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Multipurpose plants in home gardens of Guarulhos (São Paulo State, Brazil): from biodiversity conservation to public health

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Abstract

Introduction: Among the human adaptive strategies, plant cultivation is one of the most important over the last ten thousand years. However, with the development of large urban centers, human population resign some habits in relation of plant cultivation. Recently home gardens have received attention as an important germplasm bank, preserving many non-commercial species.
Objective: This study aims to investigate the diversity of plants cultivated in home gardens. Was also explored how the human population relation with these resources.
Originality: Home gardens have a high potential to maintain resources for urban biodiversity through the variety of plants that are cultivated. However, predominantly small cities are targets of studies of this nature, and large cities are the ones that suffer the most from urbanization pressure. Thus, this work brings this approach to the second largest city in the metropolitan region of São Paulo.
Methodology: The population of President Dutra and Bonsucesso in the city of Guarulhos, SP, was studied. We interview 150 people, being 102 at the Presidente Dutra district and 48 in Bonsucesso neighborhood. It was used a semi-structured and random selection of households surveyed.
Results: The neighborhoods prevailed the cultivation of ornamental plants which were represented by 51 botanical families, followed by food related plants with 38 botanical families and medicinal plants with 15 botanical families.
Contributions: These data indicate a preference for the cultivation of ornamental plants in backyards in the city of Guarulhos, SP.
Conclusions: Residential backyards of the city of Guarulhos showed numerous purposes such as leisure space, housework, car garage and shelter for animals; however, there is a strong occurrence of cultivated plants.

Key words: Human Ecology. Ethnobotany. Sustainable Urban. Private Green Area.

Usos múltiplos de plantas em quintais residenciais de Guarulhos: da conservação da biodiversidade à saúde pública

Resumo

Introdução: Dentre as estratégias adaptativas humanas, destaca-se o cultivo de plantas ao longo dos últimos dez mil anos. No entanto, com o crescimento dos grandes centros urbanos, a população humana deixa alguns hábitos em relação ao cultivo de plantas. Recentemente, os quintais residenciais têm recebido merecida atenção como importante banco de germoplasma, conservando muitas espécies não comerciais.

Objetivo: No presente trabalho levantou-se a presença de quintais e a diversidade de plantas cultivadas e seus usos nos mesmos.

Originalidade: Os quintais domésticos possuem elevado potencial para manter recursos para a biodiversidade urbana por meio da variedade de plantas que são cultivadas. No entanto, predominantemente cidades pequenas são alvos de estudos desta natureza, sendo que cidades grandes são as que sofrem mais a pressão da urbanização. Assim, este trabalho traz esse approach na segunda maior cidade da região metropolitana de São Paulo.

Metodologia: Foram realizadas 150 entrevistas, sendo 102 no bairro Presidente Dutra e 48 no bairro Bonsucesso no município de Guarulhos, SP; em roteiro semiestruturado e escolha aleatória dos domicílios.

Resultados: Nos bairros houve a predominância de cultivo de plantas ornamentais, representadas por 51 famílias botânicas, seguidas pelas alimentícias com 38 famílias botânicas e as medicinais com 15 famílias botânicas.

Contribuições: Esses dados indicam preferência pelo cultivo de plantas ornamentais nos quintais da cidade de Guarulhos, SP.

Conclusões: Os quintais residenciais do município de Guarulhos apresentam inúmeras finalidades além do cultivo de plantas, como espaço de lazer, trabalho doméstico, garagem de carro e abrigo para animais.

Palavras-chave: Ecologia Humana. Etnobotânica. Sustentabilidade Urbana. Áreas Verdes Privadas.

Múltiples usos de las plantas en los patios residenciales de Guarulhos: de la conservación de la biodiversidad a la salud pública

Resumen

Introducción: Entre las estrategias adaptativas humanas destaca el cultivo de plantas durante los últimos diez mil años. Sin embargo, con el crecimiento de los grandes centros urbanos, la población humana deja algunos hábitos en relación al cultivo de plantas. Recientemente, los patios residenciales han recibido merecida atención como un importante banco de germoplasma, conservando muchas especies no comerciales.

Objetivo: En el presente trabajo se planteó la presencia de traspatios y la diversidad de plantas cultivadas y sus usos en las mismas.

Originalidad: Los huertos familiares tienen un alto potencial para mantener los recursos para la biodiversidad urbana a través de la variedad de plantas que se cultivan. Sin embargo, las ciudades predominantemente pequeñas son objeto de estudios de esta naturaleza, y las grandes ciudades son las que más sufren la presión de la urbanización. Así, este trabajo trae este acercamiento a la segunda ciudad más grande de la región metropolitana de São Paulo.

Metodología: se realizaron 150 entrevistas, 102 en el barrio Presidente Dutra y 48 en el barrio Bonsucesso del municipio de Guarulhos, SP; en un guión semiestructurado y elección aleatoria de hogares.

Resultados: En los barrios hubo predominio de las plantas ornamentales, representadas por 51 familias botánicas, seguidas de las alimenticias con 38 familias botánicas y las plantas medicinales con 15 familias botánicas.

Contribuciones: Estos datos indican una preferencia por el cultivo de plantas ornamentales en traspatios en la ciudad de Guarulhos, SP.

Conclusiones: Los traspatios residenciales en el municipio de Guarulhos tienen numerosos propósitos además del cultivo de plantas, como espacio de ocio, trabajo doméstico, garaje para automóviles y albergue de animales.

Palabras clave: Ecología Humana. Etnobotánica. Sostenibilidad Urbana. Áreas Verdes Privadas.

Introduction

As the urbanization process increases in cities, the exploitation of natural resources, the alteration of ecological patterns and processes and the reduction of green areas have become an important focus of study (Ferreira et al., 2021; Pereira et al., 2022; Ramon et al., 2022). Urban green areas accomplish important functions such as oxygen production, adjusting the microclimate, and absorbing pollutants, in addition to its landscape function (Silva & Vargas, 2010). Therefore, the use of plants in the urban environment comprises the principle of sustainability, a strategy for health promotion (Siviero et al., 2011; Santos et al., 2019), maintenance of biodiversity, ecological patters and processes and transfer of acknowledgement to younger generations (Baldauf et al., 2009).

Residential spaces represent one of the oldest forms of land management (Amaral & Guarim Neto, 2008). These spaces can be a combination of trees, shrubs, and/or herbs, sometimes associated with small domestic animals. The ecological contributions of these private and public green areas are diverse (Loboda & De Angelis, 2005). The practice of culivate plants in backyards contributes to improving important aspects of life in urban centers, mainly the food security, which allows the diversification of diet (Nascimento et al., 2005; Eichemberg & Amorozo, 2013), for medicinal pplant uses (Perna & Lamano-Ferreira, 2014) and conservation of biodiversity (Althaus-Ottmann, Cruz & Fonte, 2010; Lamano-Ferreira et al., 2016). Approximately 38% of species cultivated in backyards are used to improve the diet of the families (Eichemberg & Amorozo, 2013), with the highest consumption of vegetables (Amaral & Guarim Neto, 2008). However, few existing urban green areas are used for food production for human consumption (Lamano-Ferreira et al., 2016).

Agriculture in the city has other important interfaces with various aspects of the urban ecosystem, especially those ones related to sustainability, ranging from food production and cultural heritage conservation, related to the environment and plants (Monteiro & Mendonça, 2004; Adler & Tanner, 2015, Rodrigues et al., 2022) known as social biodiversity (Almada, 2012). The term ethnobotany refers to the study of this association and began to be used over a century ago, initially as the study of plants used by the heritage population (Oliveira et al., 2009). These studies promote the interaction of the population with botanical resources and help to understand the ethnoknowledge of the population, contributing to its conservation (Miranda & Hanazaki, 2008; Diegues, 2010; Perna & Lamano-Ferreira, 2014; Martins, Nascimento & Francos, 2021).

Considering that the city of Guarulhos has the second largest demography in the Metropolitan Region of São Paulo and that residential and industrial neighborhoods are diverse by means of domestic backyards uses, our study aims to answer the questions: i) Which plants

are cultivated in urban residential spaces in two residential neighborhoods in Guarulhos? and ii) What are the purposes of plant cultivation in the backyards?

Methodology

Studied area

The municipality of Guarulhos is located in the metropolitan region of São Paulo (RMSP), São Paulo State, Brazil, approximately 17 km from the capital (São Paulo City) and has the second largest population in São Paulo State. The biome is the Atlantic Forest with an area of 318,679 km² and with 1,299,249 habitants (IBGE, 2013).

The study selected two districts of Guarulhos municipality. Presidente Dutra (PD) and Bonsucesso (BO, also known as Inocoop), are in an eastern region of Guarulhos. The Presidente Dutra neighborhood is located on the banks of the Presidente Dutra highway, with residences, industries, industrial sheds, transporters and services. The Bonsucesso neighborhood is mainly residential, in spite of some industries and commercial establishments; and part of the neighborhood is occupied by single storey housing projects, with squares in the center and a wide distribution of shrubs, trees, and herbs of various sizes.

Data collection

Five streets were randomly selected in the two neighborhoods and the residences in the streets were randomly visited. The interviews were mainly conducted with women, once they are the responsible to maintain the backyards and the plants cultivated (Nascimento et al., 2006; Freitas et al., 2012). The study carried out 102 interviews in Presidente Dutra and 48 in Bonsucesso neighborhoods. It was used a semi-structured survey with open and closed questions (Marconi & Lakatos, 2002). The information required were if there was a backyard in the residence, cultivation habits and use of plants, socio-environmental profile, level of education, religiosity, perception of backyards, length of residence in Guarulhos and economic family structure.

The study was registered in the Ethics Committee for Research with Human Beings (COEP) of Universidade Nove de Julho under protocol 450769. Residents received a Free and Informed Consent Term bout the research, agreeing the use of the information generated by the interviews.

Characterization of the socio-environmental profile

The profile of the interviewees was characterized according to the parameters: Age range divided into: 1 = 20 to 30 years old; 2 = 31 to 40 years; 3 = 41 to 50 years; 4 = 51 to 60

years; 5 = 61 or more; Education level: 1 = illiterate / incomplete elementary school (0 to 3 years); 2 = complete elementary I / incomplete elementary II (4 to 7 years); elementary II complete / high school incomplete (8 to 11 years old); 3 = complete high school / incomplete higher education (12 to 13 years old); 4 = complete higher education (14 years or older); Economic profile: 1= A1 and A2, 2= B1 and B2, 3= C1 and C2, 4= D, 5= E (Amaral & Guarim Neto, 2008); Presence of backyards and plant cultivation.

Objective of plant cultivation

The objective of the plant's cultivation in urban backyards (1 = food plants; 2 = medicinal plants and/or 3 = ornamental plants) and their use for food and/or medicinal purposes was verified. Plant organ used and indications for use as medicinal plants were also registered.

Identification of the botanical families

The plants were identified from the images of the plants in the residential backyards. The popular names given by the interviewees were also used for the identification. The method used to identify the scientific and botanical families' names was the visualization and assessment of the images with botanical literature (Lorenzi & Matos, 2000; Lorenzi & Souza, 2001; Haraguchi & Carvalho, 2010; Souza & Lorenzi, 2012).

Results and discussion

Social-environmental profile

The habitants in the neighborhoods were over 50 years old (54.9% PD and 64.6% BO), followed by 41 to 50 years old (23.5% PD and 16.7% BO); 61 years or older (22.5% PD and 25% BO); 20 to 30 years old (10.8% PD and 6.3% BO) and 31 to 40 years old (10.8% PD and 12.5% BO) (Table 1).

Table 1

Socio-environmental profile of the habitants of Guarulhos. PD – Presidente Dutra; BO – Bonsucesso

VARIABLES	PD N=102		BO N=48	
	N	%	N	%
AGE GROUP				
20 to 30 years	11	10.8	03	6.3
31 to 40 years	11	10.8	06	12.5
41 to 50 years	24	23.5	08	16.7
51 to 60 years	33	32.4	19	39.6
61 or more	23	22.5	12	25
EDUCATION LEVEL				
0 to 3 years	53	52.0	14	29.2
4 to 7 years	18	17.6	07	14.6
8 to 11 years	13	12.7	04	8.3
Complete high school	13	12.7	19	39.6
Complete Higher Education	05	4.9	04	8.3
MARRIAGE STATUS				
With partner (a)	69	67.6	31	64.6
Without partner (a)	33	32.4	17	35.4
ECONOMIC RANK				
A			03	6.3
B	10	9.8	40	83.3
C	58	56.9	05	10.4
D	22	21.6	00	0
NUMBER OF CHILDREN				
One	21	21.6	08	16.7
Two	33	32.4	12	25
Three or more	29	28.4	23	47.9
Without children	19	18.6	05	10.4
RELIGION				
Buddhism	01	2.3	0	0
Catholic	23	54.8	26	54.1
Spiritist	02	4.76	05	10.4
Spiritualist	0	0	01	2
Evangelical	13	30.9	14	29.1
Messianic	0	0	02	4.1
Without religion	03	4.6	01	2
RESIDENCE TIME				
0 to 3	06	6	01	2
4 to 6	5	5	04	8.3
7 to 10	4	4	03	6.2
11 to 15	7	6.9	02	4.7
16 to 20	20	19.7	04	8.3
+ than 20	60	59	34	70.9
BACKYARD				
Presence	94	92.2	38	79.2
Plant Resources	98	96.1	47	97.9

Source: Prepared by the authors

The educational stage showed differences related to the time of study of the habitants of the neighborhoods surveyed. The habitants with 0 to 3 years of study were 52% in PD and 29.2 in BO. The habitants that finish high school were 12.7% in PD and 39.6% in BO. The

results showed that 48% of habitants of BO have finished high school while the majority of PD habitants (52%) studied for up to 3 years. Most of the habitants has a partner, 67.6% in PD and 64.6% in BO neighborhood. The number of children is lower in PD neighborhood, with two children per couple (32.4%) and three or more children in BO (47.9%).

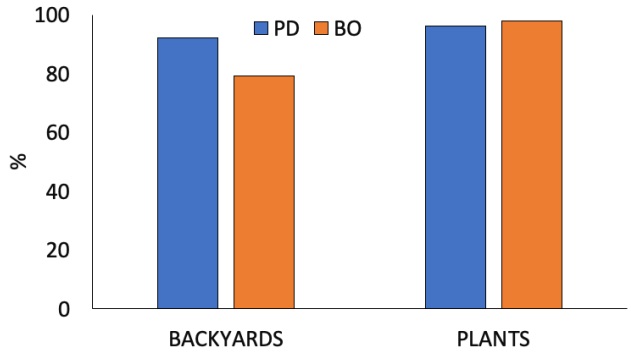
Regarding the religious practices of the habitants, the majority were Catholic (54.8% PD and 54.1% BO), followed by Evangelicals (30.9% PD and 29.1% BO) and Spiritualists (4.8%PD and 10.4%BO). Other religious practices such as Buddhism in the PD (2.3%) and Messianic in BO (4.1%) were also reported. Habitants with no religious practice were 7.1% in PD and 2% in BO. The data in our study is similar to that obtained by Freitas (2009) with the highest number of Catholic (95%) and Evangelical (5%) habitants. However, in the study by Freitas (2009) the number of evangelicals was much smaller than those observed in our study.

The habitants live at least 20 years in the neighborhoods BO (70.9%) and PD (58.9%). The habitants living from 0 to 3 years were 6% in PD and 2% in BO, 4 to 6 years were 5% in PD and 8.3% in BO, 7 to 10 years were 4% in PD and 6.2% in BO, 11 to 15 years were 6.9% in PD and 4.7% in BO, 16 to 20 years were 19.7% in PD and 8.3 in BO.

The occurrence of backyards was high (92.2% PD and 79.2% BO), with high percentage of plants in backyards (96.1% PD and 97.9% BO) (Figure 1). The backyards are also used for leisure, domestic work, and garage, among others.

Figure 1

Relationship (%) between the occurrence of urban backyards and plant cultivation in Presidente Dutra (PD) and Bonsucesso (BO) neighborhoods, Guarulhos, SP



Source: Prepared by the authors.

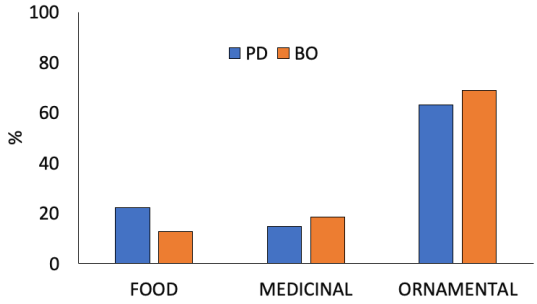
Objective of plant's cultivation

The majority of plants cultivated in the urban residential backyards were for ornamental purposes (60% PD and 40% BO), as shown in Figure 2. The cultivation of food and medicinal

plants was 22.1% and 12% in PD and 14.2 and 10% in BO, respectively. Large Brazilian cities such as Curitiba (PR) (Althaus-Otmman, Cruz & Fonte, 2010) and Porto Alegre (RS) (Vendruscolo & Mentz, 2006; Baldauf et al., 2009) also have a high number of ornamental plants, compared to other functional plants, as observed in Guarulhos. We would like to highlight that there are few ethnobotany studies involving the different purposes of plant cultivation, and most of them carry out surveys only with medicinal or food plants.

Figure 2

Relative values (%) of the purpose of plants grown in residential spaces in Presidente Dutra (PD) and Bonsucesso (BO) neighborhoods in Guarulhos, SP



Source: Prepared by the authors.

Heritage knowledge

The main source of heritage knowledge occurs within the family, where the knowledge acquired from mothers is transmitted to children and grandchildren. The traditions are about the cultivation, handling, plant attributes, suggestion of use and preparation of teas. Information about medicinal, culinary and forms of plant consumption, are transmitted from mothers to children (vertical transmission), with 33% in PD and 35.5% in BO neighborhoods. The transmission with people of the same generation (horizontal transmission), was also mentioned as an important source of knowledge (30.6% in PD and 31.1% in BO). There are also reports of knowledge transmitted from grandparents (9.9% in PD and 6.6% in BO), and longitudinal transmission (Begossi, 1993).

The main form of transmission of heritage knowledge is carried out through orality, with the younger generations attending to the older ones on everyday jobs (Pasa & Ávila, 2010). Most of the time, parents, grandparents, or family members carry out oral transmission within the domestic group. It is worth mentioning that the main group with greater availability to answer the questionnaire was over 50 years old. When asked about the importance of transmitting the heritage knowledge to younger generations, the majority (98%) believe it is

important, but there were cases in which the habitants stated that their knowledge about plants is not valued by the young generation. Other ways to acquire knowledge were established through friends, neighbors, books, and television (Table 2).

Table 2

Habits to obtain knowledge about the use of medicinal plants in Presidente Dutra (PD) and Bonsucesso (BO) neighborhoods in Guarulhos

OBTAINING KNOWLEDGE	PD	BO
FRIENDS	4.7%	7.8%
GRANDPARENTS	9.7%	5.6%
BOOKS	5.1%	8.6%
MOTHER	31.6%	32.5%
TV	1%	0%
AUNTS	7.1 %	2.2%
EXPERIENCE	30.0%	31.1%
NEIGHBORS	7.9%	8%
DID NOT ANSWER	4%	4.5%

Source: Prepared by the authors

Plants cultivated in backyards

Thirty-nine categories of food plants were reported in Guarulhos municipality. There are 26 food plants from 26 botanical families in PD neighborhood, and 13 food plants from 9 botanical families in BO. The frequency of consumption (daily, weekly, monthly or never), the occurrence of plants and absolute frequency (AF) are described in Table 3.

Table 3

Food plants and their frequency of consumption in Presidente Dutra (PD) and Bonsucesso (BO) neighborhoods in Guarulhos (D-Daily/S-Weekly/M-Monthly/N-Never). AF – Absolute frequency. - Organs: Leaves (L); Plant (All Plant); B (B); Stem (S); Flower (Fl); Fruit (Fr); Rhizome (Rh); Root (R); Seed (Se)

Common name	Scientific name	Family	Organs	AF		Consumption Frequency	
				PD	BO	PD	BO
Avocado	*Persea americana* Mill.	Lauraceae	Fr	04	01	S/M	M
Saffron	*Curcuma longa* L.	Zingiberaceae	Rh	01	00	M	N
Acerola	*Malpighia glabra* L.	Malpighiaceae	Fr	05	00	D	N
Basil	*Ocimum basilicum* L.	Lamiaceae	L	03	00	S/M	N
Plum	*Prunus domestica* L.	Rosaceae	Fr	05	01	M	M
Blackberry	*Morus nigra* L.	Moraceae	Fr	01	00	S/M	N
Yellow guava	*Psidium guajava* L.	Myrtaceae	Fr	01	00	M	N
Sweet Potato	*Ipomea* (L.) Lam	Convolvulaceae	R	01	00	M	N
Cocoa	*Theobroma cacao* L.	Malvaceae	Fr	03	00	M	N
Sugarcane	*Saccharum officinarum* L.	Poaceae	S	02	00	S/M	N
Khaki	*Diospyros kaki* Thunb.	Ebenaceae	Fr	01	00	D/M	N
Scallion	*Allium fistulosum* L.	Amaryllidaceae	L	10	04	D/S/M	D/S/M
Cherry	*Prunus domestica* L.	Rosaceae	Fr	01	00	M	N
Chayote	*Sechium edule* (Jac.) Sw.	Curcubitaceae	Fr	01	00	D	N
Cilantro	*Coriandrum sativum* L.	Apiaceae	L	01	02	D/S/M	D/M
Paprika, Annatto	*Bixa orellana* L.	Bixaceae	Se	01	00	S	N
Kale Butter	*Brassica oleracea* L.	Brassicaceae	L	01	01	D	M
Bean	*Phaseolus vulgaris* L.	Fabaceae	Se	03	00	D	N
Fig	*Ficus carica* L.	Moraceae	Fr	06	00	D/M	N
Jabuticaba tree	*Myrciaria cauliflora* (Mart.) O. Berg	Myrtaceae	Fr	09	00	D/S/M	N
Scarlet eggplant	*Solanum gilo* Radi	Solanaceae	Fr	02	00	D/S	N
Orange	*Citrus aurantium* L.	Rutaceae	Fr	03	03	D/S/M	S/M/N
Lemon	*Citrus limonia* Osbech	Rutaceae	Fr	07	00	D/M	N
Papaya	*Carica papaya* L.	Caricaceae	Fr	06	00	D/S/M	N

Common name	Scientific name	Family	Organs	AF		Consumption Frequency	
				PD	BO	PD	BO
Manioc	*Manihot esculenta* Crantz.	Euphorbiaceae	R	01	00	M	N
Mango	*Mangifera indica* L.	Anacardiaceae	Fr	08	00	S/M	N
Basil	*Ocimum basilicum* L.	Lamiaceae	L	11	04	D/S/M	D/S
Passion Fr	*Passiflora* spp.	Passifloraceae	Fr	04	00	S/M	N
Mexerica poncan	*Citrus reticulata* Blanco	Rutaceae	Fr	06	02	D/M	M
Corn	*Zea mays* L.	Poaceae	Fr	02	00	S/M	N
Strawberry	*Fragaria virginiana* Mill.	Rosaceae	Fr	03	00	D/S	N
Pepper	*Capsicum annuum* L.	Solanaceae	Fr	03	01	D/S/M	M
Pinecone	*Annona squamosa* L.	Annonaceae	Fr	01	00	M	N
Pitanga	*Eugenia uniflora* L.	Myrtaceae	Fr	09	02	D/M	M
Pomegranate	*Punica granatum* L.	Lytraceae	Fr	09	00	S/M	
Parsley	*Petroselinum crispum* (Mill.) Fuss	Apiaceae	L	05	02	D/S	S/M
Tomato	*Solanum lycopersicum* Lam.	Solanaceae	Fr	07	02	D/S/M	N
Grape	*Vitis vinifera* L.	Vitaceae	Fr	04	00	M	N

Source: Prepared by the authors.

The vegetable resources with the highest consumption rate are for culinary use and fruit trees. The most consumed plants are basil (7%), chives (6.2%), jabuticaba (5.5%), pitanga (5.5%) and pomegranate (5.5%) in PD and chives (16%), basil (16%) and orange (12%) in BO. The families have the habit to cultivate food plants in gardens and pots. This habit of plant cultivation and consumption should be encouraged as it brings important health benefits, as it can substitute processed foods with a high level of fat and sodium and harmful to health (OMS, 2007). The inhabitants of Guarulhos consume fresh food such as fruits, juices, salads and stews, according to their availability throughout the year. The most cultivated food plants in Rio Branco City (Acre State), are fruit and vegetables (Siviero et al., 2011).

Food plants

The botanical families of food plants cultivated were Myrtaceae (14.5%), Rutaceae (14%), Lamiaceae (8.4%) and Solanaceae (7%) in PD and Rutaceae (20%), Lamiaceae (16%), Amaryllidaceae (16%) and Apiaceae (16%) in BO neighborhood. Most of plants from Myrtaceae family, have and arboreal habit and their distribution are predominantly pantropical and subtropical, and represents one of the largest families of the Brazilian flora. Rutaceae are represented by shrubs or trees, rarely herbs or lianas with a predominantly pantropical distribution. The genus *Citrus* stands out, from an economic point of view, with numerous hybrids that include lemons, oranges, tangerines and cider. The Lamiaceae family includes aromatic herbs such as lavender, lemon balm, pennyroyal, rosemary, basil, basil, boldo, thyme and mint, and several species of Lamiaceae are cultivated as ornamentals. The Amaryllidaceae family is represented by herbs, with occasionally aromatic bulbs or latex, has an almost cosmopolitan distribution and some species are widely used in culinary, such as garlic, onion, chives, chives and leeks. The Solanaceae family is represented by herbs, shrubs or small trees, rarely lianas or hemiepiphytes with a cosmopolitan distribution, concentrated in the neotropical region. This family includes a variety of plants with an economic interest, used in culinary, such as tomato, potato, peppers, peppers, and eggplant. The plants from Apiaceae family are generally aromatic herbs with a cosmopolitan distribution, representing one of the largest angiosperm families. Many Apiaceae are cultivated in Brazil such as carrots, cassava or sweet potato as food plants, and the shoots of celery, parsley, and coriander, among others are used for condiments (Souza & Lorenzi, 2012). The present study presents data comparable to that obtained in Rio Claro City (São Paulo State), which found food plants from Lamiaceae, Myrtaceae, Rutaceae and Solanaceae families (Eichemberg, Amoroso & Moura, 2009). The survey was carried out in 12 municipalities in São Paulo State (including São Paulo City), the botanical families Lamiaceae (31.8%), Rutaceae (27.3%), Myrtaceae (13.6%) and Solanaceae (9.1%) were the most recurrent in food plant category (Trotta et al., 2012).

Studies such as those by Botelho, Lamano-Ferreira and Ferreira (2014) in capitals and inland cities in Brazil and Queiroz and Lamano-Ferreira (2015) in the northern part of São Paulo City observed the same botanical families of the residential backyards of Guarulhos. The food plants were an important nutritional source and income supplement for Mirassol do Oeste (Mato Grosso State) population and ornamental plants occupied the same level of importance, followed by medicinal plants (Carnielo et al., 2010). The production of plant food in the backyard is very important, diversifying or complementing the diet (Nascimento et al., 2005). Backyards represent a rich germplasm depository space and contribute to the strengthening of community relations once the exchange of seedlings, seeds, fruits and vegetables occurs frequently and this movement promotes the circulation of information about the use and importance of these plants, as promoting the dissemination of germplasm of interest in the community (Eichemberg, Amoroso & Moura, 2009). The results of the PD neighborhood for food plants were similar to the study carried out in Curitiba City (Paraná State) with great cultivation of ornamental plants followed by 108 food plant species of 40 botanical families (Althaus-Ottmann, Cruz & Fonte, 2010).

Medicinal plants

The use of medicinal plants persists and resists to modernization, as a form of prevention, treatment or relief of disease symptoms (Madia & Rodrigues, 2009). Traditional medicine was strong enough to be recognized by WHO in the 1970s, emphasizing that a large part of the population of developing countries depends on traditional medicine for their primary care, since 85% of this population uses medicinal plants. The Traditional Medicine Program recommends to the Member States the development of public policies to facilitate the integration of traditional medicine, and in 2006 the Ministry of Health released a document with the Policies of Medicinal and Phytotherapeutic Plants and creating the conditions for the implementation of these policies in the municipalities (Corrêa, Rodrigues & Barbano, 2006). The National Policy on Integrative and Complementary Practices in the SUS, approved by the National Health Council in 2005, and published on May 3, 2006, proposes the inclusion of medicinal plants and phytotherapy, homeopathy, traditional Chinese medicine and social spas as therapeutic options in the public health system, and the access to medicinal and phytotherapy plants to SUS users (Corrêa, Rodrigues & Barbano, 2006).

The National Policy on Integrative and Complementary Practices in the Unified Health System (SUS) in Brazil, was published, aiming to expand the therapeutic options offered to SUS users, with guaranteed access to medicinal plants, herbal medicines and other related services, with safety, efficacy and quality (Ministry of Health, 2006). Twenty-one medicinal plants divided into 13 families, were related in PD neighborhood (Table 4). Eighteen plants

divided into 09 botanical families were related as in BO neighborhood. The main families related in the neighborhoods were Lamiaceae (54.5% PD and 45% BO), Poaceae (20% PD and 27% BO) and Xanthorrhoeaceae (8.4% PD and 12.5% BO). Lamiaceae has a cosmopolitan distribution and are among the most aromatic herbs cultivated in Brazil. Poaceae are generally rhizomatous herbs, sometimes lignified with cosmopolitan distribution and are used as medicinal, as lemongrass, among others. The plants of the Xanthorrhoeaceae family are exotic and used as medicinal or ornamental, mainly aloe (Souza & Lorenzi, 2012). Our results corroborate with other studies, with the use of the Asteraceae and Lamiaceae families in heritage medicine (Pilla, Amoroso & Furlan, 2006; Trotta et al., 2012), with the systematic use of herbal tea based on mint, Melissa and basil, all these species being introduced (exotic), also configuring the influence of European and African traditions.

The leaf is the part of the medicinal plant most used by the habitants of PD neighborhood (100%), however other plant organs are used as the stems (9%), roots (4.5%), barks (2.9 %), seeds (2.9%) and flowers (1%). The leaves are used by 95.7% of BO habitants, followed by the fruits 4.3% and stems 4.3%. The leaves are mostly used due it concentrates a large part of the plant's active principles, can be harvested without causing damage to plants and is available during all year (Santos, Lima & Ferreira, 2008). Infusion (tea) is the most common method of preparation of leaves for medicinal purposes. Mint is used for disorders such as cough, flu, headache, digestive tract, stomachache, flatulence, anthelmintic and soothing. Boldo for health problems associated with the digestive system, liver problems and insect bites and burns. Rosemary for psycho-emotional problems such as nervousness, heart, and respiratory diseases such as colds and high blood pressure. Aloe vera is used for burns, healing, diseases of the digestive system, inflammation, and prevention for cancer. Research carried out in Rondonópolis (MT), relate the convergence in the use of plants to treat some diseases, however, the use of the same plant for other diseases, compared to Guarulhos. Boldo was used for indigestion and vertigo, aloe vera for ulcers and gastritis, and mint as a vermifuge (Pasa & Ávila, 2010). Among the plants registered as medicinal plants of interest to the SUS (RENISUS, 2021), 57% of the plants related by the habitants of Guarulhos are included in the official list of SUS. The results observed in PD and BO neighborhoods, showed different uses for three plants. Boldo is used in case of burns and/or insect bites and rosemary for nervousness in PD. Aloe is used to prevent cancer, inflammation, and indigestion in BO neighborhood. Thus, it was possible to observe that the plants are intended for the most varied health problems and that most of the plants are indicated for more than one disease.

Table 4

Medicinal plants and their frequency of use in Presidente Dutra and Bonsucesso neighborhoods, in the municipality of Guarulhos. Organs: Leaves (L); Plant (P); B (B); Stem (S); Flower (Fl); Fruit (Fr). All popular names are in Brazilian vernacular

Popular Name *	Scientific Name	Family	Indication	Organ	Preparation method
Common rosemary	*Rosmarinus officinalis* L.	Lamiaceae	Cardiovascular problem	L	Tea
Arnica	*Solidago* spp.	Asteraceae	Insect bite allergy, fever	L	Infusion
Rue	*Ruta graveolens* L.	Rutaceae	Ear pain, evil eye	L/P	Decoction e maceration
Aloe	*Aloe vera* (L.) Burm.	Asphodelaceae	Cancer/burn prevention	L/B	Juicy of L and pulp use
Sedum vistoso	*Sedum* sp.	Crassulaceae	Gastritis/earache	L	Decoction
Balm	*Plectranthus barbatus* Andrews	Lamiaceae	Digestive	L	Infusion and Tea
Boldo, false boldo	*Artemisia camphorata* Vill.	Asteraceae	Headache	L/S	Infusion
Camphor	*Costus spicatus* (Jacq.) Sw.	Costaceae	kidney problems	L	Tea
Macado cane, swamp cane	*Cymbopogon citratus* (DC.) Stapf	Poaceae	Soothing	L	Tea
	Symphytum officinale L.	Boraginaceae		L	Tea
lemongrass/lemon grass	*Foeniculun vulgare* Mill.	Apiaceae	Diabetes	L	Tea
Comfrey	*Mikania* spp	Asteraceae	Soothing	L	Tea
Fennel	*Mentha x villosa* Huds	Lamiaceae	Expectorant	L	Tea
Guaco	*Artemisia absinthium* L.	Asteraceae	Flu/Cough/Diabetes	L	Infusion
Mint	*Chenopodium ambrosioides* L.	Amaranthaceae	Soothing	L	Poultice
Wormwood	*Melissa officinalis* L.	Lamiaceae	Nervous	L	Tea
Mast	*Morinda citrifolia* L.	Rubiaceae	Cancer prevention	Fr	Pulp juicy
Melissa	*Senna occidentalis* (L.) Link.	Fabaceae	Digestive	L	Tea
Noni	*Mentha pulegium* L.	Lamiaceae	Cold flu	L/S	Tea
Quebra pedra	*Phyllanthus niruri* L.	Phyllanthaceae	Kidney stone	L	Tea
Sabugueiro	*Sambucus canadensis* L.	Viburnaceae	Chicken pox / diabetes	Fr/B	Tea

Note: * All popular names are in Brazilian vernacular.
Source: Prepared by the authors.

The use of medicinal plants for the treatment, cure and prevention of diseases is one of the oldest forms of medicinal practice in humanity (Ustulin et al., 2009). However, the use of the same plant for different types of diseases was also verified among the neighborhoods studied in our study, as shown in Table 4. Among the alternative treatments proposed by the Integrative and Complementary Health Practices, phytotherapy and medicinal plants are part of the practice of some basic health units in Guarulhos. The project intends to work with educational gardens, mixing vegetables and medicinal plants seeking sustainable practices, contributing to a safe and effective use of medicinal plants and at the same time as a strategy for health promotion and environmental education, allowing a connection between health, food education and sustainability, and a stimulus to cultivate vegetables and medicinal plants in residential backyards (Magnobosco & Tomé, 2014).

Ornamental plants

The ornamental use was the most representative group of plants observed in the neighborhoods, totaling 766 individuals distributed in 55 botanical families. The most recurrent plants in PD were rose (6%), anthurium (5.4%), fern (4.9%), with me nobody can (4.8%) and peace lily (4.8%) and lily (9.2%), espada-de-são-jorge (8.3%), flor-de-maio (7.8%) and ferns (6.9%) in BO. The most recurrent botanical families were Araceae (25%), Rosaceae (6.5%) and Davaliaceae (5.6%) in PD and Araceae (30.3%), Asparagaceae (8%), Davaliaceae (2.7%) and Cactaceae (2.3%) in BO (Table 5). Araceae has a cosmopolitan distribution, there are 36 genera and 450 species in Brazil; Rosaceae distribution is cosmopolitan, concentrated in the northern hemisphere, and the family is composed of trees, shrubs, and herbs, such as roses, alquemila, piracanta, buque da noiva, among others. Asparagaceae have five genera and 15 species in Brazil, with herbs or lianas, hardy or woody plants and sometimes arborescent, occasionally with rhizomes or bulbs, such as espada-de-São-Jorge, among others. Davaliaceae are terrestrial, epiphytic or rupicolous plants with 14 genera and approximately 120 species. Cactaceae with a neotropical distribution with 36 genera and approximately 230 species in Brazil, species such as mandacaru, palms, flor-de-maio and melocactus are used as ornamentals.

Table 5

Ornamental plants cultivated in residential backyards and absolute frequency in Presidente Dutra (PD) and Bonsucesso (BO) neighborhoods in the municipality of Guarulhos, SP. AF – Absolute frequency. All popular names are in Brazilian vernacular

Popular name*	Sctientific name	Botanical family	AF	
			PD	BO
Pineapple	*Ananas* sp.	Bromeliaceae	03	01
Alamanda-de-flor-grande	*Allamanda cathartica* L.	Apocynaceae	02	00
Angélica	*Polianthes tuberosa* L.	Asparagaceae	01	00
Antúrio	*Anthurium andraeanum* Linden	Araceae	27	11
Árvore-da-felicidade	*Polyscias guilfoylei* (W. Bull.) L.H. Bailey	Araliaceae	03	07
Ave-do-paraíso	*Strelitzia* sp.	Strelitziaceae	03	00
Avenca	*Adiantum raddianum* C. Presl	*Pteridaceae*	07	01
Azaléia	*Rhododendron simsii* Planch.	*Ericaceae*	16	02
Balãozinho, sininho	*Abutilon striatum* Dicks. *ex* Lindl.	Malvaceae	03	01
Begônia	*Begonia* spp.	Begoniaceae	02	02
Beijo	*Impatiens balsamina* L.	Balsaminaceae	05	00
Boa-noite	*Catharanthus roseus* (L.) G. Don	Apocynaceae	05	02
Bonsai-de-figo	*Ficus* sp.	Moraceae	00	01
Brinco-de-princesa	*Fuchsia hibrida* Hort. *ex* Siebert & Voss	Onagraceae	02	00
Cacto-macarrão	*Rhipsalis baccifera* (Sol.) Stearn	Cactaceae	01	00
Caládio, tinhorão	*Caladium* x *hortulanum* Birdsey	Araceae	00	06
Calanchoê, flor-da-fortuna	*Kalanchoe blossfeldiana* Poelln.	Crassulaceae	05	01
Camarão	*Justicia brandegeeana* Wassh. & L.B. Sm.	Acanthaceae	03	01
Camélia	*Camellia japonica* L.	Theaceae	03	00
Cara-de-cavalo	*Philodendron* sp.	Araceae	00	01
Carnaubeira	*Copernicia prunifera* (Miller) H.E. Moore	Arecaceae	01	00
Cavaleiro-das-onze-horas	*Portulaca oleracea* L.	Portulacaceae	03	03
Cerejeira	*Prunus serrulata* Lindl.	Rosaceae	02	00
Cinerária	*Senecio douglasii* DC.	Asteraceae	01	01
Coléus	*SolenoSon scutellarioides* (L.) Codd	Lamiaceae	07	00
Columéia, Peixinho	*Nematanthus wettsteinii* (Fritsch) H.E. Moore	Gesneriacaceae	01	01
Colônia	*Alpinia zerumbet* (Pers.) B.L. Burtt & R.M. Sm.	Zingiberaceae	01	00

Popular name*	Sctientific name	Botanical family	AF	
			PD	BO
Comigo-ninguém-pode	*Dieffenbachia seguine* (Jacq.) Schott	Araceae	24	05
Copo-de-leite	*Zantedeschia aethiopica* (L.) Spreng.	Araceae	16	02
Coqueiro-de-jardim	*Dypsis lutescens* (H. Wendl.) Beentje & J. Dransf.	Arecaceae	25	10
Coroa-de-cristo	*Euphorbia milii* var. *Breonii* (Nois.) Ursch & Leandri	Euphorbiaceae	03	01
Costela-de-adão	*Monstera deliciosa* Liebm.	Araceae	03	00
Cravo	*Dianthus caryophyllus* L.	Caryophyllaceae	08	01
Cravo-de-defunto	*Tagetes erecta* L.	Asteraceae	01	00
Cróton	*Codiaeum variegatum* (L.) A. Juss.	Euphorbiaceae	07	02
Crisântemo	*Dendranthema grandiflorum* (Ramat.) Kitam.	Asteraceae	01	01
Dália	*Dahlia pinnata* Cav.	Asteraceae	06	00
Dama-da-noite	*Ipomoea alba* L.	Convolvulaceae	08	00
Dedo de moça	*Sedum morganianum* E. Walther	Crassulaceae	01	00
Dinheiro-em-penca, hera-sueca	*Plectranthus verticillatus*(L. f.) Druce	Lamiaceae	05	03
Dracena	*Dracaena* spp.	Asparagaceae	06	04
Érica	*Cuphea gracilis* Kunth	Lythraceae	01	00
Espada-de-São-Jorge	*Sansevieria trifasciata var. laurentii* (De Wild.) N. E. Br	Asparagaceae	18	18
Espirradeira	*Nerium oleander* L.	Apocynaceae	02	00
Estrela-do-norte	*Randia formosa* (Jacq.) K. Schum.	Rubiaceae	04	01
Flor-de-maio	*Schlumbergera truncata* (Haw.) Moran	Cactaceae	13	17
Folha-da-fortuna	*Kalanchoe* spp.	Crassulaceae	02	03
Folha-de-sangue, bico-de-papagaio	*Euphorbia pulcherrima* Willd. *ex* klotzsch	Euphorbiaceae	02	01
Gerânio	*Pelargonium* spp.	Geraniaceae	04	03
Gerbera	*Gerbera jamesonii* Adlam	Asteraceae	03	09
Jibóia	*Epipremnum pinnatum* (L.) Engl.	Araceae	04	07
Gloxínia	*Gloxinia sylvatica* (Kunth) Wiehler	Gesneriaceae	00	08
Guiné	*Petiveria alliacea* L.	Petiveriaceae	05	01
Ipoméia	*Ipomoea purpurea* (L.) Roth	Convolvulaceae	01	00
Hortência	*Hydrangea macrophylla* (Thunb.) Ser.	Hydrangeaceae	05	00
Malvavisco, hibisco-colibri	*Malvaviscus arboreus* Cav.	Malvaceae	06	02
Imbé	*Philodendron* sp.	Araceae	06	02

Popular name*	Sctientific name	Botanical family	AF	
			PD	BO
Ipê-roxo	*Tabebuia impetiginosa* (Mart. *ex* DC.) Standl.	Bignoniaceae	04	02
Marianinha, cana-de-macaco	*Dichorisandra thyrsiflora* J.C. Mikan	Commelinaceae	01	02
Jasmim	*Jasminum* sp.	Oleaceae	03	00
Lágrima-de-cristo	*Clerodendron thomsonae* Balf.	Lamiaceae	04	00
Lilás-da-china	*Buddleja davidi* Franch.	Scrophulariaceae	01	00
Lírio	*Lilium* spp.	Liliaceae	04	00
Lírio-da-paz	*Spathiphyllum wallisi* Regel	Araceae	24	20
Lírio-de-São-José	*Hemerocalis flava* L.	Liliaceae	00	01
Lírio-do-brejo	*Convallaria majalis* L.	Asparagaceae	01	00
Magnólia	*Talauma ovata* A. St.-Hil.	Magnoliacee	01	00
Manacá da serra	*Tibouchina mutabilis* (Vell.) Cogn.	Melastomataceae	02	00
Manjiroba	*Senna occidentalis* (L.) Link	Fabaceae	00	01
Maranta	*Calathea* spp.	Marantaceae	02	01
Margarida	*Dendranthema* spp.	Asteraceae	05	00
Maria-sem-vergonha	*Impatiens walleriana* Hook. F.	Balsaminaceae	02	00
Melancia	*Peperomia sandersii* C. DC.	Piperaceae	02	03
Mosquitinho	*Gypsophila paniculata* L.	Caryophyllaceae	07	04
Mussaendra	*Mussaenda* sp.	Rubiaceae	01	00
Oliveira	*Olea europaea* L.	Oleaceae	01	00
Orquídea		Orchidaceae	13	11
Pacová	*Heliconia* sp.	Heliconiaceae	01	01
Palma	*Gladiolus hortulanus* L.H. Bailey	Iridaceae	02	01
Palmeirinha	*Chamaedorea* sp.	Arecaceae	01	00
Pé-de-elefante	*Beaucarnea recurvata* Lem.	Asparagaceae	01	00
Peperomia	*Peperomia* spp.	Piperaceae	05	00
Pinhão-roxo	*Jatropha gossypifolia* L.	Euphorbiaceae	03	00
Piléia	*Pilea cadierei* Gagnep. & Guillaumin	Urticaceae	01	00
Coffe-Plant	*Coffea arabica* L.	Rubiaceae	05	00
Portulacaria	*Portulacaria afra* Jacq.	Didiereaceae	01	00
Primavera	*Bougainvillea spectabilis* Willd.	Nyctaginaceae	02	01
Red Cat's Tail, Bastard Copperleaf, Strawberry Firetail	*Acalypha reptans* Sw.	Euphorbiaceae	01	00
Red Cat's Tail, Bastard Copperleaf, Strawberry Firetail	*Acalypha reptans* Sw.	Euphorbiaceae	05	02

Popular name*	Sctientific name	Botanical family	AF	
			PD	BO
Rabbit's Foot Fern	*Davallia fejeensis* Hook.	Davalliaceae	04	04
Rose	*Rosa* x *grandiflora* Hort.	Rosaceae	30	15
Rose	*Rosa chinensis* Jacq.	Rosaceae	01	00
Ruélia	*Ruellia coerulea* Morong	Acanthaceae	01	00
Sálvia-Vermelha	*Salvia splendens* Selow *ex Wied-Neuw*	Lamiaceae	02	01
Fern	*Nephrolepis* spp.	Davalliaceae	25	15
Sapatinho-de-judeu	*Calceolaria x herbeohybrida* Voss	Calceolariaceae	00	02
Santos-filhos	*Leonurus sibiricus* L.	Lamiaceae	00	01
Sedum	*Sedum morganianum* E. Walther	Crassulaceae	03	02
Sansivieiria, Espadinha-de-São-Jorge	*Sansevieria trifasciata* Prain	Asparagaceae	02	01
Cheflera	*Schefflera arboricola* (Hayata) Merr.	Araliaceae	01	01
Singônio	*Syngonium angustatum* Schott	Araceae	04	02
Sucupira	*Pterodon emarginatus* Vogel	Fabaceae	01	00
Taioba	*Xanthosoma robustum* Schott	Araceae	01	08
Tinhorão	*Caladium x hortulanum* Birdsey	Araceae	02	01
Trapoeraba-roxa	*Tradescantia pallida* var. *purpurea* D.R. Hunt	Commelinaceae	03	02
Trevo-de-quatro Ls	*Marsilea* sp.	Marsileaceae	03	00
Trevo-de-três Ls	*Oxalis* sp.	Oxalidaceae	03	00
Violeta-africana	*Saintpaulia ionantha* H. Wendl.	Gesneriaceae	10	14
Violeteira, pingo-de-ouro	*Duranta repens* L.	Verbenaceae	02	04
Zamioculcas, brilhante	*Zamioculcas zamiifolia* Engl.	Araceae	04	02
Helicônia	*Heliconia* spp.	Heliconiaceae	01	00

Note: * All popular names are in Brazilian vernacular.
Source: Prepared by the authors.

The gardens of Curitiba (Paraná State) have ornamental plants of 85 botanical families, highlighting Asteraceae, Araceae, Asparagaceae and Rosaceae, according to two families with the highest occurrence in the backyards of Guarulhos (Althaus-Ottmann, Cruz & Fonte 2010). A higher index of ornamental plants was observed in Rio Claro (São Paulo State), with approximately 63% of the species, with Lamiaceae, Asteraceae, Araceae and Liliaceae the most representative botanical families (Eichrmberg & Amoroso, 2009). There is a tendency to cultivate ornamental plants in urban backyards of industrialized cities in São Paulo State (Trotta et al., 2012). In the recurrent literature, the greatest emphasis of the studies concerns the food and medicinal categories, and there is less availability of bibliographic material about ornamental plants. There are insufficient studies in urban backyards in the Southeast region of Brazil and the absence of standardized sampling procedures in the studies makes comparisons difficult; and the few studies with plants in urban backyards are related to their importance as a source of food (Eichemberg, Amoroso & Moura, 2009).

The study related the occurrence of residential backyards in the Presidente Dutra (PD) and Bonsucesso (BO) neighborhoods in the municipality of Guarulhos, with the cultivation of plants in most of the residences. The most cultivated plants in PD neighborhood are ornamental, followed by food and medicinal plants. There is also a great predominance of cultivation of ornamental plants in BO neighborhood, followed by medicinal and food plants. The most used food plants are for culinary and fruit trees. The most used plant organs in both districts are the leaves, to be used in tea infusions. Stems, roots, bark, seeds and flowers are used for medicinal purposes less frequently. The present study provided a diagnosis of local cultivation where proposals for Environmental Education and the encouragement of the cultivation and use of plant resources can be discussed and prepared, which are related to food, health, and biodiversity conservation, contributing to urban sustainability.

The study represents an important contribution to understand the urban biodiversity, as well as its use and conservation. Strategies to promote gene flow in urban environments have considered the importance of backyards with trees and plants, particularly those with ornamental plants, which are important reservoirs for pollinating birds and insects.

Final remarks

Residential backyards were found in Presidente Dutra and Inocoop neighborhoods, in the municipality of Guarulhos, SP, as well as the cultivation of plants in most of these residential spaces. The most cultivated plants in the Presidente Dutra neighborhood are ornamental, followed by food and finally medicinal. In the Inoccop neighborhood, there is also a greater predominance of ornamental plants, followed by medicinal and food plants. Among the most used food plants are plants for food purposes. The most used plant organs are the

leaves, reaching 100% of the people interviewed who have medicinal plants grown in their backyards, both in the PD and IN neighborhoods. However, other plant organs such as stem, root, bark, seed and flower are used for medicinal purposes.

However, the present work provided a diagnosis of local cultivation where proposals for Environmental Education and the encouragement of the cultivation and use of plant resources which are related to food, health and biodiversity conservation can be discussed and elaborated, which contributes to urban sustainability. It is suggested to deepen studies involving the choice of plants grown in urban backyards, that is, what are the advantages of choosing the cultivation of ornamental plants in large cities, and not for human consumption (food and medicinal plants).

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