

Anti-inflammatory and cicatrizing properties of the *Tabebuia* genus: A review

Propriedades antiinflamatórias e cicatrizantes do gênero *Tabebuia*: Uma revisão

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Received: 07/09/2021 | Reviewed: 07/15/2021 | Accept: 07/17/2021 | Published: 07/25/2021

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Abstract

The *Tabebuia* genus is one of the largest genera of the Bignoniaceae family, comprising more than 100 species. One of its main representatives is the ipê tree, which is popularly known for their ornamental and logging potential. However, parts of the tree, such as the stem, leaves and flowers, are used in traditional medicine for anti-bacterial, anti-inflammatory (rhinitis, sinusitis, tonsillitis and pharyngitis), anti-ulcerogenic, antiviral, antineoplastic, antimalarial and immunomodulatory purposes. The objective of the present study was to collate articles on the cicatrizing and therapeutic properties of species belonging to the *Tabebuia* spp genus.

Keywords: Ipê yellow; *Tabebuia*; Popular medicine; Anti-inflammatory; Cicatrizing.

Resumo

O gênero *Tabebuia* é um dos maiores gêneros da família Bignoniaceae, compreendendo mais de 100 espécies. Um de seus principais representantes é o ipê, popularmente conhecido por seu potencial ornamental e madeireiro. Entretanto, partes da árvore, como caule, folhas e flores, são utilizadas na medicina tradicional como antibacteriano, antiinflamatório (rinite, sinusite, amigdalite e faringite), antiulcerogênico, antiviral, antineoplásico, antimalárico e com propósito imunomodulador. O objetivo do presente estudo foi reunir artigos sobre propriedades cicatrizantes e terapêuticas de espécies pertencentes ao gênero *Tabebuia* spp.

Palavras-chave: Ipê amarelo; *Tabebuia*; Medicina popular; Anti-inflamatório; Cicatrizante.

Resumen

El género *Tabebuia* es uno de los géneros más grandes de la familia Bignoniaceae, que comprende más de 100 especies. Uno de sus principales representantes es el árbol ipê, conocido popularmente por su potencial ornamental y maderero. Sin embargo, partes del árbol, como el tallo, las hojas y las flores, se utilizan en la medicina tradicional con fines antibacterianos, antiinflamatorios (rinitis, sinusitis, amigdalitis y faringitis), antiulcerogénicos, antivirales, antineoplásicos, antipalúdicos e inmunomoduladores propósitos. El objetivo del presente estudio fue recopilar artículos sobre las propiedades cicatrizantes y terapéuticas de especies pertenecientes al género *Tabebuia* spp.

Palabras clave: Ipê amarillo; *Tabebuia*; Medicina popular; Anti-inflamatório; Cicatrizante.

1. Introduction

The use of plants and their products for medicinal purposes represents an age-old medical practice, which is currently expanding (Souza Maria et al., 2013). This practice is based primarily on popular knowledge, passed down from generation to generation, especially in Brazil due to its wide biodiversity and cultural diversity, but, which has been incorporating scientific advances in the quest to ensure the safe use of plant species with proven therapeutic efficacy (Araujo et al., 2010; Bruning et al., 2012; Figueredo et al., 2014).

Plants are used in therapy for a variety of purposes. Among these uses, we highlight the plant species used in the treatment of wounds. Wound healing is a complex process that involves cell organization, chemical signals and extracellular matrix remodeling to repair tissue. (Haeffner et al, 2012). Thus, the products used in skin repair should have different properties as anti-inflammatory, analgesic and favor the regeneration of epithelial cells. For wounds that are difficult to heal, antibiotics may need to be used to ward off infections, so antimicrobial action is another important property of a healing plant (Piriz et al., 2014).

The complexity and high cost of wound treatments increase the importance of research in search of plant species that can act with different properties on injured tissues, aiming to accelerate the healing process (Araújo et al., 2015; Moreski, Leite-Mello e Bueno, 2018). Considering wounds as a serious public health problem and the need for new products to be used as healers, this work aims to contribute to the recovery of knowledge of healing and anti-inflammatory activity of *Tabebuia* species.

Tabebuia is the largest genus of the Bignoniaceae family and comprises around 100 species. The genus has changed a great deal throughout its history, and was recently split into three genera: *Tabebuia* Alliance, *Handroanthus* Mattos and *Roseodendron* Miranda, mainly due to the morphology of its leaves and flowers. *Tabebuia* species occur in neotropical regions, especially from the USA to Argentina and Chile (Santos, 2017). The genus can also be found in tropical and subtropical areas, and includes many temperate climate species, such as ipês (Son et al., 2006; Silva et al., 2009; Gómez-Estrada et al., 2012; Jiménez-González et al., 2013; Silva et al., 2016).

Representatives of the genus can also be found in Brazil. These vary a great deal, and together with the species of the *Handroanthus* genus, are known as the Brazilian Ipê (Severiano, 2016). They are generally large hardwood trees, and feature distinctive colored flowers, which can be white, yellow or purple (Silva et al., 2009; Martins, Lago & Cicero, 2011).

Species of the *Tabebuia* genus are popularly known as ipê, and their wood is resistant to termites. Extracts of this wood are used in traditional medicine, mainly due to their anti-bacterial, anti-inflammatory (rhinitis, sinusitis, tonsillitis,

pharyngitis) anti-ulcerogenic, antiviral, antineoplastic, antimalarial and immunomodulatory actions (Lipinski et al, 2012; Ribeiro et al., 2017).

From a pharmacological perspective, the most studied species of *Tabebuia* include *Tabebuia roseo-alba* (Ridl.) Sand., *T. serratifolia* (Vahl) Nicholson, *Tabebuia impetiginosa* (Mart. ex DC.) Standl, *Tabebuia aurea* (Silva Manso) Benth. & Hook.f. ex S.Moore.

The present review therefore aims to collate studies on species of the *Tabebuia* genus, focusing on their cicatrizant and anti-inflammatory properties, in order to high light their therapeutic importance and explore their biotechnological potential. The analysis was performed in the main health databases, such as PubMed and Science Direct, as well as the Capes Portal, using the keywords: tabebuia, bioprospection, naphthoquinone, lapachol, cicatrizant and anti-inflammatory. In this search, 81 references were obtained between articles (69), dissertations (5), thesis (1) and patents (2).

2. Methodology

The bibliographic research was carried out according to the secondary evaluation of works already published, including articles in Portuguese and English, according to the methodology proposed by Carneiro et al (2021). The present review therefore aims to collate studies on species of the *Tabebuia* genus, focusing on their cicatrizant and anti-inflammatory properties, in order to high light their therapeutic importance and explore their biotechnological potential. The analysis was performed in the main health databases, such as PubMed and Science Direct, as well as the Capes Portal, using the keywords: tabebuia, bioprospection, naphthoquinone, lapachol, cicatrizant and anti-inflammatory. In this search, 81 references were obtained between articles (69), dissertations (5), thesis (1) and patents (2).

3. Results and Discussion

Botanic Aspects

The Bignoniaceae family generally has arboreal, arbustive, lianous appearance with an arrangement of compound, pinnate or palmate leaves. They usually have axillary, terminal or cauliflower inflorescences, which are differentiated by their exuberant coloration, and which usually bloom at certain times of the year (Camarinha et al., 2015). The botanic aspects, including scientific synonymy, common name, botanical description, and economic use are described below:

Tabebuia roseo-alba (Ridl.) Sand.

This is popularly known as white ipê, and is a native tree to Brazil, with a height of approximately 16 meters. It has soft, lustrous wood, and is adapted to indoor environments. It is mainly used for landscaping and the afforestation of streets and avenues, due to its small size, as well as in the reforestation of dry and stony land. It has heavy, soft, glossy wood, which is often used for indoor environments (Santos et al., 2005; Stockman et al., 2007).

Tabebuia serratifolia (Vahl) Nicholson

T. serratifolia is popularly known as yellow ipê. It is around 5-25 m in height, and is widely distributed in Brazil, Peru, Bolivia, Ecuador and Suriname. It is used in traditional medicine for its anti-inflammatory, antifungal and antimicrobial potential, and against infectious and contagious diseases. Its wood has economic and ornamental value (Duarte et al., 2014) and is used in landscaping and for therapeutic purposes. Its main use, however, is as timber in the construction of external and internal environments, and in boat manufacture (Dousseau et al., 2008).

According to Ferreira, Chaluband Muxfeld (2004) the wood of the tree is generally rich and dense and resistant to contamination by fungi and termites. Its surface is not especially polished, and due to its density, it can be difficult to process. It usually has a long root system, and should not be planted close to dwellings, since its roots can damage the pavement and drainage systems.

Tabebuia impetiginosa (Mart. ex DC.) Standl

Widely known as purple ipê, *pau d'arco-roxo*, and *ipê-roxo-de-bola*, this tree also has an arboreal appearance, is about 8-20 m high, and is found practically throughout Brazil, Paraguay, Argentina and other countries (Schneider et al., 2010).

According to Vieira, Camilo and Coradin (2016) it is used for ornamental purposes. It should not be kept near swimming pools, as its falling leaves make maintenance difficult. It is used in boat building as well as being widely employed in traditional medicine.

The present review therefore aims to collate studies on species of the *Tabebuia* ssp genus, focusing on their cicatrizant and anti-inflammatory properties, in order to highlight their therapeutic importance and explore their biotechnological potential.

Therapeutic Uses

The Bignoniaceae family is composed of several species that are used in traditional medicinal. These species have pharmacological potential, but are yet to be widely scientifically explored (Duarte et al., 2014). The only commercial product obtained from this family is lapachol, which is a naphthoquinone, with recognized anti-neoplastic properties (Araujo et al., 2002). Species of the family possess a variety of secondary metabolites such as alkaloids, quinones, catechins, purines, saponins, monoterpenes, phenols and tannins, demonstrating potential for the development of phytotherapies. These plants are widely used in traditional medicine for the treatment of gastrointestinal and respiratory tract illnesses, sexually transmitted diseases, cancer and skin conditions, and as anti-inflammatory drugs with an emphasis on their cicatrizant properties (Sarmiento et al., 2014).

Tabebuia avellanedae (purple ipê, black ipê or *pau d'arco*) is traditionally recommended for the treatment of wounds, itching, scabies, arthritis, leucorrhoea, and due to its anti-inflammatory and antibiotic characteristics is used as a macerated oil for application in difficult to heal infections and wounds. The bark of the plant is also used in hydroalcoholic extract form (Bevilaqua et al, 2015).

There are few reports of the use of *Tabebuia aurea* (Silva Manso) Benth. & Hook.f. ex S.Moore in traditional medicine, but its use against influenza and snakebite, and its molluscicidal activity (Santos et al., 2015) have been described. According to Barbosa-Filho et al. (2004), it can be used for the treatment of astringent skin infections as well as in cancer therapy.

Tabebuia serratifolia (Vahl) Nicholson can be used in the treatment of cancer, intestinal infections, kidney and liver diseases (Barcelos et al., 2017). It can also be employed for other activities common to the *Tabebuia* genus, such as for antibacterial, antiviral, antiparasitic and antifungal uses (Duarte et al., 2014).

Chemical Composition

Lapachol, initially found in the *Tabebuia avellanedae* (purple ipê) species (Duarte et al., 2014), is abundant in the grain of ipê wood. It has been identified in various species of the *Tabebuia* sp genus, differing only in terms of concentration. This yellow phytoconstituent belongs to the naphthoquinone class and possesses a broad range of biological activities, including antimicrobial, anti-inflammatory, trypanosomicide and cicatrizant properties (Ribeiro et al., 2017).

Naphthoquinones and the *Tabebuia* genus

The *Tabebuia* genus is considered by remote and rural populations as an alternative treatment (Duarte et al., 2014). The product obtained from the bark of *tabebuia* plants, called *taheebo* or *pau d'arco*, is used in traditional medicine to treat ulcers, syphilis, gastrointestinal problems, candidiasis, cancer, diabetes, prostatitis, constipation and allergies (Park et al., 2006).

Naphthoquinones are among the most prominent of the secondary metabolites identified in species of *Tabebuia*, and are the chemical markers of these plants. They consist of highly reactive organic substances and are present in plants, microorganisms and certain animals, and are used as synthetic or natural dyes ranging in color from yellow to red (Brandelli et al., 2004; López et al., 2014). Structurally, these compounds have a similar carbon chain to naphthalene (Silveira, 2016) and are divided into 1,2- and 1,4-naphthoquinones, which can also be classified as prenyl-naphthoquinones, furano-naphthoquinones, difuro-naphthoquinones and pyrano-naphthoquinones, according to the presence of an oxygenated heterocyclic ring (Silva et al., 2012).

Naphthoquinones are biologically important compounds, mainly due to their pharmacological potential and cytotoxicity (Villamil et al., 1996). The molecular structures of these substances allow them to be used in vital biochemical processes (Moura et al., 2001), which has contributed to an increase in studies related to their biological actions (Franco et al., 2011).

Important biological activities of naphthoquinones have been described in literature, notably their antiparasitic, antibacterial, antifungal and anticancer properties. The biological actions of these metabolites are based on their acid-base properties and ability to receive one or two electrons, forming a radical anion or corresponding dianion (López et al., 2011).

Lapachol, α -lapachone and β -lapachone are the most highly concentrated compounds of the naturally occurring naphthoquinones in *Tabebuia* spp (Cavalcante et al., 2008). Lapachol is an easily extracted prenylated naphthoquinone and represents about 3 to 7% of the total chemical constituents of the plant, depending on the species (Aucélio et al., 2013; Lima et al., 2013). This substance has been widely studied since the discovery of its antiparasitic potential by the researcher Wendel in 1946 (Silva et al., 2012), and is an important representative of the group of quinones in tabebuias, forming a raw material in the syntheses of other compounds with different biological dynamics (Silva et al., 2003).

Lapachol is traditionally used by indigenous peoples for the treatment of a variety of parasitic infections (Carneiro et al., 2012). In addition to the pharmacological properties of this naphthoquinone, scientific studies have demonstrated its antibacterial, antiviral, antiparasitic and antifungal actions (Jiménez-González et al., 2013, Duarte et al., 2014). Lapachol and its derivatives also act on the enzymes topoisomerases I and II, contributing to apoptosis, or programmed cell death (Higa et al., 2011).

Cicatrizant And Anti-Inflammatory Properties

Cicatrizant properties

Cicatrizing involves the replacement of damaged tissue with vascularized connective tissue, and it is a complex and organized process involving the participation of cells and intra and intercellular messenger systems. The cicatrizing mechanism comprises inflammatory, proliferative and remodeling phases that are necessary for the restoration of the injured area. This complex process seeks to recompose the tissue in order to recover similar structure and function to prior to the injury (Isaac et al., 2010; Laureano & Rodrigues, 2011).

In selected studies on the cicatrizing action of species of the *Tabebuia* genus, it was found that in the municipal region of Aiuaba, in the state of Ceará, Brazil the bark of *T. impetiginosa* Mart. et. (*Pau-d'Arco roxo*) is used in traditional medicine based on seven (7) therapeutic properties, one of which is its cicatrizing action (Cartaxo, 2009). Studies have been carried out with hydroalcoholic and aqueous extracts obtained from plants of this same genus (*Tabebuia avellanedae* and *Tabebuia impetiginosa*). In a study by Coelho et al. (2010), the cicatrizing potential of a crude extract obtained by boiling the *T. impetiginosa* bark was identified in rats; and its angiogenic, mutagenic and antimutagenic action has also been described, originating from an aqueous extract obtained by a process of infusion of the bark (Moraes, 2015).

The cicatrizing action of the tree was also described in a comparative study carried out by Lipinski et al, (2012) with the species *Tabebuia avellanedae* (purple Ipê), *Casearia sylvestris* Sw. (*Guaçatonga*) and *Schinus terebinthifolius* Raddi (*Groeira mansa*), using desiccated bark decoction. Satisfactory results were obtained from the species *Tabebuia avellanedae* and *Schinus terebinthifolius* Raddi. In the topical treatment of bovine skin wounds (*Puruña* heifers), the cicatrizing action of *Tabebuia avellanedae* was greater than that of the other two species studied, when the authors correlated this effect with their antibacterial and anti-inflammatory properties.

Pereira et al., 2013, detected the anti-ulcerogenic activity of *Tabebuia avellanedae* Lorentz Ex Griseb through the use of ethanolic extracts of bark. These extracts accelerated the healing of the mucosa, leading the authors to believe that the cicatrizing action of this species is due to the maintenance of the gastric mucus layer, as well as the stimulation of cellular proliferation, thus promoting cicatrizing activity in the treatment of gastric ulcers.

It is known that new blood vessels can be generated in living tissue through angiogenesis. Moraes (2016) tested this activity using the aqueous extract of the bark of *Tabebuia impetiginosa* (purple ipê) on the chorioallantoic membrane (CAM) of embryonated chicken eggs. The results were satisfactory and promising, significantly increasing the formation of the vascular network of the CAM and confirming the presence of this activity, which is important for the healing mechanism.

Anti-inflammatory properties

Inflammation is a defensive bodily process following an injury/aggression, which aims to repair the body and return it to its original physiological condition, as a state of protection. The inflammatory process requires the interaction of various cell types and signaling pathways, as well as the participation of the immune system and tissue homeostasis, reflecting its complexity (Paulo et al, 2010; Marmitt et al, 2015).

In the search for new drugs with anti-inflammatory actions and minor side effects, medicinal plants represent a possibility for expanding the market with new products, due to the diversity of substances identified and their biological activities (Gechev et al., 2014; Atanasov et al., 2015; Marmitt et al, 2015). In rural areas of Latin American countries, such as Brazil, Colombia, Bolivia, plants of the *Tabebuia* genus are empirically used for anti-inflammatory, antitumor and antimicrobial purposes (Franco et al, 2013).

These of species of the genus *Tabebuia* for anti-inflammatory purposes is recommended by practitioners in traditional remedies in many municipal regions of Brazil, and such species have been widely studied in specialized literature. They include *T. avellanedae* (purple ipê), *Tabebuia impetiginosa* (Mart. Ex D.C.) Standl) – *pau d'arco* (Conceição et al, 2011; Santos et al, 2013; Linhares et al, 2014).

Of this genus, Lapachol possesses medicinal properties including a recognized anti-inflammatory activity, as well as analgesic, antibiotic, antimalarial, anti-tyrosine and anti-neoplastic characteristics. Lapachol (2-hydroxy-3-(*e*-methyl-2-butenyl)-1, 4-naphthoquinone) can be extracted from sawdust, and is one of the major constituents of the naphthoquinones present in this genus. It was isolated for the first time in 1882 from the *T. avellanedae* species, and is also found in the species: *Tabebuia flavescens* Benth - & Hook. F. ex. Griseb, *T. guayacan* Hemsl.; *T. avellanedae* Lor. Ex Griseb; *T. serratifolia* (Vahl.) Nichols; *T. rosa*; *T. bata* (E. Mey) Sandw; *T. pentaphylla* (Linn) Hemsl. and *T. heptaphylla* (Aguiar, 2010; Gonçalves, 2017).

Species of this genus such as *T. Avellanedae* (purple ipê) are used due to their anti-inflammatory action (in inflammatory and associated diseases) as well as their antimicrobial, analgesic, antineoplastic and antifungal properties, detected in substances such as saponins, resins and lapachol (Costa et al., 2010; Conceição et al, 2011; Glehn & Rodrigues, 2012; Marmitt, 2015). In 2008, Byeon et al. verified in aqueous extract studies that part of this species exhibited a negative modulation of the inflammatory response due to the suppression of prostaglandin production. The species can be used in in the

form of shavings or as a 10% tincture, with caution required in the dosage, as it can cause bleeding and is contraindicated in pregnancy and lactation (Boorhem & Lage, 2009).

When assessing the anti-inflammatory and antibacterial activity of alcoholic extracts of *Tabebuia rosea* and *Tabebuia ochracea* bark, a higher concentration of anti-inflammatory constituents was determined in the dichloromethane and ethyl acetate fractions after extraction by liquid-liquid partition of the concentrate of the total alcoholic extract. In these fractions the anti-inflammatory response was similar to that obtained with indomethacin. The same study also identified antibacterial activity, inhibiting the growth of *Staphylococcus aureus*. According to the authors, these activities are correlated with quinoidal substances, mainly present in the dichloromethane and ethyl acetate fractions (Ospina et al, 2013).

Phyto-constituents such as furano-naphthoquinones, quinones, naphthoquinones, benzoic acid, benzaldehyde derivatives, dialdehydes, cyclopentene and flavonoids have been found in the bark of the species *Tabebuia impetiginosa* (Mart. Ex DC) Standl), with the anti-inflammatory activity of beta-lapachone type naphthoquinone also detected in same material (Lourenço et al, 2010; Moraes, et al, 2016). Koyama et al (2000) attributed the anti-inflammatory action of this species to two cyclopentenialdehydes ($C_{17}H_{18}O_5$ and the 2-formyl-5-(3', 4'-dimethoxybenzoyloxy) -3-methyl-2-cyclopentene-1-acetaldehyde) which according to the study are hydrolysis products of the iridoid glycosides.

In 2015, Santos et al described the anti-edematogenic activity induced by capsaicin in ethanolic extracts of the flowers and leaves of *T. aurea* and also identified antibacterial activity against gram-positive bacteria and bactericidal action against *Staphylococcus epidermidis* in the ethanolic extract of the flowers. In this study, it was found that the alcoholic extract of the flowers showed a reduction of the edema of 40.5%, while in the alcoholic extract of the leaves the reduction was 41.73%. Another study with alcoholic extract of *Tabebuia aurea* by Reis et al (2014) found anti-inflammatory, antihemorrhagic and antimyotoxic activities against *Bothrops neuwiedi* venom. In 2017, Moslaves et al identified anti-inflammatory activity and a potential antiophidic effect in mice treated with an isolated iridoid (specimen) of the same species, after receiving venom of *Bothrops moojeni* (Vbm).

The anti-inflammatory effect of a 10% hydroalcoholic extract on acute acetic acid-induced colitis in rats was identified in the species *T. serratifolia* (dose 3800mg extract/kg in weight) (Nivin-Huerta et al, 2013). The results can be found according to the table below.

Table 1: Studies with plant species of the genus *Tabebuia* ssp

Spécies	Popular names	Used part	Extractive Method	Uses	References
<i>Tabebuia avelanidae</i>	Purple ipê	Bark	Maceration	Wounds, itching baths, arthritic inflammations, urethral phlegm, leukorrhea	Bevilaqua et al., 2015
		Bark	Aqueous solution	Wound healing	Coelho et al., 2010
		Bark	Maceration	Efect antiulcerogenic at celular proliferation in gastric mucosis	Pereira et al., 2013
		Bark Sawdust	Solution prepared with deionized water in high temperature	Cicatrizant	Lipinski, 2008
		Bark	Maceration	Angiogenic activity in Gallus domesticus chicken	Moraes et al.,2016

eggs

<i>Tabebuia aurea</i>	Yellow ipê	Flowers and leaves	Maceration	MTT cell viability, antimicrobial, antidermatogenic activity with ear swelling in Swiss mice, antiradical (antioxidant) activity	Santos et al., 2015
		Bark	Maceration	Antimicrobiana	Barbosa-Filho et al., 2004
<i>Tabebuia serratifolia</i>	Ipê amarelo	Flowers	Infusion	Cytotoxicity against microcrustacean <i>A.salina</i> , antioxidant activity	Barcelos et al., 2017
		Leaves	Extraction under reflux in high temperature	Phytochemical identification of secondary metabolites	Duarte, Mota e Almeida, 2014

		Bark	Maceration	Inductive effect of murine model of acute colitis	Huerta- Nivin et al., 2013
<i>Tabebuia</i> rósea (Bertol.) A. DC/ <i>Tabebuia</i> ochracea (Cham.) Standl	Ipê roxo/ ipê amarelo do Cerrado	Bark	Maceration	Antiinflammatory activity in in vivo murine model of atrial, antimicrobial, and antioxidant edema	Ospina et al., 2013

Source: Authors.

Other Biological Actions

In addition to cicatrizing and anti-inflammatory activities, other important biological properties of species of *Tabebuia* have been studied. In a study of the larvicidal, chemical and anti-inflammatory activity of the *T. elliptica* species, TeCaA-1 (p-hydroxycoumaric acid/coumaric acid) was isolated from the bark extract in an ethyl acetate fraction, and demonstrated anti-inflammatory potential in an *in vivo* study using a model of acute lung inflammation induced by LPS. In the present study, nine substances were identified and identified: icariside E4 (with a peripheral antinociceptive effect) and coumaric acid (reduction of total leukocytes and neutrophils), which presented promising results in a study of pain and inflammation (Ferreira Júnior, 2015).

Bioprospecting studies are reported to biology, phytochemistry, ethnobotany and especially ethnopharmacology, and are fundamental for the development of studies with medicinal plants (Sousa et al., 2013). This technique is defined as the ability to use a plant species in a precise manner, in order to apply its therapeutic properties rationally and safely (Palma & Palma, 2012).

The ethnopharmacological studies carried out by Ribeiro et al., (2017), describe the therapeutic importance of ipê species such as *Handroanthus impetiginosus* (Mart. Ex DC.) Mattos (purple ipê), employing maceration and decoction techniques and evaluating their use in the treatment of cancer, leprosy, toothache, bronchitis, gastrointestinal tract infections, vaginitis, arthrosis and chagas disease. Significant bioprospecting potential was identified, as these plants are widely used for therapeutic purposes and may be useful in the discovery of new drugs.

In addition to the subdivisions proposed by Santos (2017), the bioprospecting potential of the *Tabebuia* genus is based on the use of endophytic fungi isolated from representatives of the genus, supporting the discovery of new compounds, as they have high therapeutic compound potential, highlighting the therapeutic activity of the metabolites of the host medicinal plant (Gómez and Luis, 2018).

Patents

A search of the National Institute of Industrial Property database using the descriptors cicatrization, anti-inflammatory, *Tabebuia*, purple ipê, yellow ipê, *Tabebuia serratifolia*, *Tabebuia aurea*, *Tabebuia impetiginosa* in the title and abstract was carried out when evaluating the bioprospecting potential of species of the *Tabebuia* spp genus. The following patents were found: obtaining of enriched glycosylated iridoid extracts from species of the *Tabebuia* genus for anti-inflammatory purposes and in feed (Carollo et al., 2015); nail polish remover composition, which had purple ipê as one of its components (Alvarenga, 2004).

4. Conclusion

Based on the above, it can be concluded that the *Tabebuia* genus is extremely important in traditional medicine, and possesses considerable bioprospecting potential, supporting further studies and strengthening the development of herbal medicines.

Acknowledgments

The authors wish to express their gratitude to the Federal University of Maranhão (UFMA) and to support foundation and research support (FAPEMA) for the support

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