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**Articles**

# Assessment of the vegetation in the squares of the city of Patos, State of Paraíba, Brazil

## Avaliação da vegetação das praças da cidade de Patos, Paraíba, Brasil

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## ABSTRACT

Green areas are elements of the urban environment that provide environmental improvements, preserve values, and benefit society. This study aimed to diagnose the vegetation present in the squares of the city of Patos, State of Paraíba, Brazil, and verify whether their vegetation cover is sufficient and in satisfactory condition. For this, the floristic survey and the measurement of individuals and the area of the squares were conducted. The individuals were classified according to botanical family, genus, species, common name, and origin. The green area index, the vegetation cover index, and the percentage of vegetation cover were calculated for the squares. A total of 817 individuals belonging to 67 species, distributed in 28 botanical families and 58 genera, were recorded in the 37 inventoried squares. As for the origin of individuals found in the urban forestry in the squares of Patos, 68.71% are exotic and 31.28% are native to Brazil. The calculated percentage of vegetation cover of the squares was considered satisfactory, but the green area index per inhabitant (0.58 $m^2$ $inhabitant^{-1}$) is below what the Brazilian Society of Urban Forestry recommends. In this context, the tree and shrub individuals present in the squares of the city of Patos, in general, are in good condition, Fabaceae is the predominant botanical family, and *Azadirachta indica* A. Juss is the dominant species. The native species *Tabebuia aurea*, *Sarcomphalus joazeiro*, *Cenostigma pluviosum, Peltophorum dubium*, and *Handroanthus impetiginosus* can be used in the urban forestry of squares.

**Keywords**: Green area; Urban forestry; Urban tree planting

**RESUMO**

As áreas verdes são elementos do meio urbano que proporcionam melhorias ambientais, conservam valores e trazem benefícios à sociedade. O trabalho teve como objetivo diagnosticar a vegetação presente nas praças da cidade de Patos-PB, verificando se a cobertura vegetal das praças é suficiente e se encontra em condições satisfatórias. Para isso, foram realizados o levantamento florístico, medição da copa dos indivíduos e da área das praças. Os indivíduos foram classificados quanto à família botânica, gênero, espécie, nome vulgar e origem. Foram calculados para as praças os Índices de área verde, cobertura vegetal e o percentual da cobertura vegetal. Nas 37 praças inventariadas, foram registrados um total de 817 indivíduos pertencentes a 67 espécies, distribuídas em 28 famílias botânicas e 58 gêneros. Quanto à origem dos indivíduos encontrados na arborização das praças de Patos, 68,71% são exóticos e 31,28% são nativos do Brasil. O percentual da cobertura vegetal das praças calculado foi considerado satisfatório, porém o índice de área verde por habitante (0,58 $m^2$ $habitantes^{-1}$) está abaixo do recomendado pela Sociedade Brasileira de Arborização Urbana. Conclui-se que os indivíduos arbóreos e arbustivos presentes nas praças da cidade de Patos, no geral, encontram-se em bom estado, tendo como família botânica predominante a Fabaceae e espécie dominante *Azadirachta indica* A. Juss. As espécies nativas *Tabebuia aurea, Sarcomphalus joazeiro, Cenostigma pluviosum, Peltophorum dubium* e *Handroanthus impetiginosus* podem ser utilizadas na arborização de praças.

**Palavras-chave**: Área verde; Silvicultura urbana; Arborização urbana

## 1 INTRODUCTION

Squares are urban public spaces free of buildings intending to promote recreational environments and environmental well-being, democratize access to sports and leisure, and encourage social inclusion and cultural expression (Alcantara; Vazquez, 2015). They are symbols of sociability and urban landscape, playing important roles for cities and the population through ecological, social, historical, cultural, and identity aspects (Viezzer *et al.*, 2016).

Squares are considered green areas when vegetation is the fundamental element of their composition; they are one of the most recognized types of green areas worldwide and the most present and identified in Brazilian cities (Biondi; Lima Neto, 2012). Considered green areas, squares are fundamental to urban life and require care to avoid ecological imbalance regarding the reduction of diversity and increasing homogenization of plant species (Oliveira *et al.*, 2017; Bernardes *et al.*, 2019).

Floristic homogeneity due to the predominance of a few species per unit area

poses a risk for the proliferation of pests and diseases in urban vegetation and may cause changes in the microclimate and a decrease and evasion of fauna (Oliveira *et al.*, 2017; Souza *et al.*, 2011). Therefore, adopting well-founded criteria when choosing tree species is necessary to mitigate the risks associated with floristic homogeneity.

According to Basso and Corrêa (2014), the appropriate choice of tree species requires studies to support decisions regarding planning, planting, and maintenance of the tree vegetation network in cities.

Assessing the conditions of the vegetation present in squares and its distribution in urban areas allows for a more complete analysis of its ecological and structural conservation status. Research that aims to analyze squares within cities is important to determine whether they promote a satisfactory level of green area cover for the city-built structure, in addition to acquiring data on the species planted in these areas.

Analysis of the environmental benefits of a square requires the evaluation of characteristics regarding its tree vegetation, including the number of individuals and the floristic composition, an important tool for understanding the dynamics of this vegetation and supporting the preservation and improvement actions in the diversity of these areas (Rezende; Aroni; Rodrigues, 2020; Teixeira *et al.*, 2016).

The prioritization of exotic species in urban forestry is associated with their advantageous characteristics, such as fast growth and evergreen foliage, compared to native species, which are mostly deciduous and have slow growth and sparse canopies, among other characteristics. According to Neves *et al.* (2021), the high use of exotic species in the urban forestry of green areas is related to past landscape trends, when species choices were performed according to their aesthetic beauty, regardless of their origin.

Despite this, there are species native to Brazil that could be used more in the urban forestry of squares in cities in the semiarid of the Northeast region of Brazil, such as *Tabebuia aurea* (Silva Manso) Benth. & Hook.f. ex S. Moore, *Handroanthus impetiginosus* (Mart. ex DC.) Mattos, *Peltophorum dubium* (Spreng.) Taub., and *Sarcomphalus joazeiro* (Mart.) Hauenshild (EMBRAPA, 2012). However, awareness-raising efforts and environmental perception programs are still needed to provide

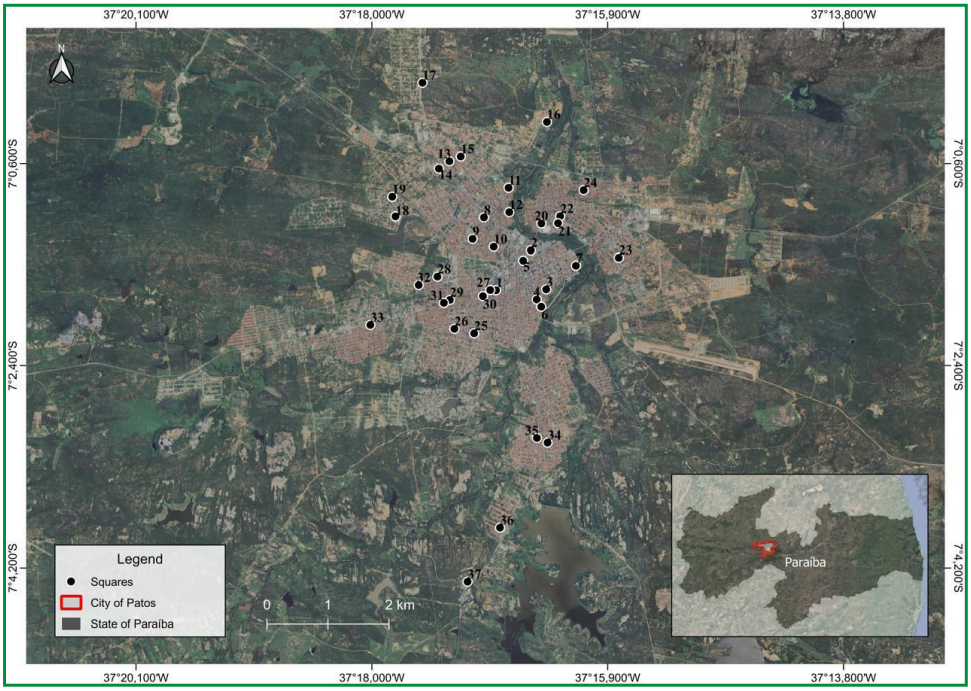
the population with opportunities to learn about regional native species, thereby recognizing the importance of urban forestry with native species. Another aspect that reduces the use of native species is the lack of knowledge about their development and behavior in urban forestry, which highlights the need to invest in the implementation and subsequent dissemination of studies on the behavior of native species in urban forestry, especially in cities in the Brazilian semiarid region.

In this context, this study aimed to diagnose the current situation and the floristic composition of the vegetation present in the squares of the city of Patos, State of Paraíba, Brazil, to obtain subsidies that can reveal whether their vegetation cover is in satisfactory condition.

## 2 MATERIALS AND METHODS

The study was conducted in 37 squares located in the city of Patos, State of Paraíba, Brazil, where a survey of the tree and shrub vegetation present in these green areas was carried out. The city is located in an area covered by the Brazilian semiarid region, the immediate geographic region of Patos (Figure 1).

Figure 1 – Map of the study area




Source: Authors (2024)

The city's climate is BSh, according to the Köppen classification (ALVARES *et al.*, 2014), hot and dry, with a maximum temperature of 38 °C, a minimum temperature of 28°C, and a mean rainfall of 800 mm per year (BRASIL, 2005). The population of the city of Patos, State of Paraíba, is 108,192 inhabitants, with a territorial area of 472.892 km$^2$ and an area of 5.11 km$^2$ corresponding to the urban area (IBGE, 2020).

## 2.1 Floristic survey

The tree-shrub component present in the squares was identified to assess the floristic composition using a field spreadsheet. Subsequently, the registered species were classified by botanical family, genus, and species, in addition to the common name, habit, and origin (exotic or native). The classification and naming system of the species followed the Angiosperm Phylogeny Group (APG IV, 2016), while the correct spelling of the scientific names of the species followed the List of Species of the Flora of Brazil (JBRJ, 2024).

## 2.2 Green area index and vegetation cover index of squares

The calculation of the green area index initially considered the total area of each square, measured using a GPS device. The obtained value, considering the sum of the total areas of the squares, was divided by the number of inhabitants of the urban area, expressed in square meters (m$^2$), adapted from Harder, Ribeiro and Tavares (2006).

The vegetation cover index (VC) was calculated by adding the canopy areas of the trees in the squares in square meters and dividing them by the number of inhabitants of the urban area (Harder; Ribeiro; Tavares, 2006). Moreover, two measurements were taken to determine the canopy diameter (CD): one in the north-south direction and the other in the east-west direction, following the methodology of Harder, Ribeiro and Tavares (2006). Subsequently, the mean of the two measurements was calculated and applied to the geometric formula for the area of a circle.

### 2.3 Percentage of vegetation cover of squares

The percentage of vegetation cover of the squares (PVCS) was calculated by adding the areas of the canopy areas in each square, dividing them by the total area of the corresponding square, and multiplying it by one hundred, according to the Equation (1) below, proposed by Abreu *et al.* (2012):

$$PVCS = \frac{Vegetation\ coverage\ area\ of\ the\ square}{Total\ area\ of\ the\ square} x100 \quad (1)$$

The obtained result allowed us to analyze whether the percentage of vegetation cover is satisfactory based on the parameter determined by Oke (1973), in which a percentage of vegetation cover of 30% is considered ideal and areas with less than 5% of vegetation cover are characterized as desert regions. Data collections were carried out in May, August, and September 2021. The collected data were tabulated in spreadsheets of Microsoft Excel version 2016 and then the indices were calculated.

## 3 RESULTS AND DISCUSSIONS

### 3.1 Plant component floristics

The floristic survey of tree and shrub species present in the 37 squares of the city of Patos, State of Paraíba, Brazil, revealed the presence of 808 individuals belonging to 67 species, distributed in 28 botanical families and 58 genera (Table 1).

Table 1 – List of botanical families, scientific and popular names, number of individuals, habits, and origin of the species found in 37 squares of the city of Patos, State of Paraíba, Brazil

| Family/species | Common name | NI | Habit | O |
|---|---|---|---|---|
| **ARALIACEAE** | | | | |
| *Didymopanax morototoni* (Aubl.) Decne. & Planch. | Caixeta | 1 | Tree | N |
| **ANACARDIACEAE** | | | | |
| *Albizia lebbeck* (L.) Benth. | Esponjinha | 5 | Tree | E |
| *Anacardium occidentale* L. | Cajueiro | 5 | Tree | N |

To be continued ...

Table 1 – Continuation

| Family/species | Common name | NI | Habit | O |
|---|---|---|---|---|
| **ANACARDIACEAE** | | | | |
| *Mangifera indica* L. | Mangueira | 9 | Tree | E |
| *Myracrodruon urundeuva* M. Allemão | Aroeira | 6 | Tree | N |
| *Schinus terebinthifolia* Raddi | Aroeira Pimenteira | 2 | Tree | N |
| *Spondias dulcis* Parkinson | Cajarana | 3 | Tree | N |
| *Spondias purpurea* L. | Seriguela | 5 | Tree | E |
| *Spondias tuberosa* Arruda | Umbuzeiro | 1 | Tree | N |
| **ANNONACEAE** | | | | |
| *Annona muricata* L. | Graviola | 2 | Shrub | E |
| *Annona squamosa* L. | Pinha | 3 | Shrub | E |
| **APOCYNACEAE** | | | | |
| *Nerium oleander* L | Espirradeira | 12 | Shrub | E |
| *Plumeria pudica* Jacq. | Jasmim Buquê de Noiva | 10 | Shrub | E |
| **ARAUCARIACEAE** | | | | |
| *Araucaria columnaris* (J.R.Forst.) Hook. | Pinheiro | 1 | Tree | E |
| **ARECACEAE** | | | | |
| *Roystonea oleracea* (Jacq.) O.F.Cook | Palmeira Imperial | 6 | Palmeira | E |
| *Dypsis lutescens* (H.Wendl.) Beentje & J.Dransf. | Palmeira Areca Bambu | 4 | Palmeira | E |
| *Dypsis decaryi* (Jum.) Beentje & J.Dransf. | Palmeira Triangular | 2 | Palmeira | E |
| *Bismarckia nobilis* Hildebrandt & H. Wendl. | Palmeira Azul | 2 | Palmeira | E |
| **ASPARAGACEAE** | | | | |
| *Agave* L. | | 2 | - | E |
| **BIGNONIACEAE** | | | | |
| *Handroanthus impetiginosus* (Mart. ex DC.) Mattos | Ipê Roxo | 24 | Tree | N |
| *Tabebuia aurea* (Silva Manso) Benth. & Hook.f. ex S.Moore | Craibeira | 103 | | N |
| *Tecoma stans* (L.) Juss. ex Kunth | Ipê de Jardim | 11 | Shrub | E |
| **BORAGINACEAE** | | | | |
| *Cordia africana* Lam. | Cola | 5 | Tree | E |
| **CACTACEAE** | | | | |
| *Cereus jamacaru* DC. | Mandacaru | 1 | - | N |
| **CAPPARACEAE** | | | | |
| *Crateva tapia* L. | Trapiá | 2 | Tree | N |
| **CARICACEAE** | | | | |
| *Carica papaya* L. | Mamão | 2 | Shrub | E |
| **CHRYSOBALANACEAE** | | | | |
| *Moquilea tomentosa* Benth. | Oiti | 11 | Tree | N |
| **COMBRETACEAE** | | | | |
| *Combretum leprosum* Mart. | Mofumbo | 1 | Shrub | N |
| *Terminalia catappa* L. | Castanhola | 2 | Tree | E |
| **CYCADACEAE** | | | | |
| *Cycas revoluta* Thunb. | Cica Revoluta | 25 | Shrub | E |

To be continued ...

Table 1 – Continuation

| Family/species | Common name | NI | Habit | O |
|---|---|---|---|---|
| **EUPHORBIACEAE** | | | | |
| *Cnidoscolus quercifolius* Pohl | Favela | 1 | Tree | N |
| *Jatropha gossypiifolia* L. | Pinhão Manso | 6 | Shrub | N |
| **FABACEAE** | | | | |
| *Adenanthera pavonina* L. | Falso Pau-brasil | 1 | Tree | E |
| *Bauhinia forficata* Link | Mororó | 3 | Tree | N |
| *Caesalpinia pulcherrima* (L.) Sw. | Flamboyant Mirim | 18 | Shrub | E |
| *Cassia fistula* L. | Chuva de Ouro | 12 | Tree | E |
| *Cenostigma pluviosum* (DC.) Gagnon & G.P.Lewis | Sibipiruna | 9 | Tree | N |
| *Cenostigma pyramidale* (Tul.) Gagnon & G.P.Lewis | Catingueira | 11 | Tree | N |
| *Delonix regi* (Bojer ex Hook.) Raf. | Flamboyant | 10 | Tree | E |
| *Erythrina indica* picta | Brasileirinho | 1 | Tree | E |
| *Erythrina velutina* Willd. | Mulungu | 1 | Tree | N |
| *Inga edulis* Mart. | Ingazeira | 1 | Tree | N |
| *Leucaena leucocephala* (Lam.) de Wit | Leucena | 1 | Shrub | E |
| *Libidibia férrea* (Mart. ex Tul.) L.P.Queiroz | Jucá | 2 | Tree | N |
| *Paubrasilia echinata* (Lam.) Gagnon, H.C.Lima & G.P.Lewis | Pau-brasil | 3 | Tree | N |
| *Peltophorum dubium* (Spreng.) Taub. | Canafístula | 12 | Tree | N |
| *Pithecellobium dulce* (Roxb.) Benth. | Mata Fome | 9 | Tree | E |
| *Prosopis juliflora* (Sw.) DC. | Algaroba | 10 | Tree | E |
| *Senna siamea* (Lam.) H.S.Irwin & Barneby | Acácia | 4 | Tree | E |
| *Tamarindus indica* L. | Tamarindo | 7 | Tree | E |
| **LYTHRACEAE** | | | | |
| *Punica granatum* L. | Romãzeira | 1 | Tree | E |
| **MALPIGHIACEAE** | | | | |
| *Malpighia emarginata* DC. | Acerola | 6 | Shrub | E |
| **MALVACEAE** | | | | |
| *Hibiscus rosa-sinensis* L. | Papoula | 3 | Shrub | E |
| *Hibiscus* L. | Algodão-da-praia | 1 | Shrub | N |
| **MELIACEAE** | | | | |
| *Azadirachta indica* A.Juss. | Nim | 296 | Tree | E |
| **MORINGACEAE** | | | | |
| *Moringa oleífera* Lam. | Moringa | 19 | Tree | E |
| **MYRTACEAE** | | | | |
| *Syzygium cumini* (L.) Skeels | Azeitona Preta | 4 | Tree | E |
| *Psidium guajava* L. | Goiabeira | 1 | Tree | E |
| **NYCTAGINACEAE** | | | | |
| *Bougainvillea* Comm. ex Juss. | Buganvília | 25 | Shrub | N |
| **RHAMNACEAE** | | | | |
| *Sarcomphalus joazeiro* (Mart.) Hauenshild | Juazeiro | 18 | Tree | N |
| **RUBIACEAE** | | | | |
| *Morinda citrifolia* L. | Noni | 2 | Tree | N |

To be continued ...

Table 1 – Conclusion

| Family/species | Common name | NI | Habit | O |
|---|---|---|---|---|
| **RUTACEAE** | | | | |
| *Citrus limon* (L.) Osbeck | Limoeiro | 2 | Shrub | E |
| *Citrus sinensis* (L.) Osbeck | Laranja | 2 | Shrub | E |
| *Murraya paniculata* (L.) Jack | Jasmim Limão | 26 | Shrub | E |
| **SCROPHULARIACEAE** | | | | |
| *Leucophyllum frutescens* (Berland.) I.M.Johnst. | Chuva de Prata | 12 | Shrub | E |
| **Total** | | 808 | | |

Source: Authors (2021)

In where: E = exotic; N = native.

The obtained values were higher than those found in seven public green spaces in the city of Monteiro, State of Paraíba, with 529 individuals distributed in nine botanical families, 10 genera, and 11 species (Bezerra; Costa; Silva, 2016), six public spaces in the city of Arapiraca, State of Alagoas, where 424 trees were counted, belonging to 30 species, 30 genera, and 11 botanical families (Silva; Gomes, 2013).

The botanical families that stood out in the number of species were Fabaceae, with 18 species, and Anacardiaceae, with eight species. The families Fabaceae and Anacardiaceae also stood out significantly in the number of species in the surveys carried out in the cities of Nossa Senhora do Socorro, State of Sergipe (Jesus *et al*., 2015), and Arapiraca, State of Alagoas, where the survey was conducted only in the central area of the city (Silva, 2012).

Other surveys have shown that the family Fabaceae is the most representative in studies on the urban forestry of squares (Pinheiro *et al.*, 2022; Neves *et al.*, 2021; Bacelar *et al.*, 2020; Bernardes *et al.*, 2019; Silva *et al.*, 2018; Matta *et al.*, 2017; Bezerra; Costa; Silva, 2016; Teixeira *et al.*, 2016; Freitas; Pinheiro; Abrahão, 2015; Santos; José; Sousa, 2013). According to Souza and Lorenzi (2005), the family Fabaceae is predominant because it has many species with landscaping potential, widely disseminated throughout Brazil and the world, and well-known by the population.

The study of origin showed that 67.33% of the 808 individuals found in the urban forestry of the squares are exotic and 32.67% are native to Brazil, totaling 39 native and 25 exotic species (Table 1). This result is similar to the values reported in the literature (Matta *et al.*, 2017; Dantas; Gomes; Pinheiro, 2016; Bezerra; Costa; Silva, 2016; Freitas; Pinheiro; Abrahão, 2015; Romani *et al.*, 2012).

Among the exotic species, *Azadirachta indica* presented the highest number of individuals, with 296 representatives, corresponding to 36.63% of the total number of individuals. Bacelar *et al.* (2020) verified a similar result, in which the species *Azadirachta indica* was one of the most observed, totaling 281 individuals. The authors attributed the increased use of exotic species in urban forestry to the lack of planning standards, specialized techniques and technicians in urban forestry, and information and research on native flora.

According to Alencar *et al.* (2014), the increased use of exotic species is a worrying fact, as it presents a high risk of biodiversity loss, which will limit the development of other species. According to Neves *et al.* (2021), the high use of exotic species in urban forestry is related to past landscaping trends, when species were chosen based on their aesthetic beauty, without taking their origin into account.

The most representative number of individuals per species was found for *Azadirachta indica* (296), *Tabebuia aurea* (103), *Murraya paniculata* (26), *Cycas revoluta* (25), *Bougainvillea* (25), and *Handroanthus impetiginosus* (24), representing 61.12% of the total number of individuals (Table 1).

### 3.3 Green area index and vegetation cover index of squares

The green area index of the squares in the city of Patos, State of Paraíba, was 0.58 $m^2$ per inhabitant, which is lower than the suggested value. The green area index of the city's squares is well below the minimum of 15 $m^2$ per inhabitant for public green areas intended for recreation, as suggested by the Brazilian Society of Urban Forestry (SBAU, 1996), reinforcing the need to create new green areas and urban forestry plans

that meet the reality of the city. This value corroborates that found by Arruda *et al.* (2013), who obtained an index of 0.57 $m^2$ per inhabitant for the central urban perimeter of the municipality of Mossoró, State of Rio Grande do Norte. Nascimento, Brito, and Chaves (2021) found higher values for parks in ten neighborhoods Downtown and North Teresina, State of Piauí, with values ranging from 2.4 to 45.2 $m^2$ per inhabitant.

The value found in this study points to the need to enrich the vegetation in the squares and the creation of new green areas in the city to comply with the suggested index value. From this perspective, the index of Curitiba, State of Paraná, is worth mentioning, as it consists of one of the best in Brazil, reaching 64.5 $m^2$ per inhabitant (CURITIBA, 2012), and the index of Paulínia, State of São Paulo, which corresponds to 96.32 $m^2$ per inhabitant (Bargos; Matias, 2012).

Achieving this index is not impossible for the city of Patos, but joint actions by the government and civil society are essential to begin this process of change, with an increase in the planting of tree species in the existing squares, especially native ones, offering their ecosystem services over the years, with the peak reached when the vegetation is mature. Furthermore, the creation of urban parks in the city is a growing need, as people seek out spacious, tree-filled spaces to engage in physical and leisure activities. Therefore, highlighting the functions that green areas play in terms of environmental, social, aesthetic, and ecological quality is important.

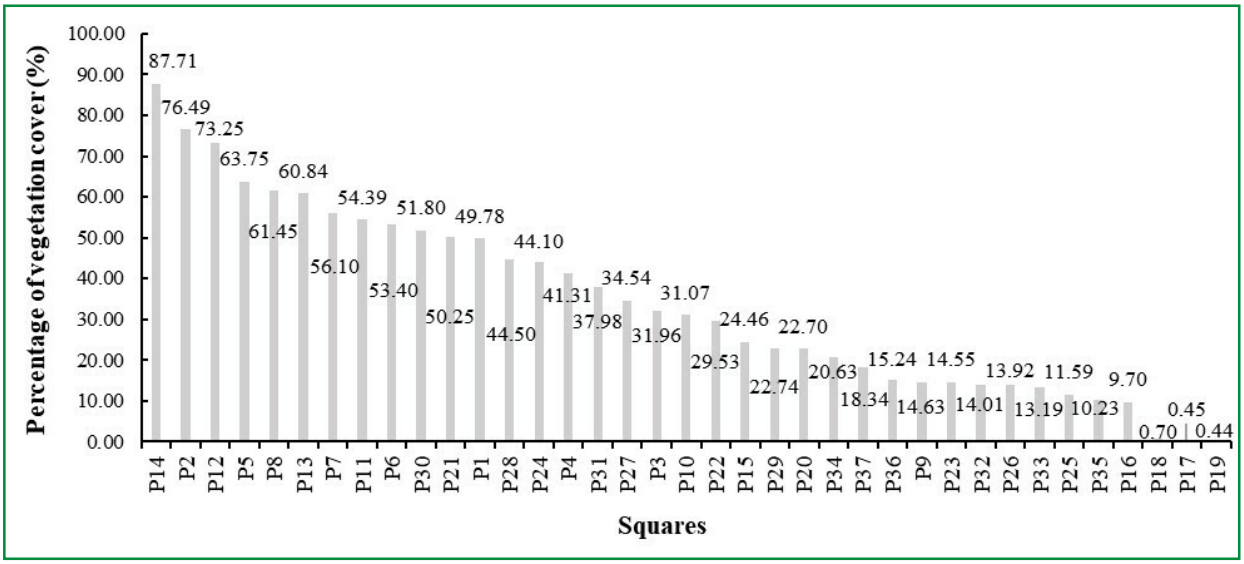
The total canopy area found in the squares of the city of Patos, State of Paraíba, was 17,265.893 $m^2$, which resulted in a vegetation cover index of the squares of 0.16 $m^2$ of canopy in squares per inhabitant. This value is considered lower than that found by Arruda *et al*. (2013) for the central urban perimeter of the municipality of Mossoró, State of Rio Grande do Norte, with a vegetation cover index of 9.57 $m^2$ of canopy in squares per inhabitant, and Neves *et al*. (2021) for the squares of Downtown Santarém, State of Pará, with an index of 3.12 $m^2$ of vegetation cover per inhabitant, a value higher than that found in this research. The data found in this study show the need to review the pruning management, which reduces the coverage in these places, and the

need to enrich the tree component in the squares that have space for the introduction of more individuals. According to Neves *et al.* (2021), the lack of a reference value related to vegetation cover in urban forestry studies makes it impossible to determine the quality of these areas based on this index.

### 3.4 Percentage of vegetation cover in squares

A total of the squares presented a percentage of vegetation cover of 51.35% (Figure 2), which is above the ideal percentage of 30% determined by Oke (1973). Square 14 (Praça do Rotary) stood out with 87.71% vegetation cover, as this square presents similar values of the sum of canopy area (260.5 $m^2$) and total square area (297 $m^2$).

Figure 2 – Percentage of vegetation cover in the 37 squares of the city of Patos, State of Paraíba, Brazil




Source: Authors (2021)

A total of 40.54% of the remaining squares have a percentage lower than indicated and 8.10% have a percentage lower than 5%, indicating the presence of areas that can be characterized as inhospitable. The squares with a percentage lower than 5% (Squares 17, 18, and 19) were recently built, and many of their individuals are in the seedling stage and others died due to the lack of silvicultural practices, mainly

irrigation, which resulted in reduced canopy cover. This result differs from the data found by Abreu *et al.* (2012), who analyzed 11 squares in Downtown Teresina, State of Piauí, and obtained a percentage of cover higher than 55% for all squares.

Based on the diagnosis carried out in this study and the obtained data and results, the City of Patos will have support to efficiently plan and manage the vegetation existing in the squares. In addition, other species, preferably native to the region, may be introduced to diversify and beautify urban green areas. These actions not only improve local aesthetics and biodiversity but also promote a healthier and more pleasant environment for residents, encouraging the conscious and sustainable use of these public spaces.

## 3 CONCLUSIONS

The floristic composition of the shrub-tree component of the 37 evaluated squares indicated that individuals from the family Fabaceae were dominant, and most of the tree group was of exotic origin. The dominant species was the exotic *Azadirachta indica* A. Juss, whose choice was guided by advantageous characteristics such as rapid growth and evergreen nature.

The percentage of vegetation cover of the squares (PVCS) was considered satisfactory, but the obtained value is related to the existence of squares with small areas, which ends up overestimating this variable. The green area index for squares per inhabitant is below that recommended by the Brazilian Society of Urban Forestry, demonstrating that the urban forestry of these areas is still insufficient to provide environments with characteristics favorable to the well-being of the population. There is a need to create new green areas and increase the vegetation cover of existing ones, in addition to carrying out awareness-raising and environmental education efforts to spread knowledge about the importance of green areas and the use of native species in urban forestry.

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