

# Matrix Microparticles of Copaiba Oil (*Copaifera langsdorffii*) on Renal Physiology: Patent Review\*

REVIEW

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## Abstract

**Purpose:** to demonstrate the effect of matrix microparticles of *Copaifera langsdorffii* (aerial parts of copaiba), aiming to evaluate the discussions and results of the works that demonstrate its function on the kidneys as well as its effectiveness.

**Methods:** A bibliographic study was carried out by consulting public online databases of patents, such as the United States Patent and Trademark office, World Intellectual Property Organization and the National Intellectual Property Institute; The following keywords were used: copaiba oil, renal function, kidney, kidney stones, matrix microparticles *Copaifera langsdorffii* and lithiasis. In this study were included patents of invention, innovations and utility models in the period from January 2007 to May 2016.

**Results:** One patent register was included regarding a method for obtaining microparticles and compounds, having antilithiasic, analgesic, antispasmodic, anti-inflammatory, diuretic and antiseptic activity.

**Conclusion:** The patent registry survey demonstrates the possibility of beneficial action of matrix microparticles *Copaifera langsdorffii* on renal physiology, acting as antilithiasis and even with diuretic properties, thus opening up new possibilities of research of this substance on renal physiology.

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## Keywords

Medicinal Plants; Kidney;  
Kidney Calculi; Lithiasis;  
Inventions.

## Introduction

The world market for herbal medicines represents a significant part of the medicine sector, moving globally 21.7 billion dollars a year [1]. The main movement in the world is concentrated in Europe, with 50% in Germany. Next, Asia and Japan appear. However, no other market grows as much as the North American market [1]. In Brazil, there is no up-to-date official data, but it is estimated that this market is around 160 million dollars per year [2].

The largest plant biodiversity in the world, estimated at about 200,000 plant species, is located in Brazil. However, the data show that only 15 to 17% of the species were studied for their medicinal potential, justifying the search for further development in this area the basis of our research is the use of copaiba and its by-products [3]. The oil-resin extracted from the copaibeira receives indication of traditional medicine, for innumerable purposes, of the most different natures, and has been for several years the subject of several studies, aiming at proving them or adapting them to new therapies [4]. In 1972, the US Food and Drug Administration approved copaiba oil, after undergoing sensitization and irritation tests, with the use of twenty-five volunteers [5].

In the present study, a systematic review was carried out in the literature based on the search of patent data to demonstrate the effect of matrix microparticles of *Copaifera langsdorffii* (aerial parts of copaiba), aiming to evaluate the discussions and results of the works that demonstrate its function on the kidneys as well as its effectiveness.

## Methods

The research is characterized as a quantitative-qualitative, retrospective and cross-sectional bibliographic study based on electronic consultation (on-line) in main public databases of patents with

registration on the internet in the period determined from January 2007 to May 2016; ([www.patentesonline.com.br](http://www.patentesonline.com.br)) and in patent database of the National Intellectual Property Institute ([www.inpi.gov.br](http://www.inpi.gov.br)). The following descriptors were used in the records search: patentes, óleo de copaíba, função renal, litíase, micropartículas matriciais de *Copaifera langsdorffii* (partes aéreas), cálculo renal and litíase.

In the international patent search, advanced searches were used in the database of the United States Patent and Trademark Office ([patft.uspto.gov](http://patft.uspto.gov)), Google patents ([patents.google.com](http://patents.google.com)), World Intellectual Property Organization ([www.wipo.int](http://www.wipo.int)), Espacenet ([www.ep.espacenet.com](http://www.ep.espacenet.com)) and Free patents on line ([www.freepatentsonline.com](http://www.freepatentsonline.com)). The following keywords were found in the search: copaiba oil, renal function, kidney, kidney stones, matrix microparticles *Copaifera langsdorffii* and lithiasis.

In the study were included records of inventions, innovations and utility models regarding the use of technologies for the purpose of performing oil or other by-products of copaiba and its action on renal function, excluding records prior to 2007, a patent, and related inventions the use of compounds combined with other substances and the use for other purposes, such as cosmetics, for example, a further 78 patents being excluded.

## Results

In the search for patents concerning the use of copaiba oil and its probable action on renal physiology, no patent was found, using the key words copaiba oil and kidney, only with the use of aerial parts the invention relates to a method for obtaining microparticles of *Copaifera langsdorffii* (aerial parts) and isolating the active principles; Microparticles and compounds thus obtained, having antilithiasic, analgesic, antispasmodic, anti-inflam-

matory, diuretic and antiseptic activity, their formulations, products and uses" under registration WO2011120118A1 [6].

## Discussion

In the research of database of patent registry was found an important action of *Copaifera* in prevention of renal calculations, an action that is unprecedented in the renal physiology, having in literature only the description of this unique patent. In the case of renal lithiasis, more than 70 species with antilithiasic properties are described. It stands out the plant species *Phyllanthus niruri*, popularly denominated by stone breaker, for treatment of urolithiasis [7-9].

This is a paradox because, despite the large amount of species, there are few well-described scientific studies aiming to evaluate these properties. An example of this is the lack in Brazil of patents on active principles and/or drugs capable of effectively exercising such action.

Among the medicinal plants and traditional use, *Copaifera sp.*, a native Brazilian plant very popularly used by the Indians of the sixteenth century. In Brazil, there are over twenty species of the genus *Copaifera* used with the same therapeutic actions. Some species are very popular name in both Portuguese and possibly in other languages. In particular, *C. langsdorffii* is denominated red copaiba, red oil or copaiba meadow in Amazonas, copaibeira of Minas, cupiúva or podoi in Piauí and Ceará, potter or cabimo in Venezuela [10].

The literature provides several studies of biological activities of oil-resin of several genus of *Copaifera sp.* [5, 10-15] as its healing action, antiseptic and anti-inflammatory of respiratory airways [10], analgesic, antibacterial, antitumor, antioxidant, healing, gastroprotective, anthelmintic, leishmanicide, tripanomicide, muscle relaxant among many others [5, 10, 11]. In its specific action on renal

physiology there was the description of diuretic properties [5].

However, studies on *Copaifera sp* leaves are scarce in the literature except for the study of their constituents in ecological interactions [16-18]. In the chemical composition of *Copaifera langsdorffii* leaves, 3% of amino acid N-methyl-trans-4-hydroxy-L-proline and sesquiterpenes, such as  $\alpha$ -cubebene,  $\sigma$ -copaene, cyperene, 3-copaene, caryophyllene,  $\beta$ -humulene, muurolene, 3-selinene,  $\delta$ -cadinene and  $\gamma$ -cadinene [16-18].

In contrast, in the oil-resin of the species of *C. langsdorffii* presents as main chemical constituents tetracyclic diterpenes of kaurano series, as kaurenoic and kauranoic acids [19], clerodanes such as hardwic acid [20] and labdanum diterpenes such as copalic acid [21, 22], sesquiterpenes, predominating  $\beta$ -caryophyllene, 3-bisabolene,  $\sigma$ -bergamotene and  $\beta$ -selinen [4, 23].

The process of obtaining matrix microparticles containing *Copaifera langsdorffii* extracts has a very advantageous technological system in relation to the use of lyophilized extracts, which provides greater protection and stability to the compounds identified in the extract, homogeneity of the system, modified release, reduced size of particle and morphology that provide better pharmacotechnical development, endowed with excellent biological activity.

The lyophilized extracts may undergo degradation processes, decomposition of the compounds of interest, and offer larger particles with large granulometric variation, which are deformed and difficult to handle pharmaceutically. Also, it is noted that chemical composition of aerial parts of *Copaifera sp.* is completely different from that observed on copaiba oil, which is obtained from stem of the plant [5].

In the scientific literature there are reports only of the antilithiasic activity, with the use of hydroalcoholic extract of copaiba in experimental studies [24],

however does not contemplate any data referring to the study of the leaves of *Copaifera langsdorffii*, and that the standardized extract and its isolated substances obtained from the aerial parts, are shown to exhibit antilithiasic, anti-inflammatory, analgesic, antispasmodic, antiseptic and diuretic properties, as described in said patent.

## Conclusion

The patent registry survey demonstrates the possibility of beneficial action of matrix microparticles *Copaifera langsdorffii* (aerial parts) on renal physiology, acting as antilithiasis and even with diuretic properties, thus opening up a possibility of opening new lines of action research of this substance on renal physiology, the shortage of patents that register and explore the study on this plant is highlighted.

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