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Microorganisms that attack forest species in the north of the state of Mato Grosso

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Abstract: Sawnwood presents one of the main forest products commercialized in the northern region of southern Amazonia, but due to its anatomical, chemical and physical composition, it becomes a target of deterioration of xylophagous organisms in general, due to the presence of parenchyma tissue in its constitution , The arrangement of the elements gives greater or less resistance to the proliferation of fungi in the cell wall, since wood that has high volumes of extractives, become more resistant and gives the wood a lower degree of susceptibility to the development of organisms in the cellular wall of the wood, works which identify xylophagous organisms in wood, are still in the initial phase, with few scientific studies on species of commercial interest. Thus, the general objective of the work is to identify the microorganisms that attack the wood of native species of southern Amazonia, as well as to classify the types of fungi attack in the woods, for the development of the study, such as the following species: cedrinho (E*risma uncinatum*); white cedar (E*risma bicolor*); cupiúba (G*oupia glabra*); Rosinha (V*ochysia maxima*). Six genera of fungi under the wood solution were identified during the evaluation period: *Trichorderma sp;* P*aecilomyces variotii;* G*raphium arrosporium;* R*hizoctonia solani;* L*asioplodia theobromae* and F*usarium sp*. are that they are classified in relation to the damage of the wood as stains and emboloradores. T*richorderma* and P*aecilomyces variotii* are categorized as wood shapers, due to an increase in quality, a quality of the wood, thus reducing its technological properties.

Key words: Native species; fungi; Identification of xylophagous organisms.

Introduction

Due to its anatomical and chemical constitution, wood can become the target of deterioration caused by chemical, physical, mechanical and biological agents. In this study, the biodegradability of the wood was higher than that of the wood. In the case of wood, the wood is susceptible to attack by xylophagous organisms and, depending on the environmental conditions, it will suffer a greater or lesser deterioration Mesquita et al. (1997).

Woody organisms have the wood or the main source of food (Rocha, 2001), and are represented by insects, bacteria and fungi, the latter being the most important group, responsible for the highest proportion of wood damages Corassa et al. (2013), rotting, staining or embolishing them, generating serious damages, especially the pieces already benefited. (Oliveira, 1986) reports that the group of fungi causes surface staining, a powdery appearance and a varied color, composed of mass and spores, easily removable. According to the same author, the presence of fungi under the surface of the wood can penetrate the inner surfaces, thus affecting its technological properties. Spotting fungi, unlike pigmented or hyaline hyphae. This group has the ability to secrete colored substances. Thus, species that possess the sapwood, attacked by these fungi cause the formation of areas of variable coloration, generally of blue to dark gray. The stains can be superficial or deep, thus depreciating the quality and commercial value of the wood.

The susceptibility of wood to the attack of xylophagous agents depends on its durability or natural resistance (Burger & Ritcher, 1991), which can be attributed to substances present in the wood and which has a toxic effect on these organisms.

Rocha (2001) emphasizes that the moisture content and temperature in tropical regions are constants that must be taken into account in the propagation of microorganisms and above 35º C, are factors that provide better conditions for the development of these wood degrading agents, because the medium for the proliferation becomes favorable, requiring in this way, adequate preservation techniques from the cutting phase until the industrialization of the wood, aiming at the greater durability of the same.

In this sense, it is convenient to evaluate the changes that the other properties of the wood, can suffer by the exposure to the attack of rotting fungi, as well as the interaction between these properties. However, the external temperature conditions in which the wood is exposed can interfere in the quality of these in the storage yards, because according to Fagundes (2003) the humidity has a direct influence in all the properties of the wood including in its resistance to the attack of fungi machadores and decoders.

Due to the importance in knowing the deteriorating organisms of tropical woods with commercial values. The objective of this work was to identify the microorganisms that attack wood species native to the Amazon region and to classify the types of attack of the identified agents in the woods of the present study.

Method

The study was developed in the municipality of Alta Floresta, located in the north of the state of Mato Grosso. According to the Köppen classification, the region presents a tropical monsoon climate (Alvares et al., 2013) with an annual average temperature between 24.3 and 24.8 ºC (Butturi et al., 2013) and rainfall of 2,000 to 2,300 mm . In the rainy season, it presents an average annual rainfall of 2750 mm and an average annual temperature of 25ºC, that is, humidity and ideal temperature for the appearance and development of fungi and insects in wood deposited in the wood yards.

Four tropical species widely used in the region's timber industries were used. cedrinho (E*risma uncinattum*); white cedar (E*risma bicolor*); cupiúba (G*oupia glabra*); rosinha (V*ochysia maxima*). Subsequently the samples had their dimensions reduced to 1x1x1, tangential, radial and axial.

In order to prepare the fungi isolation, the Blotter test method was used, which consists in the incubation of two specimens contaminated by the fungus in 3 petri dishes with leaf and filter paper. The plates with filter paper were wrapped in foil and autoclaved at 121º C and 1 atm of pressure for 20 minutes. The specimens were disinfested in 70% alcohol for 3 minutes, then subjected to 2.5% sodium hypochlorite solution for 3 minutes and subsequently in sterile distilled water for 1 minute.

After decontamination, the samples were placed into petri dishes on two sheets of sterile filter paper, which was moistened with 10 ml of sterile distilled water, all plates were sealed and placed within BOD with photoperiod of 12 hours, at 25 ° C ± 2 ° C for 15 days.

The fungal colonies with differentiated staining (present on the samples) were identified with the aid of a stereoscopic microscope with a 10x magnification. Slides were prepared using blue cotton dye with lactophenol and adhesive tape containing fungal structures of the pathogen and evaluated by optical microscope with an increase of 40x, in addition, consultations were made to descriptive references, with the aid of a taxonomic classification key de Menezes (1993).

Results and discussion

Table 1 shows the microorganisms identified in the test specimens of the wood samples, and the fungus that occurred under the surface of all wood samples was *Paecilomyces*, present in all woods, as shown in table 1.

Table 1- Incidence of emboling fungi and staining under the surface of the wood present in the test specimens analyzed.

Species	Wood sample	Fungi
Cupiúba	1	T*richorderma sp*
Cupiúba	2	P*aecilomyces*
Cupiúba	3	P*aecilomyces*
Cupiúba	4	P*aecilomyces*
Cupiúba	5	P*aecilomyces*
Cupiúba	6	P*aecilomyces*
Cedrinho	1	T*richoderma sp*
Cedrinho	2	R*hizoctonia solani*
Cedrinho	3	F*usarium sp.*
Cedrinho	4	L*asioplodia theobromae,*
Cedrinho	5	P*aecilomyces*
Cedrinho	6	P*aecilomyces*
Cedrinho branco	1	P*aecilomyces*
Cedrinho branco	2	T*richoderma sp.*
Cedrinho branco	3	T*richoderma sp*
Cedrinho branco	4	L*asiodiplodia theobromae*
Cedrinho branco	5	*Paecilomyces*
Cedrinho branco	6	T*richoderma sp*
Rosinha	1	G*raphium*
Rosinha	2	G*raphium*
Rosinha	3	G*raphium*
Rosinha	4	G*raphium*
Rosinha	5	P*aecilomyces*
Rosinha	6	*Graphium.*

In order to study the fungus incidence of fungi in Jatobá, in the municipality of Alta Floresta in the state of Mato Grosso, Saccoman et al. (2016) detected about 90% of the fungi recorded in the present study. cites that the humidity of the place is favorable for the development of fungi in the region.

L*asiodiplodia theobromae,* is a pathogen typical of the tropical and subtropical regions, where it causes serious damages to numerous cultivated

vegetable species. In pure BDA culture, the colonies of L*asiodiplodia theobromae* are blackish to gray, with abundant aerial mycelium and the reverse of the Petri dish culture are black or matte. The reproductive structure of the wood can be seen, according to the figure 1.

Nunes et al. (1992), studying the cardinal species (S*cleronema micranthum* Ducke), during 20 months, identified the following microorganisms under laboratory conditions: L*asiodiplodia* theobramae; T*richoderma*; P*eacilomyces*, the fungus T*richorderma* sp occurred in the studied woods with the exception of the Rosinha species, the analysis of the fungus can be seen according to figure 2.

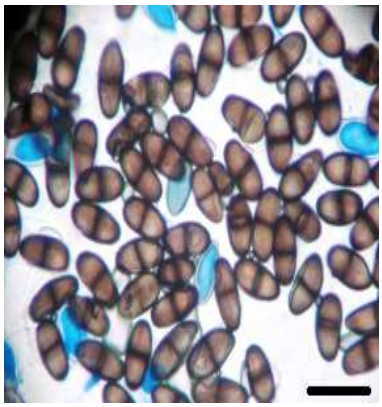

Figure 1. Conidia of L*asiodiplodia theobromae* in white cedro wood. Measuring bar (30µm).

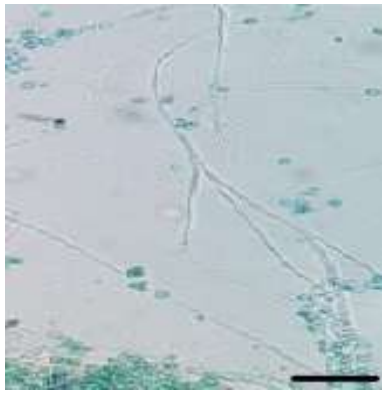

Figure 2. T*richoderma* observed in the white cedar wood. Measuring bar (30µm).

The genus R*hizoctonia* identified in Cedrinho wood, is classified by Bergamin et al. (2005), as characteristic soil fungi, being responsible for the internal staining of the wood.

Furtado et al. (2000), reports that the main fungi causing internal staining in wood are: L*asioplodia theobromae*, G*raphium* sp, D*iplodia* sp and O*phiostoma* sp. the latter two being not observed in the present study. The reproductive structures of the main spotting fungi identified can be seen according to figure 3.

Figure 3. Reproductive structure of G*raphium* sp identified in rosewood. Measuring bar (30µm).

The fungus P*aecylomyces* occurred in all the Cedrinho and Cupiúba samples, in two of the Cedrinho white samples and one in the Rosinha wood sample. Of the organisms identified, the genus that has few reports is the recently a research done by Lopes et al. (2017), identified two new genera of the family, P*aecilomyces formosus* and P*aecilomyces parvisporus*, the authors of the study report that the new genera identified are able to synthesize organic biomolecules.

The genus P*aecilomyces* variotii found in the study was studied by Ziglio et al. (2010), belongs to the Ascomycotina subdivision, whose main characteristics is the great capacity of decomposition of plants and food, mainly cellulose and hemicellulose found in the woods , being classified as fungi causing soft rot. Also in the present study, the author can verify the natural resistance of Jatobá wood in 4 weeks, the mass loss was significant, making a total of 8.6%.

Basso et al. (2010), has aroused attention, because P*aecilomyces* has the ability to convert complex substances, such as cellulose, into higher value products, such as bioethanol, the reproductive structures of P*aecilomyces* can be seen in accordance with figure 4.

Figure 4. Reproductive structures of P*aecilomyces* identified in cupiúba wood. Measuring bar (30µm).

Conclusion

There are a variety of fungi staining or emboloradores in the samples of the sawed species, studied. It is observed the occurrence of the genera Trichorderma sp; *Paecilomyces*; G*raphium arthrosporium*; R*hizoctonia solani*; L*asioplodia theobromae* and F*usarium* sp in the species studied.

In general, the identified microorganisms are classified as saprophytes of the soil, with capacity for degradation of plant and lignocellulosic material, and it is necessary to adopt measures of control in the wood storage yards, as they may depreciate the technological quality of the wood, subsequently reducing the market price on the market.

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