Floristic composition of public squares in Presidente Venceslau, western São Paulo State, Brazil

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Abstract

Public squares are relevant for urban environment and human well-being. We studied tree species of the main public squares of Presidente Venceslau, São Paulo State, whose original biome is Atlantic Rainforest. Ecological indices were calculated, and species origin were checked and divided in three categories: regional natives, Brazilian natives and exotics. The squares hold 272 species (21 families). Arecaceae, Fabaceae and Bignoniaceae are the most diverse families. *Cenostigma pluviosum* var. *peltophoroides* and *Moquilea tomentosa* are the most abundant species. Although Brazilian native species make up the majority of tree species, regional native species can be more valued for square afforestation, to enhance city's biodiversity.

Keywords: Urban afforestation, Native species, *Cenostigma pluviosum*.

Introduction

In the urban environment, public squares with vegetation cover, including trees, are important for the inhabitant's well-being, health (Sanesi et al., 2017) and even for economic reasons (Zölch et al., 2019). These green spaces harbor urban biodiversity, and several factors modulate the composition of square flora, like social, economic and arboricultural ones (Freitas et al., 2020).

The original vegetation cover of Pontal do Paranapanema region, on Southwestern São Paulo State, underwent rapid change from early 20th century (Hueck, 1972). The Semideciduous Seasonal Forest of Atlantic Rainforest domain along with some Cerrado areas, were deforested for agriculture and logging exploitation, around the same time the first cities appeared in the region. The municipality of Presidente Venceslau (21º52'31"S; 51º50'47"W) was emancipated in 1926 and currently hold 39,648 people, with an average HDI of 0.763 (IBGE, 2021). Only 3% of the municipality's total area is covered with original vegetation, most (1,792 ha) within the Rio do Peixe State Park (ISA, 2016).

This work aimed to assess the tree species composition of the three main squares located in the central zone of Presidente Venceslau – São Paulo State, focusing on the species origin and ecological indices among the squares.

Material and Methods

All three public squares in the main zone of Presidente Venceslau – SP were visited (Table 1) and all trees were identified and counted, by species. Doubtful identifications were compared through online virtual herbarium (Herbário Virtual, Reflora 2022). Some individuals were identified only at botanic family level. The surface area of the squares was measured using Google Earth Pro.

Table 01. Description and location of the squares studied in Presidente Venceslau – SP.

Square identification	Location	Altitude (a.s.l.)	Area (m²)
"Coronel Brizola" ("Bosque")	21º52'22.32" S 51°50'57.54" W	414 m	7,370
"Dr. Álvaro Coelho" ("Matriz")	21º52'36.78" S 51º50'39.12" W	427 m	7,240
"Nicolino Rondó" ("Correio")	21º52'28.02" S 51º50'45.12" W	423 m	11,560

The species were grouped into three classes of origin: (1) Regional natives, that is, those who are native from Pontal do Paranapanema region; (2) Brazilian natives, those that aren't regional indigenous, but from others ecosystems within the country, and (3) Exotic, those species from other countries anywhere in the world. Specialized literature (Lorenzi, 2014; Flora do Brasil, 2020) was consulted to confirm species identification and origin. To verify the regional indigenous species, we consulted species lists from Rio do Peixe and Morro do Diabo State Parks (Faria; Pires, 2006; 2010).

Ecological indices were calculated for each square: Density of trees per 1,000 m², Shannon diversity index and Pielou's evenness (Jost, 2010):

$$H' = \sum p_i ¿¿$$

Where H' = Shannon diversity index; *pi* = proportion of each species in relation to the total number of individuals.

$$J' = \frac{H'}{\ln S}$$

Where J' = Pielou's evenness; H' = Shannon diversity index; S = total number of species in the community.

Results and Discussion

We counted 272 trees in the three squares, belonging to 21 families (table 2). The family with higher number of species was Arecaceae (12), followed by Fabaceae (11) and Bignoniaceae (6). In the table, the sum of the species results in more than these values due to repeated species in the squares.

Table 02. Number of species and individuals by botanic families in each square, Presidente Venceslau – SP.

	Number of species			Number of individuals		
Family	"Correio"	"Bosque"	"Matriz"	"Correio"	"Bosque"	"Matriz"
Anacardiaceae	1	1		3	1	
Annonaceae	1			2		
Apocynaceae	1	1		1	1	
Arecaceae	8	5	4	27	13	10
Bignoniaceae	4	5	3	33	15	13
Boraginaceae		1			2	
Chrysobalanacea e	1	1	1	23	2	10
Combretaceae	1	1		1	5	
Fabaceae	7	6	4	35	20	23
Lamiaceae			1			1
Lauraceae	1			1		
Lythraceae	2		1	7		1
Malvaceae	2	2		2	2	
Meliaceae	2	1		5	1	
Moraceae	2			4		
Muntingiaceae		1		0	1	
Myrtaceae	1	1		1	1	
Nyctaginaceae	1			1		
Rosaceae		1			1	
Rutaceae	1			2		
Urticaceae	1			1		
Total	37	27	14	149	65	58

The "Correio" square hold the largest number of individuals, species, density, and Shannon index (table 3).

The three squares have the same patterns of most abundant species composition, being *Cenostigma pluviosum* var. *peltophoroides* (Benth.) Gagnon & G.P.Lewis, *Moquilea tomentosa* Benth.

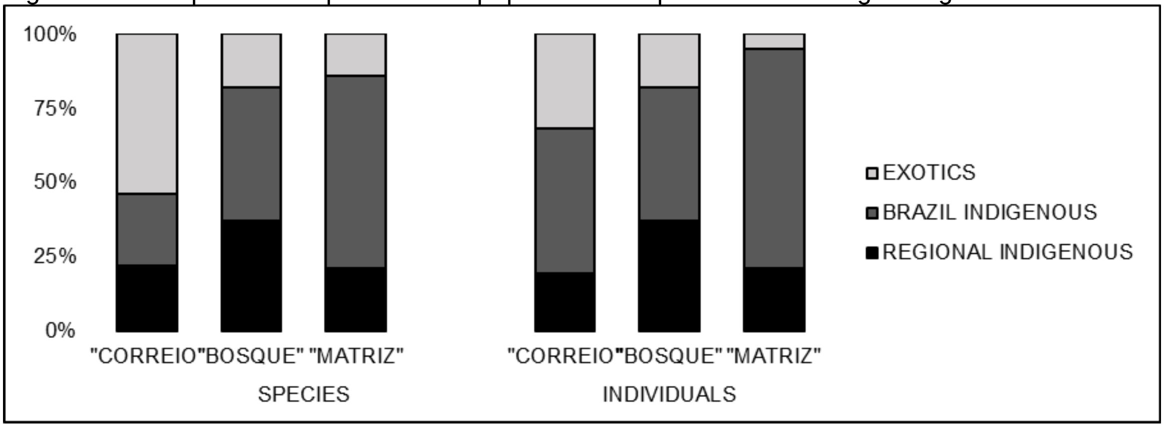
and *Handroanthus impetiginosus* (Vell.) Mattos the most abundant species. Just in “Matriz” square *C. pluviosum* var. *peltophoroides* and *M. tomentosa* form 43% of the total tree population. These species are among the most frequent in urban afforestation in several cities throughout the country (Basso; Corrêa, 2014), although are not regional natives to the study site.

Table 03. Ecological indices in squares of Presidente Venceslau – SP.

	Density (ind 1,000 m^{-2})	Shannon Index (H’)	Pielou’s evenness (J’)
“Correio”	13	3.09	0.86
“Bosque”	9	2.97	0.90
“Matriz”	8	2.27	0.86

Species origin varied along the squares (Figure 01), with “Bosque” and “Matriz” squares having similar patterns and “Correio” square showing the highest proportion of exotic species. In general, regional native species have fewer proportion in species composition and population.

Figure 1. Tree species composition and population composition according to origin.



Most of the square’s tree population were composed of Brazilian natives, but non regional indigenous. This may indicate a blurred interpretation of the native and exotic species concepts. While a species may be native to the country, it does not necessarily represent the original biodiversity of a city’s ecosystem. The region’s original flora has several tree species with potential ornamental that could be more valued for squares afforestation, especially large trees (Lorenzi, 2014). This is important to promote greater contact and interaction of people with local natural biodiversity (Khew et al., 2014). Moreover, regional native species are important to promote and maintain urban biodiversity (Silva et al., 2020). Another feature to be considered in species selection is the adaptability to climate changes, like drought and warming tolerance (Liu et al., 2021).

Conclusion

Arecaceae, Fabaceae and Bignoniaceae were the richest families in species number. *Cenostigma pluviosum* var. *peltophoroides* (Fabaceae) and *Moquilea tomentosa* (Chrysobalanaceae) were the most abundant species in the squares. A large proportion of Brazilian native species (but non regional natives) was observed. Regional native species could be more appreciated in urban squares afforestation projects.

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