Original Research Article

AGROBIODIVERSITY OF HOMEGARDENS IN MARANHÃO, BRAZIL

ABSTRACT

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, Anacarrdiaceae (two species each) and the others families one 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 cultivalization, 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, a 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 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].

Theodoro; Duarte; Rocha, 2009 [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.

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

2. MATERIAL AND METHODS

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

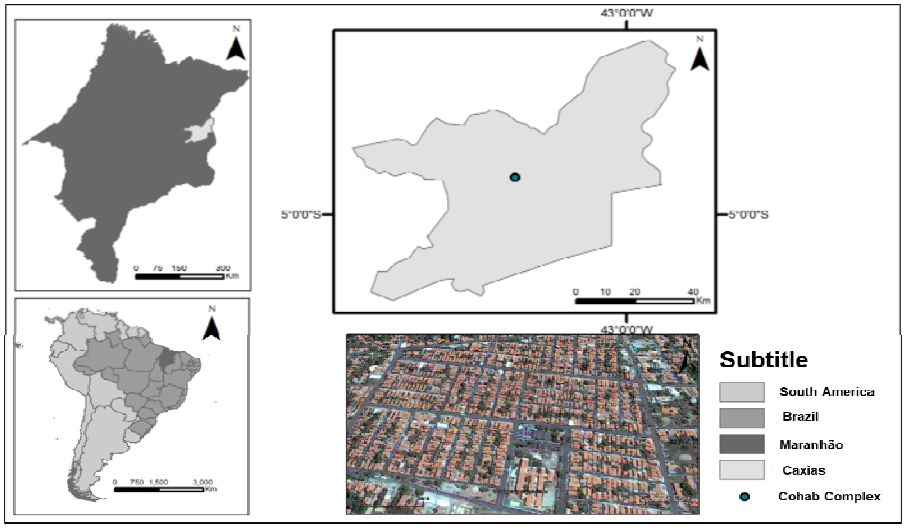

Figure 1. Map of municipality of Caxias with emphasis in Cohab complex, Maranhão/Brazil

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 questions about the management techniques used in the homegardens, namely: Use de external inputs, and if so what 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 105 specimens belonging to 47 species, 41 genera and 29 botanical families (Table 1). With two or more plant species 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, presented two species, while the other families presented only one specie (Figure 2). The representativeness of these families is closely related to the various resources 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. Cohab complex, Nova Caxias neighborhood, Caxias, Maranhão, Brazil.

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

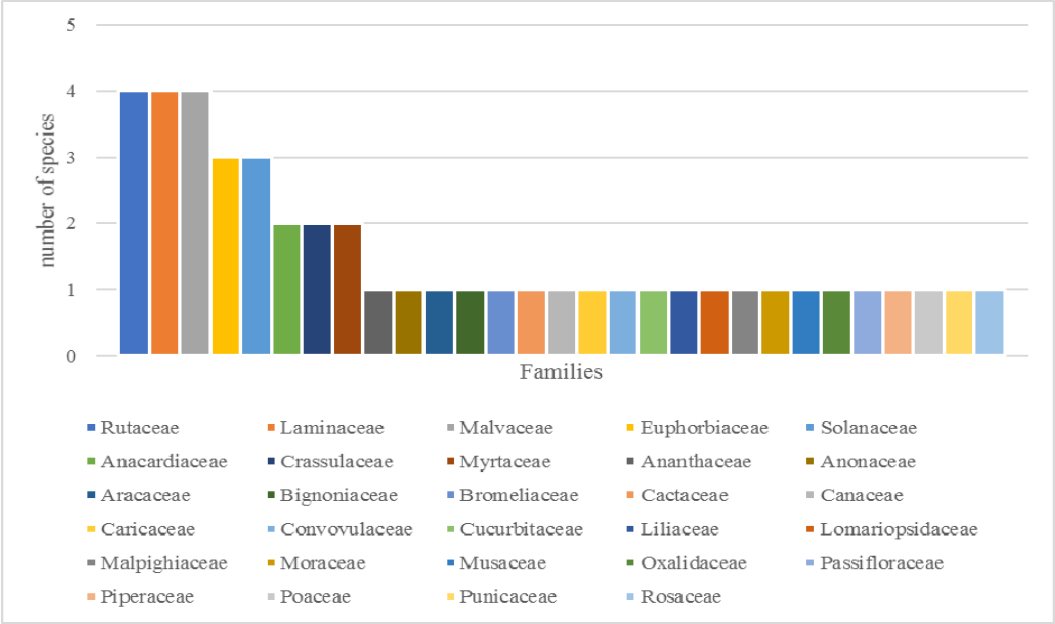

Figure 2. Number of species per botanical family found in agroforestry homegardens in Maranhão, Brazil

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).

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.

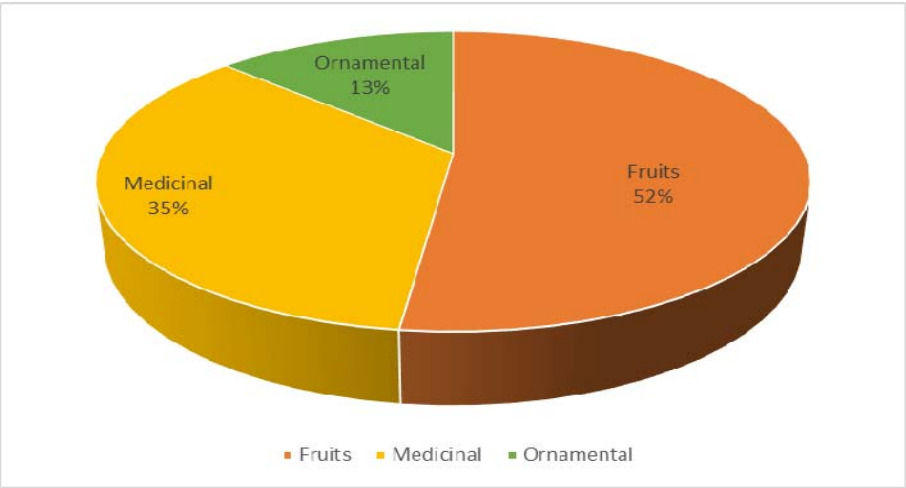

Figure 3. Distribution of plant species according to the category of use in the agroforestry yards in Maranhão / Brazil.

In the research, fruit species were the most frequent, among them *Malpighia glabra* (acerola) 12 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.

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.

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.

REFERENCES

1. Almeida TVV, Rodrigues M, Norder LAC. Agrobiodiversidade nas comunidades Guarani-Nhandewa no Norte do Paraná: memória e resgate. Espaço Ameríndio 2014.8. (1) 40-58.

2. Qualset C, McGuire, P Warburton M. In California: ‘Agrobiodiversity’ key to agricultural productivity. Calif Agr 1995.49(6)45-49.

3. Oakley E. Quintais domésticos: uma responsabilidade cultural Agriculturas 2004. (1) 1.

4. Pereira PVM, Figuereido Neto LF. Conservação de espécies florestais: I am an estrade agroflorestais no municipality of Cáceres - MT. Revista Eletrônica Em Gestão, Educação e Tecnologia Ambiental 2015.19. (3) 783-793.

5. Paiva JR. Melhoramento genético de espécies agroindustriais na Amazônia EMBRAPA: Brasília, 1998.

6. Women Pikar The introduction is the agrofrostry. London: Academic Publishers of the Club, 1993.

7. Rosa LS, Silveira EL, Santos MM, Modesto RS, Perote JRS, Vieira TA. Brasilia is a non-profit family member of Braganca - PA: a composer florist, the use of the Spanish language and the familiar language. Rev. Bras de Agroecologia 2007 (2).

8. Theodoro SH, Duarte LG, Rocha EL. Incorporação dos princípios agroecológicos pénélés rural, rural brasileira: The potential for the development of the coconut is available. In: Theodoro SH, Duarte LG, Viana JN. (org.) Agroecologia: For the new generation of rural poor support. Rio de Janeiro: Garamond, 2009.20-35.

9. Martins WMO, Martins LMO, Paiva FS, Martins WJO, Lima Júnior SF. Agrobiodiversidade nos quintais e roçados ribeirinhos na comunidade Boca do Môa - Acre Revista Biotemas 2012.25 (3) 111-120.

10. Winkler Prins, AMGA House-lot Gardens in Santarém, Pará, Brazil: Linking rural with urban Urban Ecosystems, v. 6, n. 1-2, p. 43-65, 2002.
11. Pessoa CC, Souza M, Schuch I. Agricultura urbana e Segurança Alimentar: Estudo no municipality of Santa Maria - RS. Segurança Alimentar e Nutricional 2006.13 (1) 23-27.

12. Nair PKR. The role of soil science in the sustainability of agroforestry systems: eliminating hunger and poverty. In: GAMA-RODRIGUES et al. (eds) Sistemas agroflorestais: bases científicas para o desenvolvimento sustentável. 2006.

13. Anderson AB, Gely A, Strudwick J, Sobel GL, Pinto MGC. Um sistema agroflorestal na várzea do estuário amazônico (Ilha das Onças, Município de Barcarena, Estado do Pará). Acta amazônica.1985 (15) 195-224.

14. Emperaire L, Pinton F. Dona Flora et cajous: Deux systemmes agricultur au piauí (Brèsil). Journal d'AgriculturalTraditionel et de Botanique Appliqué, 1986. 33.193-212,

15. amentations, Gods, Greensberg M. Compassion, Diversity, and Uses of Homelessness among the Three Amazonian Villages. Economic Boatani.1999.53. (3) 312-326.

16. Consultar CEP. Conjunto Cohab Disponível em: http://www.consultarcep.com.br/ma/caxias/nova-caxias/conjunto cohab/65604400 Acesso em: 08/02/2018.

17. Portal Brasil Economia e Emprego Estudo Indica Áreas para o Plantio de Sete Culturas 2011. Disponível em: http://www.brasil.gov.br/economia-e-emprego/2011/12/estudo-indica-areas-para-o-plantio-de-sete-culturas acessado, 05/02/2018.

18. Souza VC, Lorenzi H. Botânica Sistemática: Guajaru is known for being a philanthropist and philanthropist in Brazil, based on APG III. 3ª edição, Nova Odessa, São Paulo, Instituto Plantarum. 2012. 768p

19. Carneiro MGR, Camurca AM, Esmeraldo GGS. L.; SOUSA, N. R. Quintais Produtivos: Contributed by a local farmer familiar to the local community of contribucian resources (O caso do Assentamento Alegre, municipality of Quixeramobim / CE). Revista Brasileira de Agroecologia. v. 8, n.2, p. 135-147, 2013.

20. Oliveira FEB, Souza MC. O envelhecimento populacional e a previdência social como? População Brasileira 1997.2. (2), 25-27.

21. Sukopp H, Werner P. Monologue of the Secretarial for the State of Políticas del Agua and Medio Ambiente. Madri: MOPT.1991.141.

22. Lira Filho JÁ, Medeiros, MAS. Impact of adolescents in a variety of ways, due to an overdose of arbitrage. Revista de Biologia e Ciências da Terra 2006.6. (2) 375-39

23. Viertler RB. Métodos antropologicos are related to the etnobiology and etnochologia in: Amorozo MCM, Ming LCE, Silva SP. (Ed.) Métodos de coleta e análise de dados em etnobiologia, etoecologia e disciplinas correlatas Rio Claro: Unesp. 2002.

24. Perfecto I, Vandermeer J, Wright A. Nature's Matrix.Linking agriculture, conservation and food sovereignty. 1.ed. Reino Unido: Cromwell Press Group.2009. 242

25. Silva MFP, Silva PH, Oliveira YR, Gomes TMF, Ferreira PMP, Cerqueira GS, Abreu MC, Plantas medicines: For the first time in the country, it has been done in Brazil, Brazil. Revista Intertox de Toxicologia, Risco Ambiental e Sociedade. 2014. 7 (3) 101-113.