

QUANTITATIVE SURVEY OF AFFORESTATION OF SQUARES IN THE CITY OF CÁCERES, MATO GROSSO STATE, BRAZIL

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ABSTRACT

The objective of this study was carry out a quantitative survey of the trees and palms existing on four squares on the central area of Cáceres City, Mato Grosso State, Brazil. We studied four squares: José de Anchieta, Barão do Rio Branco, Duque de Caxias and Benjamin Constant. We relied on specific literature and professionals to identify 231 trees and palms distributed on the four squares sampled. We identified 12 families, 22 genera and 25 species. The Square José de Anchieta has the most trees and palms (68 individuals). We observed the presence of termites and herb-of-finch (*Struthanthus flexicaulis*) in 17.64%. The species *Licania tomentosa* was found on all the squares with 42 individuals (18.2%). The most frequent family was Arecaceae with 65 individuals (28.2%). We found that 135 (58.44%) of individuals are native and 96 (41.56%) exotic. The knowledge of species is of fundamental importance for the preservation and maintenance of the public space, providing and/or improving the quality of these spaces, ensuring comfort and leisure for people who frequent them.

Keywords: landscaping; trees; Arecaceae; public area.

LEVANTAMENTO QUANTITATIVO DA ARBORIZAÇÃO DE PRAÇAS DA CIDADE DE CÁCERES/MT

RESUMO

O estudo teve objetivo de realizar um levantamento quantitativo das árvores e palmeiras existentes em quatro praças na área central de Cáceres/MT. Foram estudadas quatro praças: José de Anchieta, Barão do Rio Branco, Duque de Caxias e Benjamim Constant. Com auxílio de literatura específica e profissionais da área foram feita a identificação das espécies. Identificaram-se 231 árvores e palmeiras distribuídas nas quatro praças amostradas. Foram identificadas 12 famílias, 22 gêneros e 25 espécies. A Praça José de Anchieta possui o maior número de árvores e palmeiras (68). Observou-se presença de cupins e erva-de-passarinho em 17,64%. A espécie *Licania tomentosa* estava presente em todas as praças, com total de 42 exemplares (18,2%). A família com maior frequência foi Arecaceae, com 65 indivíduos (28,2%). Constatou-se que 135 (58,44%) dos indivíduos são nativos e 96 (41,56%) exóticos. O conhecimento sobre as espécies é de fundamental importância para conservação e manutenção do espaço público, viabilizando ou melhorando a qualidade desses espaços, oferecendo conforto e lazer as pessoas que os freqüentam.

Palavras- chave: paisagismo; árvores; Arecaceae; espaço público.

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⁴ recebido em 23.07.2012 e aceito para publicação em 15.03.2014



INTRODUCTION

Urban vegetation offers many benefits to populations, such as psychological well-being, better aesthetic effect, shading for pedestrians and vehicles, protection against the wind, noise buffer, reduction of noise pollution, reduction of the impact of rain water and surface runoffs, temperature decrease, because the trees absorb the sun rays and refresh the environment through evotranspiration, improving air quality, and wildlife preservation (PIVETTA & SILVA FILHO, 2002).

The urban landscape has undergone changes due to the increase of the urban population, with the presence of houses, industries, road systems, structures, and equipment of electric power, water, sanitation, and telecommunication (CEMIG, 2001).

Thus, the planning of the urban landscape is fundamental for the conservation of trees, which are components of great importance to the quality of life of the population.

Urban afforestation in Brazil is considered a recent subject, slowly advancing, where public managers and the community should be involved, fulfilling distinct

roles. Currently, in cities where the planning of afforestation is applied, the concern is to make urban environment more homogeneous and interconnected with the surrounding landscape (MELO & ROMANINI, 2008).

In general, urban parks are urban units fundamental for urban life. Vegetation cover is a striking feature in these spaces, and is one of the components of great importance in the formation of the local landscape (SILVA et al., 2007a).

To know the afforestation of a city, it is necessary to conduct a survey to assess the scenario, and use the results to achieve solutions for each site.

This study was conducted in the city of Cáceres, because it is an old city without planning of urban afforestation, and the objective is provide guidance for the management of trees and palm trees and subsidies for future interventions and improvement of these locations. We conducted a quantitative survey of trees and palms on four squares in the central area of Cáceres.

MATERIAL AND METHODS

Study site

The study was conducted in the municipality of Cáceres (16°04'16" S lat; and 57°40'44"W long.) in the State of Mato Grosso, Brazil, at 211 km from Cuiabá (Capital City) covering an area of approximately 24,398,399 km² and an estimated population of 87,261 inhabitants (IBGE, 2009).

The squares surveyed Praça Barão do Rio Branco, Praça Duque de Caxias, Praça Benjamin Constant (known as "Praça da Cavahada"), and Praça José de Anchieta (known as "Praça da PM"), all in the central region of the city.

Methods

The data were collected by means of visits to the sites, in the months of August and September 2009. The data were recorded with a camera and worksheets. The spreadsheet model was equal for all locations. The items surveyed were the popular name, scientific name, plant health, root system (outcropping or not, being checked if the root was affecting the sidewalk or

street), wiring position with respect to the treetops, type of pruning, obstruction to pedestrians.

The species were identified through a literature review and consultations to professionals in the field of botany. The data were grouped in families, genera, species, exotic, and native. After collection, the data were processed for the descriptive analysis.

RESULTS AND DISCUSSION

In the survey, we identified 231 trees and palm trees distributed on the four squares, represented by 12 families, 22 genera, and 25 species (Table 1). We found the following species: *Licania tomentosa* (oiti

(18.2%), *Roystonea oleracea* (palmeira imperial) (16.5%), *Vochysia divergens* (cambará) (11.3%), *Tabebuia sp* (ipê) (9.1%), and *Acrocomia aculeata* (bocaiúva) (8.2), belonging to five different families.

Table 1: List of families, species, origin, number of individuals and frequency of plant individuals found in four central squares of Cáceres, Mato Grosso State, 2009. UNEMAT, 2009

Popular name	Family	Scientific name	Origin	No. of individuals	Frequency (%)
Bocaiúva	Arecaceae	<i>Acrocomia aculeata</i> (Jacq.) Lodd	N	19	8.2
Cajueiro	Anacardiaceae	<i>Anacardium occidentale</i> Franz Eugen Köhler	N	1	0.4
Cambará	Vochysiaceae	<i>Vochysia divergens</i> Pohl	N	26	11.3
Canafístula faveiro	Fabaceae - Caesalpinioideae	<i>Peltophorum dubium</i> (Sprengel) Taubert	N	9	3.9
Chuva de ouro	Fabaceae - Caesalpinioideae	<i>Cassia fistula</i>	E	2	0.9
Cumbaru	Fabaceae- Papilionoidae	<i>Dipteryx alata</i> Vogel	N	1	0.4
Figueira benjamina	Moraceae	<i>Ficus benjamina</i> L.	E	11	4.8
Figueira lira	Moraceae	<i>Ficus lyrata</i> Warb	E	8	3.5
Figueira branca	Moraceae	<i>Ficus gomelleira</i> Kth. et Bouché	E	2	0.9
Flamboyant	Fabaceae-	<i>Delonix regia</i>	E	17	7.4

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	Caesalpinioideae	(Hook.) Raf			
Ipê	Bignoniaceae	<i>Tabebuia sp.</i>	N	21	9.1
Ipê mirim	Bignoniaceae	<i>Tecoma stans</i> (L.) Juss. ex Kunth	E	2	0.9
Mangueira	Anacardiaceae	<i>Mangifera indica</i> L.	E	5	2.2
Mogno	Meliaceae	<i>Swetenia macrophyla</i> R.A.King	N	1	0.4
Monguba	Bombacaceae	<i>Pachira aquática</i> Aubl.	N	1	0.4
Oiti	Chrysobalanaceae	<i>Licania tomentosa</i> (Benth.) Fritsch	N	42	18.2
Orelha de macaco	Fabaceae- Mimosoideae	<i>Enterolobium contortisiliquum</i> (Vell.) Morong.	N	3	1.3
Palmeira carnaúba	Arecaceae	<i>Copercicia prunifera</i> (Miller) H.E. Moore	N	8	3.5
Palmeira imperial	Arecaceae	<i>Roystonea oleracea</i> (Jacq.) Cook	E	38	16.5
Pau cigarra	Fabaceae- Caesalpinioideae	<i>Senna siamea</i> (LAM.) Irwim & Barneby.	E	1	0.4
Pokam	Rutaceae	<i>Citrus reticulata</i> Blanco	E	1	0.4
Sete copas	Combretaceae	<i>Terminalia catappa</i> L.	E	10	4.3
Sibiriruna	Fabaceae- Caesalpinioideae	<i>Caesalpinia peltophoroides</i>	N	2	0.9
TOTAL				231	

Legend: N= native; E= exotic

The family Arecaceae had the highest index, with 65 individuals, followed by Chrysobalanaceae, with 42 individuals, along with other 10 families (Fig. 1).

Praça José de Anchieta has the most individuals (68), distributed in six families, nine genera and 10 species. The family Arecaceae predominates, with 39 plants, from which 25 belong to the species *Roystonea oleracea* (Fig. 2).

Some trees (17.64%) showed damages caused by termites and herb finch. We observed the practice of L-type pruning in some trees to avoid conflict with the

aerial grid. We also observed damages (cracks) on the sidewalk caused the tree roots.

Praça Barão do Rio Branco, located in the central area of the city, receives a greater number of visitors and presented 49 individuals, especially from the family Chrysobalanaceae, with 23 plants species *Licania tomentosa* (oiti). Because it is a large tree, there are cracks in the sidewalk caused by its roots. Only two individuals were conflicting with the aerial power grid, and three individuals of *Ficus benjamina* had the side branches removed to prevent irregular growth of the plant.

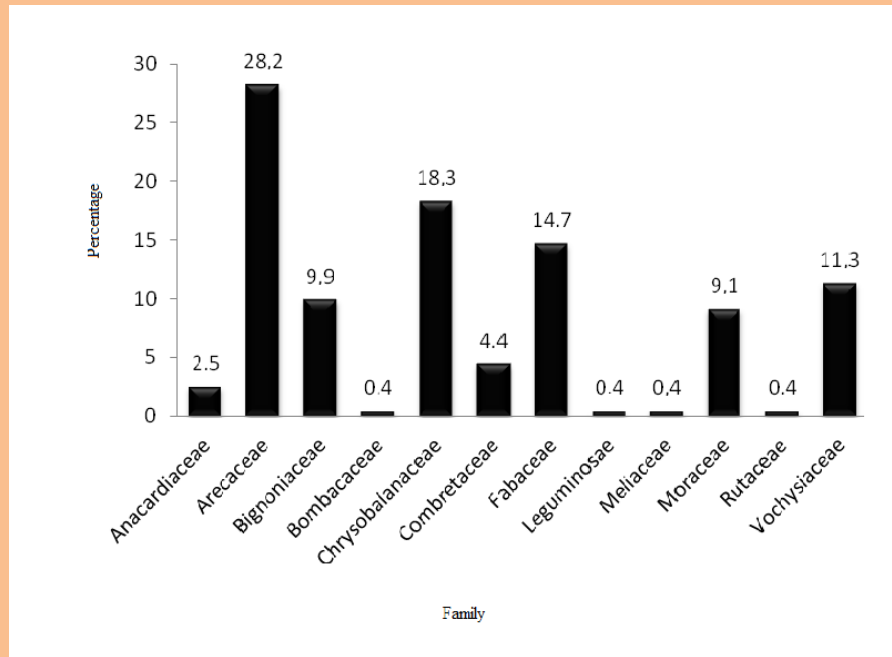


Figure 1: Percentage of families identified on the squares studied in Cáceres, Mato Grosso State, 2009. UNEMAT, 2009.

For Lorenzi (2003), *F. benjamina* is not recommended for afforestation of public roads, because its roots are very vigorous, compromising sidewalks. Silva et. al. (2007b) state that this species, if planted on sidewalks or central medians, is synonymous for future problems, due to its type of root system and its size, constantly requiring pruning practices.

Several studies report that *Licania tomentosa* is the most used species in square afforestation. In similar study conducted in Uberlândia, Minas Gerais State, Brazil, Silva et. Al. (2002) identified 1,329 trees belonging to 30 species, and *Licania tomentosa*, with 430 individuals (32%), was the most abundant and the second most abundant was *Ficus benjamina*, with 205 individuals (15%). Ibiapina et. Al. (2007) conducted studies in Teresina, Piauí State, Brazil and found that *Licania tomentosa* was the predominant species with 61% of the 105 individuals sampled.

Fava (2004) conducted a study in Cuiabá, Mato Grosso State, Brazil, in Boa Esperança neighborhood and sampled 1,060 trees. The authors found 33 species distributed in 16 families, and *Licania tomentosa* was

the most abundant species, with 468 individuals, followed by *Ficus benjamina*, with 108 individuals, and *Caesalpinia peltophoroides*, with 96 individuals.

Studies show that in Itaguaí, Rio de Janeiro State, Brazil, *Ficus benjamina* had 50% of the total number of trees, followed by *Terminalia catappa*, with 17% (Borba, 2006). In Nova Iguaçu, Rio de Janeiro State, Brazil, *Ficus benjamina* is the predominant species, representing 21% (Rocha et. Al., 2004), and in Curitiba, Paraná State, Brazil, the shrub *Lagerstroemia indica* comprises 19% of the trees, which is the species with the highest occurrence (MILANO et al., 1992).

According to Santamour Junior (2002), a greater diversity of tree species in the urban environment is necessary to ensure maximum protection against pests and diseases. The author recommends a maximum of 10% of the same species, 20% of the same genre, and 20% of the same botanical family. This condition was not observed with the numbers of individuals of species and families, which exceeded the recommendation with 28.2% and 18.2%, respectively.

In this scenario, Gajardoni (1995) warning about the importance of species diversity and recommends to give preference to native trees. The author states that diversification means that each species must represent, at most, 10% of the total number of trees in the city.

Licania tomentosa, the second most common species found, does not cause as much damage as *Ficus benjamina* does, but in general, its root system outcrops and sometimes compromises the sidewalk, its crown is dense, it is an evergreen tree and provides good shading.

According to Lorenzi (2009), because *Ficus benjamina* presents good shading, it is ideal for planting in parks,

gardens, streets, and avenues. However, for Oliveira (1997), *Ficus benjamina* is a large tree and, therefore, it is not ideal for planting in sidewalks, mainly under the aerial power grid.

On Praça Duque de Caxias, we found 59 individuals belonging to 7 families, 12 genera, and 14 species. *Licania tomentosa* also excelled in number of individuals, as well as on Praça Barão do Rio Branco, which were also causing cracks to sidewalks.

On Praça Benjamin Constant, we found 10 families, 13 genera, and 13 species, and the largest number of individuals (26) came from the same species *Vochysia divergens*.

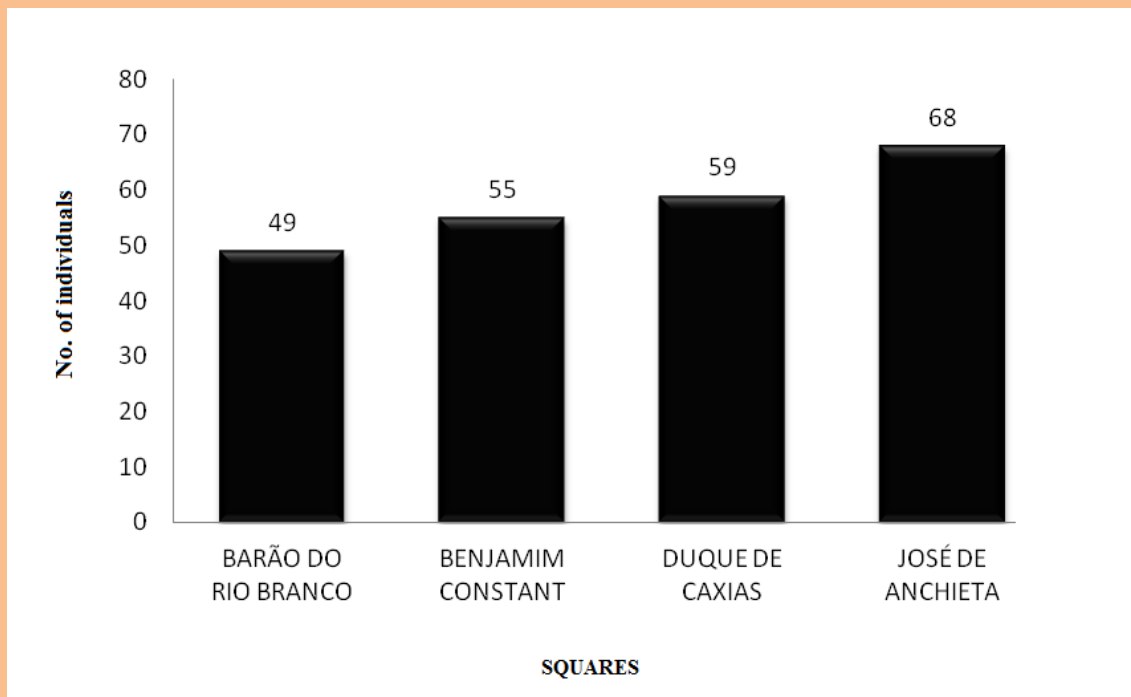


Figure 2: Number of individuals on the central squares of Cáceres, Mato Grosso State, Brazil, 2009. UNEMAT, 2009.

We found that *Licania tomentosa* is present in all the squares studied, with 42 individuals, representing 18.2%, followed by *Roystonea oleracea*, with 16.5% (Fig. 3).

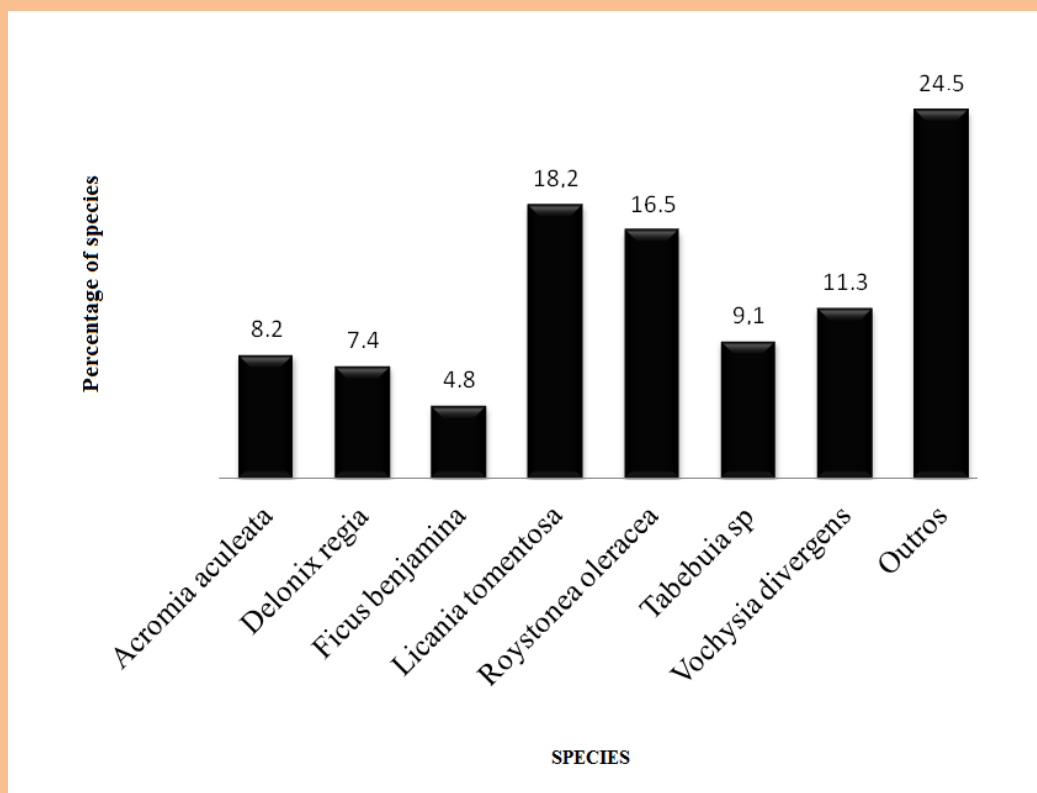


Figure 3: Species with the highest percentage of occurrence on the four central squares of Cáceres, Mato Grosso State, Brazil, 2009. UNEMAT, 2009.

Moura & Santos (2009) conducted a qualitative/quantitative survey of trees and shrubs in Central and Central Northern neighborhoods in Várzea Grande, Mato Grosso State, and found 352 trees, in which the predominant species accounted for 33.81% and belonged to the species *Licania tomentosa*, showing the preference for tree species that offer shading.

Regarding the origin of the trees found, of the 231 individuals studied, 134 are native and 97 are exotic. Silva (2007) studied the impact urban trees on buildings on six squares of Cáceres and found that 68% were native species and 32% exotic, similar to the results in the present study (Fig. 4).

Fava (2004) found different results for Cuiabá, Mato Grosso State, Brazil, corresponding to 45.5% of native and 54.5% of exotic species.

On the four squares analyzed in the municipality of Cáceres, we found 231 individuals, distributed in 25 different species, 22 genera, and 12 botanical families. But despite the large number of individuals, the results show that there is a relative uniformity in the afforestation of the squares, given that only five species correspond to 63.3% of the total trees inventoried. It is recommended the planting of new species, preferably native, to avoid uniformity.

The *Arecaceae* family has the largest number of individuals with 65 trees, representing 28.2% of total trees analyzed.

Of the species identified, *Licania tomentosa* stood out for being identified on all the squares and *Roystonea oleracea* was the second most used.

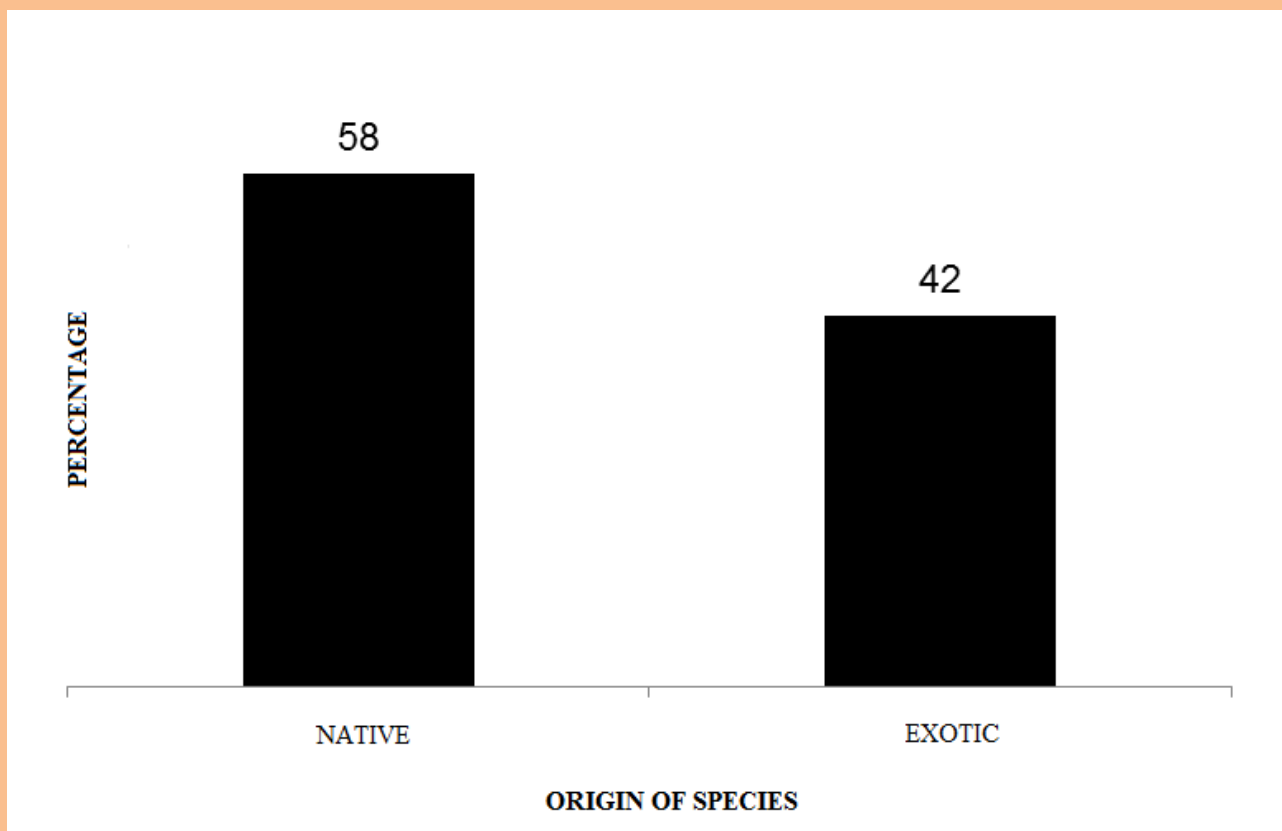


Figure 4: Native and exotic species found on the four central squares of Cáceres, Mato Grosso State, Brazil, 2009. UNEMAT, 2009

CONCLUSIONS

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Praça José de Anchieta had the largest number of trees.

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