ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 09, Issue, 08, pp. 29495-29502, August, 2019

RESEARCH ARTICLE OPEN ACCESS

SOCIOECONOMIC AND ENVIRONMENTAL CHARACTERIZATION OF URBAN BACKYARDS IN THE MARITUBA MUNICIPALITY, BELÉM METROPOLITAN REGION, PARÁ STATE, BRAZILIAN AMAZON

[1,*]Josiane Santos da Silva, [2]Marta Cristina Marjotta-Maistro, [3]Marcos Antônio Souza dos Santos, [4]Antônia do Socorro Aleixo Barbosa and [5]Andréia Santana Bezerra

[1]Agronomist, Master in Agroecology and Rural Development, Federal University of São Carlos, São Paulo, Brazil
[2]Economist, PhD in Applied Economics, Professor at the Federal University of São Carlos, São Paulo, Brazil
[3]Agronomist, PhD in Animal Science, Professor at the Federal University of Amazon, Pará, Brazil
[4]Agronomist, Master in Agronomy, Federal University of Amazon, Pará, Brazil
[5]Zootechnist, Master in Animal Health and Production, Federal University of Amazon, Pará, Brazil

ARTICLE INFO

Article History:
Received 03rd May, 2019
Received in revised form
17th June, 2019
Accepted 22nd July, 2019
Published online 30th August, 2019

Key Words:
Urban agriculture,
Vegetables,
Medicinal plants,
Ornamental plants,
Biodiversity

***Corresponding author:* Josiane Santos da Silva**

ABSTRACT

The article analyzes the socioeconomic and environmental characteristics of urban backyards in the Marituba municipality, Belém Metropolitan Region, Pará State, Brazilian Amazon. Data were collected between December 2018 and January 2019 using semi-structured questionnaires. The sampling was "snowball" type, comprising 22 productive backyards located in four neighborhoods: Uriboca, São Francisco, Almir Gabriel, and Bela Vista. Of the respondents, more than half (54%) were women and 45% were men. Ages ranged from 38 to 74 years, with an average of 52.64 and standard deviation of 9.42 years. Only 18% were retired, 32% received financial aid through the Bolsa Família Program, and 50% did not receive help whatsoever. Schooling was low; 54% of interviewees did not complete elementary school, and there was a record of illiteracy. The environmental profile showed the adoption of few agro ecological practices in the agricultural production carried out in the backyards; the most prominent is the cultivation of native species (82%), crop rotation (73%), and composting (50%). Urban agriculture developed in these yards assumes relevance to Marituba's urban economy as it contributes to social inclusion, food security, and market access, and it should be a priority in local development public policies.

Citation: ***Josiane Santos da Silva, Marta Cristina Marjotta-Maistro, Marcos Antônio Souza dos Santos et al*, 2019.** "Socioeconomic and environmental characterization of urban backyards in the Marituba municipality, Belém Metropolitan Region, Pará state, Brazilian Amazon", *International Journal of Development Research*, 09, (08), 29495-29502.

INTRODUCTION

Backyards are characterized as a space between housing and agricultural production systems, with a multi-stratified combination of trees, perennials, and (bi)annual crops, sometimes associated with domestic animals and similar to agro forestry systems (Kumar and Nair, 2004). Anderson *et al.* (1985) report that these spaces have, besides diversity in the floristic composition, the function of guaranteeing food security of residents, preserving the agrobiodiversity and maintenance of local knowledge and technology. Disordered urban growth comes against this path, and it has caused several problems, especially social, economic, and environmental, such as the poor income distribution that limits access to good nutritional conditions, causing food insecurity. Added to the environmental impacts is the accumulation of excess waste, generating intense environmental pollution. In this scenario, thousands of families living in cities around the world havebeen looking for other ways to produce food, taking advantage of limited space available. Urban and/or periurban agriculture (UPA) can be an important alternative in this context, as it works in small spaces, with few chemical inputs, besides taking advantage of local waste; and it also produces quality food, ensuring the food security of the poorest families. In the context of urban agriculture in Belém Metropolitan Region, Pará state, the largest metropolis of the Brazilian Amazon, is the Marituba municipality, which has a tradition of agricultural production stemming from its formation associated with the establishment of the Belém-Bragança railway station. Due to these characteristics, the municipality was relevant for this research. In Marituba, besides UPA, agroecology can contribute as a driving force in the activity development, as it seeks the integration between production and lower impact on the environment while maintaining productivity; and it uses

technologies already available, such as the reuse of organic residues of domestic or industrial origin (bakeries, butchers, breweries, sugarcane bagasse, kitchen waste). Additional advantages include proximity to the consumer market, availability of fresh products, and easy access to labor (GNAU, 2002). Therefore, the general objective of this research was to make a socioeconomic and environmental characterization of productive backyards in the Marituba municipality, Pará state. Specific objectives focused on observing the biodiversity in the backyards as well as outlining the farmers' socioeconomic profile and investigating how they contribute to the family unit production. We also identify the main barriers to trade in agricultural products and which crops are grown in the backyards. The study thus may help to guide public policies that value and encourage family and UPA in Marituba. Research analyses are based on both primary data, collected in the field through questionnaires, and secondary data, obtained in official publications and scientific articles. This research is justified by observing the context of Marituba backyards, where urban agriculture is carried out with food production for a wide range of consumers. The results may guide public incentive policies for UPA, as well as the implementation of actions aimed at the maintenance and development of municipal production. Additional guidance can come from access to courses to improve agricultural techniques in a sustainable way, encouraging regularization in the condition of family farmers from the Pronaf Declaration of Aptitude and participation in government programs such as the Food Procurement Program and National School Feeding Program.

METHODS

Characterization of study region: The Marituba municipality was formed under the influence of Belém-Bragança Railway station, whose construction began in 1883 (Rebello and Homma, 2017; Da Costa Tavares, 2010). This was one of the first actions intended to colonize Northeast Paraense. The first people to arrive in this region, in mid-April 1875, were the French, Italian, and Spanish, who originated several agricultural centers, among them Apeú, Castanhal, and Inhangapi; these municipalities are part of the Bragantina Zone. The colonization, besides objectifying the occupation of territory, also sought fertile and arable land for agricultural production that would supply the inhabitants of the city of Belém, which was in full territorial expansion (Brazilian Institute of Geography and Statistics, IBGE, 2018). The consolidation of the Marituba municipality was developed as a result of the Belém-Bragança Railway establishment, as well as other villages that would later become municipalities. The occupation of the municipality took place through provincial government policies, implemented in the second half of the twentieth century, that sought the integration of the Bragantina region through this railway. At this time there was a large area separating the current Bragantina zones Guajarina and Salgado from the urban center, Belém, which therefore was ripe for population (Da Costa Tavares, 2010). The Marituba municipality is located in the Belém Metropolitan Region, has an estimated population of 129,321 people, and has a demographic density of 1,047.44 inhabitants/km,^{2} according to IBGE data (2018). Marituba comprises the municipalities of Benevides to the north, Santa Bárbara do Pará to the east, Acará and Belém to the south, and Ananindeua to the west. It is 13 km from the state capital, Belém, via the BR 316 Federal Highway, and is located at these geographic coordinates: latitude: 1° 21'19" south, longitude: 48° 20' 36" west (Figure 1). Regarding economic aspects, data from the IBGE indicate that the municipal gross domestic product reached R$13,781.36 in 2016. The main income-generating activities of the municipality in 2016 were services (49%), administration and public services (26%), taxes (14%), and industry (12%). The municipality has a Municipal Human Development Index of 0.676 (2010), which according to the United Nations Development Program is an average level of socioeconomic development (PNUD, 2019).

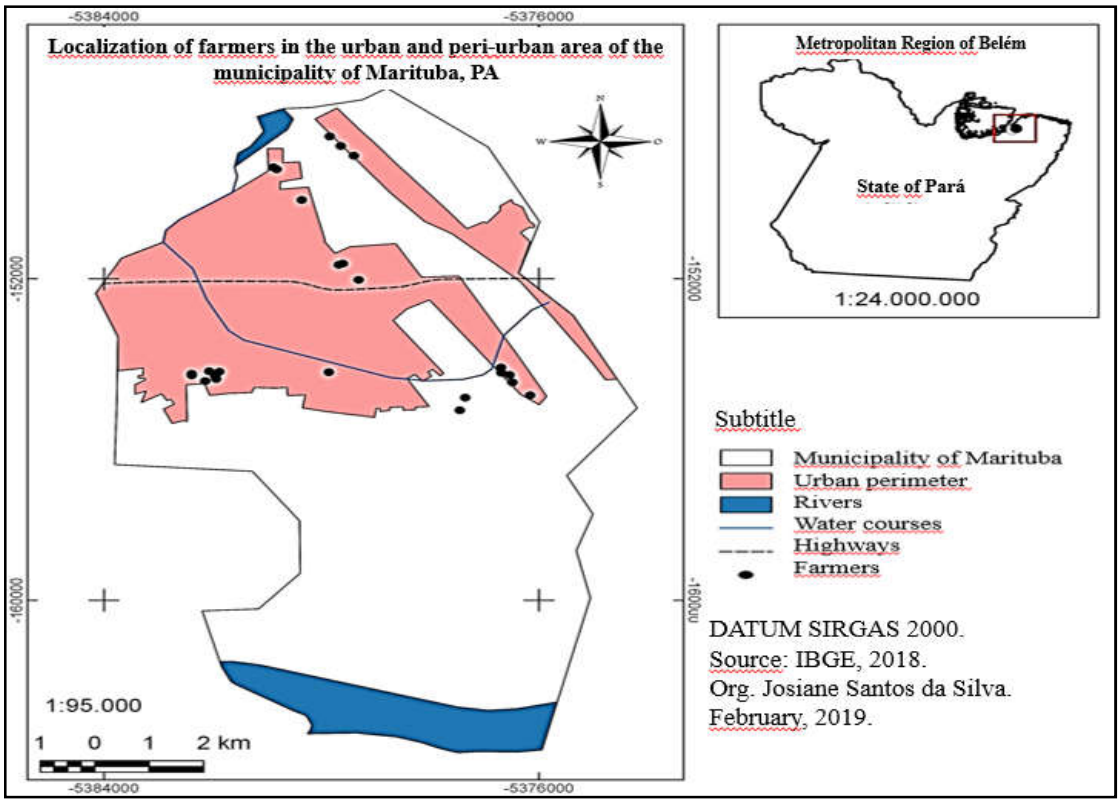

Figure 1. Location map of urban and/or periurban producers in the Marituba municipality, Pará State.

Data collection instrument: questionnaire building

The field research was conducted between December 2018 and January 2019, and the primary data were obtained by applying a questionnaire in 22 quintals. Direct observation was also used to complement this information. The questionnaire was based on similar research instruments in the literature (Barbosa Vilar *et al.,* 2010). The surveys were conducted in person in respondents' homes or backyards. The questions were divided into two blocks: socioeconomic profile and environmental profile. Due to the lack of official census information about urban farmers, we decided to employ snowball sampling. In this technique one interviewee indicates another (Bailey, 1994) and so on, until there is repetition in the observed profiles and/or the research objective is reached. This sampling is non-probabilistic for convenience and uses reference chains, i.e., it is not possible to define the probability of selection of each participant in the survey or research (Vinuto, 2016). This practice is widely used in groups that are difficult to reach or are not accurate in their quantity (Bernard, 2005) and was therefore chosen due to the difficulty in obtaining a sample that represented urban farmers in Marituba. In total, 22 farmers were interviewed, covering four neighborhoods: Uriboca, San Francisco, Almir Gabriel, and Bela Vista. These neighborhoods comprise Marituba's main centers of UPA. Several questions in the questionnaire were used to obtain quantitative (closed questions) and qualitative (open questions) data. For Godoy (1995, p. 58), qualitative research "involves obtaining descriptive data about people, places and interactive processes through the researcher's direct contact with the situation studied, seeking to understand the phenomena from the perspective of the subjects." Quantitative research has a more precise approach, and the researcher seeks to recognize the representative elements of the studied object (Portela, 2004). In this research we used both approaches, aiming to guarantee data accuracy and provide material for evaluative and analytical discussion.

RESULTS

Social and economic profile of urban farmers

From 22 interviewed people, 36% were from other municipalities in Pará state, and the remainder were distributed among those born in Marituba (31%) and other states (32%). Approximately 50% of families have been living in the municipality for over 20 years. In addition, 91% of them have been working in agriculture for more than 10 years; on the other hand, the number of young people in this activity is low, which might change the configuration of agricultural activities in the future. This can be explained by various urban issues, ranging from basic infrastructure to public safety issues and also commercialization alternatives, as reported by respondents. More than 50% of respondents (54%) were women and 45% were men; this distribution is similar to a survey by Carneiro *et al.* (2013), showing that women remain one of the urban agriculture foundations in Marituba. This strong presence of women is mainly due to the fact that men seek other ways of livelihood. In an attempt to overcome the low income from agricultural activities, men often work in service companies and thus are entitled to a signed working card; typically they earn little more than a minimum wage. On the other hand, women have the possibility of earning income through farming in the backyards and at the same time they continue to care of the home and children. Another fact that can strengthen the contact ties with the productive environment is the time devoted to cultivation, where 90% of farmers spend more than eight hours a day in their backyards. In addition, there are other reasons that mark the strong relationship with productive backyards, such as contact with the land (91%) and the tranquility of the work environment (77%). The respondents' age ranged from 38 to 74 years, with a mean of 52.64 and a standard deviation of 9.42 years. Although producers are at a later stage in life, by the fact that from 22 interviewed people only one was under 40 years of age, only 18% are retired; 32% receive financial assistance through the Bolsa Familia Program and 50% do not receive any kind of government income assistance. The data collected in the field showed that 86% of respondents consider the yard to be the space behind or next to the residence, which makes the practice close to family life and also contributes to farmers' financial autonomy, as pointed out by Ambrósio *et al.* (1996).

The income obtained in the backyards for some producers (41%) reaches up to two minimum wages, while 32% receive up to one minimum wage, and 77% reported that they market the products of the backyards as a supplementary income strategy. Even with few financial resources, these farmers still hire external labor (45%) in the phases of planting and harvesting. This temporary hiring of labor is also associated with the high average age of farmers, which limits their ability to develop various activities of agricultural production systems. Regarding education, more than half of respondents (54%) did not complete elementary school, while 23% completed high school, and one producer was illiterate. The participation of farmers in associations and/or cooperatives is very low (18%). The occupied area in the backyards can be stratified by size: 41% owned up to 0.5 hectares, 36% from 0.5 to 3 hectares, 14% over 3 hectares, and 9% did not report. On average, farmers cultivate 53% of their production units' area. Farmers commit their workforce to five groups of crops: vegetable crops (73%), fruit plants (54%), ornamentals (32%), medicinal plants (27%), and other agricultural products (13%), which include the production of chicken, eggs, and cassava. Vegetable cultivation is the dominant activity with fifteen different products (Table 1). The most frequent vegetables are coriander (68%), cariru (50%), cabbage (45%), and jambú (41%). The last one cited, although traditional in the local cuisine, had a low production at the time, due to heavy rain, causing irregular plant development during the period (late second half of 2018). In the set of medicinal plants there are approximately thirty-three species (Table 2), with the most cited listed as aloe (27%) and mint (27%). Most of the observed medicinal plants are typical of the Amazon region, used in various ways, such as cosmetics, tea, compresses, cooking, and syrups. These species are used in folk medicine to treat various diseases and also are grown for commercialization in local markets (Santos *et al.,* 2005). Table 3 shows the seventeen most common ornamental plants in the backyards. The main one was the fern (32%), which is very common in the region for space ornamentation. It was also noted that the production of ornamental plants is made on a smaller scale compared to vegetables. This is mainly because farmers do not have a more developed marketing channel with regular buyers, so sales happen sporadically, making the producer work according to demand. The fruit plants cultivated by the interviewees are shown in Table 4, where the most frequent are acai (54%) and banana (36%), followed by pupunha (36%), cupuaçu (27%), and mango (27 %). Except banana and mango, the other fruits are typical of northern

Table 1. Family, scientific, and popular name of vegetables produced by urban farmers in Marituba, 2018

Vegetables and Herbs			Frequency (%)
Family	Scientific name	Popular name	
Apiaceae	*Coriandrum sativum L.*	Coriander	68
Amarantáceas	*Amaranthus viridis L.*	Cariru	50
Brassicaceae	*Brassica oleracea L.*	Cabbage	45
Asteraceae	*Spilanthes oleracea*	Jambu	41
Asteraceae	*Lactuca sativa L.*	Lettuce	32
Liliaceae	*Allium schoenoprasum L.*	Chive	23
Asteraceae	*Cichorium endivia L.*	Chicory	23
Lamiaceae	*Ocimum basilicum*	Alfavaca	9
Solanaceae	*Capiscum chinense*	Smelling pepper	9
Malvaceae	*Hibiscus sabdariffa*	Vinegar tree	9
Apiaceae	*Petroselinum crispum*	Parsley	9
Amarantáceas	*Spinacia oleracea L.*	Spinach	4
Cactaceae	*Pereskia aculeata*	Ora-pro-nobis	4
Solanaceae	*capsicum chinense*	Bhut jolokia pepper	4
Brassicaceae	*Eruca sativa*	Arugula	4

Source: Research data.

Table 2. Family, scientific, and popular name of medicinal and aromatic plants produced in Marituba backyards, 2018

Medicinal and Aromatic Plants			Frequency (%)
Family	Scientific name	Popular name	
Liliaceae	*Aloe vera (L.) Burm. f*	Aloe Vera	27
Labiatae	*Mentha spicata*	Mint	27
Amaranthaceae	*Dysphania ambrosioides*	Mastruz	0.27
Labiatae	*Melissa officinalis L.*	Lemongrass	0.18
Lamiaceae	*Ocimum basilicum*	Basil	0.18
Compositae	*Tanacetum vulgare L.*	Catinga-de-mulata	0.18
Rutaceae	*Ruta graveolens L.*	rue	0.18
Acanthaceae	*Justicia pectoralis*	Anador	0.14
Labiatae	*Plectranthus barbatus Andrews*	Bilberry	0.14
Piperaceae	*Piper callosum Ruiz & Pa*	Paregoric	0.14
Malvaceae	*Hibiscus sabdariffa*	Vinegar tree	0.14
Lamiaceae	*Rosmarinus officinalis*	Rosemary	0.05
Labiatae	*Lavandula officinalis*	Lavender	0.05
Asteraceae	*Arnica Montana*	Arnica	0.09
Anacardiaceae	*Spondias dulcis*	Cajarana	0.09
Poaceae	*Cymbopogon citratus*	Capim-santo	0.09
Celastraceae	*Maytenus ilicifolia*	Espinheira Santa	0.09
Zingiberaceae	*Zingiber officinale*	Ginger	0.09
Compositae	*Mikania glomerata Spreng.*	Guaco / Sucuriju	0.09
Lamiaceae	*Origanum vulgare*	Oregano	0.09
Asteraceae	*Stevia Rebaudiana*	Stevea	0.09
Adoxaceae	*Sambucus nigra L.*	Elderberry	0.09
Vitaceae	*Cissus sicyoides L.*	Insulin	0.05
Rutaceae	*Pilocarpus microphyllus*	Jaborandi	0.05
Acanthaceae	*Justicia pectoralis*	Melhoral	0.05
Cucurbitaceae	*Momordica charantia*	Melao-Caetano	0.05
Lamiaceae	*Origanum majorana*	Marjoram	0.05
Fabaceae	*Senna obtusifolia*	Mata-pasto	0.05
Lamiaceae	*Pogostemon cablin*	Oriza	0.05
Bignoniaceae	*Arrabidaea chica*	Pariri	0.05
Piperaceae	*Piper longum*	Long pepper	0.05
Amaranthaceae	*Alternanthera dentata*	Terramycin	0.05

Source: Research data.

Table 3. Family, scientific, and popular name of ornamental plants produced in Marituba, 2018

Ornamental Plants			Frequency
Family	Scientific name	Popular name	
Davalliaceae	*Nephrolepis exaltada*	Fern	32
Bromeliaceae	*Neoregelia carolinea*	Bromeliad	0.27
Cactaeae	*Melocactus zehntneri*	Cacti	0.27
Begoniaceae	*Begonia elatior*	Begonia	0.23
Apocynum	*Adenium obesum*	Desert Rose	0.23
Lamiaceae	*Solenostemon scutellarioides*	Coleus	0.18
Nyctaginaceae	*Boungainvillea glabra*	Boungaiville	0.14
Araceae	*Anthurium andraeanum*	Anthurium	0.09
Hydrangeaceae	*Hydrangea macrophylla*	Hortence	0.09
Pinaceae	*Pinus pínea L*	Pine	0.09
Zingiberaceae	*Alpinia purpurata*	Alpinia	0.05
Zingiberaceae	*Etlingera elatior*	Bastão-do-imperador	0.05
Euphorbiaceae	*Euphorbia milii*	Coroa-de-cristo	0.05
Heliconiaceae	*Heliconia rostrata*	Heliconia	0.05
Arecaceae	*Licuala peltata*	Palm trees	0.05
Zingiberaceae	*Zingiber spectabile*	shampoo	0.05

Source: Research data.

Table 4. Family, scientific, and popular name of fruit trees produced in Marituba backyards, 2018

Fruit Trees			Frequency (%)
Family	**Scientific name**	**Popular name**	
Arecaceae	*Euterpe oleracea*	Acai berry	54
Musaceae	*Musa spp*	Banana	36
Arecaceae	*Bactris gasipaes*	Pupunha	36
Malvaceae	*Theobroma grandiflorum*	Cupuacu	27
Anacardiaceae	*Mangifera indica*	Mango	27
Fabaceae Mimosoideae	*Inga edulis*	Inga	14
Sapindaceae	*Nephelium lappaceum*	Rambutan	9
Solanaceae	*Solanum lycopersicum*	Cherry tomato	9
Myrtaceae	*Psidium guajava*	Guava	4
Moraceae	*Morus nigra L*	Blackberry	4
Annonaceae	*Annona (Rollinia) mucosa Jacq. Baill*	Biribá	4
Lauraceae	*Persea americana*	Avocado	4
Moraceae	*Artocarpus heterophyllus*	Jackfruit	4
Malpighiaceae	*Byrsonima crassifolia*	Murici	4
Malpighiaceae	*Malpighia emarginata*	Acerola	0.09
Malvaceae	*Theobroma cacao*	Cocoa	0.09
Anacardiaceae	*Anacardium occidentale*	Cashew	0.09
Poaceae	*Saccharum officinarum*	Sugarcane	0.09

Source: Research data.

Table 5. Main agricultural practices carried out by urban farmers in Marituba, 2018

Agricultural Practices	Percent (%)
Native species cultivation	82
Crop rotation	73
Compost	50
Mulch	42
Green adubation	42
Agricultural diversity	36
Species consortium	32
Waste utilization	27
Alternative insect and disease control	23

Source: Research data.

Brazil, which may indicate the maintenance of local food tastes.

Environmental profile of urban productive backyards

In general, farmers use few sustainable agricultural practices. In other words, urban farmers in Marituba can be classified as "traditional" because they use chemical inputs with great intensity in the production systems, especially in the cultivation of vegetables. In this context, the participation of public and private institutions in campaigns about the importance of prioritizing more sustainable agricultural practices, generating healthy products for the consumer and minimally impacting the environment, is essential. This conclusion is supported by survey data showing that 86% of respondents cite the lack of public policies as the main obstacle to the development of urban agriculture in the Belém metropolitan region, and 82% highlight the low effectiveness of official technical assistance services provided by the municipal and state governments. Access to technical assistance reached only 54% of the interviewed farmers, where the most cited institutions were the Empresa de Assistência Técnica e Extensão Rural do Estado do Pará—EMATER (Company for Technical Assistance and Rural Extension of the Pará State), Serviço Brasileiro de Apoio às Micro e Pequenas Empresas Sebrae (Brazilian service of assistance to micro and small enterprises), Universidade Federal Rural da Amazônia UFRA (Federal Rural University of Amazon), and the Projeto Quintais Amazônicos (Amazon Quintais Project), which is a joint initiative between the Instituto Pobres Servos da Divina Providência (Poor Servants of Divine Providence Institute) and the municipal administration of Marituba. The main guidance received by farmers refer to the techniques of fertilization, planting, proper application of inputs, and commercialization. Many farmers have reported that access to technical assistance services is very difficult, and in most cases the interval between visits is very long. According to research conducted by Santos and Silva (2007), this context may decrease the potential for the implementation of technologies and innovation of production systems, as the quality and regularity of technical assistance services are fundamental for innovation and sustainability of agricultural production systems (Santos and Guerreiro Filho, 2003; Pacheco *et al.,* 2018). Another important issue perceived through field data refers to the farmer's contact with agroecological agriculture. In the Marituba backyard environment, 68.18% of respondents do not know and/or have never heard about it. In this scenario, effective actions are needed to stimulate a change reaction, given the importance and obligation of closer ties of UPA with agroecology, as it may favor the development of public policies for urban agriculture (Aquino and Assis, 2007). Table 5 identifies some agroecological management practices used by farmers. Farmers showed little knowledge about agroecological practices, as they use chemical inputs with great intensity, which generates products with pesticide residues. Given this context, the challenge for the development of UPA in Marituba lies in the construction of the agroecological transition of current production systems.

DISCUSSION

Farmers in Marituba recognize the yard as an important source of income to complement family needs. On the other hand, the farmers' aging and also the little interest of new generations to continue the agricultural activities can be observed, which in the medium and long term will have a direct impact on

production continuity; this situation also was identified by Spanevello *et al.* (2011). The participation of women and young people in urban agriculture should be encouraged through public policies, as indicated in a report by the Food and Agriculture Organization of the United Nations (FAO, 2014), where production spaces are distributed as incentives for increasing the permanence and strength of these actors in urban agricultural activity. The strong participation of women in UPA can be explained by the fact that, together with children, they are among the most vulnerable population groups. Thus, their activity emerges as an alternative to ensure food production and improve the nutritional status of their children, while the surplus is sold and the income used to improve their quality of life and also stimulate female entrepreneurship, through transformation and commercialization of products (Mougeot, 2006). The production in the backyards shows a great variety, where the most outstanding products are the olericultural, fruit, ornamental, and medicinal plants, as well as a group of other products (chicken, eggs, and cassava production). In general, we found a respect for municipality food traditions, but when the market offers demand for exotic products with attractive prices to the producer, farmers introduce them on their properties for good commercialization in the local market. This is the case of rambutan, an edible fruit from Malaysia.

In general, urban and periurban farmers in Marituba suffer the same problems as rural farmers, as they face the problem of production flow, despite their proximity to highways. Most of them do not have their own transportation and are not linked to a cooperative or association that has this type of infrastructure. The number of associated and/or cooperative farmers was much lower than expected, since Santos and Silva (2007) identified in the same municipality that the participation was 47% for these types of activities. According to theseauthors, this change may indicate a shift away from formal social organization configurations, leading to a low social inclusion process and limited access to technical assistance and credit services. Despite this distancing from social organizations, and possibly skepticism toward the leaders of these associations, there is a willingness to continue producing. Environmental issues were also raised in this research, as indicated in Table 5, which shows the main practices carried out by Marituba farmers in their backyards and how they can influence the productive environment. The use of native species (82%) by farmers may indicate the permanence of regional tastes and maintenance of local culture, as well as sustainable action to maintain the soil and environment quality, in general. It also plays an important role in the conservation of intangible heritage that may be lost due to globalization and the introduction of exotic species in the region, so the maintenance of native species such as açaí, cupuaçu, pupunha, and jambu, typical of the Amazon region, keeps the bonds with tradition while tightening ties with the present, besides ensuring food security (Carneiro *et al.,* 2013).

Crop rotation, practiced by 73% of the farmers, consists of alternating, annually, plant species in the same agricultural area, and the chosen species should be prioritized for both commercialization and soil recovery (Gonçalves *et al.,* 2007). This practice is essential for horticulturists, as planting is concentrated in a single area and there is a need to modify the crop to have less impact on the soil over the years. Crop rotation helps to increase the yield; improves the physical, chemical, and biological characteristics of the soil; and assists in the control of weeds and pests, since it impedes the completion of the life cycle of some pathogens (Cattelan, Gaudencio, and Silva, 1997). According to Souza *et al.* (2001), composting is the result of the decomposition of organic materials (leaves, food scraps, fruits, straw and manure, etc.) by microorganisms; the material obtained is a homogeneous organic fertilizer that is usable for any crop. Among Marituba producers, 50% used composting and produced compost for self-consumption and sale, having the advantage of knowing the origin and quality of the fertilizer used and also the cost-benefit of producing their own fertilizer. Among respondents, 27% said they use organic waste to make some kind of compost, an activity that according to Aquino and Assis (2007) is very important, given that in these places there is a large amount of accumulation of organic waste, whether industrial or domestic. Mulching consists of covering the soil surface with a layer of straw or other plant debris between rows, or until coverage by a plant canopy (Oliveira, 2002). Among backyards studied, 42% of respondents used mulching mainly for maintaining soil moisture for a long time, which reduces irrigation costs. It also reduces temperature variations and directs the absorption of rain, thus protecting soil aggregates, eliminating weeds, and maintaining or enriching soil fertility. Green manure with atmospheric nitrogen-fixing leguminous plants provides an increase in soil organic matter; this alternative is important considering the cost of nitrogen from external sources (De Andrade, 2005). Although 42% of growers use this type of management, few showed knowledge of the proper management of leguminous plants, such as the best species for green mass production and the right moment for cutting.

Agricultural diversity describes the successive or simultaneous production of various crops or agricultural activities, and it is an alternative often used by the family farmer as a strategy to become more competitive and to provide more options for self-consumption (Wanderley, 1997). Of the respondents, 36% indicated that they manage more than one crop, mainly due to the production seasonality of various products. In the same way, the concept of a species consortium uses the available space by planting two or more species with different characteristics, such as size, growth habits, and physiology (Kolmans and Vásquez, 1999). For the Marituba backyards, 32% of respondents considered that this is a very important practice, as it makes it possible to plant at different times and harvest full-time throughout the year; it also provides the security of having more than one source of income. Alternative pest and disease control is practiced by 23% of producers; in contrast, most of them use conventional chemical control methods to alleviate phytosanitary problems. The use of these chemicals without proper technical guidance, and often overdosing, makes the active ingredient poisonous and harms the consumers' health and the environment, and these inputs increase the production costs of small farmers. In this research context, alternative methods of control would be the most suitable, since agriculture is practiced on a small scale and some respondents already use alternative products for phytosanitary control. The low frequency of agroecological practices among urban farmers in Marituba is indicative of the limited participation of environmental and technical assistance institutions in their daily lives. A favorable scenario would involve the adoption of practices that have less impact on the environment and human health. From this perspective, production systems based on agroecological principles would be best suited to the reality of urban agroecosystems (Aquino

and Assis, 2007) due to their ability to use local inputs, enable crops in small areas, ensure food security, and contribute to biodiversity, counting on public policy incentives for urban agriculture. This adaptation for agriculture in the municipality would require technologies and inputs adapted to the local context, especially when considering the reuse of urban waste and alternatives for controlling pests and diseases with low cost and minimal impact on the environment. The diversity of plants grown in the urban backyards of Marituba is a highlight. The high frequency of medicinal plants among the plants grown there indicates that there is maintenance of customs regarding the use of these plants in folk medicine, in addition to expanding the agro biodiversity of the backyards. This shows a close relationship with agroecological agriculture that is strongly associated with the social, environmental, and economic conditions of these producers. Gliessman (1990) also has showing this fact, analyzing the perspective of family farming and agroecological principles to strengthen local production, lead to more equitable forms of land distribution and better sharing of financial benefits. Thus the studied backyards are found to be a suitable space for the implementation of agroecology-based UPA development policies.

Conclusion

The survey results indicated several difficulties that permeate the reality of urban and periurban farmers in Marituba. The absence of official data on the number of producers and their current conditions is a major problem, and the lack of a local diagnosis limits specific actions and public policies for this activity. We also found that despite the proximity to the urban center and agricultural background the road infrastructure for internal mobility and structure to support existing rural activities is very precarious. Another important aspect is the existence of a landfill near the producing communities, directly affecting the production and commercialization of the products and causing many social and environmental conflicts between municipal authorities and residents/producers (Souza *et al.,* 2019). Marituba urban backyards are important for the Belém metropolitan region and also for society as a whole, given their diversified production and marketing in the main areas of the Pará state capital, Belém, and justifying the need for appreciation by public administrators and institutions. In this social conjuncture, there are several activities that could contribute to farmers' socioeconomic and environmental development: implementing education programs, sharing knowledge about agricultural techniques, and encouraging farmers to participate in cooperatives/associations. Regarding the latter, participation in social groups is far from expected when it comes to the current sharing of experiences, knowledge, and learning. Agroecology is an option for the Marituba municipality that could have the ability to attract young people and women to practice sustainable agriculture, given the need for changes in the current productive paradigm and the interest in renewing the generation of agriculture in urban backyards. Considering the results of this research and based on the snapshot of the area that it presents, the importance of backyards for the Marituba municipality is noteworthy. Further research is suggested that would investigate the implications of the current production systems of UPA on the urban economy, health and food safety, environmental education, and urban solid waste management. These results are particularly important in guiding new strategies and public policy instruments for the development of UPA in Marituba and the Belém metropolitan region.

Acknowledgements: We thank the Coordenação de Aperfeiçoamento de Pessoal do Nível Superior for its support through the Master's Scholarship granted to the first author. We also extend thanks to urban farmers from Marituba for their patience and dedication to research, and to the teachers Carlos Adriano Leite Barbosa and Kleberson Almeida de Albuquerque for reserving some of their weekends to assist with visits to producers.

REFERENCES

Ambrósio, L. A., Peres, F. C., Salgado, J. M. 1996. Diagnóstico da contribuição dos produtos do quintal na alimentação das famílias rurais: microbacia D'Água F, Vera Cruz. *Informações Econômicas*, v. 26, n.7, pp. 27-39.

Anderson, A. B., Gely, A.,Strudwick, J., Sobel, G. L., Pinto, M. G. C. 1985. Um sistema agroflorestal na várzea do estuário amazônico (Ilha das Onças, Município de Barcarena, Estado do Pará). *Acta amazônica*, v. 15, suppl., pp. 195-224.

Aquino, A. M., and Assis, R. L. 2007. Agricultura orgânica em áreas urbanas e periurbanas com base na agroecologia. *Ambiente and Sociedade*, v. 10, n. 1, p. 137-150.

Barbosa Vilar, M.,Oliveira, A. C. C.,Jacovine, L. A. G.,Ferreira, M. G. Souza, A. L. 2010. Valoração ambiental de propriedades rurais de municípios da bacia hidrográfica do Rio Xopotó. *Cerne*, v. 16, n. 4, p. 539-545.

Bailey, K. 1994. *Methods of social research*. 4th ed. New York: The Free Press.

Carneiro, M. G. R., Camurça, A. M., Esmeraldo, G. G. S. L., Sousa, N. R. 2013. Quintais produtivos: contribuição à segurança alimentar e ao desenvolvimento sustentável local na perspectiva da agricultura familiar (O caso do assentamento Alegre, município de Quixeramobim/CE). *Revista Brasileira de Agroecologia*, v. 8, n. 2, p. 135-147.

Cattelan, A. J., Gaudencio, C. de A., and Silva, T. A. 1997. Sistemas de rotação de culturas em plantio direto e os microorganismos de solo, na cultura da soja, em Londrina. *Revista Brasileira de Ciência do Solo*, v. 21, n.2, pp. 293-301.

Da Costa Tavares, M. G. 2010. A formação territorial do espaço paraense: dos fortes à criação de municípios. *Acta Geográfica*, v. 2, n. 3, pp. 59-83.

De Andrade, A. G.,De Almeida, D. L.,De Aquino, A. M.,De-Poli, H. 2005. *Manejo da adubação verde para produção de mandioca em solo arenoso*. Embrapa Solos. Circular Técnica, 3p.

FAO. 2014. Ciudades más verdes en América Latina y el Caribe. Un informe de la FAO sobre la Agricultura Urbana y Periurbana en la región. Roma: FAO.

Gliessman, S. R. 1990. Agroecology: researching the ecological basis for sustainable agriculture. In: *Agroecology* (pp. 3-10). New York: Springer.

GNAU - Grupo Nacional De Agricultura Urbana. 2002. *Lineamentos para los subprogramas de Agricultura Urbana para el año 2002 y sistema evaluativo*. Cuba: Ministério de Agricultura, p. 84.

Godoy, A. S. 1995. Introdução à Pesquisa Qualitativa e suas Possibilidades. *Revista de Administração de Empresas*, São Paulo, v. 35, n. 2, pp. 57-63.

Gonçalves, S. L., Gaudencio, C. A., Franchini, J. C., Galerani, P. R.,Garcia, A.. 2007. *Rotação de culturas*. Londrina: Embrapa Soja.

IBGE – Instituto Brasileiro de e Geografia e Estatística. *Cidades 2018*. https://cidades.ibge.gov.br/brasil/pa/ marituba. Accessed on July 15, 2019.

Kolmans, E., and Vásquez, D. 1999. *Manual de agricultura ecológica: una introduccion a los princípios básicos y su aplicacion*. Havana: Actaf.

Kumar, B. M., and Nair, P. K. R. 2004. The enigma of tropical homegardens. *Agroforest Systems*, v. 61, pp. 135–152.

Mougeot, L. J. 2006. *Growing better cities: Urban agriculture for sustainable development*. Ottawa: IDRC.

Oliveira, F. N. S. 2002. *Influência da cobertura morta no desenvolvimento de fruteiras tropicais*. Fortaleza: Embrapa Agroindústria Tropical. (Documentos, 49).

PNUD – Programa das Nações Unidas para o Desenvolvimento. 2019. *Atlas do Desenvolvimento Humano no Brasil*. Belo Horizonte: PNUD – Fundação João Pinheiro – Instituto de Pesquisa Econômica Aplicada. Disponível em: < http://atlasbrasil.org.br/2013/>. Acesso em: 15 jul. 2019.

Pacheco, L. B., Rebello, F. K., Santos, M. A. S., Fróes Júnior, P. S. M., and Silva, S. M. 2018. Avaliação das potencialidades para a agricultura urbana no entorno da Universidade Federal Rural da Amazônia (UFRA), município de Belém (PA). *Agrarian Academy*, v. 5, n. 10. pp. 16-28.

Portela, G. L. 2004. *Pesquisa quantitativa ou qualitativa? Eis a questão*. Universidade Estadual de Feira de Santana. Feira de Santana. http://www.paulorosa.docente.ufms.br/ metodologia/AbordagensTeoricoMetodologicas_Portela.pdf. Accessed on December 5, 2018.

Rebello, F. K., and Homma, A. K. O. 2017. *História da colonização do Nordeste Paraense: Uma reflexão para o futuro da Amazônia*. UFRA.

Santos, M. A. S., and Guerreiro Filho, M. C. S. 2003. Olericultura na Região Metropolitana de Belém: o caso da Associação dos Produtores Rurais da Vila Sorriso em Santa Isabel do Pará. *Revista do IESAM*, Belém, v. 1, n.2, pp. 239-249.

Santos, M. A. S., Guerreiro Filho, M. C. S., and Silva, I. M. 2005. Análise socioeconômica da comercialização de produtos da medicina popular na Região Metropolitana de Belém. *Movendo Ideias*, Belém, v. 10, n.17, pp. 32-39.

Santos, M. A. S., and Silva, M. Y. C. 2007. Agricultura urbana e periurbana na Região Metropolitana de Belém: um estudo exploratório com produtores de hortaliças no Município de Marituba. *Movendo Ideias*, v. 12, pp. 87-93.

Souza, F. A. de, Aquino, A. M. de, Ricci, M. dos S. F., and Feiden, A. 2001. *Compostagem*. Embrapa Agrobiologia, dez. p.2. (Comunicado Técnico, 50)

Souza, C. C. F., Melo, B. R., Santos, M. A. S., Rebello, F. K., Martins, C. M., and Beltrão, N. E. S. 2019. Diagnóstico da sustentabilidade na gestão de resíduos sólidos no município de Marituba, Região Metropolitana de Belém, estado do Pará. *Revista Metropolitana de Sustentabilidade*, v. 9, n. 2. http://www.revistaseletronicas.fmu.br/index.php/rms/article/view/1950. Accessed on July 15, 2019.

Spanevello, R. M., De Azevedo, L. F.,Vargas, L. P.,Matte, A. 2011. A migração juvenil e implicações sucessórias na agricultura familiar. *Revista de Ciências Humanas*, v. 45, n. 2, pp. 291-304.

Vinuto, J. 2016. A amostragem em bola de neve na pesquisa qualitativa: um debate em aberto. *Temáticas*, n. 44.

Wanderley, M. de N. B. 1997. Raízes históricas do campesinato brasileiro. *Agricultura familiar: realidades e perspectivas*, v. 3, pp. 21-55.

****