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## ARCHAEOBOTANICAL REMAINS OF CAVE SITE IN CAETITÉ, BAHIA, BRAZIL

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### ABSTRACT

Archeobotany is a division of archeology that is dedicated to the study of the relationship between past human communities and plants. The objective of this article is to identify the macrobotanical remains and the potential of use of plants found in the excavation levels of the archaeological site Caixa D'água cave, located in Caetité, Bahia, Brazil. The methodology of this research consisted in the identification of fruits and seeds by means of the comparison of botanical types in collections of seeds, herbaria and specialized bibliography. Twelve carpological types were found and of these, seven types were identified, indicating as representative of the Caatinga and Cerrado plants. All identified vegetables have potential uses, such as food, medicines and other uses.

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### INTRODUCTION

Among the various biological disciplines that are added to Archeology to interpret the life of the human communities, Archeobotany is one of the most important. Studies of plants and their potential uses by human groups of the past may answer questions associated with the relationship between man / environment. Archeobotany has as objects of study the vegetables remains found in archeological contexts, be they charcoals, pollen, carp, or other identifiable vegetables elements. For Scheel-Ybert *et al.*, (2005-2006), archeobotanical investigations can provide information on different ancient peoples and the environment, patterns of intervention in the landscape, and activities related to collection, plant management, and food production. For Ferreira *et al.* (2013) Archeobotany offers important

information that makes it possible to answer many questions asked by archaeologists. Some of these questions include: What foods were present in the diet of prehistoric peoples? Which plants were possibly used for medicinal practice? The questions are many and the possibilities to respond are increasing every day with the advancement of research techniques. Thus fragments or parts of conserved plants can give information on the human-environment interrelationship, especially as regards the use of plants for the various purposes, whether in the making of artifacts, in food, in the treatment of diseases or other uses. Seeds and fruits are most often preserved by carbonization and found in combustion structures that generally originate from fires that in the past were used by the inhabitants for the preparation of food or specialized activities such as funeral rituals, ceramic burning or to produce to remove animals from the vicinity (Andreacci and Melo Jr., 2009). Research on remnants of fruits and seeds found in archaeological sites is still rare in Brazil, but they are even rarer in the Brazilian Northeast, especially in the state of Bahia. This work is of great relevance, as it studies, under the

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archaeobotanical approach, an archaeological site in cave, in the state of Bahia and, mainly, in the transition area between the Caatinga and Cerrado biomes. The present study comprises the study of carps recovered in the sediments of combustion areas of the prehistoric archaeological site Caixa D'Água cave, located in the village of Brejinho das Ametistas, Caetité, Bahia State, Brazil. The Caixa D'água cave site is inserted inside a iron cave and has dimensions of 10m x 17m and consists of large rocky walls that in the past served as a space for human habitation. This site had a maximum depth of about 1.0 m in the areas with the highest concentration of traces and presents two dating levels, the N: 20-30 cm with Cal BP 550 to 510 dating and the N: 70-80 cm with Cal BP 5880 to 5820 made by the C-14 method on bonfire coal (Silva-Santana *et al.*, 2010). Near this site there are three other archaeological sites: cave of the Baixada, cave of the Iron and cave of Palmito, all prehistoric. The site was excavated between the years 2010 and 2011 and resulted in the establishment of a wide collection of lithic and ceramic artifacts (Silva-Santana *et al.*, 2010). During the excavations, sediment and combustion areas were collected for archaeobotanical studies, these traces being described in this article. The main objective of this study is to identify the vegetation present at campfires at the various excavation levels of the archaeological site of the Caixa D'água cave, and to discuss the potential use of these vegetables by the people who inhabited the site in the prehistoric period.

## MATERIALS AND METHODS

The approach of the research was qualitative, where initially the sieving and separation of the carpological traces of the rest of the coals occurred, always taking into account the level of excavation to which the traces belong. After separation of the seeds and fruits from the other vegetables remains, we performed morphological observations of the carps. For the identification of the seeds and fruits a technique of comparison of botanical types of the carpological collection originated in the area of the site and located in the Laboratory of Archeology and Paleontology of the State University of Bahia was used, as well as comparisons with the plants of the Herbarium of the State University of Bahia - Campus VII. In addition, queries were made in the botanical bibliographies of Lorenzi (2008) and Giulietti *et al* (2009).

## RESULTS AND DISCUSSION

Twelve plant types were registered and seven types were determined. The predominant layers were quantitatively those of 40-50 cm, where were found 5 types of plants, being 1 indeterminate. Of the determined plants, one specimen is found at the level of the genus and six at the species level. The type of vegetation with the greatest number of traces was the Arecaceae family, which appears at all levels of the excavation. All other types appear only quantitatively in one unit and in only one of the excavation levels. At the levels 60-70 cm, 40-50 cm, 30-40 cm, 20-30 cm and 0-10 cm, the presence of fruits was recorded, being most Arecaceae. The fruits of these palms, because they have more rigid physiological structures, are present even at the deepest levels. The plants determined were the genus *Qualea*, popularly known as "pau-terra", present in the most recent historical layer of the site; the species *Enterolobium contortisiliquum* Vell., *Eugeniadysenterica* (Mart.) DC., *Hymenaeacourbaril* L.

and *Couepiagrandidiflora* Benth., respectively known as: "Timbaúba" or "Tamboril", "Cagaíta", "Jatobá do Cerrado" and "Oití de Ema", all at prehistoric levels; the species *Syagruswerdermannii* Burret. *Syagruscoronata* Mart., Known as "Coco-vassoura" and, "Ouricuri" or "Licuri" recurrent at all prehistoric and historical levels.

### Utilities of Identified Plants

***Qualea*:** The genus *Qualea*, popularly known as "pau-terra", belongs to the family Vochysiaceae and, according to Warming and Ferri (1973), the species of this family are arboreal and can be considered the most representative of the Cerrado, as is the case of the species *Qualeagrandidiflora* Mart. This species is mentioned by Carneiro (2009) as used by popular medicine for the treatment of several diseases such as: stomach pain, intestinal pain, diarrhea, dysentery, gastritis, ulcer, stomach congestion, fever and multiple lesions. There are records of the use of species of the genus *Qualea* for the treatment of liver diseases, as well as the use as a cough remedy (Souza *et al.*, 2016). Of the green fruits of some species of pau-earth can be extracted dyes of the colors purple, blue, dark gray and black. From the root, the yellow dye is extracted (Oliveira, 2009).

***Enterolobium contortisiliquum* Vell.:** *Enterolobium contortisiliquum* (Vell.) Morong, known as "Tamboril" and "Timbaúba", belongs to the family Fabaceae Mimosoideae and consists of a large tree, reaching a height of 20 to 35 m, rapid growth, heliophilous, found in several Brazilian forest formations, often colonizing deforested areas, clearings and forest edges (Scalon *et al.*, 2005; Gonçalves *et al.*, 2013). Both the bark and the fruits of this plant have high percentage of saponin, substance of detergent properties that are used to make homemade soap. Its wood is light and soft to the cut and is suitable for the manufacture of canoes of whole trunk. Its roots are also thick, long and light and are used for the construction of rafts (Sant'ana *et al.*, 2013). According to Silva *et al.* (2015), in a community living in the Caatinga biome in the state of Ceará, this plant is used to cure pain in the body. Vieira, Souza and Lemos (2015) also highlight the use of this vegetable by a rural community in the state of Maranhão, as a curative plant for pain in general and as an anti-inflammatory.

***Eugenia dysenterica* (Mart.) DC:** Among the fruit species of the Cerrado biome are the "Cagaiteira" (*Eugenia dysenterica*), a species native to Cerrado, composed of a medium-sized tree, tortuous trunk and high fruit potential (Martinotto *et al.*, 2008). The fruits of the "Cagaíta" are consumed in natura or processed, being sources of vitamins of the complex B, vitamin C, niacina and also of carbohydrates and proteins (Ferreira and Pereira 2016). The pulp of the fruit, with or without peel, is energetic, with low caloric content. In addition, it is a tree that has ornamental and economic potential during flowering (Abreu, 2015). The fruits of the "Cagaiteira" are edible and can be consumed in *natura* or processed. This species is part of the apicultural flora of the Cerrado and its leaves and bark are used in traditional medicine as antidiarrheals, for diabetes and jaundice, other traditional uses include the use as firewood (Silva, Chaves, Naves, 2001; Silva *et al.*, 2015).

***Hymenaea courbaril* L.:** *Hymenaea courbaril* L., belonging to the Fabaceae family, is popularly known as "Jatobá". The "Jatobá" trees present straight and cylindrical trunks, fruit of

sweetish flavor, farinaceous aspect, high dietary fiber content, with great amount of calcium and magnesium, being widely used in human and animal feeding (Cipriano *et al.*, 2014). The fruit of the "Jatobá" presents pulp farinaceous that covers the seeds and that is widely used in the preparation of food. To obtain the flour, the seeds are grated delicately, being this food exceptionally rich in calcium and fibers (Silva, *et al.*, 2001).

Coutinho, Travassos and Amaral (2002) report the traditional medicinal use among Maranhão indians who use the bark of "Jatobá" as an antipyretic and also as an aid in the treatment of anemia and cancer. Leite and Marinho (2014) also highlight the use of stem bark in the treatment of inflammation and pneumonia by indigenous communities in the state of Paraíba. In an article by Fernandes, Santos and Pimenta (2005), there is information that "Jatobá" presents terpenes with biological activity related to protection against infections and insect attacks. They also present antibacterial and antifungal action, as described in Cipriano *et al.* (2014).

***Couepia grandiflora* Benth:** *Couepia grandiflora* Benth is popularly known as "Fruta-de-ema", belongs to the family Chrysobalanaceae, and occurs in regions of the Cerrado. The plants of this family are used by populations mainly in the treatment of diarrhea, dysentery and malaria. The genus *Couepia* is composed of 55 species, where most have not yet been studied from the chemical and pharmacological point of view (Zuque, 2004). According to Arrúa and González (2014) the roots of this species are used in Paraguay, in folk medicine, for the treatment of infections of the urinary tract and ovaries. The wood of *Couepia grandiflora* can be used for civil and naval construction and general carpentry (Lorenzi, 2008).

***Syagrus werdermannii* Burret:** Species popularly known as "Coco-de-vassoura", "Coco-de-raposa" or "Coco-peneira", is a palm tree of the family Arecaceae that, although restricted to the state of Bahia, is very abundant in the municipality of Caetité. It is an abundant species in its localities of occurrence (Giulietti, 2009). It is a species with high ornamental potential, mainly by the foliage, the fruits are very appreciated by the fauna and the leaves are used regionally for the handmade confection of brooms and sieves (Lorenzi, 2008). This plant is adapted to the Cerrado and open fields, being found in agglomerates near *Allegoptera campestris* (Giulietti, 2009). In the countryside of the Caetité region, this palm tree is still used in the production of baskets and in the covering of rustic houses.

***Syagrus coronata* Mart:** *Syagrus coronata* is a palm tree known by the name of "Ouricuri" and "Licuri", depending on the region. It is a palm adapted to the arid and dry regions of the Caatinga and also in the transition area of forest and Caatinga, being one of the main palm trees of the semi-arid region of the Brazilian northeast. It can be born and grow in the gravel and needs little moisture to survive, also occurring in areas of good soil fertility (Lorenzi, 2008). Its fruits and seeds are edible, forming the food base of many animals among insects such as bees, ants, but also vertebrates such as reptiles, mammals and especially wild birds. One of the best-known bird species that uses this coconut as the basis of their diet is the "ararinha-azul-de-lear" (Souza *et al.*, 2012). Besides the ecological importance, the "Licuri" also presents great economic importance to the communities of the interior of the northeastern semi-arid, in addition to resisting prolonged droughts, this tree bears fruit throughout the year. The species is widely used, constituting human food and also in cattle

raising as fodder. Almonds are consumed *in natura* or in food preparations, and their oil is also widely used (Sousa *et al.*, 2012). The fruit of the "Licuri" (almond and pulp) presents great nutritional value, being very caloric with 108, 6 Kcal / 100g for the pulp and 527,3 Kcal / 100g for the almond. The fruit pulp is especially rich in b-carotene (ig / g), pro-vitamin A (ER) and  $\alpha$ -tocopherol (ig / g) (Crepaldi *et al.*, 2001; Sousa *et al.*, 2012). Sousa *et al.* (2012) also emphasizes the widespread use and versatility of "Licuri" by communities, where leaves are used to cover huts, handicrafts, utensils such as mats, brooms, as well as wax production. The endocarps present in the fruits of the palms present rich tissue in vascular bundles, fiber and filler parenchyma, being a lignified tissue, extremely hard, with great affinity in the conversion in coal (Silva *et al.*, 1986). Also the straw (dry leaves) and the mesocarp of the "Licuri" are used as a source of energy for burning in ovens, because, due to the presence of the oil, it presents a high combustion index (Sousa *et al.*, 2012). This may be an important factor in the study of the use of plants in the past, since the presence of a large number of these "Licuris" mesocarps in bonfires may indicate the reuse (after the feeding of the pulp and the almond) of the fragments of the mesocarp as a raw material for fuels in the past, being an important fuel capable of producing a strong and lasting fire.

## Conclusions

The carbonized plants found in the Caixa D'Água cave are composed of shrub and mainly arboreal species belonging to the Brazilian biomes Caatinga and Cerrado. The identified vegetables have potential food, medicinal, pigmentation, in wicker works, to cover huts, to make canoes. In the specific case of Arecaceae may also have served as woody components in bonfires. The presence of these plants in the combustion structures leads us to believe that it was the humans who took these plants and benefited from them for the various purposes. If other forms of intrusion of these fruits occur at the site, such as by zoocoric and / or anemocoric dispersion, it was not possible to identify them. Regarding diversity of plant types, there are no indications of significant changes, since the vegetable remains found in the archaeological site present representatives in the current floristic list of the region. It is stated with precision only that great changes have not occurred since then, since the plants found and identified in this work still occur in the area and are characteristic of the Caatinga and Cerrado floras. Finally, it is worth mentioning that this material provides information of great importance, especially with regard to the plants used for food and for the treatment of diseases by these prehistoric human groups that took shelter in the caves of Caetité, Bahia, Brazil.

## REFERENCES

- Abreu PAA. 2015. Caracterização dos fatores nutricionais e antinutricionais de sementes de frutos do cerrado. Dissertação de mestrado. Universidade Federal de Goiás,Goiania, Brasil.
- Andreacci F, Melo Jr. JCF. 2009. Análise antracológica de uma fogueira paleoíndia do Brasil Central: um olhar sobre o uso pré-histórico de recursos florestais. In: Anais do VI Encontro Internacional de Produção Científica Cesumar, Maringá.
- Arrúa RD,González Y. 2014. Plantas utilizadas en la medicina popular paraguayana como antiinflamatorias. Boletín

- Latinoamericano y del Caribe de Plantas Medicinales y Aromáticas 13 (3): 213-231.
- Carneiro MRB. 2009. A flora medicinal no Centro Oeste do Brasil: um estudo de caso com abordagem etnobotânica em Campo Limpo de Goiás. Dissertação de Mestrado, Unievangélica, Anápolis, Brasil.
- Cipriano J, Martins L, Deus MSM, Pero AP 2014. O gênero *Hymenaea* e suas espécies mais importantes do ponto de vista econômico e medicinal para o Brasil. Caderno de Pesquisa, sér. Biologia, 26 (2): 41-51.
- Coutinho DF, Travassos LMA, Amaral FMM 2002. Estudo etnobotânico de plantas medicinais utilizadas em comunidades indígenas no estado do Maranhão – Brasil. Visão Acadêmica, Curitiba, 3: 7-12.
- Crepaldi IC, Almeida-Muradian LB, Rios MDG, Pentead MVC, Salatino A. 2001. Composição nutricional do fruto de licuri (*Syagrus coronata* (Martius) Beccari). Revta brasil. Bot., 24 (2): 155-159.
- Ferreira C, Allué EM, Burjachs FC, Rosina P, Oosterbeek L 2013. Dados Arqueológicos do Alto Ribeirão – Perspectivas Futuras. Arkeos, 34: 153-160.
- Ferreira LC, Pereira WR 2016. Aspectos microbiológicos e físico-químicos da conservação de cagaita (*Eugenia dysenterica* DC) com aplicação de biofilme comestível. Caderno de Ciências Agrárias, 8: 9-13.
- Giulietti AM, Rapini A, Andrade MJG, Paganucci LQ, Silva JMC 2009. Plantas raras do Brasil. Conservação Internacional, 496 p.
- Leite IA, Marinho MGV 2014. Levantamento etnobotânico de plantas medicinais em comunidade indígena no município de Baía da Traição-PB. Biodiversidade. 13: 82-105.
- LORENZI H 2008. Árvores brasileiras: manual de identificação e cultivo de plantas arbóreas nativas do Brasil. Instituto Plantarum de Estudos da Flora, 384 p.
- Oliveira JBS 2009. Pau-Terra: Destruição criadora, autopoiese e sustentabilidade. Clube dos autores, Joinville, 80 p.
- Sant'ana VZ, Freitas MLM, Moraes MLT, Zanata M, Zanatto ACS, Moraes MA, Sebbenn AM 2013. Parâmetros genéticos em progênies de polinização aberta de *Enterolobium contortisiliquum* (Vell.) Morong em Luiz Antonio, SP, Brasil. Hoehnea. 40 (3): 515-520.
- Scheel-Ybert R, Klökler D, Gaspar MD, Figuti L, (2005-2006). Proposta de amostragem padronizada para macrovestígios bioarqueológicos: antracologia, arqueobotânica, zooarqueologia. Revista do Museu de Arqueologia e Etnologia. 15-16:139-163.
- Silva CG, Marinho MGV, Lucena MFA, Costa JGM. 2015. Levantamento etnobotânico de plantas medicinais em área de Caatinga na comunidade do Sítio Nazaré, município de Milagres, Ceará, Brasil. Rev. bras. plantas med. [online]. 17: 133-142.
- Silva JC, Barrichelo LEG, Brito JO 1986. Endocarpos de Babaçu e de Macaúba Comparados a madeira de *Eucalyptus grandis* para a produção de carvão vegetal. Instituto de Pesquisas e Estudos Florestais. 34:31-34.
- Silva MR, Silva MS, Martins KA, Borges S. 2001. Utilização tecnológica dos frutos de jatobá-do-cerrado e de jatobá-da-mata na elaboração de biscoitos fontes de fibra alimentar e isentos de açúcares. Ciências Tecnologia de alimentos. 2: 176-182.
- Silva RSM, Chaves LJ, Naves RV. 2001. Caracterização de frutos e árvores de cagaita (*Eugenia dysenterica* DC.) no sudeste do estado de Goiás, Brasil. Rev. Bras. Frutic. 23 (2): 330-334.
- Silva SMM, Silva CAG, Fonseca-Basso YM, Magalhães PO, Silveira D 2015. *Eugenia dysenterica* Mart. Ex DC. (Cagaita): planta brasileira com potencial terapêutico. Infarma. 27: 49-95.
- Silva-Santana CC, Silva VC, Santana HA 2010. Projeto Arqueológico Pedra do Ferro - Relatório Final de Prospecção e Resgate. Universidade do Estado da Bahia, Senhor do Bonfim, Bahia, Brasil.
- Sousa AEBA, Crepaldi IC, DeOliveira KG, Barbosa AEA, Linares SFTP, Bosh DML, Martins T. 2012. Licuri na área de ocorrência da Arara-Azul-de-Lear. In: Lugarini et al. (orgs.) Plano de Ação Nacional para a Conservação da Arara-Azul-de-Lear., Instituto Chico Mendes de Conservação da Biodiversidade ICMBio, Brasília, pp. 55-71.
- Souza LF, Dias RF, Guilherme FAG, Coelho CP. 2016. Plantas medicinais referenciadas por raizeiros no município de Jataí, estado de Goiás. Rev. bras. plantas med. [online]. 18 (2): 451-461.
- Vieira LS, Sousa RS, Lemos JR. 2015. Plantas medicinais conhecidas por especialistas locais de uma comunidade rural maranhense. Rev. Bras. Pl. Med. 17 (4), supl. III: 1061-1068.
- Warming E; Ferri M. 1973. Lagoa Santa e a vegetação de cerrados brasileiros. Itatiaia, Belo Horizonte, Brasil.
- Zuque ALF, Bueno NR, Castilho RO, Rezende UM, Arruda ALA. 2004. Avaliação das atividades antioxidante, antimicrobiana e citotóxica de *Couepiagrandidiflora* Benth. (Chrysobalanaceae). Revista brasileira de farmacognosia. 14 (2): 129-136.

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