage agents, diffuse porosity. Rays visible to the naked eye in the transverse plane and not visible in the tangential plane. Indistinct growth layers even under 10x lens (Figure 2, M and N).

Sextonia rubra (Mez) van der Werff

Wood moderately soft to cut, dark brownish to slightly reddish heartwood. Vasicentric axial parenchyma, scarcely lozenge aliform, slightly differentiated even under 10x lens. Pores visible to the naked eye, solitary and multiple of two, some of three, some in diagonal pattern; frequency of three to five pores per mm^2, mostly obstructed by tyloses or an oily substance, diffuse porosity. Rays visible to the naked eye in the transverse plane and visible in the tangential plane. Indistinct growth layers even under 10x lens (Figure 2, O and P).

Vouacapoua americana Aubl.

Wood hard to cut, dark brown heartwood. Lozenge aliform axial parenchyma, forming short oblique confluent and marginal parenchyma bands. Pores visible to the naked eye, mostly solitary, few multiples of two and three; frequency of three to five pores per mm², diffuse porosity. Rays visible only under 10x lens in the transverse plane and not visible in the tangential plane. Indistinct growth layers even under 10x lens (Figure 2, Q and R).

Unidentified wood

Hard wood to cut, dark brown heartwood tending to yellowish-green. Scanty axial parenchyma. Pores visible to the naked eye, multiples of two and/or three obstructed by tyloses, frequency of five to seven pores per mm², in radial arrangement, diffuse porosity. Rays barely visible to the naked eye in the transverse plane and visible in tangencial plane, showing signs of stratification in the tangential plane. Indistinct growth layers even under 10x lens (Figure 2, S and T).

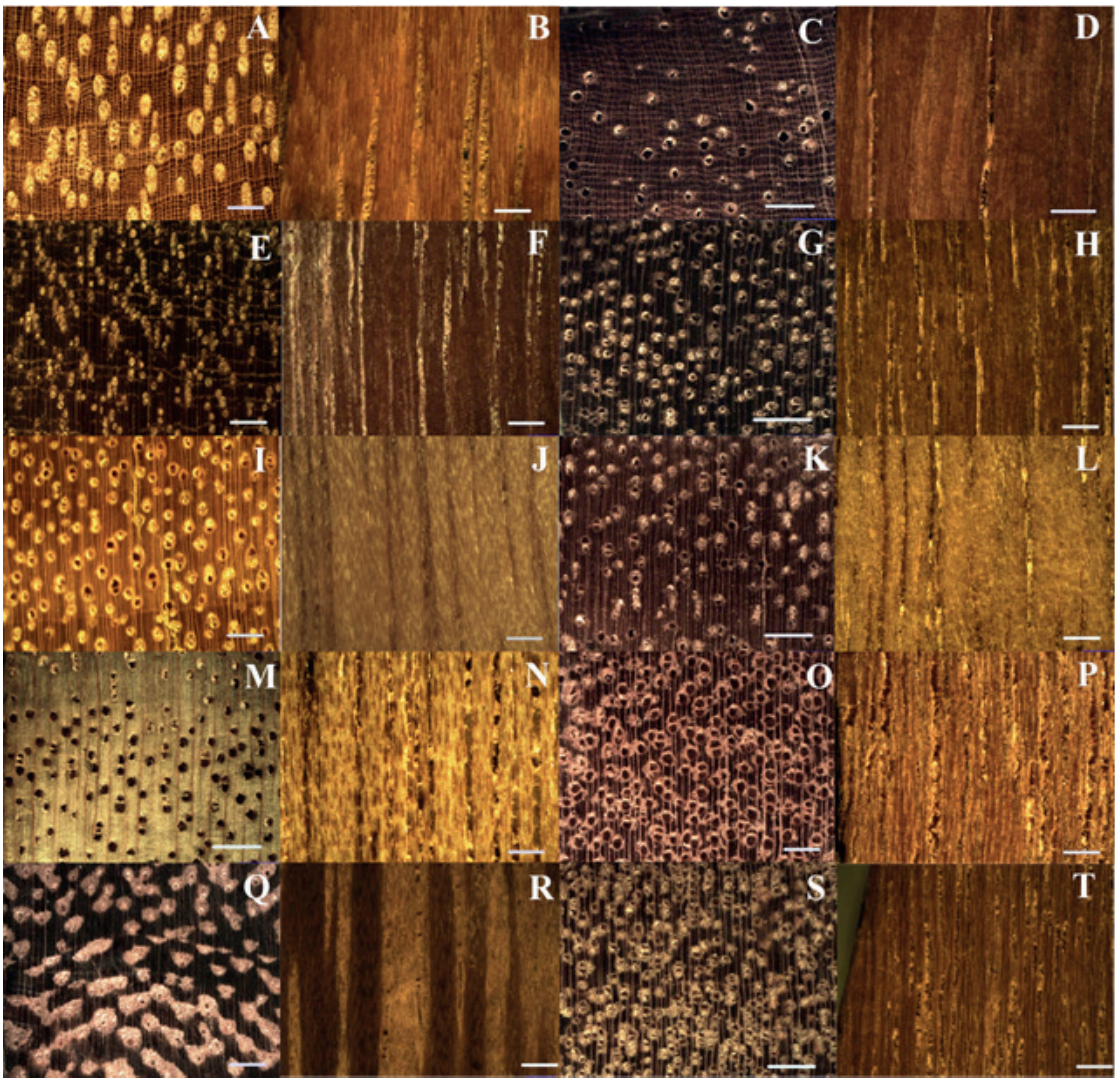

Figure 2. Macroscopy of transverse and longitudinal tangential planes of the studied species. Increase 1.5. Scale 1.5 mm. A and B - *Lecythis pisonis*; C and D - *Licania* cf. *heteromorpha*; E and F - *Manilkara amazonica*; G and H - *Mezilaurus* cf. *itauba*; I and J - *Pseudopiptadenia* sp.; K and L - *Qualea* sp; M and N - *Schefflera morototoni*; O and P - *Sextonia rubra*; Q and R - *Vouacapoua americana*; S and T - Unidentified wood.

Figura 2. Macroscopia dos planos transversal e longitudinal tangencial das espécies estudadas. Aumento 1.5. Escala 1.5 mm. A e B - *Lecythis pisonis*; C e D - *Licania* cf. *heteromorpha*; E e F - *Manilkara amazonica*; G e H - *Mezilaurus* cf. *itauba*; I e J - *Pseudopiptadenia* sp.; K e L - *Qualea* sp.; M e N - *Schefflera morototoni*; O e P - *Sextonia rubra*; Q e R - *Vouacapoua americana*; S e T - madeira não identificada.

4 DISCUSSION

The following species were the most used in boat manufacture and found in all municipalities visited: *Caryocar villosum* (Aubl.) Pers. and *Lecythis pisonis* Cambess. The Fabaceae family and the genus *Caryocar* (Caryocaraceae family) had the largest number of species.

Each species has a certain use in the boats produced in the shipyards. The species of the genus *Caryocar* are used in the vertical frame for their resistance, workability and good receptivity to screws, whereas *Lecythis pisonis*, *Manilkara amazonica* and *Licania heteromorpha* are used in the keel and stem, mainly due to their high mechanical resistance. With regard to lining, cover and other finishes, the identification showed that a greater number and diversity of species is being used. Figure 3 shows the species mostly used in each boat structure.

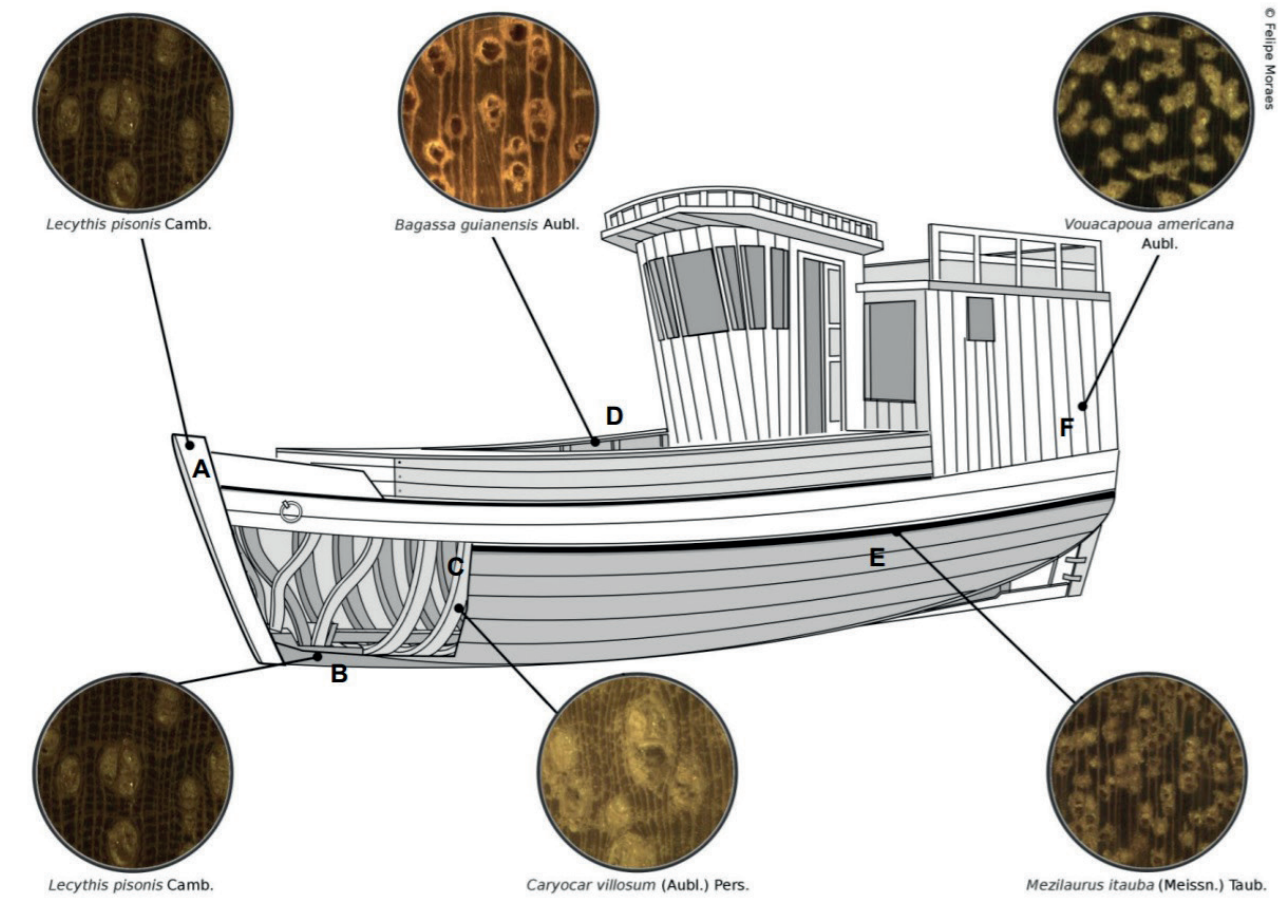

Figure 3. Main species, macroscopically identified, used in boat making.

*A- Stem; B- Keel; C- Vertical frame; D- Cover; E- Lining; F- Gallery.

Figura 3. Principais espécies, identificadas macroscopicamente, usadas na fabricação de barcos.

*A- Talhamar; B- Quilha; C-Braçame (Cavername); D- Cobertura; E- Forro; F- Casinhola.

The species identified as *Manilkara amazonica*, commercially known as Maçaranduba, was collected with the vernacular name of Sapucaia, common to *Lecythis pisonis* species. The species *Manilkara amazonica* has a high density of 0.84 g/cm³ (Iwakiri et al., 2016a), and it is indicated for the production of laterally glued panels (Bila et al., 2016).

The species of the genus *Caryocar* were collected as Piquiá, independent of the species, or Pau D'arco, name commonly given to the species of the genus *Handroanthus*. The *C. villosum* species is indicated for structural components of boats. Iwakiri et al. (2012) showed the technical feasibility of using *C. villosum* from tropical rainforests in the Amazon, also in the production of particleboards.

Lecythis pisonis was collected with the vernacular name of Sapucaia, which is its most common popular name, yet it was also collected as Bacuri, which is the popular name commonly given to *Platonia insignis*, a species of the Clusiaceae family. Since species such as *Caryocar glabrum, C. villosum, Dinizia excelsa, Lecythis pisonis, Manilkara amazonica* are considered heavy woods, with medium to high mechanical resistance, good durability and high resistance to attack by xylophagous agents, they are species suitable for constructions and use (Mainieri and Chimelo, 1989).

The species *Vouacapoua americana* was collected under the name of Acapu, which really matches its best-known popular name. However, it was also collected with the vernacular name of Sucupira, the usual name for the species *Bowdichia* cf. *racemosa*. According to Amusant et al. (2014), the species *Vouacapoua americana* has high density and high resistance to rotting, its wood is associated with high extractive content and basic density.

Dinizia excelsa was collected with the vernacular name of Angelim-vermelho, its most common vernacular name; however, the vernacular name of Pracuúba, usually given for the species *Mora paraensis* was also used. *Dinizia excelsa* is a wood with high density, a strong unpleasant smell, which tends to disappear over time, has difficult workability, but a great finish (Zenid et al., 2009); it is recommended for the production of laterally glued panels (Iwakiri et al., 2016b), commercialized in the Brazilian market as woods for civil construction, shipbuilding and rustic furniture (Mesquita et al., 2009).

The species *Bowdichia* cf. *racemosa* was collected by its most common popular name, Sucupira. It can assume other nomenclatures, such as sucupira-preta, sucupira-roxa, sucupira-da-terra-firme; it has high density, difficult workability and high resistance to attack by xylophagous organisms. It is used in civil construction, furniture and boats (Zenid et al., 2009).

The wood of *Licania heteromorpha*, mainly known by the usual names Nuerá and Anauerá, was collected with the name of Anauerá. This wood has low resistance when in contact with the soil and/or moisture (fresh water). It is mainly used in naval carpentry and construction; since it is subject to warping, it must be used in pieces that do not require a perfect finish (Gonzaga, 2006).

Sextonia rubra was collected with the name of Louro Vermelho; this is its most common vernacular name. *Sextonia rubra* is resistant to termite-induced degradation (Rodrigues et al., 2011). According to the IPT (2003), the wood is used mainly in civil construction, as in stops, doors and windows, and structurally as slats and secondary structure parts.

The species identified as *Goupia glabra* was collected by its most common popular name, cupiúba. *Goupia glabra* wood is indicated for both shipbuilding and civil construction, and the species is used in the medicinal area against malaria, syphilis and worm (Gurgel et al., 2015). Hirai et al. (2007) studied 84 ha of dense dryland forest in the municipality of Paragominas, in the State of Pará – Brazil. *Goupia glabra* was one of the most representative species in the forest structure; the authors found that the growth of the species is fast and that trees are well distributed in diametric grades from 45cm in diameter; however, only 54% of these trees have excellent-quality shavings for wood production.

The wood of *Aspidosperma* cf. *album* was collected as Arara, which is one of its most common names; besides, the species is also known as Peroba marfim, Araracanga, Peroba, Guatambu, among others.

The species *Astronium* cf. *graveolens* and *Bagassa guianensis* were collected by their vernacular names of Muiracatiara and Tatajuba, respectively. *Bagassa guianensis* is very resistant to the attack of marine insects and molluscs, thus having great potential for external use (Embrapa Amazônia Oriental, 2004). *Astronium* has high-density wood and is widely used in products that require dimensional stability, such as luxury furniture, floors, carpentry and woodworking in general (Loureiro et al., 2000).

Mezilaurus itauba and *Pseudopiptadenia* sp. were collected with the popular names of Itauba and Timborana, respectively; these are their most common vernacular names. The wood of *Mezilaurus itauba* has high resistance to the fungi *Lenzites trabea* and *Pycnoporus sanguineus*, as well as high resistance to the attack of the termite *Nasutitermes* sp. (Instituto Nacional de Pesquisas da Amazônia / Centro de Pesquisas de Produtos Florestais - INPA/CPPF , 1991). Itauba is a wood suitable for boats (INPA/CPPF, 1991), as well as *Pseudopiptadenia* sp. (Santini Junior, 2013).

Morototó, caxeta, caixeta, mandiocão-as-mata, mandioqueira, are the main popular names associated with the species *Schefflera morototoni*. However, the wood was collected with the name of tamanca. According to Macieira et al. (2014), this wood is very mild, susceptible to fungal and insect attack; it is indicated for non-structural uses such as broomsticks, crates, construction, light packaging, crates, spatula for ice cream, rafts, pencils, woodworking, door knocker, furniture, frame, panel, toothpicks and matches, among others.

Euplassa pinnata, popularly known as Louro-faia, was collected by the vernacular name of Loura-tamanca. Its wood is considered of low durability and easy workability (IPT, 1989).

Three samples were not identified with their popular name in the shipyards and were identified in this study as *Caryocar villosum*, already found in other yards and two new ones, one *Qualea* sp. and another *Artocarpus* sp. Qualea wood has low resistance to attack by xylophagous organisms, and it is considered moderately susceptible to termite attack and susceptible to marine perforators (Zenid et al., 2009), therefore, it is not so interesting for use in boats.

5 CONCLUSIONS

• Nineteen species belonging to 13 families and inserted in 18 genera were identified in the craft boats of Paraense artisans;

• The most used were *Caryocar villosum* and *Lecythis pisonis*;

• With this study, it was possible to observe that even the artisans who work for many years with the region's woods make mistakes in the identification of the wood used, giving vernacular names that do not correspond to the identified species.

REFERENCES

ALVES, R.C. et al. Caracterização anatômica macroscópica de madeira folhosas comercializadas no Estado do Espírito Santo. **Floresta e Ambiente**, v.19, n. 3, p. 352-361, 2012.

AMUSANT, N. et al. Diversity of decay resistance strategies of durable tropical woods species: *Bocoa prouacencsis* Aublet, *Vouacapoua americana* Aublet, *Inga alba* (Sw.) Wild. **International Biodeterioration & Biodegradation**. 94, p.103-108, 2014.

BILA, N.F. et al. Avaliação da qualidade de juntas coladas de seis espécies de madeiras tropicais da Amazônia. **Floresta**, v.46, n. 4, p. 455-464, 2016.

EMBRAPA AMAZÔNIA ORIENTAL. **Espécies arbóreas da Amazonia Nº 5: Tatajuba**, ***Bagassa guianensis***. Brasil: Embrapa Amazônia Oriental, 2004.

GONZAGA, A.L. **Madeira:** Uso e Conservação. Brasília, DF: IPHAN/MONUMENTA, 2006. 246 p.

GURGEL, E.S. et al. **Conhecendo Espécie de Plantas da Amazônia:** Cupiúba (*Goupia glabra* Aubl. – Goupiaceae). Brasil: Embrapa Amazônia Oriental, 2015 (Comunicado Técnico n. 262).

HIRAI, E.H.; CARVALHO, J.O.P. DE; PINHEIRO, K.A.O. Comportamento populacional de Cupiúba (*Goupia glabra* Aubl.) em floresta de terra firme na fazenda Rio Capim, Paragominas (PA). **Rev. ciênc. agrár.**, n. 47, p. 89-101, 2007.

IAWA COMMITTEE. International Association of Wood Anatomists. List of microscopic features for hardwood identification. **IAWA Bulletin**, v.10, p. 220-332, 1989.

INSTITUTO NACIONAL DE PESQUISAS DA AMAZÔNIA / CENTRO DE PESQUISA DE PRODUTOS FLORESTAIS – INPA/CPPF. **Catálogo de madeiras da Amazônia:** características e utilização - Área da Hidrelétrica de Balbina. Manaus: INPA/CPPF, 1991. 163p.

INSTITUTO DE PESQUISA TECNOLÓGICA DO ESTADO DE SÃO PAULO - IPT. **Fichas de Características das Madeiras Brasileiras**. 2ª ed. São Paulo: IPT, 1989. 418 p. (publicação IPT n. 1791).

INSTITUTO DE PESQUISA TECNOLÓGICA DO ESTADO DE SÃO PAULO - IPT. **Madeira:** uso sustentável na construção civil. São Paulo: IPT, 2003. 59 p.

IWAKIRI, S. et al. Avaliação das propriedades de painéis aglomerados produzidos com resíduos de serrarias de nove espécies de madeiras tropicais da Amazônia. **Acta Amazônica**, v. 42, n. 1, p. 59-64, 2012.

IWAKIRI, S. et al. Produção de painéis aglomerados com misturas de seis espécies de madeiras da Amazônia e *Pinus taeda*. **Floresta**, v. 46, n. 2, p. 259-267, 2016a.

IWAKIRI, S. et al. Potencial de uso de madeiras de *Dinizia excelsa* Ducke e *Protium puncticulatum* J.F.Macbr para produção de painéis EGP. **Sci. For.**, v. 44, n. 111, p. 709-717, 2016b.

LOUREIRO, A.A.; FREITAS, J.A. DE; RAMOS, K.B.L. **Essências madeireiras da Amazônia**. Manaus: MCT/INPACPPF, 2000. v. 4, 191 p.

MACIEIRA, A.P. et al. **Conhecendo Espécie de Plantas da Amazônia:** Morototó (*Schefflera morototoni* (Aubl.) Maguire, Steyerm. & Frodin - Araliaceae). Brasil: Embrapa Amazônia Oriental, 2014. (Comunicado Técnico n. 245).

MAINIERI, C.; CHIMELO, J.P. Fichas de características das madeiras brasileiras. São Paulo: IPT. 1989. 241 p.

MESQUITA, M.R.; FERRAZ, I.D.K.; CAMARGO, J.L.C. Angelim vermelho, *Dinizia excelsa* Ducke, Fabaceae. In: FERRAZ, I.D.K.; CAMARGO, J.L.C. (Ed.). **Manual de Sementes da Amazônia**. Manaus: INPA, 2009. Fascículo 8. 12p.

RODRIGUES, A.M.S. et al. The termiticidal activity of *Sextonia rubra* (Mez) van der Werff (Lauraceae) extract and its active constituent rubrynolide. **Pest Management Science**, v. 67, n. 11, p. 1420-1423, 2011.

RUFFINATTO, F.; CRIVELLARO, A.; WIEDENHOEFT, A.C. Review of macroscopic features for hardwood and softwood identification and a proposal for a new character list. **IAWA J**. v. 36, p. 208-241, 2015.

SANTINI JUNIOR, L. **Descrição macroscópica e microscópica da madeira aplicada na identificação das principais espécies comercializadas no Estado de São Paulo** – Programas "São Paulo Amigo da Amazônia" e "Cadmadeira". 2013. 272 f. Dissertação (Mestrado em Ciências) - Escola Superior de Agricultura "Luiz de Queiroz", Universidade de São Paulo, Piracicaba.

TEIXEIRA, A.S. et al. Gestão da Inovação Portuária na Amazônia: Proposta de Remodelagem de Transporte dos Ribeirinhos no Rio Madeira. **RASI**, v. 3, n. 2, p. 188-204, 2017.

WALTER, Y. et al. Artisanal boat building in brazilian shores: craftsmen, boatyards, and manufacturing process. **International Journal of Advances in Engineering & Technology**. v. 10, n. 6, p. 572-584, 2017.

ZENID, G.J.; CECCANTINI, G.C.T. **Identificação Macroscópica de Madeiras**. Instituto de Pesquisas Tecnológicas do Estado de São Paulo - IPT: São Paulo, 2007. 24 p.

ZENID, G.J. et al. **Madeira:** uso sustentável na construção civil. 2 ed. São Paulo: IPT, 2009. 99p. (IPT publicação n. 3010).