

Quali-Quantitative Evaluation of *Ficus benjamina* L. in Street Tree Planting of Áureo Filho Housing Complex – Feira de Santana, BA, Brazil

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Urban tree planting plays an essential role in the environmental quality of cities, offering ecological, aesthetic and social benefits. Among the species commonly used in Brazilian urban landscaping, *Ficus benjamina* L. stands out, although there is a scarcity of studies addressing its behavior and adaptability in the urban environment. Considering this, the present work aims to evaluate qualitatively and quantitatively the individuals of the species present in the street tree planting of the Áureo Filho Housing Complex, in Feira de Santana (BA). For this purpose, an in loco inventory was carried out, considering variables such as total height and bifurcation height, in addition to aspects such as the phytosanitary condition and the need for management. The results showed that the species represents a high percentage of the local tree planting, with heights that vary between 2 and 17 meters (average of 9.7 m). The presence of recurrent damage caused by drastic and inadequate pruning was also found. The general analysis indicated that 48.7% of the trees had phytosanitary issues, and that 53.8% need corrective actions. Therefore, the high frequency of planting the species, associated with the proximity between individuals, may be favoring the dissemination of pests and diseases. The data indicate the low suitability of *Ficus benjamina* L. to local conditions, thus reinforcing the need for careful planning in the selection of species for urban tree planting.

Keywords: Urban Tree Planting. *Ficus benjamina*. Urban Infrastructure. Exotic Species.

Urban tree planting plays a fundamental role in promoting the quality of life in cities [1], as it offers ecological, aesthetic, economic and social benefits. According to the Companhia Paraense de Energia Elétrica (Copel), it helps in regulating the microclimate, reducing pollution, and protecting the soil and fauna, in addition to valuing urban spaces and properties, as well as contributing to energy savings, making neighborhoods attractive and touristic [2].

However, urban tree planting faces challenges in hostile areas, such as pollution, contaminated soil, lack of space, and mechanical damage caused by people and vehicles. In addition, interferences with paving and conflicts with underground and overhead electrical networks compromise the survival of trees, which, many times, do not

reach maturity and remain in the juvenile stage [3]. These problems are, for the most part, a consequence of the absence of planning based on technical-scientific criteria, which generates various disturbances in urban areas [4].

One of the main criteria for the success of urban tree planting is the appropriate choice of species. According to Gonçalves and colleagues (2004) [5], the appropriate choice is essential for the success of an urban plan, as it avoids excessive maintenance costs, as well as problems resulting from planting in inadequate locations and without planning. In addition, exotic species, when introduced into environments without natural enemies, can adapt quickly, compete with native species, and alter ecological processes, becoming dominant in a short time [6].

The species *Ficus benjamina* L. is currently one of the most cultivated exotic trees in southeastern Brazil [7], with the presence of this species also being notorious in the street tree planting of other regions of the country. It originated in southern and southeastern Asia, where it is considered the official tree of Bangkok, in Thailand.

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It is widely used in urban tree planting, in gardens and parks, due to its high ornamental value. It can reach more than 30 meters in height and up to 40 centimeters in diameter. The rapid development of its roots, in search of nutrients, can cause damage to urban infrastructure, which is why its planting is prohibited in some cities [8]. In this context, the present article aimed to evaluate the use of *Ficus benjamina* L. in the tree planting of the Áureo Filho Housing Complex in Feira de Santana, Bahia (BA).

Materials and Methods

The present work focuses on the study of the species *Ficus benjamina* L. and is part of a research project that is characterized as a descriptive and exploratory field study. This study aims to analyze the street tree planting of the Áureo Filho Housing Complex, located in the Campo Limpo neighborhood of the city previously mentioned.

Delimitation of the Study Area

The mentioned housing complex is located in the city of Feira de Santana, in the state of Bahia, in the northeast region of Brazil. The city has a reference point at the following geographical coordinates: latitude 12°16'S, longitude 38°58'W, and 234 m altitude. In addition, according to Instituto Brasileiro de Geografia e Estatística (IBGE), it has a territorial extension of 1,338 km² and a population of 616,272 inhabitants [9].

Feira de Santana stands out as one of the most relevant municipalities in the state of Bahia, with a spatial and socioeconomic dynamic strongly influenced by the commercial sector, the main local economic activity [10]. In this scenario, the evaluation of the species *Ficus benjamina* L. was carried out in the Feira VI Housing Complex, also known as Áureo Filho, which was designed by Habitação e Urbanização da Bahia (Urbis), in the 1980s, to serve the military of the 1st Battalion, as well as their families.

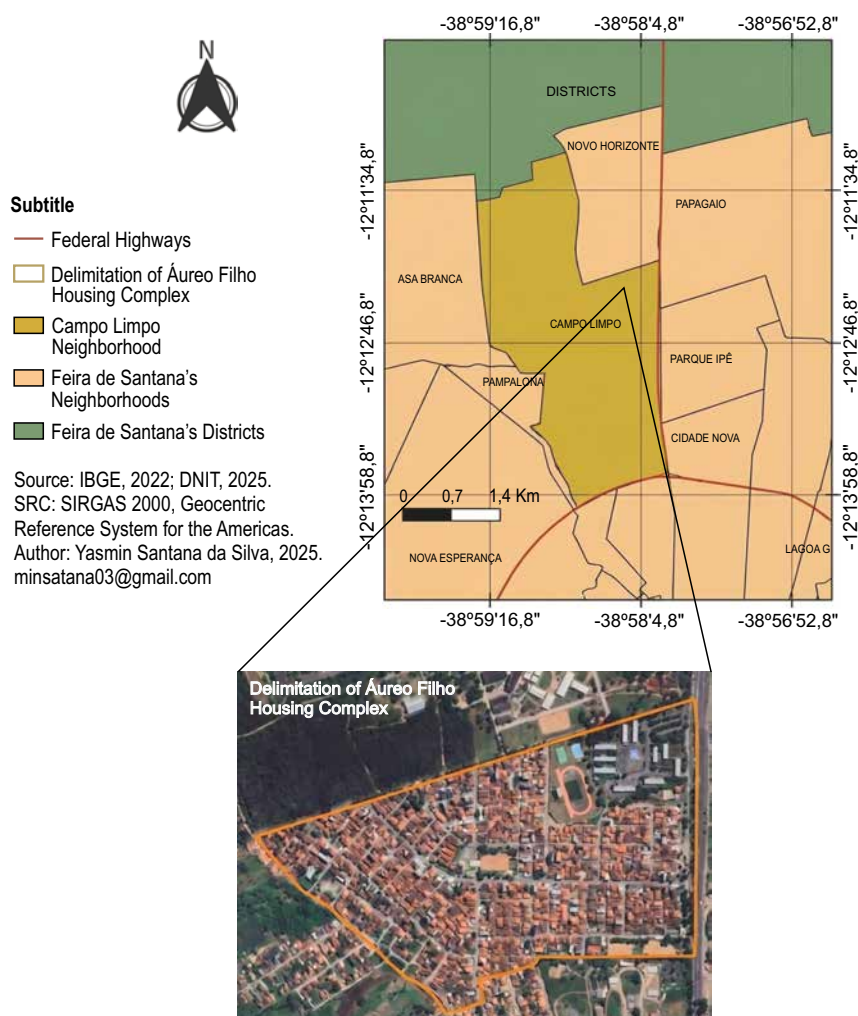
Over time, the complex underwent a process of irregular occupation, driven mainly by the arrival of students from Universidade Estadual de Feira de Santana (UEFS), in search of housing near the institution [11]. This disordered expansion led to the informal construction of residences and businesses, whose effects still impact the urban organization and social relations of the locality (Figure 1).

Data Collection and Analysis

Data collection was carried out through the application of a tree inventory, conducted from the delimitation of the study area and the on-site survey of the tree individuals, from February to March 2025. To record the information, a manual collection sheet was used, adapted from Silva Filho and colleagues (2002), structured into five sections: (i) location and identification, containing data such as street, individual number, and species; (ii) dimensions, such as the measurement of total height and the height of the first branching; (iii) biology, covering the general state and phytosanitary changes and (iv) definition of actions, where the interventions performed and management recommendations are recorded.

The survey allowed for a quali-quantitative analysis of the *Ficus benjamina* L. individuals, considering both morphological aspects and the environmental and urban conditions of the surroundings. To ensure greater accuracy and efficiency in data collection, different instruments and technological tools were used. Among the resources used, the following stand out: QGIS software, used for spatial analysis and delimitation of the study area; Tree Height Measurement Tool (Tress), used to estimate the height of individuals; and the PlantNet application, used to identify tree species.

In addition to the digital resources, a manual tape measure was used to measure the distance between the tree and the observer, which is necessary information for Tress to function.

Figure 1. Location map of the Campo Limpo neighborhood.

Finally, all collected data were organized and processed in Microsoft Office Excel® software, aiming at the systematization and analysis of the results obtained.

Results and Discussion

A total of tree individuals were counted in the street tree planting of the Áureo Filho Housing Complex. Among these, 39 belong to the *Ficus benjamina* L. species, which represents 15.9% of the total sampled. This frequency exceeds the recommendation of Santamour Junior (2002)[13], according to which no species should represent more than 10% of the total trees planted in urban areas, since the high frequency of a single species

in urban tree planting can favor the emergence of pests and diseases, due to low plant diversity.

In addition to the high frequency of individuals of the same species, the proximity between them also represents a risk factor, as it facilitates the dissemination of pests and diseases, due to the sharing of pathogenic agents. That said, the analysis of the tree arrangement revealed that 84.6% of the specimens were grouped with two or more individuals of the same species, while only 15.4% were isolated, which reinforces the phytosanitary vulnerability resulting from plant homogeneity.

Furthermore, the widespread use of this species, for the urban tree planting of the housing complex, can be justified by its suitability to local conditions.

As a species with high morphological plasticity, that is, with a great capacity for adaptation in terms of shape, *Ficus benjamina* can develop as an ornamental tree, shrub, bonsai, hedge, or in other configurations [8].

According to Oliveira, Inácio, and Pantoja (2017) [8], individuals of the genus *Ficus* have accelerated growth in urban areas and can reach more than 30 meters in height. However, the evaluated specimens presented an average height of 9.7 meters, with values between 2 and 17 meters. This limitation is attributed to the constant practice of pruning, which, although necessary, when performed inadequately, compromises the natural development of the tree.

In addition, the average bifurcation height (the point of insertion of the first branch on the trunk) was only 1 m, a value lower than the recommended minimum of 1.8 m, in order to avoid obstacles to pedestrian traffic, especially those with reduced mobility [14]. Therefore, this low bifurcation requires frequent pruning, motivated mainly by the need to prevent conflicts with the overhead electrical network and nearby buildings.

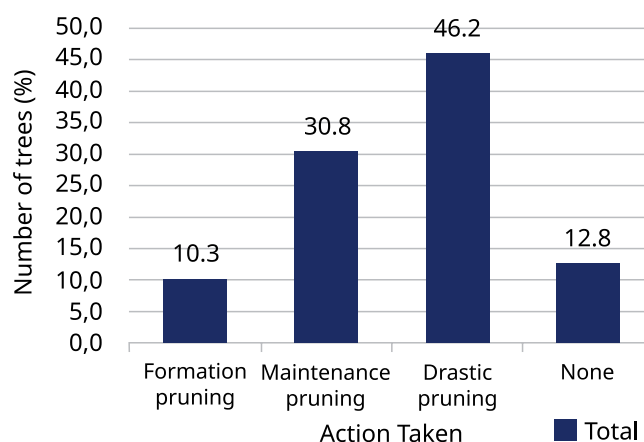
It is worth noting that pruning plays a fundamental role for the proper management of urban trees, as it contributes to safety, healthy development, and the balance of vegetation. However, when performed with excessive frequency and without technical basis, they can become harmful, compromising the phytosanitary conditions of the tree individuals.

Moreover, poorly executed pruning favors the entry of pathogens, reduces the vigor of the trees, and causes deformities in the crown, resulting in the need for new interventions [15]. In this context, the types and quality of the pruning performed on the *Ficus benjamina* specimens in the Áureo Filho Housing Complex were evaluated.

Thus, it was found that 46.2% of the trees underwent drastic pruning, while 30.8% were subjected to maintenance pruning, as illustrated in Figure 2.

Regarding the quality of these interventions, it was observed that 7.7% were considered excellent,

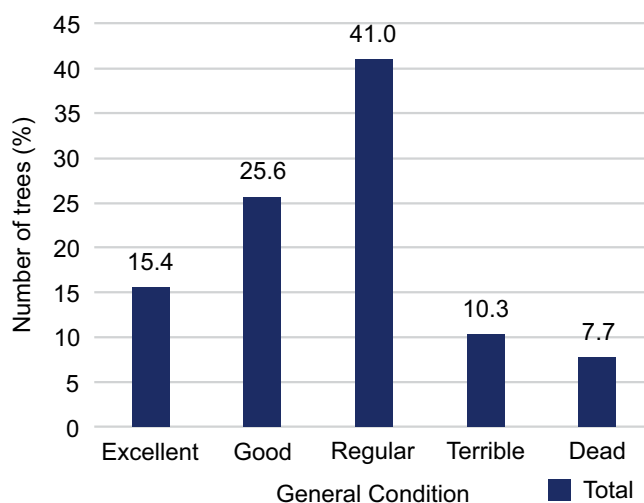
Figure 2. Actions performed on the trees inventoried in the Áureo Filho Housing Complex.



2.6% good, 23.1% regular, 56.4% very poor, and 10.3% of the individuals had no previous pruning. Corroborating these data, it was noted that 41% of the specimens were classified with regular quality (1), 10.3% in a very poor state and 7.7% dead. In good or excellent conditions were only, respectively, 25.5% and 15.4% of the *Ficus benjamina* L. tree individuals. Thus, the results on the state are in Figure 3.

Regarding the phytosanitary changes, 48.7% presented them, such as pests and mechanical damage, which are understood as a result, mainly, of incorrect pruning. In Figure 4, it is observed

Figure 3. General state of the trees inventoried in the Áureo Filho Housing Complex.



that a little more than half of the tree individuals did not present any phytosanitary problems.

A high number of individuals of the species *Ficus benjamina* L. had the presence of pests and diseases, as can be observed in Figure 4. Such a fact reinforces the inadequacy of planting a large number of trees of the same species, with a certain proximity, as it facilitates the proliferation of pests. In addition, regarding mechanical damage, according to Gilman (2012) [16], such practices favor the emergence of epicormic sprouts, fragile branches that further compromise the tree's structure (Figure 5).

Figure 4. Data on the phytosanitary alteration of the trees - (a) Graph (b) Tree individual from the locality.

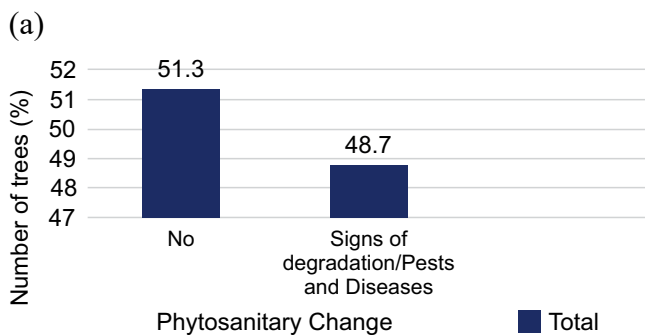


Figura 5. Epicormic sprouts.

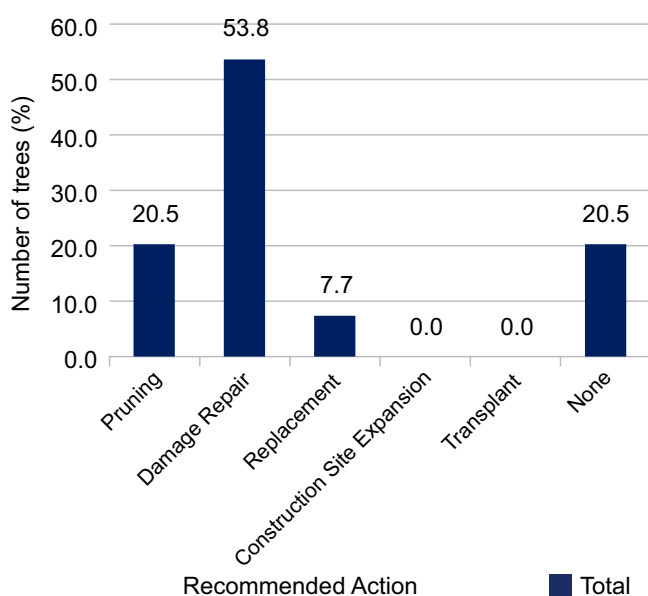


Additionally, the results evidenced different types of interferences related to the presence of *Ficus benjamina* L. in the urban environment. Thus, it was verified that 53.8% of the evaluated individuals need repairs (Figure 6), due to structural and phytosanitary damage already installed.

Conclusion

Based on the interferences observed in the individuals of *Ficus benjamina* L., evaluated in the *Áureo Filho* Housing Complex, it was possible to identify that some problems faced by the species in the study site are related to the absence of technical management and the inadequacy of the urban environment. It was found that 53.8% of the trees need repairs, whether due to structural damage, phytosanitary issues, or deformities caused by previous interventions. In addition, 28.2% of the specimens presented direct conflicts with elements of the urban infrastructure, such as sidewalks,

Figura 6. Recommended actions for the trees inventoried in the Áureo Filho Housing Complex.



walls, and service networks, highlighting the lack of planning in the planting of this species.

Furthermore, other relevant factor was the occurrence of root surfacing in 69.2% of the individuals analyzed, which represents a risk to the stability of the pavement and other constructed structures. Therefore, these data reinforce the vulnerability of the species in dense urban environments, especially when there is no adequate technical monitoring. Thus, the importance of training the professionals responsible for tree planting is highlighted, as well as the re-evaluation of the use of *Ficus benjamina* in tree planting plans in Brazil, in order to consider the impacts caused and the frequency of the species above what is recommended by the literature.

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