Scientific Article

Floristic survey of ornamental plants used in Dom Delgado University City at the Universidade Federal do Maranhão, São Luís, Maranhão State, Brazil[1]

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ABSTRACT

The objective of this study is to list the flora used in ornamentation, afforestation and landscaping in the common areas of the Dom Delgado Campus (São Luís) at the Universidade Federal do Maranhão (2º32'20.7"S 44º16'58.4"W), where this study was carried out. The collection took place through exploratory walks, including individual specimens planted there and those that were kept during the architectonical development of the University. Identification was obtained using analytical keys, specialized literature and the comparison with material previously identified in the Herbarium of Maranhão (MAR) where the exsiccates produced in the present study were deposited. 70 species, 56 genres and 29 families were found. Fabaceae (with 10 species), Apocynaceae (with nine spp.); Malvaceae and Rubiaceae (six spp.); Arecaceae (four spp.); Araceae, Bignoniaceae and Heliconiaceae with three species each were the most representative families in terms of the number of species. Among the total number of species identified, it was noted that there was no great difference in the quantity of native Brazilian species (38%), when compared to exotic species (34%); the remaining species were classified as cultivated (17%) and naturalized (11%). In conclusion, it is clear that the afforestation/ landscaping of the Dom Delgado Campus, follows a method of randomization in relation to the planting of the species used.

Key words: Landscaping, native plants, campus, urban afforestation.

RESUMO

Levantamento florístico das plantas ornamentais utilizadas na Cidade Universitária Dom Delgado da Universidade Federal do Maranhão, São Luís, Maranhão, Brasil

O presente estudo tem como objetivo listar a flora utilizada na ornamentação, arborização e paisagismo das áreas comuns da Cidade Universitária Dom Delgado (*campus* São Luís) (2º32'20.7"S 44º16'58.4"W) da Universidade Federal do Maranhão. As coletas ocorreram por meio de caminhadas exploratórias, sendo coletados os indivíduos plantados e aqueles que no decorrer do desenvolvimento arquitetônico da Universidade foram mantidos. As identificações foram realizadas com auxílio de chaves analíticas, literatura especializada e por meio de comparação com material já identificado no Herbário do Maranhão (MAR) onde as exsicatas produzidas no presente estudo foram depositadas. Foram encontradas 70 espécies, 56 gêneros e 29 famílias. Fabaceae (com 10 espécies), Apocynaceae (com nove spp.); Malvaceae e Rubiaceae (seis spp.); Arecaceae (quatro spp.); Araceae, Bignoniaceae e Heliconiaceae com três espécies cada foram as famílias mais representativas em número de espécies. Do total de espécies identificadas, percebe-se que não há uma grande diferença na quantidade de nativas do Brasil (38%), quando comparadas às exóticas (34%); as demais foram classificadas como cultivadas (17%) e naturalizadas (11%). Por fim, fica evidenciado que a arborização/paisagismo da Cidade Universitária Dom Delgado, segue uma linha de aleatorização quanto ao plantio das espécies usadas.

Palavras-chave: Paisagismo, plantas nativas, *campus*, arborização urbana.

1. INTRODUCTION

Vegetation, with its ecological, economic and social functions, can play an important role in the life of urban populations. However, much of the plant community is subject to processes of landscape cleanup and environmental destruction. In this sense, a degradation of the natural landscapes is assuming unsustainable proportions, in relation to the loss of the native vegetation and the quality of the ecosystems before the increase of the number of cultivated and exotic plants (PAIVA et al., 2004).

However, plants grown in a city, both for ornamentation and afforestation, bring benefits ranging from a reduction of the islands of heat (LOMBARDO, 1985), to the increase of human well-being (GRAHN and STIGSDOTTER, 2010), also offering a support for housing, rest and nesting of urban fauna (MENEZES, 2004). Nowadays, an association between an afforestation / urban landscape and a quality of life of its inhabitants is undeniable (MILANO, 1995). In this context, ornamental plants are those that attract attention and arouse interests by their aesthetic characteristics such as color, leaf form and flowers, phenological aspects,

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projected shadow, the swing caused by the wind and still by the visual structure formed with the plants nearby (SILVA, 2009). Trees may also be considered ornamental species, when they are planted to promote the beautification of the environment, adjusting to the free spaces, establishing a man-nature contact (SILVA, 2009).

In Brazil, plants that are used for ornamentation in landscaped environments are generally exotic and with little known phenology, whose planting has become exclusively due to unknowledge of the species (LORENZI and SOUZA, 2001). While they serve to enhance a scenic beauty of urban environments, these plants can pose problems when choices and plantings are inadequately. In most cases, the plants are selected only by analyzing their aesthetic traits, not considering important characteristics such as location of origin (HEIDEN et al., 2006), stem shape, crown shape, propagation velocity and growth (ZILLER, 2006). In this way, the practice of improving the scenic landscape requires knowledge of botany, ecology, regional climatic variations and architectural styles, as well as the study of plastic compatibilities for the balance of forms and colors (MARX and TABACOW, 2004).

In the urban arborization, are inserted the spaces of the Universities that are peculiar for the capacity to produce science and human resources, being able to become a space for floristic projects that consider the different aspects in the use of vegetal species, being these either native or exotic (EISENLOHR et al., 2008). This potential is evidenced by the floristic records developed by Paiva et al. (2004), Kurihara et al. (2005), Castro et al. (2011), Brianezi et al. (2013), in different Universities of Brazil.

Thus, the purpose of this study is to list the flora used in ornamentation, afforestation and landscaping in the common areas of Dom Delgado University City at the Universidade Federal do Maranhão.

2. MATERIAL AND METHODS

The collections of the species were carried out in the flowerbed, parking lots, main and secondary roads, gardens, interior and between the open areas of the buildings (Figure 1) of Dom Delgado University City (2º32'20.7 "S 44º16'58.4" W) at the Universidade Federal do Maranhão - UFMA (Figure 2), located in the municipality of São Luís, whose area has about 0.969 km². The region has Aw type climate (KÖPPEN, 1948), tropical rainy, with predominance of rainfall in the months of January to June.

Figure 1. Collection areas in Dom Delgado University City - UFMA. (1= Rectory Building, 2 = Central campus, 3 = Entrance to the Biological Sciences building, 4 = Exact Sciences and Technology building square, 5 = Main University entrance, 6 = Rectory square, 7 = Square of the Social Sciences building).

The study was developed from August 2016 to August 2017 by means of exploratory walks, collecting the individuals planted and those who were kept to shade and / or beautify the *campus* along the architectural development of the University. All specimens in the reproductive stage were collected, photographed and herborized according to the usual botanical methodologies (MORI et al., 1989; PEIXOTO and MAIA, 2013).

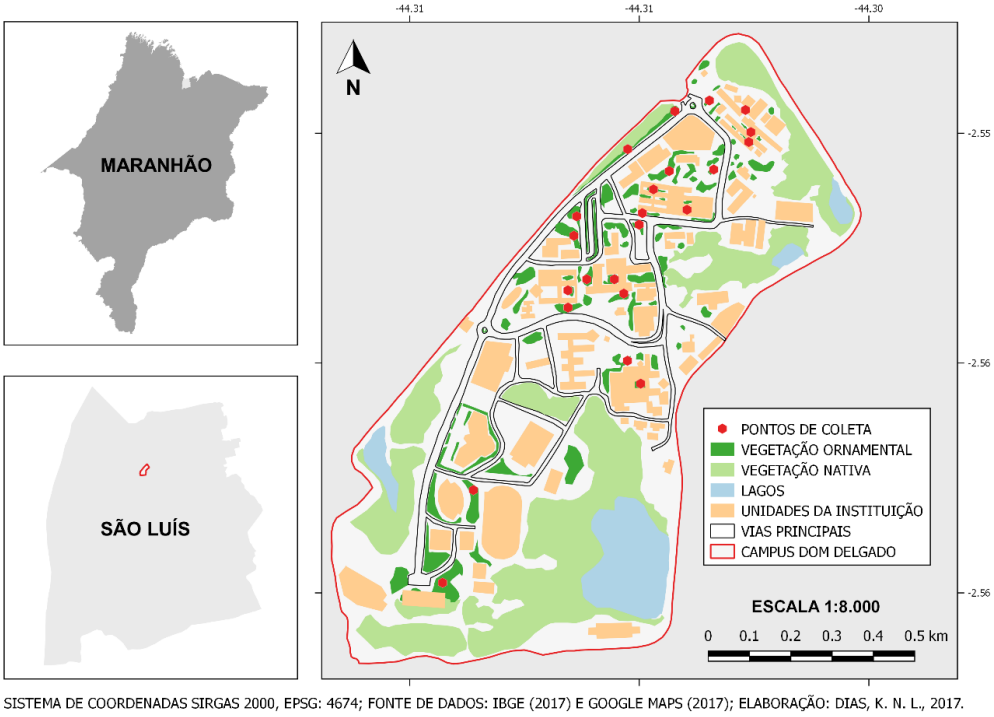

Figure 2. Location of Dom Delgado University City at the Universidade Federal do Maranhão - UFMA, São Luís, Maranhão, Brazil.

Identifications were carried out with the help of analytical keys, specialized literature and by means of a comparison with material already identified in the Herbarium of Maranhão (MAR), Department of Biology, Universidade Federal do Maranhão (ALMEIDA JR. et al., 2015). The exsiccates produced in the present study were deposited in the Herbarium MAR.

The names of the species and their respective authors were verified in APG IV (2016); in the Tropicos databases (http://www.tropicos.org/), The Plant List (http://www.theplantlist. org/), Reflora (http://reflora.jbrj.gov.br/), Flora of Brazil (http://floradobrasil.jbrj.gov.br/). The studies of Lorenzi and Souza (2001), Delprete (2003) and Lorenzi (2013) that were consulted to identify cultivated plants. Where possible, the origin, habit, endemism and vernacular names associated with the species were also investigated.

3. RESULTS AND DISCUSSION

A total of 67 species were found, distributed in 57 genera belonging to 29 families (Table 1). Of the total species, two species are gymnosperms: *Araucaria columnaris* (J.R. Forst.) Hook. (Pinheiro-de-natal) and *Cycas revoluta* Thunb. (Sagu-de-jardim). It should be noted that *Araucaria columnaris* was also registered at the Universidade Federal de Viçosa, Minas Gerais (BRIANEZI et al., 2013). *A. columnaris* is used for ornamentation by resembling a pine tree, up to 60m in height, the cream-colored wood (LORENZI, 2003). The *C. revoluta* is widely used in ornamentation due to its palm-like features, it has slow growth, but throughout its growth it is endowed with a crown of very ornamental leaves (LORENZI, 2013).

Table 1. List of plants used in afforestation / landscaping of Dom Delgado University City at the Universidade Federal do Maranhão (Nati = native from Brazil, Cult = Cultivated, Exot = Exotic, Natu = Naturalized, Herb = Herbaceous, Arbo = Arboreal, Arbu = Shrub, Palm = Palm, Arbu / Arbo = Shrub/tree, Lian = Liana).

Família/Espécie	Origem	Hábito	Nome popular.	Voucher
Acanthaceae				
Justicia calycina (Nees) V.A.W.Graham	Nati	Herb	Jacobínia-vermelha	MAR 9.624
Anacardiaceae				
Anacardium occidentale L.	Nati	Arbo	Cajueiro	MAR 9.625
Mangifera indica L.	Cult	Arbo	Mangueira	MAR 9.626
Apocynaceae				
Allamanda blanchetii A.DC.	Nati	Arbu	Sete-patacas-roxa	MAR 9.627
Allamanda cathartica L.	Nati	Arbu	Dedal-de-princesa	MAR 9.628
Catharanthus roseus (L.) Don	Cult	Herb	Maria-fedida	MAR 9.629
Nerium oleander L.	Cult	Arbo	Espirradeira	MAR 9.631
Plumeria pudica Schltdl. & Cham.	Exot	Arbu/arbo	Jasmim do Caribe	MAR 9.632
Plumeria rubra L.	Exot	Arbu/arbo	Jasmim-manga	MAR 9.633
Tabernaemontana laeta Mart.	Nati	Arbu/arbo	Lírio, jasmim, jasmim-de-leite	MAR 9.634
Thevetia peruviana (Pers.) K.Schum.	Nati	Arbu/arbo	Chapéu de Napoleão	MAR 9.635
Araceae				
Anthurium andraeanum Linden	Exot	Herb	Antúrio	MAR 9.636
Epipremnum pinnatum (L.) Engl.	Exot	Herb	Jibóia	MAR 9.637
Philodendron imbe Schott ex Endl.	Nati	Lian	Orelha de burro, jiboia	MAR 9.638
Araucariaceae				
Araucaria columnaris (J.R. Forst.) Hook.	Exot	Arbo	Pinheiro de natal	MAR 9.639
Arecaceae				
Adonidia merrillii (Becc.) Becc.	Exot	Palm	Palmeira-de-manila	MAR 9.640
Arenga caudata (Lour.) H.E. Moore	Nati	Palm	Palmeirinha-rabo- de-peixe	MAR 9.641
Cocos nucifera L.	Natu	Palm	Coco-verde, coco	MAR 9.642
Serenoa repens (W. Bartram) Small	Exot	Palm	Serenoa	MAR 9.643
Syagrus cocoides Mart.	Nati	Palm	Ariri	MAR 9.206
Asparagaceae				
Agave americana L.	Exot	Arbu	Pita, piteira	MAR 9.644
Asparagus densiflorus var. *sprengeri* Kunth	Exot	Herb	-	MAR 9.645
Bignoniaceae				
Handroanthus impetiginosus (Mart. ex DC.) Mattos	Nati	Arbo	Ipê-roxo	MAR 9.646
Tabebuia aurea (Silva Manso) Benth. & Hook.f. ex S.Moore	Nati	Arbo	Ipê-amarelo	MAR 9.647
Tecoma stans (L.) Juss. ex Kunth	Natu	Arbu	Ipê-de-jardim	MAR 9.648
Clusiaceae				
Platonia insignis Mart.	Nati	Arbo	Bacuri	MAR 9.649
Combretaceae				
Terminalia catappa L.	Natu	Arbo	Castanhola	MAR 9.650
Convolvulaceae				
Ipomoea pes-caprae (L.) R.Br.	Nati	Herb	Salsa	MAR 9.651
Cycadaceae				
Cycas revoluta Thunb.	Exot	Palm	Sagu-de-jardim	MAR 9.652

Table 1. cont.

Euphorbiaceae				
Euphorbia tirucalli L.	Exot	Arbu	Espinho-de-Crisro, Avelós	MAR 9.653
Pedilanthus tithymaloides (L.) Poit.	Nati	Arbu	Sapatinho-do-diabo, dois-irmãos	MAR 9.654
Fabaceae				
Acacia mangium Willd.	Exot	Arbo	Acácia	MAR 9.655
Adenanthera pavonina L.	Exot	Arbo	Carolina	MAR 9.656
Andira sp.	Nati	Arbo	-	MAR 9.657
Arachis pintoi Krapov. & W.C.Greg.	Nati	Herb	Amendoinzinho, capim-amendoim	MAR 9.658
Calliandra brevipes Benth.	Nati	Arbu	Esponjinha	MAR 9.659
Centrolobium tomentosum Guillem. ex Benth.	Nati	Arbo	Araribá	MAR 9.660
Delonix regia (Bojer ex Hook.) Raf.	Cult	Arbo	Flamboyant	MAR 9.661
Senna polyphylla (Jacq.) H.S.Irwin & Barneby	Nati	Arbu/arbo	Cássia-baiana	MAR 9.662
Senna sp.	Nati	Arbo	-	MAR 9.663
Tamarindus indica L.	Cult	Arbo	Tamarindo	MAR 9.664
Garryaceae				
Aucuba japonica Thunb.	Exot	Arbu	Louro-do-Japão	MAR 9.665
Heliconiaceae				
Heliconia acuminata L.C.Rich.	Nati	Herb	Heliconia	MAR 9.666
Heliconia bihai L.	Exot	Herb	Caetê vermelho	MAR 9.667
Heliconia densiflora subsp. *angustifolia* L.Andersson	Nati	Herb	Caeté-fino	MAR 9.668
Lamiaceae				
Gmelina arborea Roxb. ex Sm.	Exot	Arbo	Guemelina	MAR 9.669
Malpighiaceae				
Byrsonima crassifolia (L.) Kunth	Nati	Arbo	Murici	MAR 9.670
Malvaceae				
Hibiscus rosa-sinensis L.	Exot	Arbu	Papoula	MAR 9.671
Hibiscus sabdariffa L.	Exot	Arbu	Vinagreira, caruru-azedo	MAR 9.673
Hibiscus schizopetalus (Boulger) Hook. f.	Exot	Arbu	Hibisco-crespo	MAR 9.674
Pachira aquatica Aubl.	Nati	Arbo	Falso cacau	MAR 9.675
Sterculia striata A.St.-Hil. & Naudin	Nati	Arbo	Chichá	MAR 9.676
Moraceae				
Ficus benjamina L.	Natu	Arbu/arbo	Ficus	MAR 9.677
Myrtaceae				
Psidium guajava L.	Natu	Arbo	Goiabeira	MAR 9.678
Syzygium jambos (L.) Alston	Natu	Arbo	Jambo, jambeiro	MAR 9.679
Nyctaginaceae				
Bougainvillea spectabilis Willd.	Nati	Arbo	Três Marias rosa, vermelha e amarela	MAR 9.680
Oxalidaceae				
Averrhoa bilimbi L.	Cult	Arbo	Limãozinho	MAR 9.681
Plantaginaceae				
Russelia equisetiformis Schltdl. & Cham.	Cult	Arbu	Flor-de-coral	MAR 9.682
Rosaceae				
Rosa spinosissima L.	Exot	Arbu	Roseira, rosa	MAR 9.683

Table 1. cont.

Rubiaceae				
Ixora chinensis Lam.	Cult	Arbu	Ixora coral	MAR 9.684
Ixora coccinea L.	Cult	Arbu	Alfinete vermelho, amarelo	MAR 9.685
Ixora coccinea var. *lutea* (Hutch.) Corner	Exot	Arbu	Alfinete amarela, creme	MAR 9.687
Ixora macrothyrsa Teijsm. & Binn.	Cult	Arbu	Ixora-rei	MAR 9.689
Rutaceae				
Murraya paniculata (L.) Jack	Exot	Arbo	Murta-de-cheiro	MAR 9.690
Verbenaceae				
Duranta erecta L.	Natu	Arbu	Pingo-de-ouro	MAR 9.691
Petrea volubilis L.	Nati	Arbu/arbo	Flor-de-são-miguel	MAR 9.692
Vitaceae				
Leea rubra Blume ex Spreng.	Exot	Arbu/arbo	Léia-vermelha	MAR 9.692

Regarding the habit, 24 tree species were found, totaling 36%; 18 shrub species (27%); 10 herbaceous species (15%); eight shrub/tree (12%); six species of palm (9%) and one liana (1%) (Table 1).

The most representative families in number of species were Fabaceae with 10 species, Apocynaceae (eight spp.); Arecaceae and Malvaceae (five spp., each); Rubiaceae (four spp.); Araceae, Bignoniaceae and Heliconiaceae with three species, each. The greater representativeness of the families Fabaceae and Apocynaceae was also observed in the works developed by Kurihara et al. (2005) at the Universidade de Brasília; Eisenlohr et al. (2008) and Brianezi et al. (2013) both at the Universidade Federal de Viçosa.

There was a predominance of two families: Fabaceae, one of the largest families of angiosperms with cosmopolitan distribution and one of the main economically. The species of this family are always used in ornamentation and urban afforestation in Brazil, besides having species that produce quality wood (SOUZA and LORENZI, 2005). The Apocynaceae family also stands out for having pantropical distribution. Many species of this family are cultivated as ornamental, but several are toxic to humans and, for this reason, are not totally appropriate for cultivation in certain areas (SOUZA and LORENZI, 2005). Although toxic, species are used as ornamental. Therefore some care must be taken with the choice of spaces where these plants are placed in order to avoid direct contact with the population.

It is worth noting the presence of several plants that have toxic effects, such as *Allamanda cathartica* (dedal-de-princesa), *Catharanthus roseus* (maria-fedida), *Delonix regia* (flamboyant), *Euphorbia tirucalli* (espinho-de-cristo), *Ficus benjamina* (ficos), *Nerium oleander* (espirradeira), *Pedilanthus tithymaloides* (sapatinho-do-diabo), *Philodendron imbe* (orelha-de-burro, jiboia), *Plumeria rubra* (jasmim-manga) and *Thevetia peruviana* (chapéu-de-napoleão) (FARIAS, et al., 2003; MATOS et al., 2011). According to Matos et al. (2011), care must be taken when using such species for ornamentation in urban environments because they contain toxins that are harmful to human health.

Nascimento et al. (2015) carried out a preliminary survey at University Center Itajubá, MG, and also listed some plants used for ornamentation, but which contain toxic substances. That, according to Cavalcanti et al. (2004), can representing a danger to the local ecosystems, being able to occupy the niche of the native species (DISLICH et al., 2001).

From the total number of species identified, there is no significant difference between the number of exotic species (34%) and native species in Brazil (40%). Cultures (15%) and naturalized (11%), although used, had little representativeness for the present study. Similar results were found by Carvalho et al. (2007) at the Universidade Federal da Bahia; Potascheff et al. (2012) at the Universidade Estadual Paulista Júlio de Mesquita and by Brianezi et al. (2013) at the Universidade Federal de Viçosa.

In the study by Eisenlohr et al. (2008), also in the Universidade Federal de Viçosa, the predominance of exotic species was higher than the native ones, showing that although there is a greater number of native species in many works, the choice for exotic plants still stands out, being a factor that must be considered in urban afforestation and landscaping projects. It is necessary to give preference to the autóctones species, that is, those that are native to the natural ecosystems of each region where the city is located, as these would benefit urban ecosystems (CASTRO et al., 2011).

At UFMA, the *Allamanda blanchetii* (sete-patacas-roxa), *Arachis pintoi* (amendoinzinho, capim-amendoim), *Bougainvillea spectabilis* (três-marias), *Centrolobium tomentosum* (araribá), *Philodendron imbe* (orelha-de-burro, jiboia), *Sterculia striata* (chichá), *Syagrus cocoides* (ariri) e *Tabernaemontana laeta* (lírio, jasmim, jasmim-de-leite), that are typical of the Caatinga, Cerrado, Atlantic Forest and Amazon, were found, showing the importance of these species to the area of the present study because they are plants adapted to local conditions, especially those from Amazon. Thus, it is understood that such species should have priority in a landscaping plan in urban environments.

It is evidenced that the arborization/landscaping of Dom Delgado University City, apparently, does not follow a planned landscape line due to the lack of organization

of the aesthetic characters in relation to the plants chosen (Figure 3), being perceived the "randomization" of the planting of the species used. Thus, the present study may serve as a basis for a management plan for more consistent ornamentation, following a clear, efficient and didactic proposal (LEAL et al., 2009), and in the future replace the species considered inadequate for planting in Maranhão.

Figure 3. Plants used for ornamentation Dom Delgado University City - UFMA. (1 = *Philodendron imbe* Schott ex Endl., 2 = *Sterculia striata* A.St.-Hil. & Naudin, 3 = *Petrea volubilis* L., 4 = *Nerium oleander* L., 5 = *Delonix regia* (Bojer ex Hook.) Raf., 6 = *Adenanthera pavonina* L., 7 = *Ixora coccinea* L., 8 = *Agave americana* L., 9 = *Hibiscus rosa-sinensis* L.).

4. CONCLUSIONS

It can be concluded that the data of the present study could contribute in the elaboration of a more efficient afforestation and ornamentation plan to contribute to the "beautification" of the common areas Dom Delgado University City, giving priority to native species in the face of scenic beauty. In addition, it can help in future works that aim at the use of plants more suitable for the region, prioritizing the native species to the detriment of the exotic species; investing in the reproduction of the native species to replace or isolate of the exotic species.

CONTRIBUTIONS OF AUTHORS

LBSC: Bibliographic review, data collection, species identification, data analysis and interpretation, manuscript preparation. CSP: Bibliographic review, data collection, species identification, data analysis and interpretation, manuscript preparation and technical activities. JSA: Bibliographic review, data collection, species identification, data analysis and interpretation, manuscript preparation and technical activities. BEFC: Data collection, species identification, data analysis and interpretation, manuscript review. EBAJ: Conception of the study, critical review of the results, approval of the final version of the manuscript.

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