

Original Research Article

AGROBIODIVERSITY OF HOMEGARDENS IN MARANHÃO, BRAZIL

ABSTRACT

The research aimed to invent agrobiodiversity of homegardens in state of Maranhão/Brazil. (Were visited 25 homegardens, where were catalogued 105 botanical specimens, distributed among 47 genera and 29 families). The families with the largest species numbers were Rubiaceae, Malvaceae and Lamiaceae, with four species each, followed by the Solanaceae, Euphorbiaceae (three species each), Myrtaceae, Crassulaceae, Anacardiaceae (two species each) and other families. had only one species each. How much household use for these species studied in the homegardens, 52% presents food use, 35% medicinal use and 13% ornamental use. Mostly women were the primary care takers of the agroforest homegardens, and they had good knowledge about culturalization and garden maintenance. The survey revealed that the home gardens had a strong cultural character highlighting their value as an important community resource for the creation and transmission of knowledge, hus serving as a source of information management for the preservation of community identity

Keywords: *Agroecosystems, Plant cultives, Food safety.*

1. INTRODUCTION

The Agrobiodiversity constitute an agricultural system that associate conservation and management with sustainable development and consists of the diversification of plants, animals and microorganisms used directly or indirectly to food and agriculture [1]. This definition includes all planned agrobiodiversity and the natural biodiversity of agroecosystems as well as ecological services, interactions between living being and way of dealing with the land and technologies of the social groups involved [2].

An agrobiodiversity reservoir in rural or urban communities are the domestic homegardens [3,4], these are also used intentionally for the *in situ* conservation of germplasm of species of commercial interest [5]. According to [6], the homegardens encompass a set of plants with arboreal, shrub, climbing and herbaceous species, and present a diversification in the species, which present the most different grownt habits and, therefore, forming multiple strata, resembling to the structure of tropical forests [7].

The genetic variability maintained in these homegardens, when together, can represent a considerable sum of variation, so conservation of resources, using this procedure, would have advantages of homegardens sustainability in relation to the environment [5].

[8], suggest that the use the homegardens and other agroforestry systems as models of family agricultural production associated with conservation are essential for a link between scientific and popular knowledge. Agroforestry homegardens are related to cultural factors, since they can be results of information, or traditional knowledge passed down by generations [7,9].

In this sense, homegardens constitute links between rural and urban settlements through products, germplasm and resident members [10]. Urban agriculture is an activity of tradition among the families, being exercised in residences where the destination of the products is predominantly for autoconsumption, with little trade [11].

As highlighted by [12], homegardens are considered an "economic mystery", because even with the economy showing a market superiority, homegardens long stood out as the basic function of livelihood.

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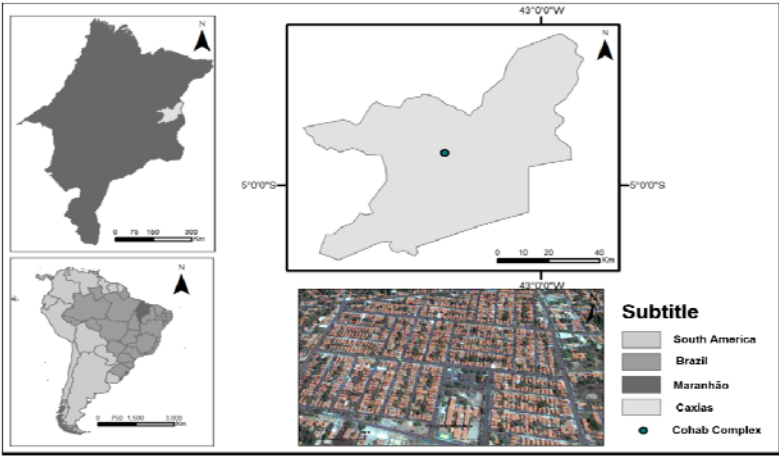
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38 In Brazil, there is a considerable amount of floristic studies on homegardens, where the majority
39 presents qualitative data with descriptions of structure, composition, organization and maintenance of
40 these practices [13, 14, 15]. In this sense, the objective of the research was to know the
41 agrobiodiversity of the homegardens in the municipality from Caxias, Maranhão, Brazil.

42 **2. MATERIAL AND METHODS**

43
44 The study was realized in the homegardens of the Cohab complex (figure 1), located in the Nova
45 Caxias neighborhood, in the municipality of Caxias, in the state of Maranhão/Brazil. The
46 neighborhood researched is located at the coordinates 04° 52' 10" Latitude South and 43° 20' 26"
47 Western Longitude. It is characterized by 58.82% of households consisting of houses or similar and
48 41.18% of buildings or residential units [16], the establishments has daily access to potable as well
49 electricity. The economy is well developed with enterprises from different sectors.



60 **Figure 1.** Map of municipality of Caxias with emphasis in Cohab complex, Maranhão/Brazil

61 We visited a total of 25 homegardens in Cohab complex, Maranhão/Brazil at random with the prior
62 consent of the resident, with the starting point at 01 avenue. Subsequently, the methodological
63 processes were interviews with residents with socioeconomic questions, such as: How old are they;
64 How have you resided in this place; Gender; What profession; How many people live in the house;
65 What is the main source of income. In addition, were asked questions about the management
66 techniques used in the homegardens, namely: Use de external inputs, and if so what it be; criteria
67 used for selecting the plants to be grown; Who is responsible for maintaining the homegardens.

68 The answers were tabulated and expressed in form of graphs and tables. The plant specimens were
69 photographed in their growing habitat. The botanical identification was carried out in the field, when
70 possible and / or with the help of specialized literature.

71 **3. RESULTS AND DISCUSSION**

72
73 In the 25 homegardens visited, were identified 105 specimens belonging to 47 species, 41 genera
74 and 29 botanical families (Table 1). With two or more plant species for each homegarden, only a
75 botanical variety was found in three homegardens. The plant families with the greatest number of
76 species were: Rutaceae, Malvaceae, Lamiaceae, with four species, followed by Solanaceae,
77 Euphorbiaceae, with three species each; and Myrtaceae, Crassulaceae, Anacardiaceae, presented
78 two species, while the other families presented only one specie (Figure 2). The representativeness of
79 these families is closely related to the various resources that they provide them. In relation to the
80 genera, the most representative were *Citrus* (Rutaceae) with four species, followed by *Hibiscus*
81 (Malvaceae) and *Capsicum* (Solanaceae) both with two species. The other genera presented only
82 one species each.

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83 **Table 01.** List of inventoried plant species in homegardens agroforestry. Cohab complex, Nova
84 Caxias neighborhood, Caxias, Maranhão, Brazil, 2016].
85

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Family	Scientific name	Popular name	Use
Anacardiaceae	<i>Mangifera indica</i> L.	Manga	Food
	<i>Anacardium occidentale</i> L.	Caju	Food
Ancanthaceae	<i>Chenopodium ambrosioides</i> L.	Matruz	Medicinal
Anonaceae	<i>Annonas quamosa</i> L.	Ata	Food
Araceae	<i>Dypsis lutescens</i> L.	Palmerinha	Ornamental
Bignoniaceae	<i>Arrabidaea Chica</i> Verlot	Pariri	Medicinal
Bromeliaceae	<i>Ananas comosus</i> L.	Abacaxi	Food
Cactaceae	<i>Euphorbia ingens</i> L.	Cacto	Ornamental
Canaceae	<i>Canna indica</i> L.	Cana da Índia	Medicinal
Caricaceae	<i>Carica papaya</i> L.	Mamão	Food
Convovulaceae	<i>Ipomoea batatas</i> L.	Batata	Food
Crassulaceae	<i>Bryophyllum calycinum</i> Salisb.	Fortuna	Medicinal
	<i>Bryophyllum calycinum</i> L.	Folha santa	Medicinal
Cucurbitaceae	<i>Cucurbita pepo</i> L.	Abóbora	Food
Euphorbiaceae	<i>Manihotes culenta</i> Crantz.	Mandioca	Food
	<i>Jatropha gossypifolia</i> L.	Pião roxo	Medicinal
	<i>Manihot</i> sp.	Macaxeira	Food
Lamiaceae	<i>Rosmarinus officinalis</i> L.	Alecrim	Medicinal
	<i>Venonia condensata</i> Baker	Boldo	Medicinal
	<i>Ocimum basilicum</i> L.	Alfavaca	Medicinal
	<i>Lippia alba</i> L.	Erva cidreira	Medicinal
Liliaceae	<i>Aloe vera</i> L.	Babosa	Medicinal
Lomariopsidaceae	<i>Nephrolepis</i> sp.	Samambaia	Ornamental
Malpighiaceae	<i>Malpighia glabra</i> L.	Acerola	Food
Malvaceae	<i>Hibiscus sabdariffa</i> L.	Vinagreira	Food
	<i>Hibiscus esculentus</i> L.	Quiabo	Food
	<i>Plectranthus amboinicus</i> Andrews	Malva do Reino	Medicinal
	<i>Gossypium arbadense</i> L.	Algodão	Medicinal
Moraceae	<i>Morus alba</i> L.	Amora	Food
Musaceae	<i>Musa paradisiaca</i> L.	Banana	Food
Myrtaceae	<i>Psidium guajava</i> L.	Goíaba	Food
	<i>Eugenia uniflora</i> L.	Pitanga	Food
Oxalidaceae	<i>Averrhoa carambola</i> L.	Carambola	Food
Passifloraceae	<i>Passiflora edulis</i> Sims.	Maracujá	Food
Piperaceae	<i>Piper aduncum</i> L.	Pimenta de macaco	Medicinal
Poaceae	<i>Cymbopogon citratus</i> (DC) Stapf.	Capim Santo	Medicinal
Punicaceae	<i>Punica granatum</i> L.	Romã	Medicinal/ food
Rosaceae	<i>Rosa</i> sp.	Rosa	Ornamental
Rutaceae	<i>Citrus limonum</i> L.	Limão	food / Medicinal
	<i>Citrus aurantium</i> L.	Laranja	food / Medicinal
	<i>Citrus nobilis</i> Lour.	Tangerina	Food
	<i>Citrus aurantifolia</i> L.	Lima	Food
Solanaceae	<i>Lycopersi cumesculentum</i> L.	Tomate	Food
	<i>Capsicum chinense</i> Jacq.	Pimenta de Cheiro	Food
	<i>Capsicum frutescens</i> L.	Pimenta malagueta	Food

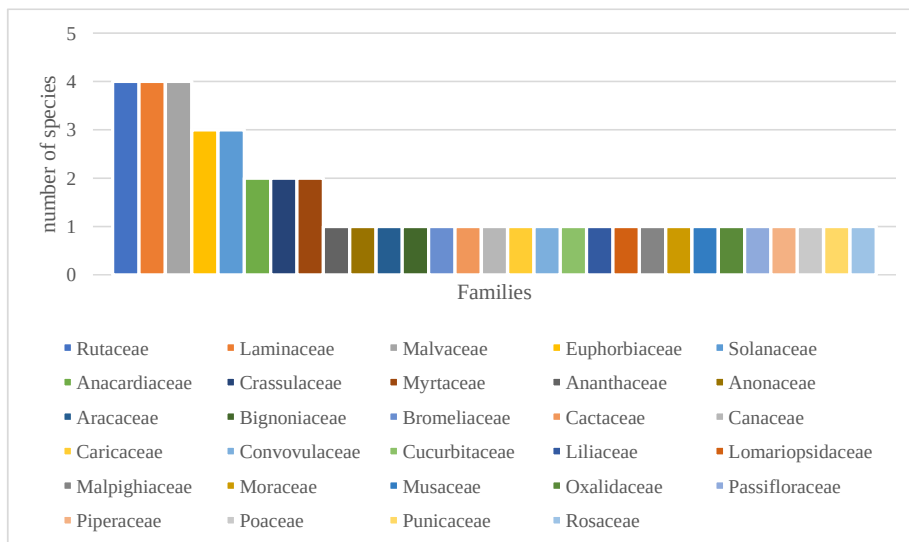


Figure 2. Number of species per botanical family found in agroforestry homegardens in Maranhão, Brazil, 2016

The representatives of the Rutaceae family cataloged in the research has great economic importance, mainly by the fact of catalog only *Citrus* species, with cultivation of their representatives (lemon, orange, tangerine and lime) that in the state of Maranhão is not indicated the cultivation, due to the low rainfall rates, since they can not suffer water deficiency in the inflorescence phase [17].

Another family that stands out is Malvaceae, where its representatives has cultural, economic and medicinal importance [18]. Species of the genus *Hibiscus* (*H. sabdariffa* and *H. esculentus*) listed in the homegardens, are used to prepare typical dishes of region. The cuxá, for example, a Maranhense delicacy is made with vinegar leaves (*H. sabdariffa*); and caruru, a typical food prepared with okra (*H. esculentus*). Other species of the family, *Plectranthus amboinicus* (Malva do reino) and *Gossypium arbadense* (cotton) stand out for medicinal use. Regarding the use of species found in homegardens, vegetables are ornamental (13%), medicinal (35%) and mainly food (52%) (Figure 3).

[19], emphasize the importance of homegardens, mainly due to the presence of fruits and vegetables, which allow the population to maintain a food autonomy, causing minimal impacts on the environment, conserving plant resources and cultural richness, based on the knowledge and culture of using natural inputs and promoting the recycling of natural elements.

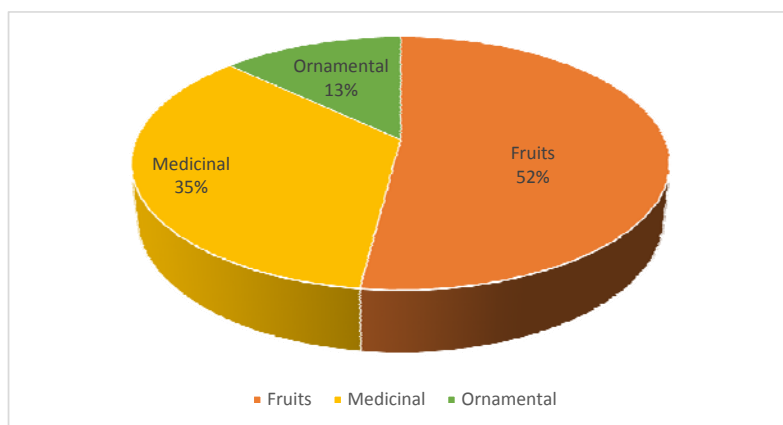


Figure 3. Distribution of plant species according to the category of use in the agroforestry yards in Maranhão / Brazil, 2016.

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In the research, fruit species were the most frequent, among them *Malpighia glabra* (acerola) 12 individuals present in 11 homegardens, followed by *Pasidium guajava* (guava) with seven individuals in seven homegardens, *Mangifera indica* (mango) with five individuals in five homegardens. These species play an important role in feeding communities. According to [20], the presence of fruit trees in agroforestry homegardens generates additional profits in the family income, as well as contributing to the increase of biodiversity and the recovery of degraded and / or abandoned areas so that it is possible to achieve sustainability in family production. For [21], fruit species provide food sources to growers and places of refuge, shelter and food for animals, especially birds [22].

The homegardens care-takers has ages ranging from 26 to 86 years old, with an average of 64 years old. Being the majority women (22 people) who had lived in the neighborhood for 10 and 30 years. The income ranges from 1 to 5 minimum wages (Brazil), obtained mainly through retirement income and occupation mainly in positions of public sectors.

Women are the main responsible for the management and conduction of agroforestry homegardens, corroborating earlier studies of [23,3,7]. The homegarden structure relates to each owner's cultural experiences and life history. In this sense, can better understand the conformations of the homegardens visited according to each resident, which vary according to cultural aspects, available space, function and history of community formation.

The home gardeners has a good knowledge about practices cultivation, with daily time spent on activities in the homegardens the time spent daily in homegardens by different households is difficult to quantify, which according to the owners takes place during their. As in most of the homegardens the person in charge does not perform gardening activities outside the property because the time dedicated to homegarden already compete with the daily household chores. [24], reveal that the benefits of planned agrobiodiversity are more easily perceived where there is care. However, the benefits of natural and unplanned (associated) agrobiodiversity require special attention.

In the homegardens researched, the management of the plants is handmade and carried out by nature, that is, there is no specific care with the plants. The owners demonstrated satisfaction in the accomplishment of the management tasks, where the irrigation process is done manually during periods drought. For the control of the materials such as pests there are minimal interventions other than the manual removal of insects, infected leaves and weeds. Fertilization of the soils is done by organic fertilizer, with the use of coal ash, being also manure, dead palm trunk, as well food, being also observed by [25].

4. CONCLUSION

The homegardens surveyed researched, presented a considerable diversity of botanical species, with the fruit tree species category in their predominance. However, it is noted that homegardens are spaces for growing fresh food, providing the family of growers with greater food security, providing a better lifestyle, and a family income alternative.

5. Ethical disclaimer:

A document was not used in the ethics committee because the work was done with the total authorization of the residents, so it was not an invasive work.

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