The importance of Urban Afforestation: analysis from the mapping of Syzygium malaccense and Licania tomentosa species in the urban area of Itapuranga, Goiás (Brazil)

Josimar dos Reis de Souza
PhD Profesor, CEFET-MG, Araxá, Brazil.
josimarsouza@cefetmg.br

Samara Cristina Azevedo Silva
Master Student, UEG, Itapuranga, Brazil.
samara.azevedo@ueg.br

Laís Naiara Gonçalves dos Reis
PhD Profesor, UEG, Itapuranga, Brazil.
geografalais2013@gmail.com

SUMMARY

The present work aimed to carry out a rereading of the work entitled "Survey of urban afforestation and evaluation of the environmental perception of the inhabitants of the city of Itapuranga-GO", carried out by Rosilane de Faria and Valéria de Sousa, in 2012. the same areas that were mapped in 2012 were compared and evaluated, focusing on two species commonly seen on city sidewalks: Syzygium malaccense and Licania tomentosa, known as Oiti and Jambota; as well as a survey of the number of existing individuals was carried out. In addition, the existence of patterns was verified in the houses where the cataloged trees were found, given the fact that economic disparity is a factor in the formation of unequal spaces. The specimens located were georeferenced using a GNSS navigation device, model GarminEtrex Vista, and photographed in field work. Subsequently, a database was created in the laboratory with basic information to identify the individual: geographic coordinates, sector, street name, species height, scientific and popular name. As a result, the relevance of some tree species for the purpose of urban afforestation is discussed, in the same way that others are classified as not recommended. During the field incursions, a total of 954 individuals were catalogued, unevenly and disproportionately divided among the four surveyed sectors, considering that the trees found in squares and other areas were not computed. Finally, it was concluded that, contrary to expectations, the areas with the most trees are not the newest areas with the highest purchasing power, but the oldest sectors of the city, with a lower income population.

KEYWORDS: Urban tree planting. Syzygium malaccense. Licania tomentosa.

INTRODUCTION

In urban landscapes, it is clear that the regions with the most trees, that is, with green elements, are the ones with the oldest buildings. considering that tree planting provides thermal comfort. The human-nature interaction, the protection of the soil, the regional fauna and capture of pollutants from the atmosphere influence the dynamics of precipitation and interception related to the hydrological cycle, help in the prevention of erosion processes and also in the permeability of urban soils (MILANO; DALCIN, 2000; SILVA et al., 2002; COSTA et al., 2006).

The urban green areas have tree cover, native and/or introduced, shrubby, undergrowth and grasses. They contribute significantly to the quality of life and environmental balance. There are two types of green areas: public and private. According to the resolution of the National Council for the Environment (CONAMA), n° 369, of March 28, 2006, green areas in the public domain are considered to be those that play an ecological, landscape and recreational role, providing the improvement of life, quality aesthetic, functional and environmental aspects of the city.

Therefore, green areas have several functionalities within a society: social integration, leisure, aesthetic function - due to landscape diversification - ecological function, due to the interconnection of vegetation, soil care and, above all, the direct and indirect connection in the dynamics of the fauna. They also obtain an educational function related to environmental education and, last but not least, a psychological function, due to the feeling of well-being provided. Urban trees (on the sidewalks) should be considered for the purpose of building the road landscape, as they contribute to the features already mentioned. (GONÇALVES, 1999; MILANO, 1998).

According to Barros et al. (2009), in contemporary times, it can be said that there is a thought in Brazilian cities that aims to build healthy environments. In this sense, it is noted that the population seeks spaces closer to nature in search of a better quality of life and, because of

this, afforestation plays a fundamental role in these requirements. In this sense, urban planning emphasizes the importance of adequate afforestation through technical studies such as Urban Afforestation Plans.

The afforestation carried out without the proper study can cause some problems to the urban space, such as falling trees, cracks in the sidewalks, among others. It is necessary to implement an inspection for control, both by the government and the local population, emphasizing care with maintenance, pruning, cleaning and checking of individual branches.

The economic disparities of a city produce unequal urban spaces, this can be observed even in urban afforestation. According to Barros et al. (2009, p. 289):

> [...] the economic condition can be one of the factors that influence local afforestation and is generally associated with the lack of information that low-income communities have for carrying out the planting, in addition to the scarcity of instructions in general, on the part of the government, on how to manipulate the tree element after planting. In this sense, urban regions with greater purchasing power tend to have better adequacy of afforestation.

However, the hypothesis of this work is to say that for the city of Itapuranga-GO, the most wooded sectors are not those with a high purchasing standard, but the oldest ones. In relation to the norms of planted tree species, it is believed that there is no adequate urban planning, thus affecting the city as a whole, regardless of the construction pattern of the blocks.

This study aimed to evaluate and compare the tree species mapped in 2019 with the studies carried out by Faria and Sousa (2012), emphasizing the species Syzygium malaccense and Licania tomentosa, Oiti and Jambota, respectively. And it also intended to verify if different patterns of civil construction reveal correlation with the presence of urban trees in Itapuranga-GO.

MATERIALS AND METHODS

Characterization of the study area

The study area of this work are sectors of the city of Itapuranga-GO (Figure 1). Found between the geographic coordinates: Latitudes 15° 32' 18' South, Longitude: 49° 56' 5'' West, the municipality is located in the center-west region of the State of Goiás, extends over 1,276.5 km² and had with 26,125 inhabitants according to the last census (IBGE, 2010). Its demographic density is 20.5 inhabitants per km² in the territory of the municipality. The climate is considered warm all year round and its temperature ranges from 18 °C to 33 °C, rarely being below 16 °C or above 37 °C. According to the Census (2010), the average family income is R$ 1,700.00 reais, and the Municipal Human Development Index (HDIM) is 0,726.
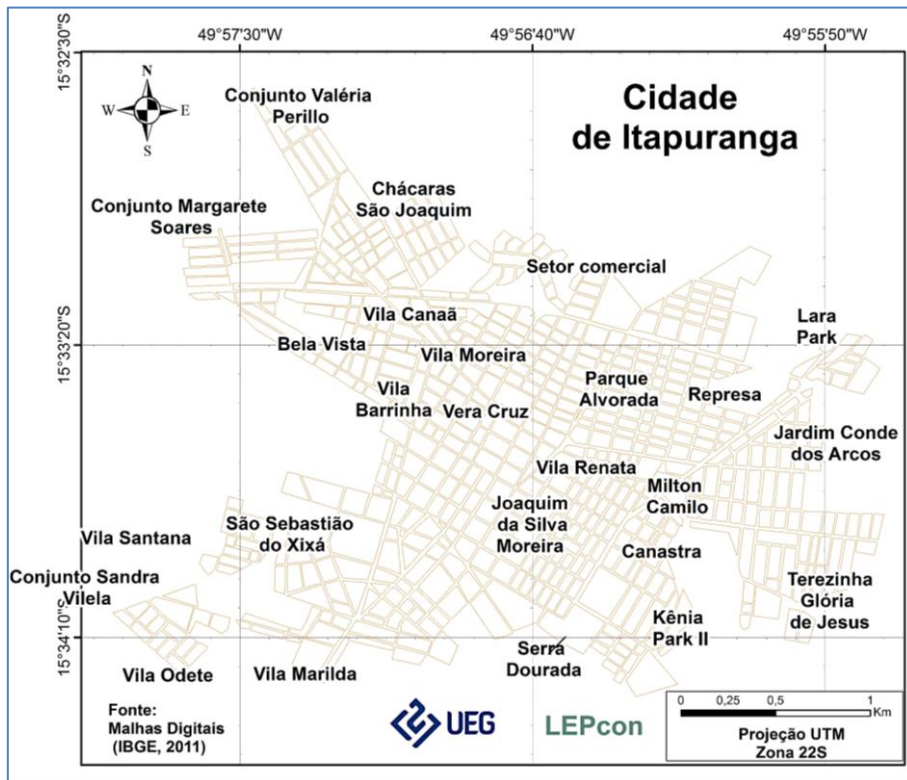
Figure 1: Location of the city of Itapuranga – Goiás
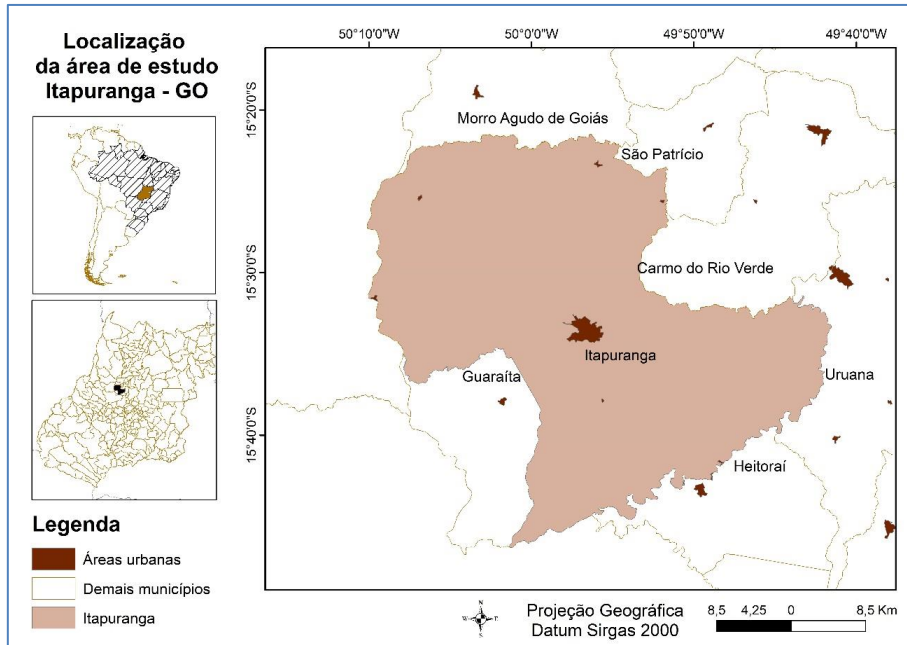
Source: Silva, 2019.

The afforestation of the city of Itapuranga was studied in 4 sectors, according to the methodology of Faria and Sousa (2012). They are: Parque Alvorada, Jardim Conde dos Arcos, Comercial and São Sebastião do Xixá (Figure 2).

Figure 2: Urban Area of Itapuranga – Goiás

Source: Silva, 2019.

Data collection and analysis

The choice of streets and sectors was based on the work of Faria e Sousa (2012). The objective was to raise the number of tree individuals for the year 2019 (with emphasis on Syzygium malaccense, known as Jambota and Licania tomentosa, the Oiti) and to contribute with the geographic perception for the theme of urban afforestation, identifying problems caused by the lack of of urban planning.

Species located in squares and parks were not considered. Observation and photographic recording of the trees were carried out, as well as the walls of the residences to carry out the economic classification.

The specimens were georeferenced using a navigation device (GNSS receiver), Garmin Etrex Vista. The database was created with the following information: geographic coordinates, sector, street name, species height, scientific and popular name.

Data collection and analysis Characterization of the species Syzygium malaccense (Jambota) and Licania tomentosa (Oiti)

Syzygium malaccense is known in Itapuranga-GO as Jambota and in other parts of Brazil it presents linguistic variations: jambo-red, jambo-pera, jambo-do-par, jambo-roxo, jambo-de-malaca, jambo-da-india , malay appel, rose-apple, manzana malaca, jambu-mawar, jambu-merah, among others. It is a species of the Myrtaceae family and presents Polynesia as its original habitat. It can reach up to 15 meters in height, its canopy is dense, and has an elongated conical shape and features a fruit known in Brazil as apple of the poor.

Licania Tomentosa is known as Oiti. Its natural occurrence is from Piauí to the north of Espírito Santo and the Rio Doce valley, in Minas Gerais. It can also be found in the state of Goiás. It has other names such as: oiti da praia, oitizeiro, oiti-cagão and oiti-mirim. It can reach up to 15 meters and its fruits, when ripe, are yellowish in color.

RESULTS

With the emergence of cities without planning, there are quite significant consequences in regional climates, including due to the omission of urban afforestation. Due to lack of guidance, the population does not have information on afforestation suitable for sidewalks, or even adequate management techniques, which, if done incorrectly, can lead to urban problems. "The continuous and disorderly growth of Brazilian cities has been accompanied by negligence regarding the tree composition of their roads and public places, thus generating impacts on the urban microclimate." (PINHEIRO; SOUZA, 2017, p. 69).

It is clear that afforestation plays an essential role in increasing the quality of life and the climate balance of cities. Among other benefits of afforestation for cities, we can mention the permeability of water, the increase of biodiversity in an urban environment, promotion of thermal comfort, among other factors.

Trees represent an essential element to promote environmental adequacy in terms of

comfort requirements. Vegetation is of fundamental importance for improving the quality of life, as it plays a role in improving and microclimate stability, due to the reduction of thermal amplitudes, increase of transpiration rates, reduction of direct sunlight, among other benefits (MILANO & DALCIN, 2000, p. 6).

In addition to all aesthetic standards, the city's floristry with the correct tree planting also helps in the process of preventing the heat island phenomenon, in the absorption of polluting gases emitted in the city's intra-urban processes and contributes to the emission of oxygen.

> The tree as a structuring element of spaces is responsible for aesthetic-visual qualities and well-being, it becomes an urban problem, when due to inefficient plans, lack of policies in the sector, improvisations and lack of awareness." (ITII; MALHEIROS; CAMPOS, 2012, p. 1).

According to Faria e Souza (2014, p. 106),

> In the four neighborhoods studied, 738 woody individuals distributed in 55 species, 51 genera and 24 families were sampled. Based on these data, we can highlight the high diversity at the generic level, because of the total sampled genera, 49 were represented by only one species. Only the genera Annona, Citrus, Spondias and Syzygium were represented by two species each (Table 2). With regard to families, Fabaceae had the highest number of species (11), followed by Anacardiaceae with five species. [...] The high representativeness of Fabaceae in urban afforestation is due to the showy flowering of its species (COSTA; LIMA, 2009). In the case of Anacardiaceae, several species produce fruits and pseudofruits that are highly appreciated by the population. The floristic survey revealed that the urban afforestation of Itapuranga has a high representation of only two species, Syzygium malaccense, which is exotic, and Licania tomentosa, native to Brazil, which represented 66% of the total number of individuals surveyed.

In 2019, the councilors of Itapuranga, on November 6, reported on the problem of using Syzygium malaccense for afforestation in the city, since, according to them, this species would "dirty" the city streets, making it difficult for street sweepers to perform. streets (Figure 3). According to the environmental inspector from the Municipality of Itapuranga (PMI), there was a policy in the municipality of donating Jambota and Oiti with species produced in the Horto of the city, which does not have a database to estimate the number of seedlings that were donated. The donation of the Licania tomomentosa species is still provided by PMI.

Figure 3: Photo of Syzygium malaccense littering the streets of the city of Itapuranga – Goiás

Source: Silva, 2019.

Licania tomentosa, on the other hand, is considered a large species and its roots have the potential to destroy sidewalks, impairing urban accessibility. Figure 4 shows an example of this species on a sidewalk in the city of Itapuranga.

Figure 4: Roots of Licania tomentosa damaging the sidewalks in the city of Itapuranga – Goiás

Source: Silva, 2019.

Another problem with these species in urban afforestation in Itapuranga is their interaction with the power grid. The trees need to be pruned so as not to cause damage to the installation, which is done aerially (Figure 5).

Figure 5: Cutting trees to avoid damaging the power grid
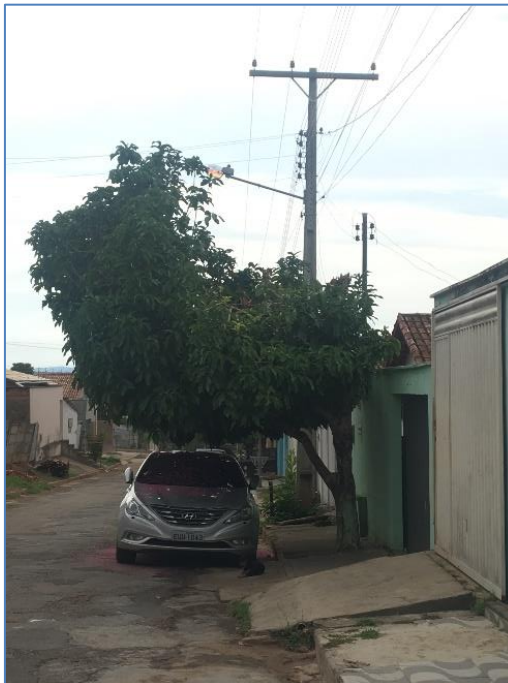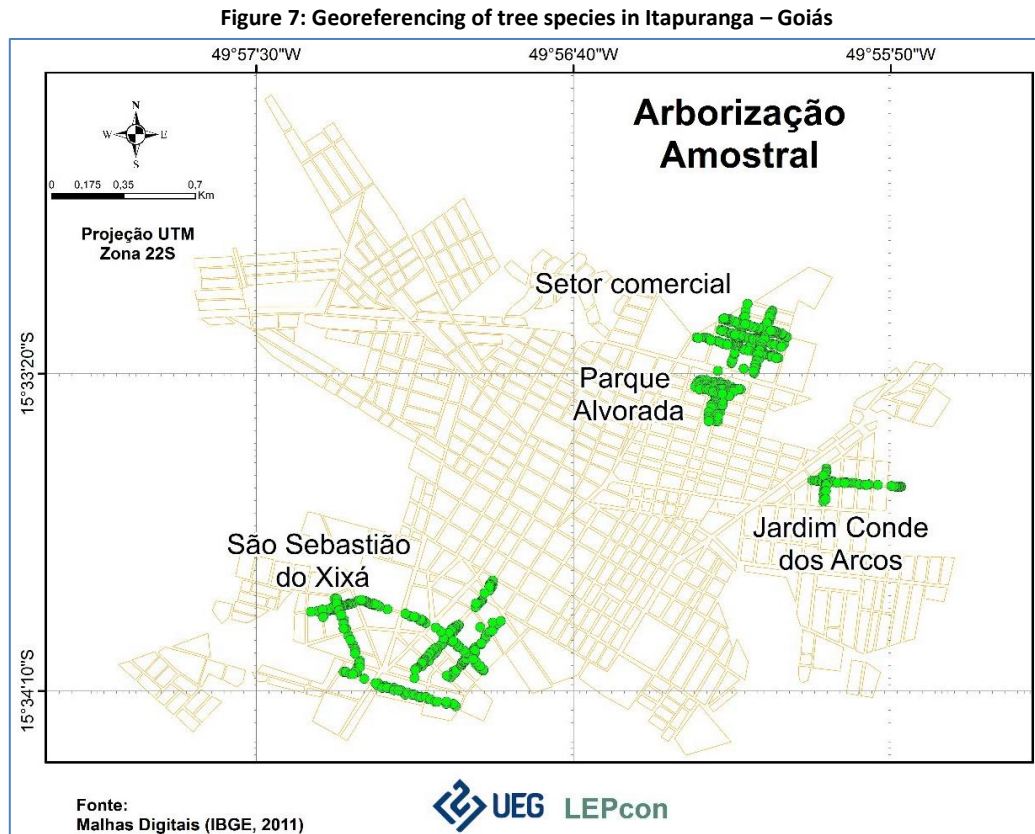

Source: Silva, 2019.

The mapping of the trees in the sampled sectors of the city of Itapuranga (Figure 6) identified a total of 954 specimens, 298 in Parque Alvorada, 211 in the Commercial Sector, 136 in the Conde dos Arcos Sector and in São Sebastião do Xixá, 402 individuals, according to the data shown in figure 7. It was found that of the surveyed sectors the most wooded are São Sebastião do Xixá and Parque Alvorada.

Figure 6: Graph of georeferenced tree individuals in Itapuranga – Goiás

Source: Silva, 2019.

Figure 7: Georeferencing of tree species in Itapuranga – Goiás
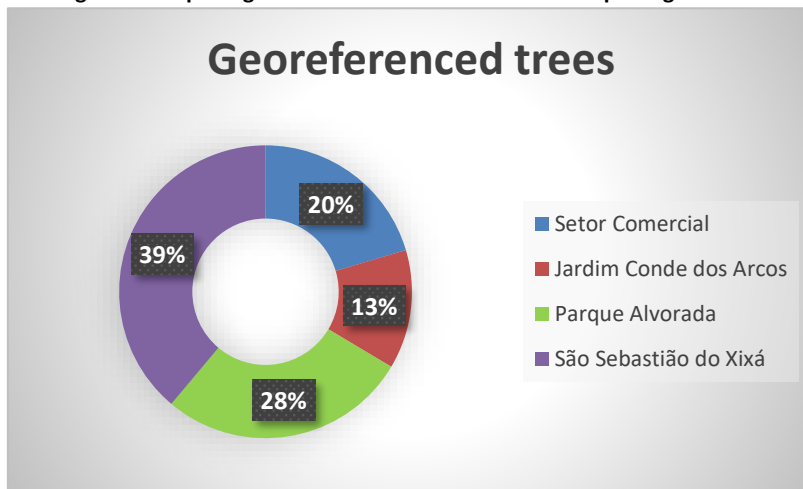
Source: Silva, 2019.

Figure 8 shows the urban landscape of a street in Itapuranga in the São Sebastião de Xixá sector, where Eugenia sp and Licania tomentosa are planted.

**Figure 8: Urban trees with Eugenia sp and Licania tomentosa**

Source: Silva, 2019.

Figure 9 shows the prevalence of the studied species in relation to the other species. The only sector that does not match this reality is the São Sebastião do Xixá neighborhood, which

has more than half of the mapped trees of other species. Among them can be highlighted: *Cestrum nocturnum; Mangifera indica, Ancadium occidentale, Psidium guajava, Citrus sp. Terminallia catappa, Anadenanthera colubrim, Morus sp., Spondias dulces, Carica papaya, Maupighia emarginata, Cocus nuciferas, Annona squamosa, Morinda citrifolia* and *Eugenia uniflora.*

Figure 9: Prevalence of Eugenia sp and Licania Tomentosa species in sectors of the city of Itapuranga – Goiás
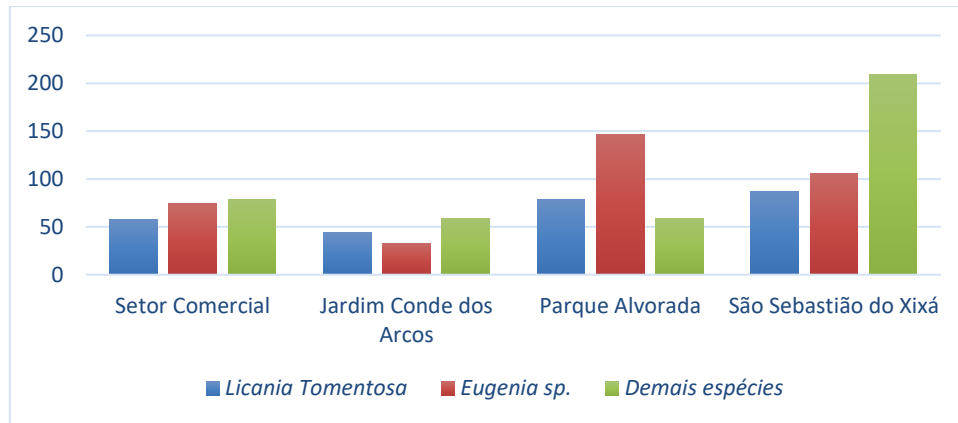
Source: Silva, 2019.

Very little was found in the literature on correct planning aimed at afforestation in the state of Goiás. However, the urban afforestation plan for the state capital, Goiânia, was found as a reference. "For the other cities in the interior there are no records of a past concerned with planned afforestation" (ITII et al, 2012, p.1). On the presence of Cerrado in cities:

> The cerrado that existed in the city was made up of tall trees and had a lot of jatobá (Hymenaea stigonocarpa), angico (Anadenanthera peregrina), purple ipe (Tabebuia impetiginosa Mart.Stand), white cinnamon (Nectandra megapotamica Spreng. Mez), common ingá (Edulis inga), cassava (Didymopanax morototonii Aubl. Dcne. et Planch.) and garapa (Apuleia leiocarpa Vog. Macbr.). (ITII et al., 2012, p. 4).

For the city of Itapuranga-GO, which is inserted in the morphoclimatic domain of the Cerrado, following the guidelines of the Urban Afforestation Plan of Goiânia to increase the diversity of species in the city, small species (4 - 6 meters) and that can contribute to the microclimate and biodiversity of the urban landscape.

During the arboreal planning process, it is fundamental to choose the species to be used for each region, since the different areas require certain species, taking into account the size, roots, climate, topography, soil, etc. For example, on steeper slopes, you cannot plant species that need deep rooting, the presence of grasses is more suitable.

FINAL CONSIDERATIONS

Although it is presented as necessary due to factors such as thermal comfort, water permeability, great landscape potential, increased biodiversity on roads, among others, afforestation in urban areas requires a series of care and management techniques to avoid

economic damage and aesthetic damage. This work was in charge of presenting a discussion about the importance of urban afforestation in human development, as well as stressing the need for information to choose the ideal species for each location, and the use of

The relevance of this work is justified by the noticeable deficit of information related to the issue addressed as a problem in this work, given that it is assumed that the population is unaware, for example, of the natural characteristics of trees when choosing for their sidewalks. On the other hand, understanding the dynamics of afforestation from a social point of view also makes it possible to understand the existing inequalities in the landscape perspective, considering the correlation between the afforestation of the neighborhoods.

Through the re-reading of the work by Rosilane de Faria and Valéria de Sousa, from 2012, and the activities proposed in this research, it is concluded that in the city of Itapuranga-GO - object of study of this work - especially in the studied neighborhoods, there is a prevalence of two species that are not suitable for planting on sidewalks due to the natural growth of their branches and roots and the annual cycles of reproduction and leaf fall.

Therefore, studies aimed at carrying out Municipal Policies on urban afforestation are recommended, in order to guarantee, through landscaping, a good quality of life for the population, in order to avoid, therefore, conflicts and future damage.

Furthermore, with the aim of diversifying species on public roads, it is recommended to choose small trees native to the Cerrado, which have developed adaptive characteristics to the local climate and which, with proper handling, will hardly damage the power grid. Another factor to be considered is the growth mode of its roots, which in a natural environment grow vertically in order to reach underground moisture, and not subsurfacely, which would cause damage to the sidewalks.

In short, in response to one of the initial questions of the research, it is considered as a hypothesis of the problem that the most wooded neighborhoods in the city are not, therefore, those with greater economic power, but the oldest neighborhoods in the city.

BIBLIOGRAPHIC REFERENCES

BARROS, E.F.S; GUILHERME, F.A.G; CARVALHO, R.S; Arborização urbana em quadras de diferentes padrões construtivos na cidade de Jataí**. Revista Árvore**, v. 34, n. 2, p. 287-295, 2010.

BRASIL. Ministério do Meio Ambiente, Conselho nacional de Meio Ambiente, (CONAM) **Resolução CONAMA 369/2006**, de 28/03/2006. Provides for exceptional cases, of public utility, social interest or low environmental impact, which allow the intervention or suppression of vegetation in Permanent Preservation Area-APP. Diário Oficial da União, nº 061, de 29/03/2006, págs. 150-151.

COSTA, L. A. et al. Avaliação das áreas verdes públicas da cidade de Manaus: situação em 1991. **Caminhos de Geografia**, v. 6, n. 19, p. 1-10, 2006.

FARIA, R. F.; SOUSA, V. R.; **Levantamento da Arborização Urbana e Avaliação da Percepção Ambiental dos Habitantes da Cidade de Itapuranga-GO.** 65 f. Monografia (Graduação em Geografia) Universidade Estadual de Goiás (UEG) Itapuranga-GO, 2012.

GONÇALVES, W. Florestas urbanas. **Revista Ação Ambiental**, v. 9, n. 1, p. 17-19, 1999.

ITII, S. H. T.; MALHEIROS, R.; CAMPOS, A. C. A Arborização Urbana com espécies nativas do Cerrado no Contexto do Patrimônio Histórico da Cidade de Nerópolis. IN**: III Congresso Brasileiro de Gestão Ambiental,** 2002, Goiânia, Anais... IBEAS – Instituto Brasileiro de Estudos Ambientais, Goiânia-GO, 2002, pp. 1-9.

MILANO, M. S. **Curso sobre arborização urbana**. Universidade Livre do Meio Ambiente, 1998.

MILANO, M. S.; DALCIN, E. C. **Arborização de vias públicas**. Rio de Janeiro: Light, 2000. 226 p.

PINHEIRO, C. R.; SOUZA, D.D.; A importância da arborização nas cidades e sua influência no microclima. **Revista Gestão & Sustentabilidade Ambiental**, [S.l.], v. 6, n. 1, p. 67-82, 2017.

PREFEITURA DE GOIÂNIA**. Plano de arborização urbana**. 2007. Available in: <https://www.goiania.go.gov.br/download/amma/relatorio_Plano_Diretor.pdf>. Access at: octuber 2019.

PREFEITURA DE SÃO PAULO. **Manual técnico de arborização urbana.** 2015. Available in: <https://www.sosma.org.br/wp-content/uploads/2015/03/MANUAL-ARBORIZACAO_22-01-15.pdf>. Access at: octuber 2019.

SILVA, E.M. et al. Estudo da arborização urbana do Bairro Mansur na cidade de Uberlândia-MG. **Caminhos de Geografia**, v. 3, n. 5, p. 73-83, 2002.