

Importance of the Non-wood Products Market for the Socio-economic Development of the Maceió Municipality, Brazil

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Authors' contributions

This work was carried out in collaboration among all authors. Authors RCL, LSP, RGCS, ITGN, VALM and MSSM designed the study, performed the statistical analysis and wrote the first draft of the manuscript. Authors MJHL, GHS and AVFP revised the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

The scarcity of information on the socioeconomic of non-wood forest products in Maceio acts as an obstacle to forest conservation and also to the development of market. In this way, the aim of this work was to evaluate the non-wood forest products (NWFPs) market in the municipality of Maceió, AL. The study was carried out in NWFP stores in the city of Maceió, AL, Brazil, between September and October 2018. Data were collected through a semi-structured questionnaire containing 9 closed questions and 11 open questions, totaling 20 questions, which were analyzed in a descriptive way and statistics. Among the interviews, there was a predominance of the female gender in the market (78%). In which, the most cited species were cinnamon (*Cinnamomum verum*) with 88.89%; aroeira (*Schinus terebinthifolius*) with 66.67%; followed by barbatimao (*Stryphnodendron barbatimam* Mart.) cited 66.67%. The boldo (*Peumus boldus*) was cited 55.56%;

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followed by rosemary (*Rosmarinus officinalis*), clove (*Syzygium aromaticum*) and laurel (*Laurus nobilis*), which presented 44.44% of the citations. It can be seen that 65% of products fall under the category of medicinal use, 15% in the category of food use and 10% are used as cosmetics. Among the most used parts, it was observed that the majority of the products are leaves (36.9%) and barks (32.6%). When questioned about the origin of their products, 77.7% of those interviewed said they bought them for resale. The other 22.3% claimed that in addition to buying them, they also collect them. This trade has proven very effective, due to its great potential for social inclusion and economic incentive in the municipality.

Keywords: Forest sector; sustainability; conservation; informal market.

1. INTRODUCTION

In the current scenario, the Brazilian planted trees industry is a benchmark due to its performance based on sustainability, competitiveness and innovation in the world market, in which the production of hundreds of products and by-products present in our homes and daily activities, such as pulp, paper, wood panels, laminate floors, charcoal and biomass [1]. However, parallel to the timber market, the production of extractivist or agroextractivist forest products has attracted the attention of society, public managers and legislators, mainly because it also has potential for income generation and environmental preservation that allows preservation of the forest that is preserved standing, since it does not imply the felling of the parent trees. Contrary to logging that contributes to the dissemination of species of higher commercial value, which compromises their future use [2,3].

Defined as originating from plants, such as peels, resins, fibers, seeds, fruits or fungi, fruiting bodies, non-wood forest products (NWFPs) have been a focus of interest for governmental and non-governmental organizations, since the incentive to collect these products in natural environments and their commercialization would promote the improvement of the quality of life of the local inhabitants due to the emergence of new alternatives of work and conservation of biodiversity. In this way, the natural products would serve the self-consumption and also internal and external markets [4,5].

Usually NWFPs products go from developing to developed countries [6]. In the Automatic Recovery System (SIDRA) of the Brazilian Institute of Geography and Statistics (IBGE), NWFPs can be found in the category of Production and Plant Extraction and Silviculture (PEVS), where they are divided into groups such as food, aromatic, medicinal and others [7].

These products are important elements of forest resources worldwide and their extraction is a fundamental activity for the inhabitants of regions rich in natural resources, because it allows aggregation of values to the forest that is preserved without the felling off matrices [8,9]. In this sense, work addressing the topic of NWFPs has been carried out for decades in Brazil [10,5,11,12], generating diverse information regarding the limitations found in its productive chain, as well as the economic opportunities resulting from its trade, and thus contributing to a better understanding of the relationships involving the various actors.

However, in spite of the great socioeconomic relevance of NWFPs, it is observed that in Maceió, little information is available on the production processes involved, such as management, conservation, commercialization, amount and value. As a consequence, this scarcity of local information acts as an obstacle to its conservation and also to the development of market strategies necessary for the growth of this activity [4].

The aim of this work was to evaluate the non-timber forest products (NWFPs) market in the municipality of Maceió, AL, Brazil.

2. MATERIALS AND METHODS

2.1 Study Area

The municipality of Maceió is located in the central coastal zone of the State of Alagoas, Brazil (Fig. 1). Its area of the territorial unit is 509.55 km² and its boundaries are defined between the parallels 09°28'14 " and 09°42'42 " of South latitude and meridians 35°33'29" and 35°47'38 " west longitude [13,14].

According to IBGE [13], the population of Maceió was 932,478 people and it is estimated that by 2018 this population approaches 1,012,382 people.

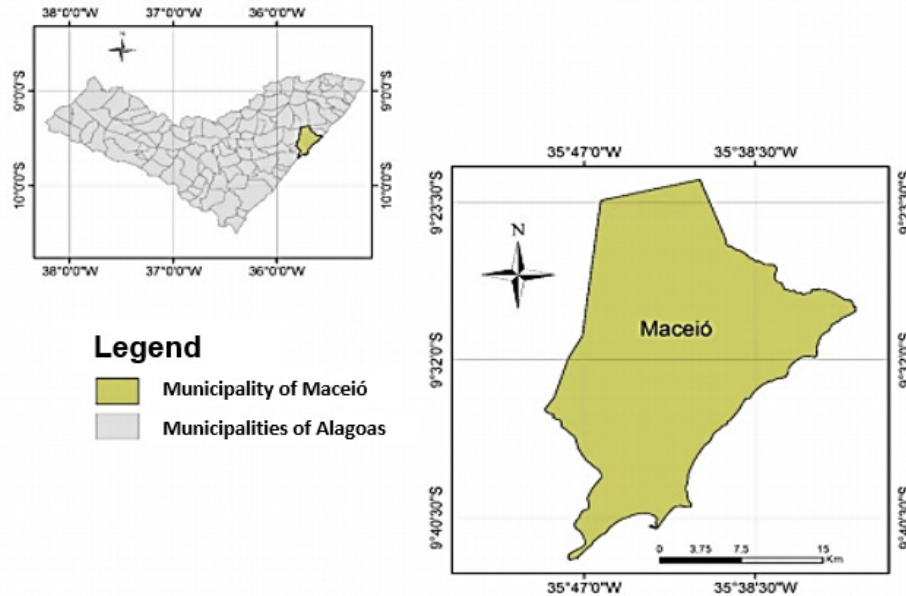


Fig. 1. Location of the municipality of Maceió in the State of Alagoas

Source: [13] adapted by [15]

According to the classification of Köppen the climate of Maceió is type As' tropical rainy, and presents temperatures above 20°C throughout the year, with thermal amplitude around 6°C. In the rainy season the minimum temperature can reach 19 °C, which occurs between May and June. Already between the months of July and September, it presents the highest temperatures, reaching 31 °C during the dry season [15].

The rainfall presents an annual irregularity, with a total of rainfall varying between 1500 mm and 2000 mm of precipitation, about 60% occur in the months of April to June, presenting a period of scarcity in the months of October to December. The relative air humidity varies between 75% and 82% throughout the year [14,16].

The hydrography of the municipality has as main lagoon formation the Mundaú lagoon that composes the Mundaú-Manguaba Estuary Complex (CELMM). With an area of over 23 km² and a depth ranging from 1m to 7m, the Mundaú lagoon flows into the Atlantic Ocean in the Pontal district, through the channel of the Calunga or large channel outside. In urban space, the city is drained by the Reginaldo Creek Basin, as well as other smaller streams that rise on the plateau and flow into the ocean [14].

The predominant biome is the Atlantic Forest, with vegetational formations of the open

ombrophylous forest type, mangrove and restinga [17].

The municipality of Maceió is the second city of Alagoas that stands out in the fishing sector. Artisanal fishing is a source of income for the population residing in lagoon and coastal districts, the commercialization of these resources is mainly done in the capital [18].

Tourism contributes to the commerce sector, presenting a complete hotel network that benefits from advanced services and technologies, attracting international investments. The agricultural sector has developed around the production of sugar cane, coconut, cassava, corn and beans. However, the sectors with the best performance are focused on trade and services [18].

In the industrial sector, most of the existing industries in Alagoas are focused on the sugar and alcohol industry. However, the lack of destination of wealth from agriculture and industry causes serious problems resulting in unemployment and the emergence of the informal sector not yet regulated [19].

2.2 Data Collection

Data were collected through a semi-structured questionnaire containing 9 closed questions and

11 open questions, totaling 20 questions. The questionnaire aimed to obtain information about the species, origin of products, uses and frequency.

The study was carried out from September to October 2018, in three urban fairs located in the neighborhoods of Tabuleiro, Santos Dumont. The questionnaire was applied to 9 traders in total.

The choice of these places to conduct the study was due to the fact that they are the most concentrated points of merchants in the city.

2.3 Analysis of the Data

Data were analyzed descriptively and statistically. Most of the open answers were analyzed in a descriptive way, as some were in list form, these were analyzed through descriptive statistics. The closed answers were all analyzed statistically.

3. RESULTS AND DISCUSSION

Among the interviewees, was observed a predominance of the female gender in the NWFP market (78%), showing the male minority in this

branch (22%), whose ages ranged from 29 to 56 years, with a mean age of 46 years, in which the time of operation in the NWFP market ranged from 15 to 30 years, with an average of 22 years. In this case, it is worth noting that in some cases, the marketing stalls have been passed down from generation to generation, being part of the history of some families.

The species most cited by merchants were (Fig. 2): cinnamon (*Cinnamomum verum*) with 88.89%; aroeira (*Schinus terebinthifolius*) with 66.67%; followed by barbatimão (*Stryphnodendron barbatimam* Mart.) which was also cited by 66.67% of merchants. The boldo (*Peumus boldus*) was cited 55.56% of the time; followed by rosemary (*Rosmarinus officinalis*), clove (*Syzygium aromaticum*) and laurel (*Laurus nobilis*), which presented 44.44% of the citations.

Cinnamon (*Cinnamomum verum*) is an exotic species from Asia, but is widely used in Brazil as spice, condiment and medicinal uses (mainly antibacterial and antifungal). It is a medium tree and the part used and traded is the bark [20]. Moreover, it was regulated by ANVISA (Brazilian National Health Surveillance Agency) as a medicinal plant in the Atlantic Forest [12].

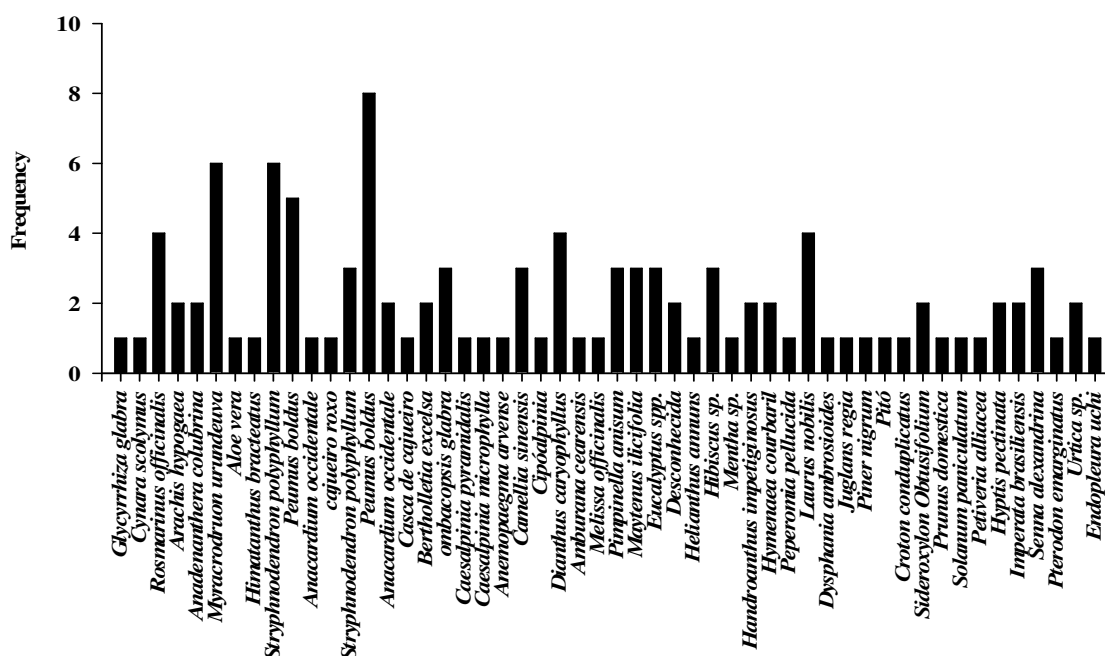


Fig. 2. Frequency in which each Non-Lumber Forest Product was cited by merchants in a survey in different markets in Maceió/AL

The aroeira (*Schinus terebinthifolius*) is a species of caatinga northeastern tree, widely used medicinally, and its uses are: for inflammation and relaxation, infusion inhalation for sinusitis and tea rind for tooth inflammation [21]. The most commonly used part is the leaves and is also a widespread species, occurring both in the fairs of the northeast and in the southeast and north of Brazil.

The barbatimão (*Stryphnodendron barbatimam* Mart.) is an endemic species of Brazilian Cerrado, this species is threatened by excessive illegal cutting and disorderly urbanization, fragmenting its habitat, exposing to edge effects, compromising its population structure. Through various forms of use of the species, its therapeutic efficacy has been proven through empirical knowledge. Since then, the species has become part of the National List of Medicinal Plants of interest to SUS (Brazilian Health Unic System). The main use of peels by communities is for antibacterial, anti-inflammatory, antiseptic, oral, astringent and healing treatments [22].

Bolus (*Peumus boldus*) is very widespread in Brazilian medicinal culture and frequently found in the composition of industrialized herbal medicines, besides being marketed in free markets throughout the national territory [23]. Its leaves are used for the treatment of hepatic disorders and cholelithiasis, also having diuretic and anti-inflammatory properties [24].

Rosemary (*Rosmarinus officinalis*) originates from southern Europe and North Africa, but is widely used medicinally in Brazil. According to reports found in the literature, this plant may present stomach, stimulant, antispasmodic, emmenagogas and cicatrizant properties. The antioxidant properties of rosemary extract have

received special attention in the last years, being recognized since antiquity [25].

The clove (*Syzygium aromaticum*) has European origin and in the early nineteenth century, clove plantations were taken to tropical countries, among them Brazil. Much known for its use as a condiment in cooking, its anesthetic and antiseptic properties are also widespread [26].

The laurel (*Laurus nobilis*) has Asian origin, but in Brazil presents economic importance mainly by the production of leaves that are used as flavors in cooking. In addition, it can be used in landscape projects and as a source of wood [27].

These species are widely found in Northeastern fairs as shown by some authors [28,29] and are also widespread in other Brazilian regions as shown in the literature [28,30].

It can be seen that 65% of products fall into the category of medicinal use, 15% in the category of food use and 10% are used as cosmetics, showing that the demand for non-timber forest products is still mainly focused on health, but also points out that other less frequent uses than medicinal medicine have been gaining space in this trade, evidencing its potential in function of the existing diversity (Fig. 3).

As a result of the data on the parts of the plants used as NWFPs (Fig. 4), most of the products are leaves (36.9%) and barks (32.6%). Roots, fruits and seeds represent respectively 13.04%, 10.87% and 6.52% of the products traded in the markets of Maceió. This behavior may be related to the ease of obtaining the resources, since the collection of leaves can occur throughout the year, as opposed to fruits and seeds.

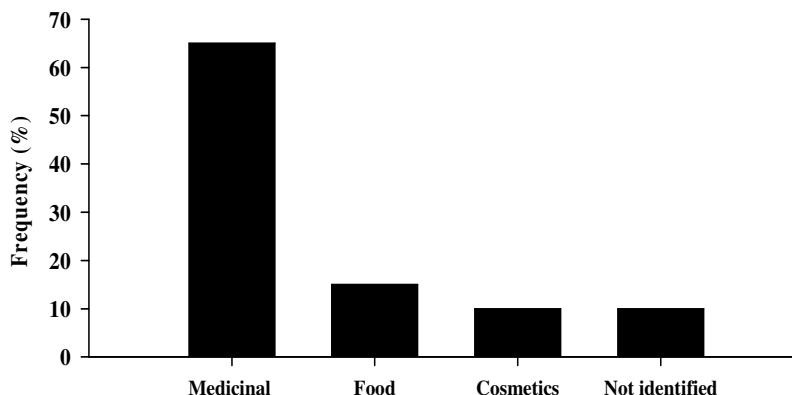


Fig. 3. Frequency (%) by category of use of non-timber forest products marketed in Maceió/AL

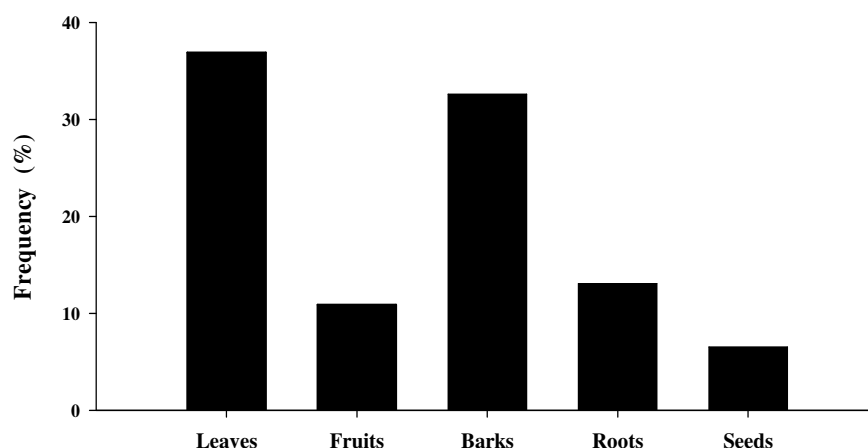


Fig. 4. Frequency of use of parts of plants used as non-timber forest products in Maceió/AL

Of the traders approached, 77.7% stated that they buy the products to resell. The other 22.3% claimed that in addition to buying NWFPs for resale, they also collect them. Barbatimão, aroeira and sambacaitá are products collected by sellers in a rustic way, with the aid of machetes and without the application of specific techniques. According to an author [31], non-timber forest resources are the main source of income and food for thousands of families living in forest extraction. In this context, the extraction of forest resources most often occurs on the basis of sustainable management, where these products that are marketed mainly in open fairs play their cultural role, as well as participate in income generation. Therefore, NWFP trade has been very effective because of its great potential for social inclusion and economic incentives.

3.1 Origin of Products

According to merchants, most products are offered throughout the year, thus ensuring the variety of what is marketed. It was found that the origin of the goods is very diversified and derives from several places, including from outside the state, such as Pará, Mato Grosso, Rio Grande do Norte, Sergipe, Minas Gerais, São Paulo, and Santa Catarina. as their main suppliers. In this sense, when turning to the supply of products of the northeast region, the angico showed relevance among the products cited, since, according to authors [32], after a production analysis of the bark of the same, it was found that 96% of this bark originate in the Northeast. Targeting specifically for the state of Sergipe, it covers a large production of Brazil nuts [33]. In the state of Rio Grande do Norte, the production

of cashew nuts predominates, reaching an export of 328 tons.

3.2 Supply and Demand

Cinnamon, boldo, laurel, nuts, peanuts, uxi, eucalyptus, barbatimão and aroeira were cited as products of greater demand in the market (Table 1). Uxi, garrida, nettle and sambacaita were considered seasonal species. Although supply occurs throughout the year, in some specific seasons, whether in winter or summer, the supply of some commodities decreases, which may possibly be justified by the phenological behavior of each plant species, which would make it difficult to obtain resources such as: leaves, flowers, fruits and seeds throughout the year and also due to the difficulty of collecting vegetative organs such as: bark and roots in the rainy season due to the obstacles found in the environment.

With regard to demand, women and the elderly were highlighted as the largest public at the fairs visited. Regarding demand, most marketers stated that there is no variation during the year, however, some of them pointed out that the search for products that have anti-flu action increases during the winter. In this context, authors [34] states that there is a growing demand for non-timber forest products (NWFPs) in developing countries, justified by higher purchasing power, as well as in developed countries, the medicinal properties offered and the adoption of alternative styles of life. Still according to the same author, such tendencies imply in the distortion of the vision of forest products as a market devalued and substitutable by synthetic products.

Table 1. Non-wood forest products marketed in Maceió/AL and their respective uses

Species	Scientific name	Use
Alcachofra	<i>Cynara scolymus</i> L.	Food, Medicinal and Cosmetic
Alecrim	<i>Rosmarinus officinalis</i> L.	Food, Medicinal and Cosmetic
Amendoim	<i>Arachis hypogaea</i> L.	Food
Amora	<i>Rubus rosifolius</i> J. Smith	Food
Angico	<i>Anadenanthera colubrina</i> (Vell.) Brenan	Medicinal
Aroeira	<i>Myracrodruon urundeuva</i> Allemão	Medicinal
Babosa	<i>Aloe vera</i> (L.) Burm.f.	Medicinal
Barbatimão	<i>Stryphnodendron polyphyllum</i>	Medicinal
Boldo	<i>Peumus boldus</i> Molina	Medicinal
Cajueiro	<i>Anacardium occidentale</i> Linn	Medicinal
Camomila	<i>Matricaria chamomilla</i> L.	Medicinal
Canela	<i>Ocotea divaricata</i> (Nees) Mez	Food and Medicinal
Canela de veio	<i>Miconia albicans</i> (Sw.) Steud.	Medicinal
Castanha do Pará	<i>Bertholletia excelsa</i> H.B.K.	Food
Castanha	<i>Ombacopsis glabra</i> (Pasq.) A.Robyns	Food
Catingueira	<i>Caesalpinia pyramidalis</i> Tui.	Medicinal
Catingueiro rasteira	<i>Caesalpinia microphylla</i> Mart.	Medicinal
Catuaba	<i>Anemopaegma arvense</i> (Vell.) Stelf	Medicinal
Chá verde	<i>Camellia sinensis</i> (L.) Kuntze	Medicinal
Cravo	<i>Dianthus caryophyllus</i> L.	Medicinal e Cosmetic
Erva cidreira	<i>Melissa officinalis</i> L.	Medicinal e Cosmetic
Erva doce	<i>Pimpinella anisum</i> L.	Medicinal e Cosmetic
Espineira Santa	<i>Maytenus ilicifolia</i> Mart.	Medicinal
Eucalipto	<i>Eucalyptus</i> sp.	Medicinal
Garrida	Desconhecida	Medicinal
Girassol	<i>Helianthus annuus</i> L.	Cosmetic
Hibisco	<i>Hibiscus</i> sp.	Cosmetic
Hortelã	<i>Mentha</i> sp.	Medicinal
Ipê roxo	<i>Handroanthus impetiginosus</i> (Mart. ex DC.) Mattos	Medicinal
Jatobá	<i>Hymenaea courbaril</i> L.	Medicinal
Língua de sapo	<i>Peperomia pellucida</i> (L.) Kunth	Medicinal
Louro	<i>Laurus nobilis</i> L.	Medicinal
Mastruz	<i>Dysphania ambrosioides</i> (L.) Mosyakin & Clemants	Medicinal
Nozes	<i>Juglans regia</i> L.	Food
Pimenta do reino	<i>Piper nigrum</i> L.	Food
Quebra-faca	<i>Croton conduplicatus</i> Kunth.	Medicinal
Quixaba	<i>Sideroxylon Obtusifolium</i> (Roem. & Schult.) T.D. Penn.	Medicinal
Raiz de ameixa	<i>Prunus domestica</i> L.	Medicinal
Raiz de jurubeba	<i>Solanum paniculatum</i> L.	Medicinal
Raiz tipi	<i>Petiveria-alliacea</i> L.	Medicinal
Sambacaitá	<i>Hyptis pectinata</i> L.	Medicinal
Sapé	<i>Imperata brasiliensis</i> Trin.	Medicinal
Sene	<i>Senna alexandrina</i> Mill.	Cosmetic
Sucupira	<i>Pterodon emarginatus</i> Vogel	Medicinal
Urtiga	<i>Urtica</i> sp.	Medicinal
Uxi	<i>Endopleura uchi</i> (Huber) Cuatrec	Medicinal

Regarding the supply of NWFPs, an author [35] assessed the international market and found that the supply of these products tends to come from developing countries and also pointed out that NWFP trade shows variations in supply that constantly tend to hamper market equilibrium.

3.3 Market Difficulties

Lack of product uniformity, lack of fiscal incentives, absence of suppliers in Alagoas, product devaluation and lack of infrastructure at fairs were identified as difficulties in the NWFP market in the metropolitan region of Maceió. Authors [11] point out the same point of view regarding the lack of infrastructure at fairs when they state that most of the existing supply centers in Brazilian cities are in precarious and obsolete conditions, requiring a physical revitalization as a matter of urgency. Another author [10] shows agreement as to the aspect of greater appreciation of the product, in the sense of investing in a better presentation of it.

3.4 Exportation

In relation to exports, there were no reports that it occurs directly. What happens occasionally is the sale to tourists who end up taking the products to other states and countries. Investment in local plantations, extraction technology, tax incentives, investment in micro and small enterprises, and publicity campaigns and market valorization by the government were cited as actions that could boost the export of these products. Some of these proposed ideas were in agreement with the alternatives suggested by authors [36] to increase the profitability of these products, where the author defends the provision of assistance in the production and commercialization of NWFPs and the use of technological apparatus, since according to [4], extractive techniques are usually carried out archaically, leading to waste of raw material and consequently devaluation of the product as to its quality and commercial value.

For sellers, what is missing is the appreciation of local commerce. When referring to the literature an author [37,38] states that the activity of extracting non-timber forest products showed a fall in the workforce between 1996 and 2006.

3.5 Quantity Sold Monthly

Because it is a simple and rustic trade, sellers, in general, have no record of the turnover of

commodities. The quantity sold monthly was about 20 kg of products per tent for the small trades. For larger trades, the monthly average sales reached 150 kg. The discrepancy is due to the fact that larger trades tend to supply to street vendors, creating a bridge between primary supplier and small traders. Most of the production and marketing of NWFPs is done informally. Therefore, both statistical information and flow information for these products are deficient in national databases [35,37].

4. CONCLUSION

The commercialization of non-timber forest products in Maceio is mainly related to the properties and their medicinal, food and cosmetic uses. Therefore, the NWFP market can be an alternative for income generation to local suppliers and merchants. However, the market still occurs informally in response to the lack of uniformity of products, fiscal incentives, investment, publicity campaigns and market valuation by the local government.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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