



Study on phytochemical properties gifts in the pau-d'algo plant (*Gallesia integrifolia* spreng)

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1 INTRODUCTION

The garlic wood, also known as garlic vine (*Gallesia integrifolia*) belongs to the *phytolaccaceae* family, of the large *Caryophyllales group*, which present a wide range of individuals, in its conjuncture of 259 species and 120 genera, and its members present the profile of have trunks of different sizes that can range from 5 to 30 meters high, with the most varied shapes, predominantly a type that reaches 15 to 30 meters high, eventually are fibrous, its canopy can reach a minimum height of 70 and maximum of 140 cm in diameter each. They have simple leaves of thick consistency, inflorescences cimosas with small flowers of beige, bisexual color and with the characteristic aroma of garlic, their fruits are toaled and green, and that when they fall they can rotate in the wind during their air trajectory (HOROWITZ; MATINS; WALTER, 2014).

Other representatives of the *phytolaccaceae family* are: the ombu (*Phytolacca dioica*), marked by the size of its canopy, can be identified from a distance, its leaves can obtain medicinal effects such as laxatives and natural purgatives, the juice can be used in the treatment of rheumatoid arthritis; the tropical bud (*Phytolacca icosandra*), cuj its primordial aroma is intense and nauseating, very characteristic of the rot of organic matter, being called smelly vine. The items produced from their raw materials or waste are mainly used for gastrointestinal problems, are widely used in the pharmaceutical industry, mainly involving harnessing their natural effects, and in such as teas or juices (BROWN, 2002). It is noteworthy that most of the members of this family are cosmopolitan, and are located in various places in the world going from Brazil to all other countries that may have a tropical climate, such as Africa and Asia (NÓBREGA *et al*, 2009)

Originally from Brazil, endemic and native, it can be located in the serrado, in the Amazon, in the caatinga and in the Atlantic Forest, it is a fast growing plant, being very useful in reforestation actions, keeps its leaves throughout the year, and can develop in very sunny places (CARVALHO, 2003). It can be

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found in other places in the world, exist many explanations for why a Brazilian species, adapted to the tropical climate of Brazil, is in other places such as Central Asia; the free marketing of spices, wood and resins in the years that Africa lived, since all its natural plant products were destined for large-scale export, and that little or nothing was done for the maintenance of the flora of the site; Cases of biopiracy over the years, after political organization and social disorganization of which the new Africa rose, much discussed, around 1903, that the exchange of natural good for weapons or supplies for troops in civil war in the country (ZILLER; DE SÁ DECHOUM, 2014).

Especially the Pau d'algo, its uses are much more focused on landscaping, and its own name already brings with it an odorous characteristic, the smell that comes out of its leaves and its tuberous is very similar to Garlic. Given its strong presence in environments, medicinal factors have also been discovered over time, such as tea from its leaves, invigorating for the immune system and aiding in colds and flu, there is also research developing a methodology so that its use can be made as verminrune (MARCHIORETTO, 2012).

The characteristic odor of the plant may have a connection with secretory structures that have been awakening in botanists a great interest since the advent of optical microscopy in the seventeenth century. In the second half of the last century, the secretive structures, fascinating in their structural diversity, led to numerous anatomical, ultra structural and chemical studies, which contributed to the knowledge of their differentiation and development, to the elucidation of the compartmentalization of the main ways of synthesis of the metabolites produced and for the clarification of their physiological and ecological functions. Their presence or absence and their particular morphology are characters with taxonomic value for some taxa. An analysis of the molecular genetics of these structures and the development of strategies that increase the synthesis of metabolites produced, in particular, in glandular trihomes, related to essential oils that have volatility as one of the main characteristics, which results in a smell that can be easily perceived, one can associate this with the characteristic odor of the plant. (Duke *et al.* 2000, Wagner, Wang and Shepherd 2004). (SPECTROMETRY, 2005).

The possibility from this exuded odor is the existence of terpenes in its molecular formula. Monoterpenes and sesquiterpenes are the most often found in volatile oils. They are formed by isoprenic units and are classified according to the number of these units that make up their structure. So we have: hemiterpenes, with five carbons; monoterpenes, with ten carbons; sesquiterpenes, with fifteen carbons; diterpenes, with 20 carbons; triterpenes, with thirty carbons; tetraterpenes, with forty carbons; and polyterpenes or poly-isoprenoids, with numerous units of cinco carbons. They may present cyclic, aphytatic and aromatic structures, as well as the addition of oxygen atoms forming alcohols, ketones, aldehydes and esters. The higher the number of carbons, the greater the potential for structural and stereotypical diversity of these compounds. (MONTANARI, 2010).

Ethnobotany denotes the garlic stick as a powerful anti-inflammatory agent, through the macerating



of its bark, besides that the bark can be used to control ticks that parasitize horse stables. With the bioprospection of their volatile oil, it was determined sufficient levels of chemical elements that yes, presented traces of antimicrobiana action (DA SILVA *et al*, 2013), proving what the local community had by their concepts of uses of medicinal plants, passed from generation to generation.

It is possible to associate because the bark is used since the chemical composition can vary in the different parts of the plant, so the tests can direct the chemical study to the parts or fractions of interest. The chemistry of natural products takes special sense when it is interrelated with biological activity. The choice of the plant is, in most cases, directed by biological studies. (MALHEIROS, 2001).

Another characteristic present in technological advances of the plant was the identification of allelochemical elements, containing different groups of secondary metabolites, main among phenolic compounds (tannins, flavonoids, saponins and others). These compounds can affect the development or even germination of other plants in their surroundings, in case of competition, the release of these chemical principles can ensure the survival of the species. Tests done in laboratories *and reproduced in vivo* within a controlled environment, caused a black picão creation to be inhibited from growing, when associated with another culture of Pau d'alho in its proximity (MOURA *et al*, 2015).

Phenolic compounds present as compounds that act on antioxidants, not only because of their ability to donate hydrogen or electrons, but also because of their radicals stable intermediates, which prevent oxidation of various food ingredients, particularly lipids (BRAND- WILLIAMS; CUVELIER; BERSET, 1995). In general, the beneficial action of phenolic compounds in human health has been related to their anti-inflammatory activity (the anti-inflammatory potential added to this plant by popular knowledge, if proven by the means of scientific studies) and with the activity that prevents not only the agglomeration of blood platelets, but free radicals in the body. Since they protect molecules such as DNA, they can abort some carcinogenic processes. (LORDELO *et al*, 2010).

A technological exploration associated with the industry was the development of production sums for wine fertilization of burgundy and white Niagara cultivars. During the management, limit amounts of pesticides were applied based on pau d'alho extract in the grapes at a distance that each bunch could not influence the degree of absorbency of the secondary metabolites. After quality control and physical-chemical tests, the presence of tannins with fungitoxic and fungitostatic character was revealed, inducing resistance to vineyards for a longer period in their maturation (NASCIMENTO, 2016).

These species face real value in the economy, since, both for their little study and for their bioavailability of secondary metabolites, their applications are mainly subpharmaceuticals or as a co-author of medicinal effects in other formulations. The present work aims to aggregate for the enrichment of the literature about bibliographic surveys, emphasizing the species *Gallesia integrifolia* Spreng, presenting the phytochemical study of extraction of their leaves, may conduct new research in the future, encouraging the application of capital in educational and research institutions, improving another of the various natural

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resources that the Brazilian flora has to offer.

2 METHODOLOGY

The material was obtained in Santana-AP, coordenadas: Latitude 0°02' 21.8" S; Longitude 51°10' 21.6" W, on May 19, 2017, late afternoon, at the time of 17 hours, with a temperature of approximately 30°. The manual extraction was done with the aid of the ladder, and branches were removed, from which the leaves were later removed and with a GPS device were recorded the coordinates of the place of collection.

2.1 DRYING

The leaves were washed in running water to remove all particles attached to the plant, to prevent the formation of fungi, then dried one by one with the aid of paper towels and placed on sheets of paper on the floor, of organized way to avoid agglomerates and using a spray to spread on top of the alcohol leaves 96% to prevent the formation of microorganisms, the leaves were around on May 23, 2017, the dried leaves were taken to the pharmacognosy laboratory for drying in the greenhouse, where they stayed for about 20 minutes, for total drying, until that would be brittle.

2.2 MACERATED PROCESS

After removal of the packages from the greenhouse the leaves were rubbed so that they would decrease their size, they were conditioned on a drum to begin the weighing process. The weighing was done on a precision scale, which after placing a plastic container and zeroing the instrument, the ground sheets were placed, the total weight was 655.73g.

2.3 PREPARATION OF EXSICATA

The exsiccata following all the steps presented in the lecture given in the room, five branches of leaves were removed, with the presence of flowers and fruits, the cut was made in a diagonal direction, so that it would become possible the internal view of the stem and was soaked in 96% alcohol to prevent fungal proliferation and bacteria, the branches were placed on newspaper sheets and pressed with the wooden press, was closed so that the change of position of the plant could not occur.

3 CONCLUSION

After the extraction and drying process, in view of the theoretical framework, it is possible to capture that the chosen species has its use popular knowledge as a parameter as to its best form of use, such as infusions made from the trunks and baths with leaf water. The tree is an angiosperm that has flowers and fruits without much medicinal or industrial use. Through the process of obtaining the material it is important to mention that it was removed in just one day, in a single time, so that I did not see

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this to occur any change in the results sought, as well as were removed the branches that had, more or less, the same solar incidence and removed from the same place so that nothing is found that can affect the final result of the research. And care to avoid the formation of microorganisms, because the tests that will be done can be very sensitive to markers of change.

According to empirical knowledge, the plant has an antibacterial and anti-inflammatory potential which opens a range of possibilities for the presence of secondary metabolites, this knowledge can be confirmed in the laboratory using the extract, which concentrates metabolites present in the plant, enabling phytochemical tests to determine the presence, absence and in some cases verify the exact type of compound.

After obtaining the hydroalcoholic extract of *Gallesia integrifolia*, the tests mentioned above were performed, obtaining the following results:

Secondary metabolic	Results
Saponins	+
Organic acids	-
Reducing sugars	-
Polysaccharides	-
Proteins and amino acids	-
Phenols and tannins	-
Flavonoids	-
Alkaloids	-
Purines	-
Cardiac glycosides	-
Catechins	-
Sesquiterpenolatonas	-
Steroids	+
Carotenoides	+
Delipidias and Depsidonas	-
Coumarin derivatives	-
Anthraquinonas	-

Parameter: + Presence; He's out of absence.

Source: Matheus Da Silva Sardinha

The positive results measure the real activity of this plant, before what was only empirical wisdom, now becomes scientific, establishing a direct relationship between use and purpose, the positive results, will be discussed in order to expose the importance for vegetables, for humans and their use in industries.



3.1 SAPONINS

Saponins are glycosides derived from secondary metabolites, characterized by foaming, formed by a lipophilic part and a hydrophilic conferring surfactant and detergent characteristic. They dissolve in water and are not nitrogenous, capable of emulsifying oils and producing hemolysis, because glycoside combines with the cholesterol molecule, disrupting the internal-external balance causing cell rupture and hemoglobin release. They are classified into two groups, the steroidal and the triterpenic, presenting respectively, 27 carbons and tetracyclic skeleton and 30 carbons with pentacyclic skeleton. They are important components in the action of various drugs, detaching themselves as expectorant and laxative, in the vegetable, acts in the defense against pathogens and insects and in the maintenance of growth. Regarding the most recurrent activities of saponins in men, its hemolytic, anti-inflammatory, antibacterial, antimicrobial, antiparasitic activity stands out, besides having properties of anti-cancer actions (FRANCO et al, 2021).

3.2 CAROTENOIDES

They are tetraterpenic chemicals, linked to carotene used in pigments widespread in nature, characterized by having oxidative molecules, exhibiting colors between yellow and red, are precursors of vitamin A in animals, are essential and are liposoluble found in vegetables.

More than 900 types of carotenoids are described, divided into two, are carotenes and xanthophylls, carotenes are characterized by presenting orange pigmentation such as carrots, being purely hydrocarbons without the presence of oxygen, while xanthophylls, contain oxygen and its pigmentation varies from yellow to reddish brown.

They act in plants and animals as pigments, and carotenoids are the second most important pigment for photosynthesis, protecting chlorophyll from excess light, indispensable in human alimentation, carotenoids are divided into four vitamin A precursors, carotenes, alpha-carotenes, beta carotenes, gamma-carotene and beta-cryptoxanthin acting directly in cellular respiration, possessing antioxidant function especially antioxidant function astaxanthin.

3.3 STEROIDS

A group of liposoluble compounds has a basic structure of seventeen carbons arranged in four rings connected to each other, having a therapeutic purpose. Called complex chain lipids, where cholesterol is fundamental in the formation of steroids, however, in large quantities it has a malevolent characteristic to the body. Cholesterol is the starting point of the production of steroidal hormones, as well as bile acids, cardioprotective glycosides, vitamin D and vegetable steroids and some alkaloids. Steroids have a common chemical structure, called cyclopentanoperhydrophenanthrene: cyclic nuclei similar



to the nuclei of the phenanthane nucleus, bound to a cyclopentane ring.

Distributed in living organisms include sexual hormones, cholesterol of animal and non-plant origin, vitamin D and some plants such as daleira, used as immunosuppressants in the treatment of autoimmune diseases and in transplants minimizing the body's rejection. The large intake during life causes the loss of calcium in the bones, derived from the male hormone (testosterone), anabolic steroids cause protein deposition in tissues, ingested by athletes to increase covalencia in muscle tissues, because it contains properties to strengthen this tissue, however, it can cause lesions in the liver, and may trigger psychological ailments such as increased aggressivity and even obituary. They constitute the range of active ingredients in contraceptive pills, plays hormonal anti-inflammatory function, some examples of these steroids are hydrocortisone, betamethasone, dexamethasone and mometasone.

It can be seen through the aggregate knowledge in this work a plant with a possible important pharmacological effect, which will be able to be used in the fight of microorganisms and infections, if through phytochemical tests the frequency of the compounds discussed remains the same. Getting the sheet macerated weighing 655.73g was the final result of the completed stage of the project. The literature presents itself with a particular and restricted character on the multiple medicinal and technological uses of Pau d'Alho, also, an academic review on its applications can generate new research for its extract. As for its ethnobotanical use, it should be explored beyond the empirical sayings of peoples, and their religious uses studied and scientifically envisioned. Given the above done here, this work.



REFERENCES

- Brown, karen. Agave sisalana perrine. **Wildlands weeks**, p. 18-21, 2002.
- Carvalho, paulo ernani ramalho. **Espécies arbóreas brasileiras**. Embrapa informação tecnológica, 2003.
- Da silva, welverson marlon oliveira et al. Uso popular de plantas medicinais na promoção da saúde animal em assentamentos rurais de seropédica-rj. **Revista brasileira de ciência veterinária**, 2013.
- Franco, s.m; caputo, l.a.v.a; rabelo, e.m; rodrigues, a.b.l; farias, a.l.f; cantuária, p.c; almeida, s.s.m.s. estudo fitoquímico, físico-químico, microbiano e de toxicidade do Extrato etanólico das folhas de *mentha × piperita l.* (lamiaceae). *Revista ouricuri, juazeiro, bahia*, v.11, n.1. P.003-015. Jan./jul., 2021. (<http://www.revistas.uneb.br/index.php/ouricuri>).
- Horowitz, christiane; martins, carlos romero; walter, bruno machado teles. Flora exótica no parque nacional de Brasília: levantamento e classificação das espécies. **Biodiversidade brasileira**, 2014.
- Lordêlo, m. Et al. Compostos fenólicos , carotenóides e atividade antioxidante em produtos vegetais phenolic compounds , carotenoids and antioxidant activity in plant products. P. 669–682. 2010.
- Lorenzi, harri. Árvores brasileiras: manual de identificação e cultivo de plantas arbóreas nativas do Brasil. **Nova odessa: editora plantarum 352p.-col. Illus. Por geog**, 1992.
- Malheiros, a. Universidade federal de santa catarina centro de ciências físicas e matemáticas curso de pós-graduação em química. 2001.
- Marchioretto, m. S. Phytolaccaceae in lista de espécies da flora do Brasil, jardim botânico do rio de janeiro. Jardim botânico do rio de janeiro. 2012.
- Montanari, r. M. Dos óleos essenciais de espécies de anacardiaceae ,siparunaceae e verbenaceae. 2010.
- Moura, gabriela silva et al. Potencial alelopático do óleo essencial de plantas medicinais sobre a germinação e desenvolvimento inicial de picão-preto e pimentão. **Ensaio e ciência: c. Biológicas, agrárias e da saúde**, 2015.
- Nascimento, paula lidiane de oliveira fernandes et al. Qualidade, maturação e vida útil pós-colheita de duas cultivares de videiras produzidas sob três porta-enxertos no município de Mossoró/rn. 2016.
- Nóbrega, d. B. Et al. Utilização de composto homeopático no tratamento da mastite bovina. **Arquivo instituto biológico, são paulo**, 2009.
- Ziller, sylvia reate; de sá dechoum, michele. Plantas e vertebrados exóticos invasores em unidades de conservação no Brasil. **Biodiversidade brasileira**, 2014