

Original Research Article

AGROBIODIVERSITY OF HOMEGARDENS IN MARANHÃO, BRAZIL

ABSTRACT

This the we
The research aimed to inventory agrobiodiversity of homegardens in state of Maranhão/Brazil. Were
visited 25 homegardens, and catalogued 105 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 the others families one
s for
only specie each. Of household use for these species included, 52% presents food use, 35%
medicinal use and 13%for ornamental use. For the most part women were the primary care takers
of the agroforest homegardens, and they had good knowledge about cultivation, 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, and thus serving as a source of information management, for the preservation of
community identity

Keywords: Agroecosystems, Plant cultives, Food safety.

1. INTRODUCTION

The Agrobiodiversity constitute is an agricultural system that associate conservation and
management with sustainable development, and consists of the diversification of plants, animals and

14 microorganisms used directly or indirectly to food and agriculture [1]. This definition includes all
15 planned agrobiodiversity and the natural biodiversity of agroecosystems, as well as ecological
16 services, interactions between living being and way of dealing with the land and technologies of the
17 social groups involved [2].

Domestic homegardens are

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

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

27 of Theodoro; Duarte; Rocha, 2009 [8], suggest that the use of the homegardens and other agroforestry
28 systems as models of family agricultural production associated with conservation are essential for a
29 link between scientific and popular knowledge. Agroforestry homegardens are related to cultural
30 factors, since they can be results of information, or traditional knowledge passed down by generations
31 [7,9].

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

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

39 In Brazil, there is a considerable amount of floristic studies on homegardens, where the majority
40 presents qualitative data with descriptions of structure, composition, organization and maintenance of

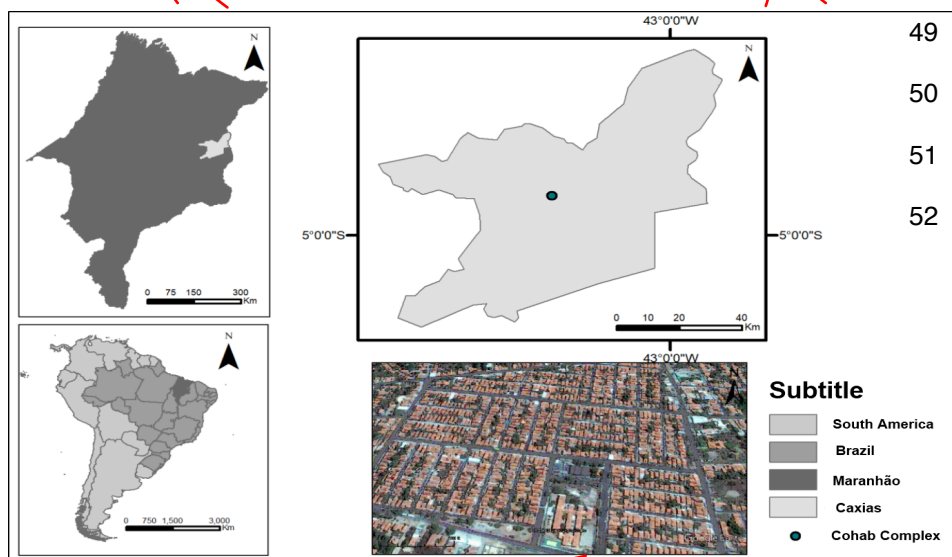
assess

41 these practices [13,14,15]. In this sense, the objective of the research was to know the
42 agrobiodiversity of the homegardens in the municipality from Caxias, Maranhão, Brazil.

43 2. MATERIAL AND METHODS

44 conducted

45 The study was realized in the homegardens of the Cohab complex (figure 1), located in the Nova
46 Caxias neighborhood, in the municipality of Caxias, in the state of Maranhão/Brazil. The
47 neighborhood researched is located at the coordinates 04° 52' 10" Latitude South and 43° 20' 26"
48 Western Longitude. It is characterized by 58.82% of households living in



49 41.18% of
50 buildings or
51 apartment?
52 residential
units [16],

53 with

54 establishments has daily access to potable as well electricity. The economy is well developed with
55 enterprises from different sectors.

and

Figure 1. Map of municipality of Caxias with ~~emphasis~~ ^{reference to the} in Cohab complex, Maranhão/Brazil

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

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

3. RESULTS AND DISCUSSION

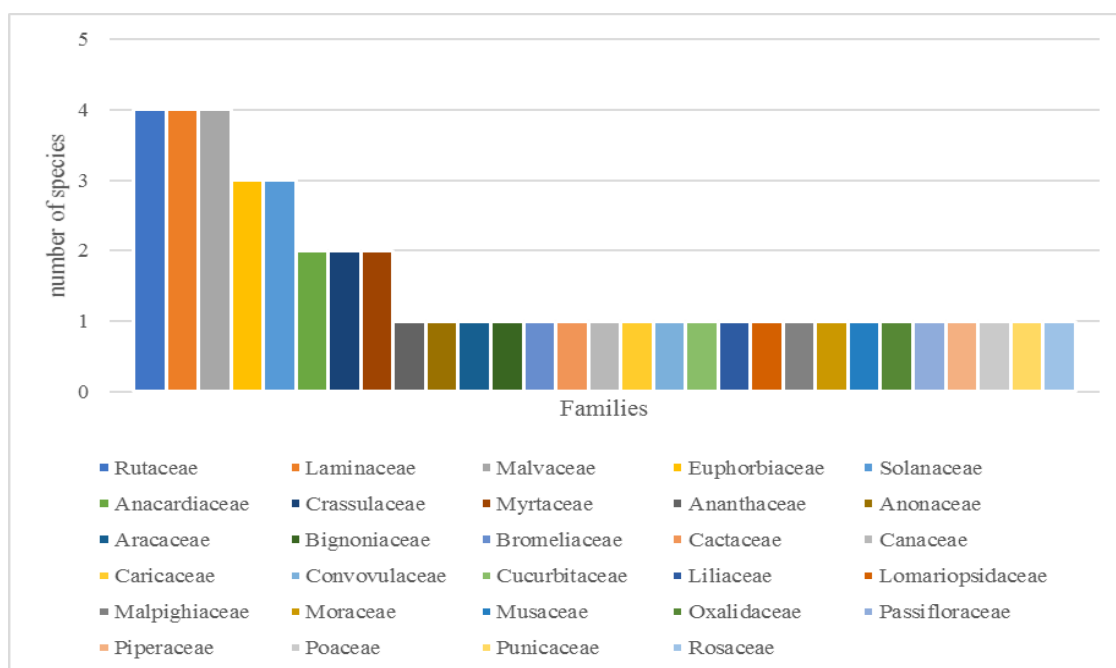
In the 25 homegardens visited, ^{were identified} ~~were identified~~ 105 specimens belonging to 47 species, 41 genera and 29 botanical families (Table 1). With two or more plant species ^{found on} ~~for~~ each homegarden, only a botanical variety was found in three homegardens. ^{The plant} families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

Table 01. List of inventoried plant species in homegardens ^{agroforestry} ~~agroforestry~~, Cohab complex, Nova Caxias neighborhood, Caxias, Maranhão, Brazil.

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
Aracaceae	<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.	Pão roxo	Medicinal
	<i>Manihot</i> sp.	Macaxeira	Food
Laminaceae	<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.	Goiaba	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 esculentum</i> L.	Tomate	Food
	<i>Capsicum chinense</i> Jacq.	Pimenta de Cheiro	Food
	<i>Capsicum frutescens</i> L.	Pimenta malagueta	Food

91



92

93 **Figure 2.** Number of species per botanical family found in agroforestry homegardens in Maranhão,

94 Brazil

are of

95 The representatives of the Rutaceae family cataloged in the research has great economic importance,

because their

96 mainly by the fact of catalog only *Citrus* species, with cultivation of their representatives (lemon,

are not normally cultivated in 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).

Carneiro et al. (2013) [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.

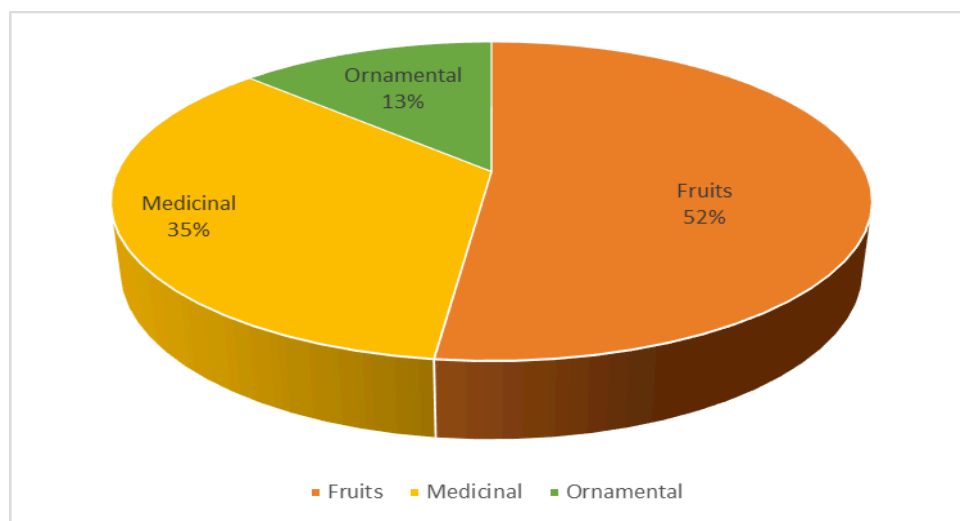


Figure 3. Distribution of plant species according to the category of use in the agroforestry yards in Maranhão / Brazil.

In the research, fruit species were the most frequent, among them *Malpighia glabra* (acerola) 12 trees individuals present in 11 homegardens, followed by *Pasidium guajava* (guava) with seven trees individuals in seven homegardens, *Mangifera indica* (mango) with five trees 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. According to [21], fruit species provide food sources to growers and places of refuge, shelter and food for animals, especially birds [22].

The homegardens care-takers have 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 mainly (or primarily) the responsible for the management and the 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.

when the gardens are managed properly and with diligence. (?)

Perfecto (2009) [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.

dedication and proper stewardship of the agroforestry gardens.

The plants and trees grown in the home gardens were either managed manually with the use of hand tools, or the plants, such as fruit trees, were left unmanaged, with periodic harvests.

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 home-gardeners were in general satisfied with the demands for hand labor to manage the gardens such as the need for periodic manual

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:

as part of (?)
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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