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COMPARATIVE STUDY OF THE PRESENCE OF TOXIC AND MEDICINAL PLANTS IN PUBLIC SQUARES OF `` RIACHO FUNDO I`` - DF

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Abstract: Considering the toxic and medicinal potential of plants present in public leisure environments, an observational and comparative study was carried out to identify them in three public squares in ``Riacho Fundo I``-DF. The results obtained included the identification of 16 species of plants considered toxic belonging to 10 botanical families, with a greater representation of the Araceae family, and as for plants with proven therapeutic properties, 9 species were identified referring to 7 botanical families in which the Lamiaceae families stand out. and Poaceae. Among the toxic plants identified, the *species* *Ficus benjamina* L. was prevalent in the three squares and the species *Mangifera indica* L. was found in two squares, both with indications of proven toxicity. Given the significant amount of toxic plants identified in the public squares of Riacho Fundo I - DF, it is necessary to bring knowledge and correct information about toxic and medicinal plants to the population, raising awareness and enabling the reduction of occurrences of human poisoning and animals.

Keywords: Federal District; ``Riacho Fundo I``; medicinal plants; toxic plants; public squares; comparative study; territory; public place; health.

INTRODUCTION/PRESENTATION

According to data recorded in the National Toxic-Pharmacological Information System (SINITOX), plants are not the main agents causing human poisoning. However, such data must be taken into consideration, as underestimated due to the fact that many cases are not reported, either due to a lack of registration by Toxicological Information and Assistance Centers (CIATs), state units, or due to ignorance of the plants. that have toxicity, which leads to the mistaken registration of these situations as resulting from unknown toxic agents (BARIONI & PROFETA, 2021).

The last records on the SINITOX website date back to 2017, which in fact reflects the lack of information provided by CIATs.

Medicinal plants must also be considered in this context, as if used inappropriately in terms of dosages and purposes, they also pose a risk of toxicity (MELO et al., 2021).

Hence the importance of knowledge about toxic plants and the rational use of medicinal plants, as they are found in backyards and gardens of homes, in public places with high circulation such as squares, parks and schools.

A toxic plant is understood to be one that presents bioavailable substances with the capacity to cause changes in human and animal metabolism, causing poisoning. Generally, these plants cause skin and stomach irritation, nausea, vomiting and diarrhea, which can lead to death in the most serious situations (CORRÊA FEIO et al., 2021).

A medicinal plant is a plant species, whether cultivated or not, used for therapeutic and/or prophylactic purposes (FFFBB, 2021).

The location chosen to develop this work is the city of Riacho Fundo I, which is one of the administrative regions of the Federal District (DF), has approximately 50,000 inhabitants, is located on the banks of BR-060 and has a permanent fair, ecological park, squares, several sports courts, shopping malls and very diverse local commerce (FEDERAL DISTRICT GOVERNMENT, 2022).

Given all of the above, this study aimed to identify toxic and medicinal plants in public squares in the city of Riacho Fundo I, taking into consideration, the risk of poisoning that they can cause to people and animals.

OBJECTIVES

GENERAL OBJECTIVE

- Identify toxic and medicinal plants in public squares in the city of Riacho Fundo I -DF

SPECIFIC OBJECTIVES

- Survey the toxic and medicinal plants that exist in public squares in the city of Riacho Fundo I -DF
- Determine the proportions of toxic plants and medicinal plants found in public squares in the city of Riacho Fundo I – DF
- how toxic and medicinal plants found in public squares interfere in the daily lives of the communities that surround them.

THEORETICAL FRAMEWORK/ DEVELOPMENT

Despite the great development of medicine in recent decades, the World Health Organization (WHO) recognizes that around 80% of the world's population uses traditional practices with primary care, mostly based on medicinal plants, such as teas (MINISTERIO DA SAUDE, 2006).

Since Brazil is the country with the largest share of biodiversity, accounting for around 15% to 20% of the world's total, there are elements that make up the flora that are raw materials for the manufacture of various natural medicinal compounds. Such plants are used in popular and traditional practice in home and community remedies (MINISTERIO DA SAUDE, 2006).

Medicinal plant is a term from the 70s, defined as any plant that contains one or more structures with biologically active substances used directly or indirectly as medicines (FAPEMIG, 2019)

However, Brazilian biodiversity is not made up of medicinal plants alone. Toxic plants can also be easily found in all biomes in the country. Defining a plant as toxic can be a highly complex task, as several aspects must be considered, such as the presence or absence of toxic substances, their concentrations, susceptibility to the effects of toxins, interactions with other factors and quantities used. A poisonous plant is any plant that, when introduced to humans or animals under natural conditions, can cause damage that negatively affects the health and vigor of these organisms (OLER et al., 2019).

In architecture, the study of Biophilia studies the importance of connecting human beings with plants in increasingly corporate, industrialized and urbanized spaces. However, this connection cannot be made with poor choices of the plants to be used.

In small cities in Brazil, it is common to grow exotic plants with toxic potential on public roads. The species are distributed in an undisciplined and inadequate manner, suggesting that the Public Authorities can carry out corrections and planning for these areas in order to obtain the best adaptation of the afforestation, aiming at the safety of the site and the best arrangement of the species (CORDEIRO, 2018).

In places that accommodate large audiences, such as schools, care must be taken when choosing the plants to be used. Educational institutions have a large number of ornamental plants, but such establishments are not concerned with species selection, recording a large number of toxic plants (BRAGA et al., 2017).

While the presence of toxic exotic plants is not enough, public squares in general also lack management intervention to avoid physical-environmental disorders resulting from the biological behavior of different species (SILVA et al., 2018).

TERRITORIALIZED REFERENCE

Territory, when it comes to the context of health, is not just physical or geographic. It is linked to a job, a motivation. It includes the human being's right to a healthy space and healing possibilities (ROVERE, 2005).

According to the Civil Code (2002), in its article 99, squares are public goods, for common use by the people. The square is built based on public interest, the purpose of this construction must be observed, it can be planned to bring health and quality of life.

The terms "public" and "private" can be understood in spatial terms such as "collective" and "individual". Thus, public is an area accessible to everyone at any time, but maintenance has a collective nature (HERTZBERGER, 2015). Thus, it is natural for a public square to have not only plants originally designed to be there, but also those introduced by the local population. It is an environment for socializing, sports, games and traditional exchanges in care and health.

Aromatic and medicinal plants have been used since the beginning of humanity, dating back to the Neolithic, between 5000- and 2500-years BC. Often the space available for cultivation is public space (SANTOS, 2015). Therefore, for this work, the choice of squares as the study territory is a natural choice of a traditional space for socializing and exchanging knowledge.

The squares selected to carry out this study are located in the city of Riacho Fundo I in the Federal District, where around 50,000 people live. The city has public health, education and security facilities, a permanent fair, an ecological park, sports courts, squares, shopping malls and social spaces (FEDERAL DISTRICT GOVERNMENT, 2022).

METHODOLOGY

TYPES OF STUDY

Initially, a bibliographical review was carried out with the purpose of knowing the species that are registered as toxic and medicinal in specific scientific literature, such as Matos et al. (2011), Matos (2012), Tokarnia et al. (2000), Barioni & Profeta (2021), Corrêa Feio et al. (2021). Virtual consultations were also carried out in scientific databases - Virtual Health Library (VHL) and Pubmed - to select articles, monographs, dissertations and theses that provided more information on the subject.

Continuing, this study consisted of field research to collect data through observations obtained *in situ*, following an observation guide (Appendix 1).

Still in the field, the technique of systematic or non-participant observation, also known as passive observation, was used, in which the researcher does not get involved with the group observed, remaining outside, witnessing the facts as a spectator (GERHARDT & SILVEIRA, 2009). This type of observation was applied to collect data regarding community interaction in the chosen public spaces, squares.

STUDY LOCATION

The fieldwork was carried out from December 2021 to February 2022 in the city of Riacho Fundo I, which is the 17th Administrative Region of the Federal District, has a total area of 56.02 km², located on the edge of Estrada Parque Núcleo Bandeirante - EPNB (DF-075 highway) between the administrative regions of Taguatinga, Águas Claras and Núcleo Bandeirante (Figure 1), with approximately 50,000 inhabitants between urban and rural areas (FEDERAL DISTRICT GOVERNMENT, 2022).

Three public spaces in the aforementioned administrative region were selected as



Figure 1 - Satellite image of the city of Riacho Fundo I (Source: GEOPORTAL-DF, 2021)



Figure 2 - Image of the standard map of the city of Riacho Fundo I (Source: GOOGLE MAPS, 2021)

described as “Square” on the Geoportal-DF platform and in the Google Maps application. The chosen squares were Cremildos, Osvaldo Cruz and Sucupira, highlighted in figure 2, which were visited twice each.

INSTRUMENTS AND DATA ANALYSIS METHOD

Once in the squares, plant species recognized as toxic and/or medicinal plants were photographed and later identified by comparison with specific bibliographic references (Matos et al., 2011; Matos, 2012; Tokarnia et al., 2000; Barioni & Profeta, 2021; Corrêa Feio et al., 2021), as well as in databases such as Re flora and Trópicos.

Based on the identification data obtained in the field, a table was created in the Microsoft Office Excel program, highlighting the following information: name of the species, botanical family and areas where it occurs.

RESULTS

The “Riacho Fundo” I squares selected to carry out this study have different structural characteristics in terms of size and quantity of equipment in them.

The square: “Praça Cremildos” is located in block QN 05 and is the largest among the three, measuring approximately 10,000 m², where there is a multi-sports court, concrete benches in several places, two outdoor gyms, a children’s playground, a circular space with bicycle parking and concrete tables/stools, a pergola with ornamental climbing plants and sidewalks for walking (Figure 3).

The square: “Praça Sucupira” is located on block QN 01 and is approximately 3,600m², features a multi-sports court, an outdoor gym, a children’s playground, a pergola and concrete benches (Figure 4).

The square: “praça Osvaldo Cruz” is located on block QS 14 and also measures approximately 3,600m², has a sports court,

a children’s playground and a pergola with concrete benches (Figure 5).



Figure 3 - Cremildos Square (Source: own, 2021)



Figure 4 - The square: “Praça Sucupira” (Source: own author, 2021)

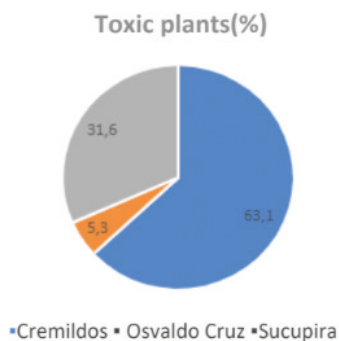


Figure 5 - Osvaldo Cruz Square (Source: own author, 2021)

In the three public squares of Riacho Fundo I, 16 species of plants considered toxic, belonging to 10 botanical families, with more representatives of the Araceae family, and 9 species of plants with proven therapeutic properties, belonging to 7 botanical families in which the families Lamiaceae and Poaceae (Tables 1 and 2).

Of the total toxic species identified, 12 species are found in the square: ``Praça Cremildos`` representing 63.1% of this total, 6 species in Praça Sucupira which makes up 31.6% and only 1 species in Praça Osvaldo Cruz which represents 5.3% (Graph 1).

As for medicinal plants, 5 species were described in ``Praça Cremildos and Sucupira``, representing 41.7% of the total of these plants for each square and 2 species in Praça Osvaldo Cruz, which makes up 16.6% (Graph 2).

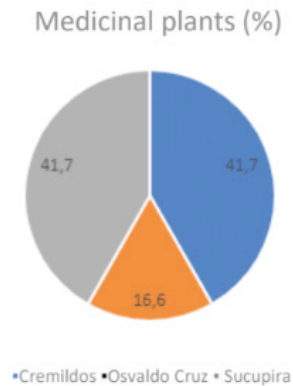


Graphic 1- Percentage of toxic plants identified in squares (Source: own, 2021)

As for medicinal plants, 5 species were described in ``Praça Cremildos and Sucupira``, representing 41.7% of the total of these plants for each square and 2 species in ``Praça Osvaldo Cruz``, which makes up 16.6% (Graph 2).

As for medicinal plants, 5 species were described in Praça Cremildos and Sucupira, representing 41.7% of the total of these plants for each square and 2 species in ``Praça Osvaldo Cruz``, which makes up 16.6%

(Graph 2).



Graph 2 - Percentage of medicinal plants identified in squares (Source: own, 2021)

It is worth highlighting that among the toxic plant species, only *Ficus benamina* L. is found in the three squares and *Mangifera indica* L. in two squares, Cremildos and Sucupira. The other species occur only in one square (Table 1).

As for medicinal plant species, *Gossypium* L. and *Ocimum americanum* L. are found in ``Praça Cremildos`` and Sucupira, *Morus nigra* L. in Praça Cremildos and Osvaldo Cruz, and the others only in one of the squares (Table 2).

Regarding the observational aspect of the social dynamics of each square, the interaction of people with that space and everything that exists there, including the vegetation, and in this study specifically the toxic and medicinal plants, it was possible to understand how the spaces are used by local community.

During all the visits to the squares, the courts were being used by adults and/or children, the playgrounds had children playing, people sitting on the concrete benches, sometimes talking, other times contemplating the landscape and other times playing dominoes.

In relation to toxic and medicinal plants themselves, it was not possible to verify the interaction of people from the local

Scientific name	Popular name	Family	Square
<i>Caesalpinia pulcherrima</i> (L.) Sw.	Flamboyant-child	Fabaceae	C
<i>Codiaeum variegatum</i> (L.) Rumph. ex A.Juss.	Croton	Euphorbiaceae	C
<i>Colocasia antiquorum</i> Schott	Angry taioba	Araceae	S
<i>Dracaena</i> spp	Dracena	Asparagaceae	C
<i>Euphorbia pulcherrima</i> Willd. ex Klotzsch	Poinsettia	Euphorbiaceae	C
<i>Ficus benjamina</i> L.	Ficus	Moraceae	C - OC - S
<i>Heptapleurum arboricola</i> Hayata	Cheflera	Araliaceae	C
<i>Leucaena leucocephala</i> (Lam.) de Wit	Leucena	Fabaceae	S
<i>Mangifera indica</i> L.	Hose	Anacardiaceae	C - S
<i>Mirabilis jalapa</i> L.	Wonder	Nyctaginaceae Juss.	C
<i>Nicandra physalodes</i> (L.) Gaertn.	Joá-de-capote	Solanaceae	S
<i>Nicotiana tabacum</i> L.	Smoke	Solanaceae	S
<i>Plumeria rubra</i> L.	Mango jasmine	Apocynaceae	C
<i>Sansevieria trifasciata</i> Prain	Sword of Saint George	Asparagaceae	C
<i>Syngonium angustatum</i> Schott	Singonium	Araceae	C
<i>Syngonium podophyllum</i> Schott	Five-toed aninga	Araceae	C

Table 1 - Toxic plants identified in public squares in Riacho Fundo I - C: Square: Cremildos; OC: The square: ``Praça Osvaldo Cruz``; S: The square: ``Praça Sucupira``

Source: own, 2021

Scientific name	Popular name	Family	Square
<i>Cymbopogon citratus</i> (DC.) Stapf	Holy grass	Poaceae	S
<i>Cymbopogon winterianus</i> Jowitt ex Bor	Citronella	Poaceae	S
<i>Gossypium</i> L.	Cotton	Malvaceae	C - S
<i>Kalanchoe pinnata</i> (Lam.) Pers.	Saião	Crassulaceae	S
<i>Lippia alba</i> (Mill.) N.E.Br. Ex Britton & P. Wilson	Lipia	Verbenaceae	C
<i>Morus nigra</i> L.	Blackberry	Moraceae	C - OC
<i>Ocimum americanum</i> L.	Basil	Lamiaceae	C - S
<i>Plectranthus barbatus</i> Andr.	Boldo	Lamiaceae	C
<i>Psidium guajava</i> L.	Guava tree	Myrtaceae	OC

Table 2 - Medicinal plants identified in the public squares of Riacho Fundo I - C: The square: ``Praça Cremildos``; OC: Praça Osvaldo Cruz; S: The square: ``Praça Sucupira``

Source: own, 2021

community with these plants during the visits, nor whether they know and use them.

However, water fountains to attract birds were seen in some trees in ``Praça Cremildos`` (Figure 3), and it can be inferred that the surrounding community somehow wants to establish some interaction in that environment.



Figure 6 - Bird drinking fountain in a pequi tree (Source: own, 2021)

DISCUSSION

The Araceae family was the one with the most representative species, which also occurred in other studies such as Souza (2019), Braga et al. (2017) and Fracaro (2016), and in the latter the author highlighted that this family presents many species of importance in the landscaping and flowers sector.

All species of toxic plants identified in this study present indications of toxicity in the literature consulted. A plant is indicated as a toxic species when its toxicity is experimentally proven (MATOS et al., 2011).

The species *Ficus benjamina* L. was the toxic plant prevalent in the squares of this work. In other studies, this species was also found in public spaces such as squares and schools (BAUMANN et al, 2019; BRAGA et al, 2017; BARROSO, 2017; SENA et al, 2016). According to a study by Barroso (2017), this species presents principles that promote dermatological effects such as

furanocoumarins and psoralens, but the principle that causes contact dermatitis when exposed to the latex of this plant is not known for sure.

Another species identified and found in two squares was *Mangifera indica* L., which presents toxicity due to the volatile oils present in its leaves, which can cause skin burns and contact dermatitis (FLORES et al, 2001; BAUMANN et al, 2019).

Several studies stand out, such as Chiminazzo et al. (2019), Souza (2019), Cordeiro & Coelho (2018), Barroso (2017), Bochner & Lemos (2017), Braga et al. (2017), Fracaro (2016), Sena et al. (2016), Vieira & Thiezerini (2016) and Santos et al. (2015), carried out especially in public spaces such as squares and schools in Brazilian cities, in which some species of toxic plants also identified in the present study were reported, such as: *Codiaeum variegatum* (L.) Rumph. ex A.Juss., *Colocasia antiquorum* Schott, *Euphorbia pulcherrima* Willd. ex Klotzsch, *Leucaena leucocephala* (Lam.) de Wit, *Plumeria rubra* L., *Sansevieria trifasciata* Prain and *Syngonium angustatum* Schott.

It is worth mentioning that among them are the species *Colocasia antiquorum* Schott and *Sansevieria trifasciata* Prain, which contain calcium oxalate crystals as toxic principles that cause poisoning with symptoms ranging from dermatitis and gastrointestinal disorders to more complicated cases of asphyxiation, which can lead to death. (AGUIAR & VEIGA JR., 2021).

In the list of medicinal plants, care must be taken regarding the dosage to be used, since in the perception of the Brazilian population these plants do not cause harm and are natural, which is a mistake, as excessive consumption can transform therapeutic doses into potentially toxic (MATOS, 2012).

FINAL CONSIDERATIONS/ CONCLUSION

The risk of plant poisoning in public spaces such as squares is imminent, mainly due to the lack of knowledge about the toxicity potential of some species that are very common in these places.

In this study it was possible to see that toxic plants can be causative agents of these occurrences as they are easily found in places with high circulation such as squares, as these provide the opportunity for leisure, social interaction and interaction with the environment.

As for medicinal plants, also present in the squares, it is no different, since it is necessary to know them to make the correct use according to the scientific proof of their therapeutic properties.

Hence, it becomes necessary to seek ways to bring correct knowledge and information about toxic and medicinal plants to the population, raising awareness and sensitization especially among people who use public spaces such as squares, even enabling the installation of identification signs that warn about the risk with the main purpose of reducing the occurrences of human and animal poisoning.

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ANNEX 1

Observation itinerary:

Date/time:

Local:

Square area:

Are there public leisure facilities? If so, which ones?

Toxic plants:

Medicinal plants:

Community Interaction:

Photographs: