

COMPARISON BETWEEN FLORISTIC SURVEY METHODS IN URBAN GREEN AREA IN MARINGÁ-PR

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Abstract: The floristic survey is applied in scientific studies and technical work to recognize the richness of botanical species in a given environment, essential for subsequent environmental studies, both for conservation and land use. The methods for developing the floristic survey used for comparison were pre-determined free walking and fixed sample plots, carried out in a preserved urban green area, covered by Semideciduous Seasonal Forest belonging to the Atlantic Forest Biome domain, in Maringá-PR. The aim of this work was to verify the difference between the number of species identified and the time spent in the field to carry out the floristic survey, between the pre-determined free walking method and the fixed sample plots method. With both methods, young individuals, with more than 1 m in height and Breast Height Perimeter (BAP) <15cm, and adult individuals, with PAP \geq 15 cm of native tree species were recorded on different field days. and exotic. 48 species were identified among adult individuals and 52 among young individuals using the free walking method, in 6 hours of sampling effort in the field for each group of individuals, while 32 species were identified among adult individuals and 45 among young individuals using the fixed sampling plot method, in 8 hours of sampling effort in the field for each group of individuals plus 9 hours to demarcate the sample plots. Therefore, both methods were efficient, however, the free walking method was more effective as it identified more species with less sampling effort in the urban green area considered for this study. The exclusive species identified by each method or group of individuals considered, young or adult, confirms that the methods applied are complementary and important to identify a greater number of species and rare species or those distributed in more specific locations in the sampling area considered.

Keywords: Biogeography; Atlantic forest; Semideciduous Seasonal Forest; Species richness; Tree Species.

INTRODUCTION

The Atlantic Forest biome covers around 15% of the Brazilian territory, reduced to approximately 12.4% of its original area, subject to fragmented spaces, which is below the minimum acceptable limit for its conservation, (SOS MATA ATLÂNTICA, 2022). In addition to being a global hotspot, it requires studies of floristic composition (AGUIAR, 2003) and monitoring. In the state of Paraná, with 99% of the territory included in the Atlantic Forest law, 11.8% of forest remains, subject to the main causes of pressure and threats to the Atlantic forest such as deforestation, predatory exploitation of natural resources, old practices unsustainable agriculture, disorderly industrialization and urban expansion, excessive consumption, waste and pollution (SOS MATA ATLÂNTICA, 2022). Among the forest formations in this biome, the Semideciduous Seasonal Forest (FES) is the most threatened, as it has been the most damaged by human actions, with only 3.4% of the original 37.3% remaining in the territory of Paraná (CAMPOS; SILVEIRA-FILHO, 2010). FES is characterized by the partial fall of canopy leaves (20 to 50%) during the most unfavorable period of the year, with low rainfall and cold (IBGE, 2012).

The floristic survey is a study, or even a tool according to Oliveira (1998), which allows recognizing the species richness of the flora (SCHORN et al., 2014), that is, qualitatively describing the species composition of a given component quickly and effective in obtaining information (PINTO et al., 2013), including in recovered areas or in a state of regeneration, to assess current conditions or monitor development (MOURA et al., 2022). Therefore, the floristic survey is the beginning

of understanding the environment, providing information that supports subsequent studies and activities, biodiversity recovery and conservation work, environmental restoration and conservation (OLIVEIRA, 1998).

There are different methods used for the floristic survey, such as the free walking method, the quadrant method (AGUIAR, 2003; MEIRA JUNIOR et al., 2015; PEREIRA, 2015) or even the sample plot method, each with their advantages and disadvantages according to the evaluated or compared requirements. In this research, free walking methods and sample plots were considered.

Free walking consists of walking along pre-existing trails (ALVES et al, 2015; MEIRA JUNIOR et al., 2015; TONNELI, 2022) or simply at the researcher's pleasure in the area (GARCIA; ROMANGONOLO, 2015; FERRARESE et al, 2016; SCHLICKMANN et al., 2016; FRANCO, 2017; GARCIA et al., 2017; BARBOSA; SCABBIA, 2018; ZEIDAN; FERREIRA, 2020; MOURA et al., 2022; AGUIAR, 2015) with the intention of covering the largest and distinct possible sample, from which the vegetative and/or reproductive botanical material of the different specimens found along the path can be collected and/or identified.

The sample plots vary in quantity, size and shape, and are used in addition to floristic surveys for phytosociological studies and other quantitative and structural assessments of the environment (OLIVEIRA, 1998; AGUIAR, 2003; JOLY, 2012; NAVES, 2012; ZAMA, 2012; ALMEIDA, 2013; DE FIGUEIREDO et al., 2013; PINTO, 2013; SCHLICKMANN et al., 2016; SILVA, 2017; BALD et al., 2021).

Meira Junior et al. (2015), Zeidan and Ferreira (2020) compared different components of the tree layer, adults and young people, using the methods used. Some researchers choose to use both methods, free walking and sample plots, in a complementary way (CARVALHO

et al., 2007; SCHLICKMANN et al., 2016; TONELLI et al., 2022), while others compared the results obtained from different methods, such as Aguiar (2003) and Pereira et al. (2015) when comparing the plot and point-quadrant methods to describe and characterize their study areas. Aguiar (2003), in addition to the richness results, compared the sampling effort in the field, grid implementation, collection and identification.

The purpose of this study was, in addition to surveying the floristic richness of tree species in the urban green area forest fragment and supporting subsequent environmental, academic and technical studies, comparisons and monitoring, to verify the difference between the number of species identified and the time spent in the field to carry out the floristic survey between the free walking method and fixed sample plots.

MATERIALS AND METHODS

The urban green area conserved by Shopping Catuaí Maringá, the setting for this study, comprises a portion of an urban fragment with around 3.8 ha, a remnant of Semideciduous Seasonal Forest (ITCG, 2009). According to Geoinfo (2022) the soil of the fragment, popularly known as "terra purple", is basaltic according to its geological formation, of the dystroferric red latosol type.

The free walk was pre-determined with a free path in 3 pre-defined transects, with the aim of expanding and diversifying the explored area, transect A on the edge facing the shopping mall's parking lot, transect B on the edge facing the av. Colombo and the C inside the fragment on the pre-existing trail. On different days, 2 people walked the 3 transects together, to identify young and adult individuals of tree species, in which the time spent was recorded.

The sample plots were fixed in the green area, marked with zebra tape, in total 10 square plots of 10x10m (100m²), in a total of 1,000m² evaluated. The plots were distributed throughout the fragment, at the edges and centralized, with the intention of diversifying the sampled area. Two people traveled through the 10 sample plots on different days, recording time, with the intention of identifying young and adult individuals of tree species.

The botanical identification of the specimens observed by both methods was carried out mainly through observable vegetative characters and applications of botanical keys from the book by Ramos et al. (2015). The first specimen of each species identified by the free walking method was recorded using a GARMIM H72 GPS. In the sample plot method, a sketch was prepared on 10x10 graph paper for each plot, in which all observed individuals were included.

RESULTS AND DISCUSSION

Through free walking, 300m were covered in transect A, 145m in transect B and 410m in C, in total 855m were walked in 6 hours, for each component of the stratum observed. Using this method, 52 tree species were identified among young individuals and 48 among adults. Using fixed plots, a total of 647 young individuals and 138 adult individuals were observed, of which 45 and 32 species were identified respectively. It took 8 hours to inspect each component. Between the 2 methods, free walking allowed the identification of more species in less time and in turn, greater species richness was obtained in the young component than in the adult. The 2 methods were complementary in enabling the identification of less abundant species restricted to certain locations.

In recent years, relevant floristic survey work has been carried out in the Atlantic Forest in several states, Joly et al. (2012) in São Paulo,

Machado et al. (2012) in Alagoas, Zama et al. (2012) in Paraná, França and Stehmann (2013) in Minas Gerais, Matos et al. (2013) in Sergipe, Lorenzoni et al. (2014) in Espírito Santo, Alves et al. (2015) in Bahia, Ferrarese et al. (2016) in Rio Grande do Sul, Silva (2017) in Rio de Janeiro. Some research was even managed in the same forestry formation as this work, at FES, Naves and Berg (2012), Figueiredo et al. (2013), Pinto et al. (2013), Meira Junior et al. (2015) and Moura et al. (2022) in Minas Gerais, Nogueira and Marchiori (2018) in São Paulo, Almeida (2013), Garcia (2015), Aguiar (2015), Garcia and Romagnolo (2015), Estevan et al. (2016), Bald et al. (2021) Lisboa et al. (2021) in Paraná, in addition to Franco (2017), Garcia et al. (2017), Zeidan and Ferreira (2020) carried out floristic survey studies in Maringá-PR; such studies made an important contribution to biogeography.

Franco (2017) in his study considered the Mimosoideae, the second largest subfamily of Leguminosae. He collected, through random walks, a sample of individuals with reproductive characters, and identified eight species of Fabaceae Mimosoideae through 47 expeditions to the remaining forest in Maringá, 45 of them distributed between 2009 and 2011 and 2 of them in 2014. Garcia et al. (2017), in the same period as Franco's work (2017), collected samples of arboreal, shrub, herbaceous, liana and epiphyte individuals in the same area, totaling 279 taxa collected, of which 244 species were identified, of which 107 are habituated. arboreal.

Zeidan and Ferreira (2020) in the same conserved urban green area, the scenario of the current work, during field expeditions carried out monthly in February, March and April 2019, they considered young and adult tree species to identify tree botanical species, where they found 66 species, of which 43 were observed among juveniles. Thus, walking asserts itself as the most efficient method.

Aguiar (2003), when comparing quadrant and plot methods in characterizing the floristic and phytosociological composition of tree species in a stretch of dense rainforest, used a sampling grid of 64 plots of 10 x 90 m (900 m²) for the plot method), systematically distributed, while for the free walking method, 5 quadrant points were allocated in each plot, totaling 320 points. Of the 9,544 individuals sampled in the plots, 252 species were identified. In the quadrant points, 1,280 individuals were sampled and 177 species were identified. As in the current research, although the compared methods are different, Aguiar (2003) observed that both methods sampled the floristic richness of the community considered in a similar way. However, depending on the objectives being knowledge of richness and diversity, methods that use plots are limited to a certain area, while the quadrant method, as well as the free walking method tested in this work, incorporates a larger and free area of coverage for better characterization of richness of species.

Regarding time, for Aguiar (2003) 10 field days were used to open trails and locate points, on average 1 day for plating and measuring the trees on each 900 m² plot, while for installing the 320 quadrant points took 10 days, that is, the implementation of each plot took 7 times longer than the quadrants. Likewise, in relation to free walking, the time spent is much longer, as in this there is no need for installations, but rather a prior assessment using satellite images to pre-determine the portions that must be covered freely during the walk. Walter and Guarino (2006) in their comparison, the time needed to complete sampling by plots was 8 hours and 17 minutes, while the rapid survey method, similar to free walking, ended in 110 minutes, that is, walking proved to be more efficient with less time spent recording the richness of the studied section, which also results in lower costs due to less field effort.

Time is an important factor in the planning and logistics of the field that will be carried out, in addition to “time is money”, in view of this, faster and less expensive reliable field methods of sampling vegetation are valued (WALTER; GUARINO, 2006). For the same reasons and difficulties highlighted by Aguiar (2003), in floristic survey studies, in many cases it is not feasible to wait for the phenological period of the reproductive phases (flowers and fruits) of the specimens observed, and recognition and identification through characters is extremely important. vegetative characters and use of botanical identification keys based on vegetative characters. In the free walking method, the time spent is related to the objectives, the distance covered, the difficulty in walking, obstacles in the field and the researchers' ability to identify the species.

The comparison of plot and point-quadrant methods was also carried out by Pereira et al. (2015) to describe a typical Cerrado woody community. In this, 10 plots of fixed areas and 140 quadrant points were implemented, distributed in five transects. This last method was more efficient in characterizing species richness, the vertical structure of vegetation and recording species with low abundance, in the same way the free walking method of the current work was advantageous when compared to sample plots.

Walter and Guarino (2006) compared the same methods proposed in the current research, but in a Cerrado community. They applied 3 walking lines and 11 sample plots for community assessment and similarly, more species were identified using the free walking method, 67, while 58 species were identified in the plots among the 1,132 specimens evaluated. They highlighted that, similarly to what was witnessed in this research, the species exclusive to each method refer to species that are less abundant or restricted to some portion of the fragment.

The results obtained attest to the complementarity of the different methods used for the floristic survey: free walking, quadrant points and sample plots (WALTER; GUARINO, 2006; CARVALHO et al., 2007; PEREIRA et al., 2015; SCHLICKMANN et al., 2016; TONELLI et al., 2022).

CONCLUSION

With this work it was possible to conclude that for the study of floristic survey both the free walking method and sample plots are effective. However, when considering the number of species identified and the time spent to carry out the floristic survey, the first method was more productive in enabling the identification of a greater number of species in less time, in the preserved urban green area covered by a fragment of Semideciduous Seasonal Forest.

Some of the species were identified exclusively by one of the methods, others by the other, this fact denotes the complementarity of free walking methods and sample plots for the floristic survey, to identify a greater number

of species and rare species or those distributed in more restricted locations in the sampling area considered. Including the approach of different components, in this case adult and young specimens of tree species, in addition to complementing the local richness, it allows us to infer that natural regeneration of the tree species identified among the adult individuals that make up the fragment is occurring. The greater number of tree species in the young component expresses that new species among the remaining ones are managing, through dispersal, to access the remainder, establish themselves and cause species enrichment.

Botanical identification through the recognition of vegetative characters of specimens is consistent with the intention of reducing time and cost in the field in floristic survey studies in a FES forest fragment with the same relief characteristics. The data obtained in this research are the basis for future environmental studies, both technical and academic, for the conservation and management of the urban green area preserved by the Shopping Mall.

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