



ISSN:1984-2295

Revista Brasileira de Geografia Física

Homepage: <https://periodicos.ufpe.br/revistas/rbgf>



Applied Botany to Landscape Architecture as a discipline: an experience in the Architecture and Urbanism undergraduate course at Federal University of Pernambuco

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Artigo recebido em 08/10/2021 e aceito em 28/01/2022.

ABSTRACT

Knowing and understanding plants are essential factors for a successful landscape architecture project. Great landscape architects from the 20th and 21st centuries - such as Burle Marx, Fernando Chacel, Rosa Kliass, Caldeira Cabral, and Piet Oudolf - perceive vegetation as a link between nature and the city, in which the valuation and the respect for the landscape are the central points. Unfortunately, little focus has been given to the appropriate employment of plants in landscape architecture projects at architecture and urbanism schools, resulting in generic planting schemes. Should these schemes be called landscape architecture projects? Oppositely, Applied Botany to Landscape Architecture has as one of its objectives providing knowledge for the conception of plant palettes, which should consider not only aesthetic criteria but also biological and environmental ones from each species to establish a harmonious relationship with the existing environment. Thus, this article intends to present the experience and the results achieved in the discipline AQ553 - Special Topics in Architecture, Urbanism and Landscape Architecture Theory III (Applied Botany to Landscape Architecture). For this discipline, it was adopted descriptive and bibliographical research as a methodology, which has made possible the understanding of aesthetical and environmental matters related to the plant element and how these attributes can be reflected in a landscape architecture project. By leading students to consider the architectural and biological aspects of the vegetation components in their proposals, the procedure adopted in this discipline had great outcomes; for instance, improvements in the areas of environmental perception, graphic representation and design of landscaping projects.

Keywords: teaching, landscape, vegetation, project.

Botânica aplicada ao paisagismo como disciplina: experiência no curso de arquitetura e urbanismo da Universidade Federal de Pernambuco

RESUMO

O conhecimento e entendimento da vegetação é parte crucial de um projeto paisagístico. Grandes paisagistas do século XX e XXI, a exemplo de Burle Marx, Fernando Chacel, Rosa Kliass, Caldeira Cabral, Piet Oudolf, tratam esse elemento como o elo entre a Natureza e a cidade e, a valorização e o respeito à paisagem são o ponto focal. Infelizmente, nas escolas de arquitetura e urbanismo do Brasil, pouca é a carga horária destinada ao estudo do elemento vegetal no paisagismo, que por sua vez aparece nas representações projetuais apenas como planos de massa. Seria isto fazer projeto paisagístico? Diante disso, a botânica aplicada ao paisagismo tem como objetivo propiciar conhecimento para a criação de uma paleta vegetal que considere não só o critério plástico, mas também ambiental, conduzindo a um pensamento de cidade e sua relação direta com a Natureza. Desta forma, objetiva-se com este artigo apresentar a experiência da disciplina AQ553 - Tópicos Especiais em Teoria da Arquitetura, Urbanismo e Paisagismo III (Botânica Aplicada ao Paisagismo) do curso de Arquitetura e Urbanismo da Universidade Federal de Pernambuco. Para tanto, tomou-se como caminho metodológico a pesquisa descritiva e bibliográfica que possibilitou o entendimento das questões estéticas e ambientais atreladas ao elemento vegetal e como tais atributos reatam no projeto paisagístico. Os procedimentos adotados na disciplina tiveram resultados positivos no que se refere à promoção de melhorias nas habilidades de percepção ambiental, de representação gráfica e de projeto paisagístico ao levar os alunos a considerar variáveis arquitetônicas e naturais/biológicas nas suas propostas.

Palavras-chave: ensino, paisagem, vegetação, projeto.

Introduction

The importance of a thorough comprehension of plants for appropriate employment of plant species in a landscaping project is a recurrent speech of a range of landscape architects, such as Caldeira Cabral, Roberto Burle Marx, Fernando Chacel, Rosa Kliass, and Piet Oudolf.

The emblematic gardens and parks which now belong to the history of landscape architecture, for example, are outcomes of this refined knowledge of the plant element, which, in every moment of history, was employed in a way to be used to its full potential, be it from aesthetical or ecological orders, or a synthesis of both (Silva, 2019a).

This condition can be observed if we analyze the treaties and handbooks of agriculture, architecture, horticulture, and gardening that were published in the Western World in the 16th century, like *Agricultura de Jardines* (1592), *Cuarto Libro de Architectura* (1537), *Hortorum viridariorumque elegantes et multiplices formae* (1583), *Traité du jardinage selon les raisons de la nature et de l'art* de 1638 and *Observations on the Theory and Practice of Landscape Gardening* (...) (1803).

Besides presenting methods of implementation of landscape architecture projects, these treaties approach the required techniques for the cultivation of plant species, such as a calendar informing the planting season of different species, plague control, and irrigation tools. Owning a substantial description of the cataloged plants, information about genus, families, and illustrations (Figure 1), these documents show a deep understanding of plant management and expose the intrinsic relationship between the botanical and landscaping knowledge.

In what concerns the history of landscape architecture in Brazil, great attention is given to the actions of Johan Maurits, Count of Nassau-Siegen, Auguste François Marie Glaziou and Roberto Burle Marx for establishing plants as the key elements of landscape architecture thinking (Silva, 2019b).

The Count of Nassau-Siegen came to Brazil with his artistic and scientific entourage, which was responsible for investigating the counterless aspects of nature and society from this part of the New World, on account of the Vrijburg Garden project (also known as: 1. Vrijburg Palace Garden; 2. The Garden of Johan Maurits and 3. Zoological and Botanical Park), a project conceived in the 17th century and located in the

Island of Antonio Vaz. By dedicating time to activities such as constructing and planting, Nassau has improved the local conditions, legislated about subsistence agriculture and the protection of the woods, and legislated about subsistence agriculture and the protection of the woods, and erected buildings on the ground. Consequently, the Vrijburg Garden was included in several urban, architectural, scientific, and artistic actions. From the members of the Dutch entourage, attention is given to Georgi Marcgravi from Liebstad for writing the book *Historia Natvralis Brasiliae* in 1648, which is a great botanic publication filled with illustrations and descriptions of the local fauna (Figure 2).

In his turn, Glaziou, by accepting the invitation from Emperor Dom Pedro II to become the coordinator of the General Board of Woods and Gardens of the Casa Imperial, located in the city of Rio de Janeiro, took the responsibility for a series of public landscaping projects (Andrade and Terra, 2016). He also continued working as Inspector of the Municipal Gardens and a member of the Brazilian Association of Acclimatization. This has allowed him to go on botanical expeditions to the states of Rio de Janeiro, São Paulo, Espírito Santo, Minas Gerais, and Goiás, which aimed at discovering plant species with landscaping potential since one of his concerns was representing the Brazilian flora in his projects. These expeditions resulted in the discovery of new plant species, whose exsiccates were vastly distributed to important European herbaria (Figure 3). Their contribution to science can be seen in the book “*Plantae Brasiliae centralis a Glaziou lectae*” = *Liste des Plantes du Bresil Central recueillies en 1861-1895* (Glaziou, 1905), in which every species is presented with short descriptions, biological and biogeographical notes.

Lastly, Burle Marx, inspired by the accomplishments of Nassau and Glaziou - but also other naturalists who came to Brazil, such as Johann Baptiste von Spix, Carl Friedrich Philipp von Martius, Heinrich Wilhelm Schott, George Gardner, Peter Wilhelm Lund, the Prince Wied-Neuwied, Auguste de Saint-Hilaire and Georg Heinrich von Langsdorf – went on botanical expeditions to almost the entire Brazilian territory, where he was also searching for plant species with landscaping potential (Silva, 2019b). From all of the expeditions he has done, only the expedition to Amazon, which was financed by the National Council for Scientific and Technological Development (CNPQ) in 1983, has records from

the collected species, ranging from drawings to botanical information (Figure 4).

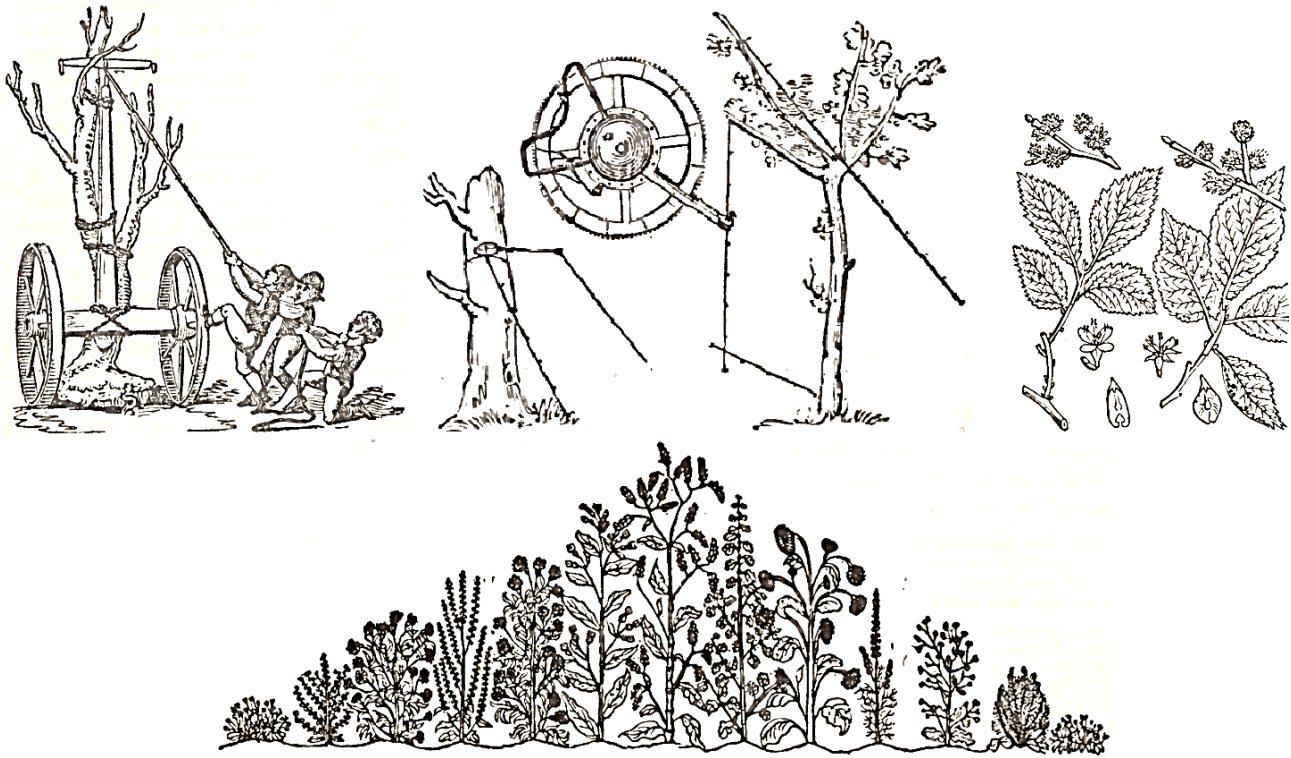


Figure 1 – Techniques presented in the Encyclopædia of Agriculture, 1824, p. 291, 881, 972 and 988. From left to right, top to bottom: (1) Transplanting technique; (ii) wood measuring technique; (iii) plant taxonomy and (iv) study of the diversity of annual and resistant flowers.



Figure 2 - Historia Natvralis Brasiliae. Characteristics of the plants recorded and analyzed by Gvilielmi Pisonis, Chapter LX; Book 4 - Qui agit de Facultatibus simplicium -, p.98 (Costus erythrothyrus).



Figure 3 – Exsiccates from *Heliconia hirsuta* [collected on September 7, 1894, Goiás; P05619184] and *Passiflora racemosa* [collected on May2, 1869, Rio de Janeiro; P02172549], which were deposited at the Herbarium Muséum Paris. These species were identified by Auguste François Marie Glaziou.

In the history of landscape architecture, plants have been acting as focal points of landscaping projects. However, despite playing such an important role in the projects, architecture and urbanism undergraduate courses do not seem to make enough effort to incorporate the basic science of plant biology into their curriculum. Frequently, this subject is presented simplistically, which hampers its applicability in landscaping projects.

In the early 30s, the National School of Fine Arts (ENBA) became the first institution to introduce the subject of “landscape architecture into the curriculum of its general education course, due to the curricular reform conducted by the architect Lúcio Costa when he was a member of ENBA’s Board of Directors, from 1930 to

1931.” (Ferreira and Ono, 2018, p.7). After this period, the architect Atílio Corrêa Lima substituted for him and became the first professor of the discipline Urbanism and Landscape Architecture from 1934 until 1937.

The specific program of the discipline Urbanism and Landscape Architecture comprehended “[...] parks and gardens; the forest problem; synthetic studies of plants as elements of urban composition” (Diário Oficial, 1935 apud Ferreira et al., 2017, p. 10). At that point, it was clear the relevance of natural and agrarian sciences for the theory and praxis of urban-landscaping projects. It is worth noting that at this same period, Roberto Burle Marx was on his first botanical expeditions in Pernambuco, searching for ornamental plants.

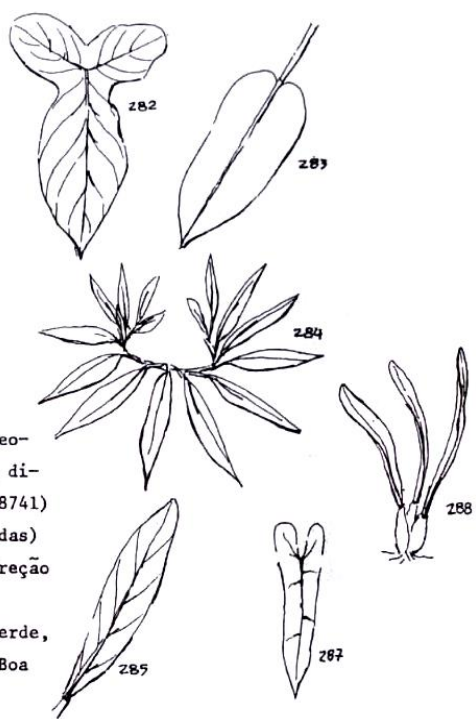
- 282 - *Philodendron* (Araceae) - Trepador. Km 120 da BR-174/AM, direção Boa Vista (Igarapé das Lajes) (PCH 8740)
- 283 - *Philodendron* (Araceae) - Folha 0,65 x 0,30. Km 120 da BR-174/AM, direção Boa Vista (Igarapé das Lajes) (PCH 8743)
- 284 - *Philodendron* (Araceae) - Km 120 da BR-174/AM, direção Boa Vista (Igarapé das Lajes) (PCH 8744)
- 285 - *Anthurium* (Araceae) - Folha elíptico-lanceolada, pecíolo curto. Km 120 da BR-174/AM, direção Boa Vista (Igarapé das Lajes) (PCH 8741)
- 286 - *Clusia* (Guttiferæ) - 0,40m de altura (mudas) sem ramificações. Km 120 da BR-174/AM, direção Boa Vista (Igarapé das Lajes)
- 287 - *Philodendron* (Araceae) - Epífita, folha verde, dorso roxo. Km 120 da BR-174/AM, direção Boa Vista (Igarapé das Lajes)
- 288 - Orchidaceae - Epífita. Km 120 da BR-174/AM direção Boa Vista (Igarapé das Lajes)
- 

Figure 4 – List of the plants collected on Burle Marx's expedition to Amazon. Notes taken on-site and drawings made by Fátima de Souza Menezes. Source: MARX, 1983, p.35.

Burle Marx is notable in the history of landscaping not only for his contributions to landscaping and visual arts, but also for introducing botany to architects and urban planners (Sá Carneiro, 2019). Academically, in 1954, Burle Marx and the architect Wit-Olaf Prochnik taught the one-year Urban Planning specialization course. In classes, "it sought to emphasize the integration between landscape, urban, and architectural design at different scales" (Barra, 2006; Ferreira, 2018, p. 252). According to Ferreira (2018), in 1957, the discipline was coordinated by Newton Penna Guedes da Silva Rosa, then head of the Studies and Projects Service of the Department of Parks and Gardens of Guanabara.

In Rio de Janeiro, in the 60s, architecture students sought Burle Marx to learn landscaping and applied botany to landscape architecture since these subjects were not taught in architecture schools. The whole learning process occurred at Burle Marx & Cia office (Burle Marx – Escritório de Paisagismo as it is known today) and during the botanical expeditions coordinated by Burle Marx and assisted by Henrique Lahmeyer de Mello Barreto, a botanist who was responsible for arranging planting palettes for the excursions. Some of these students became renowned

landscape architects, such as José Tabacow, Haruyoshi Ono, and Fernando Chacel (Tabacow, 2018).

In 1958, the architect Wit-Olaf Prochnik and the botanist Luiz Emygdio de Mello Filho taught the course Botany for Architects and Landscape Architects at The Museum of Modern Art in Rio de Janeiro (MAM Rio), which consisted of 25 lectures – 22 lectures focused on Applied Botany, which were taught by Luiz Emygdio, and 3 extracurricular classes, taught by Wit-Olaf, the architect Hélio Modesto and the educator Ethel Bauzer Medeiros, who worked as a pedagogical consultant for the projects of playgrounds of Flamengo's Park. The lectures approached subjects such as plant classification, thallophytes, bryophytes, pteridophytes, monocotyledons and dicotyledons, plant ecology, cultivation practices, horticultural techniques, Brazilian phytogeography, indoor plants, and urban afforestation.

In the 80s, the renowned landscape architect Rosa Kliass founded the Brazilian Association of Landscape Architects (Abap), which aimed at minimizing the theoretical and practical deficiency of students and professionals who worked in the field of landscape architecture, and offered some courses on botany for

landscaping, which had as assistants Roberto Burle Marx, the botanists Mario Ferri, Luiz Emygdio de Mello Filho and Harry Blossfeld, and the agronomic engineer Hermes Moreira de Souza (Barra, 2006).

Only in 1993, during the Colloquium on Landscape Architecture Education in Brazil¹, the teaching of landscape architecture became mandatory in architecture and urbanism schools, both public and private ones, and it was amended to the Regulatory Ordinance nº 1.770 on December 21, 1994 by the Ministry of Education and Sports.

Currently, few Brazilian undergraduate programs on Architecture and Urbanism include a thorough analysis of plants in their landscaping courses. The state of the teaching of applied botany to landscape architecture becomes even more critical if we observe that, even on the undergraduate degree on landscape architecture from EBA/UFRJ, the disciplines related to botany, for example, Botanical Illustration, Botany in Action - Extension program, and Applied Botany to Landscape Architecture are elective courses.

Thus, in this paper, we present the experience of the elective course AQ553 - Special Topics in Architecture, Urbanism and Landscape Architecture Theory III (Applied Botany to Landscape Architecture) of the Faculty of Architecture and Urbanism at the Federal University of Pernambuco, since it is a contemporary effort to reinforce the importance of applied botany to landscape architecture and its multidisciplinary aspects, and tries to establish a dialogue between natural, agrarian and social sciences.

Materials and methods

The elective course AQ553 - Special Topics in Architecture, Urbanism and Landscape Architecture Theory III (Applied Botany to Landscape Architecture) was a short-term workshop carried out in the second half of 2019. It had as its main objectives help students deepen their understanding of plants and their properties, and employ it in a project, which had as study area a site located in the campus of the university.

The activities that were developed during the workshop had a descriptive and

bibliographical research nature. In what concerns the descriptive research, it has covered a data survey and analysis of the study area. Consequently, to comprehend the physical, biological and environmental aspects of the campus of the university, it was conducted a field research, which, according to Tripodi et al., (1975, p. 42-71) “should be divided into three major groups: quantitative descriptive, exploratory and experimental”. As mentioned before, it was adopted the first kind of analysis, since it facilitates the description of facts and phenomena of a certain reality.

In its turn, bibliographical research refers to secondary sources, and, as stated by Silva (2017), this kind of research does not represent a mere repetition of what has been said or written about a certain topic, but a guide for research. For the aim of this workshop, the theoretical lectures covered publications that were related to the subject of the discipline, as well as relevant themes like: (i) plant classification; (ii) plant composition, (iii) perception of the landscape and (iv) technical drawing for landscape architecture.

The discipline itself was divided into three stages. In the first one, the students attended practical and theoretical lectures, which approached the following topics: (i) taxonomy, morphology and aesthetical aspects of plants and (ii) field researches covering dendrological analysis, composition studies and green infrastructure. This stage aimed at recognizing plant species along the campus to educate the eye towards the plant element in the landscape and its specificities, which has contributed to the final work of the discipline.

After this stage, every student was asked to select from two to three plant species found previously in the campus, draw them and fill a form with their characteristics. This form is based on a similar document developed by Gustavo Gama Monteiro, one of the founders of the undergraduate degree on architecture at the Federal University of Paraná. The form covers two central aspects of the plants: (i) aesthetical characteristics e (ii) botanical characteristics (Figure 5).

Lastly, the students were asked to work in groups in order to design a landscaping project, which had to incorporate artistic and sustainability principles and be presented as a preliminary study. The study area is an underused shadowed area located between two buildings of the campus and cut by a stream called Riacho Cavouco, which flows through the campus and the Western Zone

¹ This event is now known as the National Forum of Education in Landscape Architecture in Schools of Architecture (ENEPEA)

of the city, and meets Capibaribe River. (Figure 6)
Its central location and the existing natural

features turned this exercise into a great challenge
for the students.

Júlia Medeiros Alves		Vera Maria Bezerra	
CÓDIGO.....()	Nº.....	CONVENÇÃO PLANIMÉTRICA	EM CORES
CARACTERÍSTICAS PLÁSTICAS			
Cor da folha <i>verde brilhante com hastes escuras</i>			
Forma e detalhe da folha <i>composta digitada com 5 a 7 folíolos</i>			
Época de floração <i>abril a julho</i>		Cor da flor <i>rosa ou branca</i>	
Textura <i>como lã, levemente estriada, flor arredada</i>			
Transparência			
Mobilidade			
Relações folclóricas			
Evocação			
Perfume			
Empregos específicos <i>a resina da casca é utilizada para tratamento de</i> <i>úlcera, injeções e queimaduras. As flores são usadas contra a asma,</i> <i>enxaqueca e tosse.</i>			
Outras características <i>Porte de 15-30m</i>			
CARACTERÍSTICAS BOTÂNICAS			
Nome comum <i>paineira</i>			
Nome científico <i>Chorisia speciosa</i>			
Família, gênero, espécie <i>Malvaceae (ant. Bombacaceae), Chorisia, speciosa</i> <i>ou Ceiba</i>			
Origem geográfica, clima <i>Nativa (Brasil e Argentina) Presente na Amazônia,</i> <i>caatinga, cerrado e mata atlântica</i>			
Solo preferido <i>não exigente. Pode ser usada na recuperação de solos de</i> <i>gradados.</i>			
Idade adulta <i>20 anos</i>			
Época de transplante			
Altura ou idade de transplante			
Usos industriais, domésticos, etc. <i>ululose, resinas, arborização urbana, indústria</i> <i>farmacêutica</i>			
Peculiaridades <i>presença de avelãs no tronco jovem. Fruto envolto</i> <i>por paina</i>			
CARACTERÍSTICAS PLÁSTICAS			
Cor da folha <i>verde</i>			
Forma e detalhe da folha <i>forma de coração, bordas recortadas</i>			
Época de floração <i>tudo o ano</i>		Cor da flor <i>branca/creme</i>	
Textura <i>semi-lenhosa escadente, com cicatrizes</i>			
Transparência <i>média sombra</i>			
Mobilidade <i>não</i>			
Relações folclóricas			
Evocação			
Perfume			
Empregos específicos <i>plantas em sol pleno ou meia-sombra,</i> <i>em vasos ou solo natural em jardins</i>			
Outras características <i>altura: 2,0-3,5m, diâmetro da copa: 2,0-3,0m</i>			
CARACTERÍSTICAS BOTÂNICAS			
Nome comum <i>Guaimbê / Filodendro / banana-de-macaco</i>			
Nome científico <i>Philodendron bipinnatifidum</i>			
Família, gênero, espécie <i>Araceae, Philodendron, bipinnatifidum</i>			
Origem geográfica, clima <i>mata atlântica, clima tropical</i>			
Solo preferido <i>fértil, mas com boa adaptabilidade</i>			
Idade adulta <i>2 a 6 anos</i>			
Época de transplante			
Altura ou idade de transplante <i>a partir de 5cm de altura</i>			
Usos industriais, domésticos, etc. <i>uso comum em jardins, parques,</i> <i>ornamental e doméstico</i>			
Peculiaridades <i>atraem abelhas pelos frutos</i> <i>ciclo de vida das folhas: perene</i>			

Figure 5 – Information contained in the form of applied botany to landscape architecture, 2019.



Figure 6 – Location of the study area in campus (in red). Source: Thais Santos and Wilson de Barros, 2019.

Results and discussion

The act of recognizing and studying plants is considered essential by Burle Marx, who had his career consolidated in his expeditions alongside botanists like Henrique Lahmeyer de Mello Barreto (Marx, 1975 in Tabacow, 2004). The landscape architect says that, after carefully observing the collection of native Brazilian plants at the Berlin-Dahlem Botanical Garden (Silva, 2019b), he realized the “force of the genuine tropical nature, (...), its intention, at the time a little undefined, as an appropriate substance for the plastic art he searched” (Marx, 1954 in Tabacow, 2004, p. 33)

Taking this into account, the methodology of the discipline Applied Botany to Landscape Architecture had as its objective optimizing the technique of visual analysis for the apprehension of representative and composition attributes of the plant species found in the campus. Besides the introduction to the concepts and techniques of plant species identification, one of the main skills acquired during the discipline was the perception of the behavior of the tree strata found in different locations of the campus - a lacking content in the regular curriculum of the Architecture and Urbanism course at UFPE.

On-site, it could be observed that plants have several attributes such as size, shape, color, texture, and the environmental, visual, and spatial impacts of their insertion in the landscape. Therefore, the observation exercise led students to a better comprehension of the plants and their properties and an expansion of their repertoire of plants, and has also made students realize that a project that has plants as guiding elements should consider a series of variables.

In nature, plants do not live isolated, and the associations, which are how species group themselves, also known as phyto associations, obey a complex set of soil and climatic conditions (Marx, 1967 in Tabacow, 2004). After understanding these conditions, the observation exercise and the forms of Applied Botany to Landscape Architecture resulted in a data compilation, which not only focused on the aesthetical and composition features of the plants but also their seasonality as living beings: their physical structure, their arrangement on the site, sensorial impacts, shading effects, color, distinction from species of the same gender, among others (Figure 7).

According to Eduardo Barra, this kind of exercise is essential to landscape architects and it

reflects, among several other reasons, [...] “concerns with the introduction of invasive species into the ecosystems (...), which were unknown or neglected until recently” (Barra, 2018, p. 1). Based on these concerns, different species were represented and employed in the assignments of the discipline. The students were not restricted to select native species since they could identify possible associations between them and exotic species that are adapted to the local conditions and already are landmarks of Recife (Figure 8).

Even though the emphasis was given to tree species, the students also recorded information about other plants through drawing. Aside from being a great way to put their graphic representation skills into practice, what is not frequently encouraged in the undergraduate degree on Architecture and Urbanism of the Federal University of Pernambuco, the observation and the records of the species were essential factors for the conception of the preliminary studies of the projects of the discipline (Figure 9), which relates to the design process of Burle Marx, who, by observing plants, deepened his knowledge about the structure, the architecture and the aesthetical and seasonal characteristics of every plant species he collected (Tabacow, 2004 in Dias e Diligenti, 2016).

The observation technique added to the hand drawings as part of the method of interpretation of the study area also proved to be efficient for the comprehension of the spatial demands of the project area. Since a landscaping project implies representing the local landscape and preparing it for what it will become in the future, what Besse (2014, p.60) describes as an “ambiguity, constitutive of the notion of the project in the landscape thinking”, the final exercise focused on the specification of the plants for the study area and the justification of their employment, which had to relate to the landscape and the existing biological, environmental and architectural characteristics of the site.

Among the different approaches adopted by each group, it was possible to establish parallels between them in what concerns the insertion and the long permanence of the plant species identified in the study area. One of the mentioned projects during classes was the Capibaribe Park, which stands out for its understanding of the spirit of the place and the dynamic of its users, which are some of the principles adopted for the final project of the discipline.

Thus, the discipline Applied Botany to Landscape Architecture emphasized preserving the spirit of the place. This concept relates to the perception of the place which gathers; for instance, human presence, built and natural elements, and historical and cultural facts that determine its quality and “(...) a totality constituted of concrete things which have material

substance, shape, texture, and color. All these things combined determine an “environmental quality”, which is the essence of the place”. (Norberg-Schulz, 2006, p. 444). These concepts are widely employed in the work of contemporary landscape architects such as Fernando Chacel, Eduardo Barra, Piet Oudolf and Rosa Kliass.

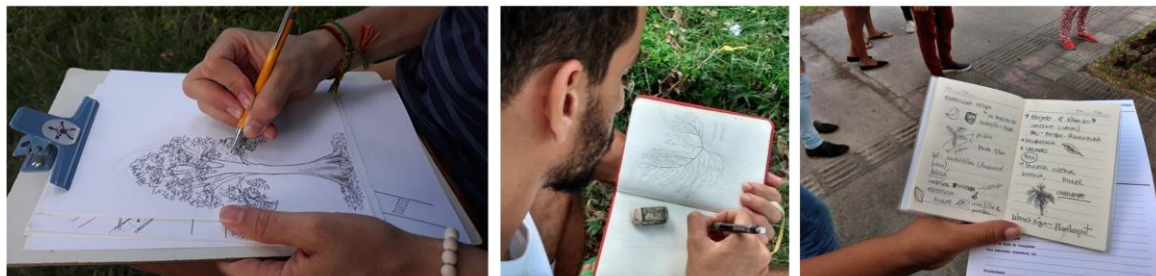


Figure 7 - Observation exercise and the records made by students, 2019.

TABELA DE ARBORIZAÇÃO					PROPOSTA			
IDENTIFICAÇÃO	NOME CIENTÍFICO	NOME COMUM	PLANTA NATIVA	COR DA FOLHA	FLORAÇÃO ÉPOCA - COR	EMPREGO ESPECÍFICO	ALTURA	Ø DE CORA
01	PEITCHARDIA PACIFICA	PALMEIRA LESUE DE FISI	NÃO	VERDE	JANEIRO - AMARELA	ÁREAS DE SOL PLENO	12 M	5M
02	DELONIX REGIA	FLAMBOYANT	NÃO	VERDE ESCURO	SETEMBRO - VERMELHA A MARÇO	ORNAMENTAL, ESPAÇO AMPLO, LOMBE DE CALÇADAS.	15M	25M A 40M
03	PLUMERIA RUBRA	JASMIN MANEJA	NÃO	VERDE CLARO	JUNHO A OUTUBRO - ROSA	ORNAMENTAL DE FOLHAS CARCICAS. OPERAÇÕES PERMEABILIDADE VISUAL	7M	3,5M
04	DYPSIS LUTESCENS	PALMEIRA ARECA	NÃO	VERDE	SETEMBRO - BRANCO OUTUBRO	CONTRAPUNTO DE JARDIM	3,6 A 9M	2M A 3M
05	FICUS BENJAMINA	FICUS	NÃO	VERDE ESCURO	SETEMBRO - A OUTUBRO	DE SOL PLENO, COM TRONCO ESCURURADO E RAMOS AGRESSIVOS	12 M	6M
06	PARKIA PENDULA	VIGUEIRO	6M	VERDE CLARO	AGOSTO A OUTUBRO - VERMELHA	ORNAMENTAL DE FLORES PEQUENAS E PENDULAS POR UMA HASTE	20 A 30M	
07	CULOTIA PARACHIDIANA	SOMBREIRO	SIM	VERDE ESCURO	OUTUBRO	ÁREAS QUE PRECISAM SER SOMBREADAS	12 M	30M
08	HANDROANTHUS IMPERIALI NOBU	YFÉ ROYO	SIM	VERDE CLARO COM AS FOLHAS QUEIMADAS	JUNHO A SETEMBRO - ROSA	ORNAMENTAL E GERA PERMEABILIDADE VISUAL	25M	5M
09	CELEA SPECIOSA	BARRIGUDA	SIM	VERDE ESCURO	SETEMBRO - ROSA A MARÇO	DE GRANDE PORTE, PRODUZ SEMENTES COM PÁPIAS, DE SOL PLENO.	12 M	5M
10	CECRODIA PACHYSTACHYA	EMBÓUBA	SIM	VERDE	DE MARÇO A OUTUBRO - VERDE A AMARELO - MARÇO	ÁREA DE BOSQUES, SOMBREANDO E UNIDOS, ÁREA HUA PARA PAISAGEM.	4 M A 8 M	8 M
11	CASSIA GRANDIS	CASSIA ROSA	SIM	VERDE CLARO	SETEMBRO - ROSA	IDEAL PARA ÁREAS PERICULASAS NAS MARGENS, ORNAMENTAL E DE SOL PLENO. ATEN A PAISAGEM SILVESTRE.	9 M A 12 M	8M
12	SISYGLIUM MALACOBANSE	JAMBEIRO	NÃO	VERDE ESCURO	DE AGOSTO A DEZEMBRO - ROSA ESCURO	ORNAMENTAL QUANDO FLORIDA, OPERAÇÃO SOL SOMBRA	20 M	5M

Figure 8 - Example of one of the proposed plant palettes composed of native and exotic species.



Figure 9 - Examples of drawings recorded on the forms of Applied Botany to Landscape Architecture. It was recorded both the plant species as a whole and its parts.

The results presented at the end of the workshop revealed that the students conceived their plant palettes in agreement with some design decisions like valuing and highlighting nature, opening windows to the landscape, and establishing connections between the surrounding buildings. These guidelines were also directed to the resolution of environmental issues, such as water pollution, a topic that was addressed with the proposal of employing filtering plant species on the banks of Cavouco's stream — this technique can improve the quality of the mentioned body of water, which currently finds

itself polluted by a series of effluents and at risk of impacting negatively Capibaribe River (Figure 10).

Even though it was a short-term workshop, the students managed to apply what they have learned to their proposals. By understanding the spirit of the place and working with the plant element, grouping different species according to their colors, shapes, textures, and respecting their seasonality and their ecological condition, they designed bucolic spaces that served as spots for social interaction and contemplation (Figure 11)

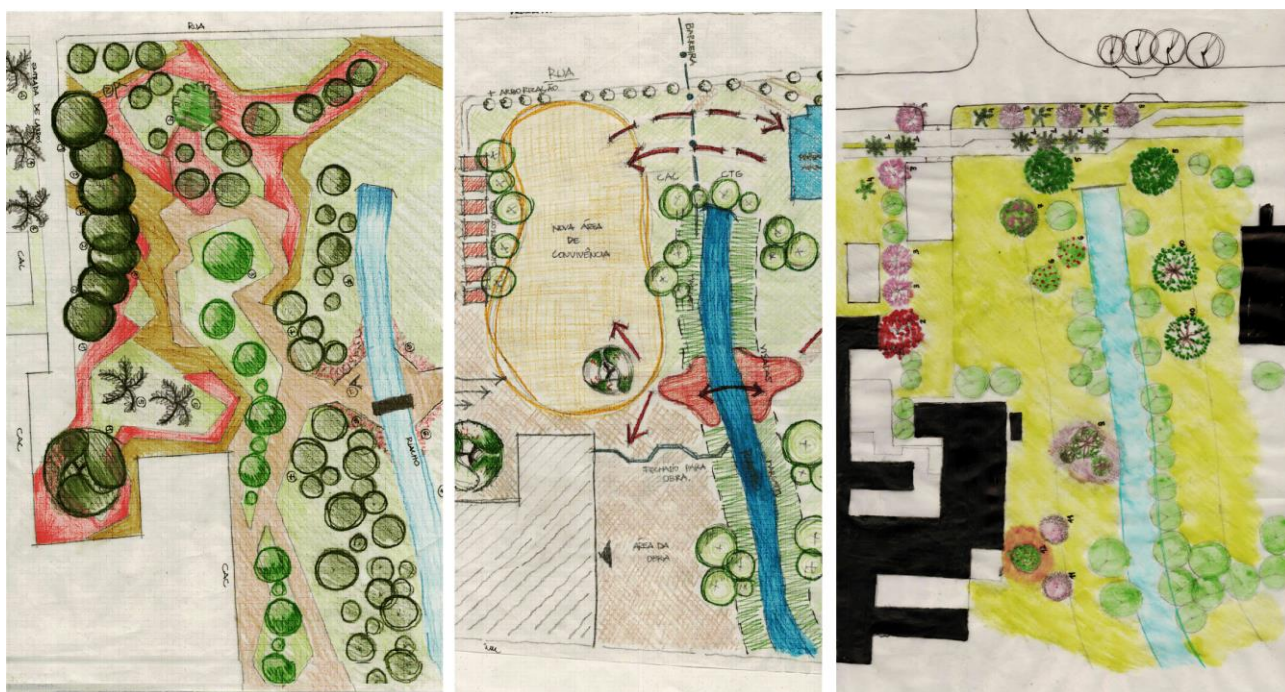


Figure 10 - Final graphic pieces of three of the workgroups. 2019.

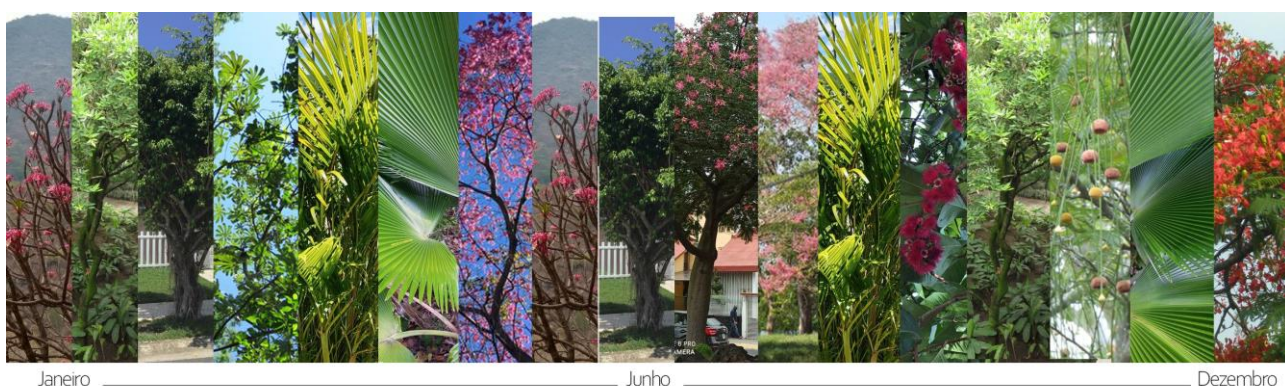


Figure 11 – The students proposed plant compositions for their projects, which took into consideration the aesthetic traits of the chosen plant species.

Having the forms of Applied Botany to Landscape Architecture as guides, the students proposed interesting plant compositions, which were strongly related to the thinking of Burle Marx, who supported the idea of having the aesthetic composition as one of the determining factors of a landscape architecture project:

Creating a garden is creating art. When I think about a garden, I think about the laws that guide artistic questions: contrasts, texture, the relationship between volumes, harmony, and color opposition [...] The garden is not only an aesthetic matter. When I design a project, I need to know the place: if the climate is a torrid, mountain or temperate climate;

what plants grow in the region. It is equally important to know its user. All of these questions must be considered (Marx in Dourado, 1991, p.59-72).

Consequently, it can be perceived that the students not only understood the individual properties of the plant species but also knew how to group them in order to promote a series of sensations, which were associated with the aesthetical aspects of the plants and conditioned to composition principles. These results made the students realize the importance of landscape architecture in the conception of pleasant spaces.

Conclusions

Considering the results of the discipline Applied Botany to Landscape Architecture, it can be understood that the identification and the graphic representation of the plants as learning tools are key elements for the appropriate employment of plants in a landscaping project and they should be included in the curriculum of architecture and urbanism undergraduate courses.

The understanding of the role of the plant element in the landscaping project must be part of a multidisciplinary teaching approach, which must gather not only architects and urbanists but also landscape architects, botanists and other professionals since the comprehension of the plants is essential to the creation of ecologically suitable environments for the cities.

In this regard, despite the difficulties mentioned in this article, it can be concluded that the suggested procedure had several positive results in what concerns the improvement of environmental perception, graphic representation and design skills, which led students to consider architectural, natural and biological variables in the exercises.

Therefore, the discipline Applied Botany to Landscape Architecture opens a large range of methodological possibilities and stands out for being a relevant initiative in the field of landscape architecture. However, it is the first experience of its kind, which needs to be repeated, perfectionated, extended and disseminated in order to be included as a mandatory discipline of the undergraduate degree on architecture and urbanism of the Federal University of Pernambuco.

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