CIÊNCIA e NATURA

UFSM

Ci. e Nat., Santa Maria v.42, e24,
Special Edition: 40 anos, p. 1-21, 2020
DOI:10.5902/2179460X40859
ISSN 2179-460X

40 years - anniversary

Received: 31/10/19 Accepted: 09/11/19 Published 03/09/20

Urban floristics in southern Minas Gerais, Brazil

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ABSTRACT

The urban afforestation is an important tool for the formation of a city with an environmental quality. The present project has the aim to provide the qualitative inventory of all tree species and their respective families, in the neighborhood of Véu das Noivas, located in the west region of the municipality of Poços de Caldas, Minas Gerais. For each tree, geographic coordinates were collected and the species identified, with the help of experts, and with the material available in "Jardim Botânico de Poços de Caldas" foundation and bibliographies. Together, all species make a total of 497 individuals, once 185 in green spaces, 211 were located close to public highways and 101 were located close to the walls of some buildings. Among these trees, 44 species were found in green spaces, 54 in streets and 19 in vertical landscaping, distributed in 27 families present in green areas, 25 in streets and 14 in vertical landscaping. It was also noticed exotical species compose most part of the analyzed trees. It's important to remember that the usage of adequate species in urban afforestation is directly related to a correct urban planning.

Keywords: Urban afforestation; Floristic survey; Vertical landscaping

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1 INTRODUCTION

According to Amato-Lourenço et al. (2016), the process of urbanization and population growth cause environmental problems and the vegetation may provide the enhancement of the environmental conditions, causing a thermal comfort. Still, the authors say the urban green spaces reduce the superficial flooding, control the atmospheric pollution and provide enhancements for the city inhabitants, presenting, beyond ecological functions, social and psychological functions.

The urban afforestation, when correctly planned, brings landscaping, environmental, social and patrimonial benefits for the population. However, when it's created in an inadequate way, it can cause problems to the population and the municipal public power. Among the benefits are: higher soil's permeability, control over air's humidity and temperature; interception of rainfall; shadowed areas; better water infiltration in soil; the function of an ecological corridor; protection for bodies of water and soil; preservation of the genetical diversity of the native flora; shelter for the silvester fauna; function of barrier against the wind, noises and high luminosity; reduction of air pollution; sequestration and storage of carbon; embellishment of the city; better psychological well-being and life quality (CEMIG, 2011).

In a vertical landscaping, the vegetal development starts from the structure or by the wall of the building and can be planted either into the soil or vases (BARBOSA and FONTES, 2016). Still, it's important to be careful with the plantation of vegetation close to buildings, considering its damaging aspects, such as foliage and branches or twigs which obstruct pipes, roots which deteriorate the structure once they penetrate into the foundations and the incident shadows onto the windows, prejudicing the internal heating, when in a place with cold weather.

The urban green areas are able to enhance population's quality of life and the public health (DADVAND et al., 2016; GOZALO et al., 2018). The urban green areas are composed of many elements, such as squares, urban parks, gardens etc. (AMATO-LOURENÇO et al., 2016). Still according to Maricato, Colosso and Comarú (2018), two harmful urban factors are the lack of green areas and deforestation.

The reason is substantiated by social benefits from urban afforestation with the necessity of existing an efficient urban planning in the city (BUCKERIDGE, 2015). The pursuit for a good quality of life for the inhabitants and the protection of the environment, of the local biodiversity and natural landscapes must configurate as important subjects in an efficient public management. Therefore, the urban afforestation starts to be an important tool for the urban planning not only for its socio-environmental concerns, but also for its capacity to protect the environment.

In this way, the main goal of this study is to provide a qualitative inventory of trees present in Véu das Noivas neighborhood, in Poços de Caldas/MG, checking the respective trees present in the local and their respective families and origins.

2 MATERIAL E METHODS

According to the city's master plan, Poços de Caldas is located in the microregion in southern Minas Gerais, lat. 21°50'20" S, long. 46°33'53" W Gr, with a altitude of 1.186. The city has a total area of 544,42 km^2, being 85,51 km^2 of its urban area and 458,91 km^2 of rural area (PMPC, 2006).

Véu das Noivas neighborhood is relatively small and located to the west, in the municipality of Poços de Caldas, next to the bus station and the city's shopping mall, strictly residential and for single-family people.

The gathered data of the trees was executed by visiting all streets in the neighborhood (Uberlândia, Irmão José Gregório, Ângelo Gaiga, Henrique Benedetti, Paulo de Oliveira, Raul Cury and Bruno Felisberti street, also João Ferrari avenue). Such visits approached three different categories of places: green spaces, streets and vertical landscaping.

To carry out the data gathering, a previously made worksheet was used with all data to be collected during each visit, helping for the creation of an inventory, census, of each visited place (Table 1).

The identification of the trees' locations was made by a Global Positioning System (GPS). The number of the closest residence and each tree coordinates were also gathered (Table 1). The studies were done according to the sequence of the numbers of each house, in ascending order.

Table 1 – Aspects gathered in field of study

	Street/Avenue name
Tree Location	Geographic coordinates (latitude, longitude)
	Reference (number of the closest house)
Tree's Botanical Identification	Common name
	Scientific name
	Origin (native, exotic or naturalized)

Source: The own authors

The species' identifications are done by a specialist who visits the neighborhood, a gathering of material for exsiccation, consultation in the Poços de Caldas' Botanical Garden foundation relevant books and bibliography. The scientifical and family names were checked through verifications in Flora do Brasil Online 2020 (FBO, 2018) and The Plant List (THE PLANT LIST, 2018) websites.

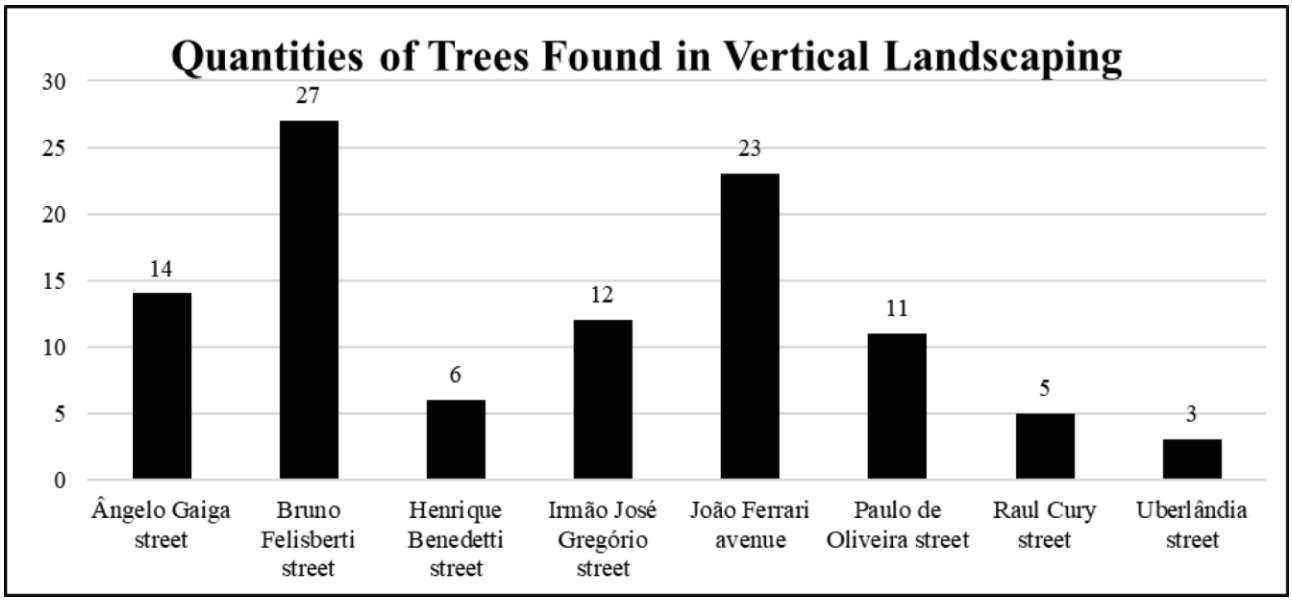
At the end of the activities in field, all collected data was organized separately per street in one worksheet. After that, basic statistics were taken from the data created for the analysis and interpretation of the results and the creation of maps for the location of each tree and their species most frequently found using *ArcGIS*® 10.2.1, a geoprocessing software. Furthermore, adjusts were made on the maps by using *CorelDRAW*® 2018.

3 RESULTS AND DISCUSSION

3.1 Vertical Landscaping

101 trees were found in the vertical landscaping of some buildings present in the neighborhood. A certain disparity was found in the quantity of these trees among the analyzed streets, presenting a higher rate in Bruno Felisbertti Street and João Ferrari Avenue (Figure 1). It's important to highlight that in Ângelo Gaiga Street there are only planted species close to walls or in a small green space located in the end of the street.

Figure 1 – Quantity of planted trees in vertical landscaping per street in Véu das Noivas neighborhood, Poços de Caldas/MG



Source: the own authors

Despite the variety of found species, six of them have less than 1% of appearance rate. There's a predominance of two species: *Duranta repens L.* and *Podocarpus macrophyllus* (Thunb) D.Don (Table 2), corresponding to 57,42% of the analyzed trees, which goes over the recommended value of 10% per species (CEMIG, 2011).

Table 2 – Family, scientific name, common name, origin and appearance rate (F) in percentages of the found species in the afforestation of green spaces in Véu das Noivas neighborhood, Poços de Caldas/MG

Family	Scientific Name	Common Name	Origin	F (%)
Araliaceae	*Schefflera morototoni* (Aubl.) Maguire et al.	morototó	Native	1,0
Arecaceae	*Acanthophoenix* sp.	palmeira-australiana	Exotic	3,0
	Dipsis lutescens (H.Wendl.) Beentje & J.Dransf.	areca-bambu	Exotic	3,0
	Roystonea oleracea (Jacq.) O.F. Cook	palmeira-australiana	Exotic	2,0
	Syagrus oleracea (Mart.) Becc.	gueroba	Native	2,0
Bignoniaceae	*Jacaranda mimosifolia* D. Don	jacarandá-mimoso	Exotic	1,0
	Tecoma stans (L.) Juss ex. Kenth	ipê-mirim	Exotic	2,0
Cupressaceae	*Cupressus sempervirens* L.	cipreste	Exotic	5,0
Cycadaceae	*Cycas circinalis* L.	palmeira-sagu	Exotic	1,0
Euphorbiaceae	*Codiaeum variegatum* L.	crotón	Exotic	6,9
Fabaceae Mimosoideae	*Machaerium amplum* Benth.	arranha-gato	Native	2,0
Moraceae	*Morus nigra* L.	amora-negra	Exotic	3,0
Myrtaceae	*Eugenia uniflora* L.	pitangueira	Native	1,0
	Psidium guajava L.	goiabeira	Naturalized	2,0
Pandanaceae	*Pandanus* sp.	pândano	Exotic	2,0
Poaceae	*Phyllostachys aurea* Carriére ex Riviére & C. Riviére	taquara-ornamental	Exotic	1,0
Podocarpaceae	*Podocarpus macrophyllus* (Thunb) D.Don	podocarpos	Exotic	28,7
Rutaceae	*Balfourodendron riedelianum* (Engl.) Engl.	guatambu	Native	1,0
Verbenaceae	*Duranta repens* L.	pingo-de-ouro	Native	28,7
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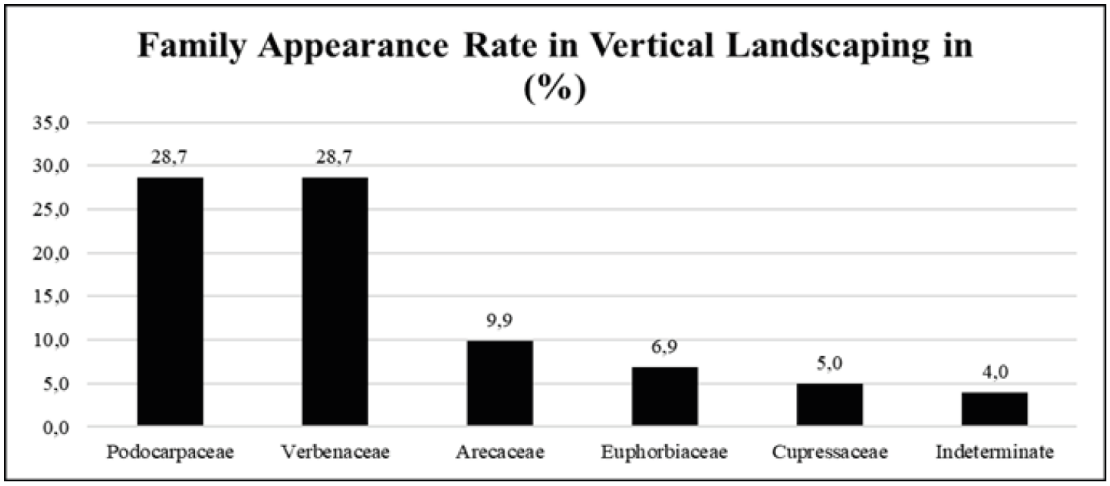
Source: the own authors

The high rate of *Duranta repens* and *Podocarpus macrophyllus* can also be observed in the analysis of the found families (Figure 2), represented by the Podocarpaceae and Verbenaceae families. It was also observed that 9.9% of the found

trees belong to the Arecaceae family, represented by trees commonly known, mostly, as palmtrees.

Figure 2 – Appearance rate in percentage about the found families in vertical landscaping in Véu das Noivas neighborhood, Poços de Caldas/MG



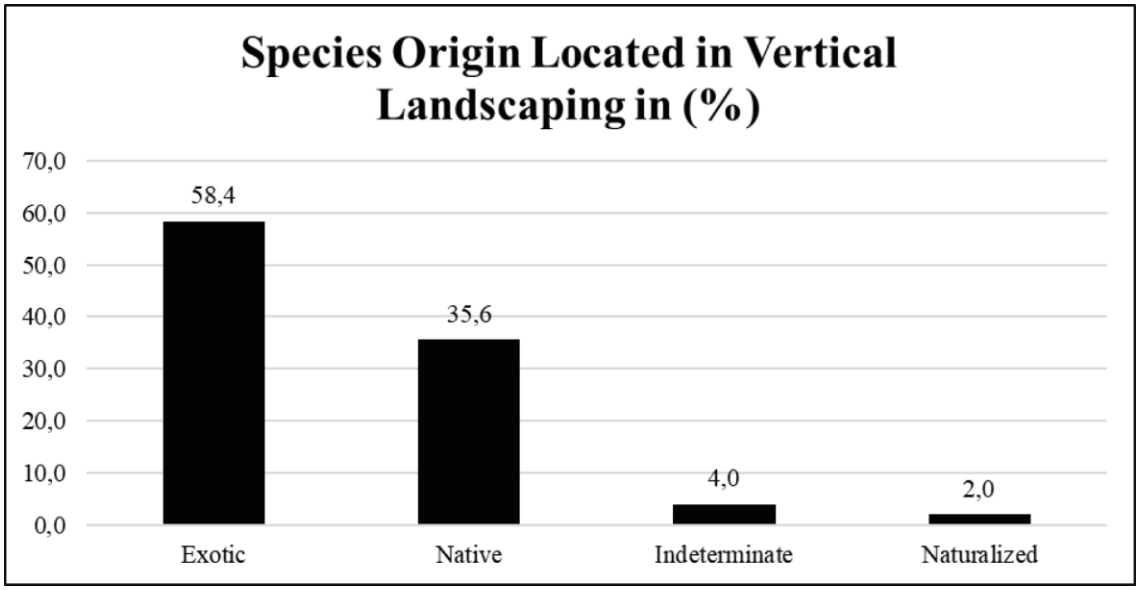
Source: the own authors

It's important to emphasize the presence of fruit trees, just like *Eugenia uniflora* L., *Morus nigra* L. and *Psidium guajava* L. The fruit trees are essencial for the urban fauna's maintenance being a source of food for the local animals in a way which contributes to the diversity of the species in cities, once they are able to provide fruits and food (KRAMER and KRUPEK, 2012).

In this data gathering, there is a predominance of exotic species if compared to those which are natives related to the afforestation made close to walls. More than half of the trees, 58,4% of them, are exotic, 35,6% are natives, 2,0% are naturalized and 4,0% are from unknown origin due to the impossibility of identifying because of the size of the tree (Figure 3).

It was verified that the presence of vegetation in the vertical landscape of the studied area contributed to raise the quantity of existing trees, bringing benefits for the population and for the environment. According to Barbosa and Fontes (2016), vertical landscapes are a solution to make the urban area greener once there are few areas in the cities such as destined to vegetation.

Figure 3 – Trees' origin planted close to the wall in Véu das Noivas neighborhood, Poços de Caldas/MG



Source: the own authors

3.2 Street Afforestation

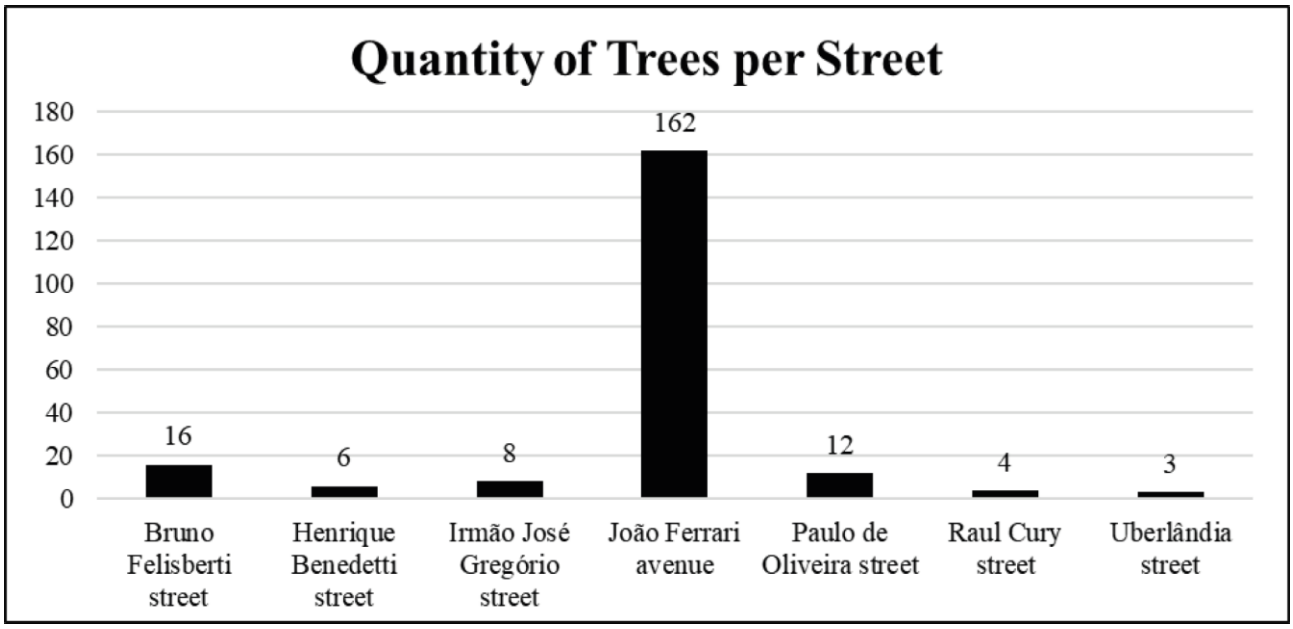
211 trees were found along the visited streets. However, an irregularity was noticed according to the distribution of these trees, once Raul Cury, Uberlândia, Henrique Benedetti, Irmão José Gregório, Bruno Felisbertti and Paulo de Oliveira streets have, respectfully**,** 4, 3, 6, 8, 16 and 22 elements and the main access to the neighborhood, João Ferrari avenue, owns 162 trees (Figure 4). It's still important to emphasize that this high number of trees found in João Ferrari avenue is due mainly to the fact of existing many trees located in their central flowerbed.

There's a big variety of tree species. Among 211 counted, there are 54 different tree species (Table 3), however, it's important to emphasize that 32 of the species own less than 1% of models.

A higher rate of the *Bauhinia variegata* L. species was noticed. They own a recurrent rate, mostly in the main flowerbed located in the center of João Ferrari avenue. The usage of this species results into two irregularities: its high rate and origin. According to CEMIG (2011), the maximum quantity of trees of a certain species should't go over 10%, thus, the present rate (17,54%) goes over the recommended

limit value (Table 3). Despite being of exotic origin, their recurrent usage in the central flowerbed causes a landscaping and aesthetic effect, interesting to the neighborhood by its pink and white flowering.

Figure 4 – Quantity of planted trees per street in Véu das Noivas neighborhood, Poços de Caldas/MG



Source: the own authors.

The impossibility of identifying some species occurred, primarily, due to the gathering of data in autumn, what contributed to many trees to be without their foliage, becoming harder the identification. Even though, these trees represent 7,58% of the data (Table 3).

Some species were the accounted fruit trees during the gathering of data: *Artocarpus heterophyllus* Lam., *Citrus* sp., *Eugenia uniflora, Mangifera indica* L., *Morus nigra, Persea americana* Mill., *Psidium guajava* and *Punica granatum* L. (Table 3). Despite producing a significative environmental gain in cities, the species which produce big fruits may cause accidents and disorder to the population (CEMIG, 2011).

During the data gathering in the streets, two invading species were found: *Leucaena leucocephala* (Lam.) de Wit and *Pittosporum undulatum* Vent. (Table 3). The species *Leucaena leucocephala* is exotic, can survive in many different places and, it owns a favored spreading in varied environments (SILVA et al., 2017).

Table 3 – Family, scientific name, common name, origin and rate of appearance (F) in percentage of the found species in the afforestation of the streets in Véu das Noivas neighborhood, in Poços de Caldas/MG

Family	Scientific Name	Common Name	Origin	F (%)
Anacardiaceae	*Mangifera indica* L.	mangueira	Exotic	6,2
	Schinus molle L.	aroeira-salsa	Native	1,0
	Schinus terebinthifolia Raddi	aroeira-pimenteira	Native	3,3
Arecaceae	*Beaucarnea recurvata* Lem.	nolina	Exotic	0,5
	Caryota mitis Lour.	palmeira rabo-de-peixe	Exotic	0,5
	Phoenix roebelenii (Carl Roebelen)	fênix	Exotic	0,5
	Roystonea oleracea (Jacq.) O.F. Cook	palmeira-australiana	Exotic	1,9
	Syagrus oleracea (Mart.) Becc.	gueroba	Native	0,5
Bignoniaceae	*Cybistax antisyphilitica* (Mart.) Mart.	ipê-mirim	Native	0,5
	Handroanthus albus (Cham.) Mattos	ipê-amarelo	Native	4,3
	Handroanthus chrysotrichus (Mart. ex A.DC.) Mattos	ipê-amarelo	Native	0,5
	Handroanthus heptaphyllus (Vell.) Mattos	ipê-roxo	Native	1,0
	Handroanthus impetiginosus (Mart. ex DC.) Mattos	ipê-roxo	Native	1,9
	Jacaranda mimosifolia D. Don	jacarandá-mimoso	Exotic	0,5
	Tabebuia impetiginosa (Mart. ex DC.)	ipê-roxo	Native	0,5
	Tecoma stans (L.) Juss ex. Kenth	ipê-mirim	Exotic	1,9
Biraginaceae	*Cordia ecalyculata* Vell.	café-de-bugre	Native	0,5
Cactaceae	*Nopalea cochenillifera* (L.) Salm-Dyck	cacto	Exotic	0,5
Convolvulaceae	*Ipomoea quamoclit* L.	primavera	Native	1,0
Cupressaceae	*Cupressus sempervirens* L.	cipreste	Exotic	1,0
Euphorbiaceae	*Codiaeum variegatum* L.	crotón	Exotic	1,0
	Euphorbia pulcherrima Wild. Ex Klotzsch.	flor-de-páscoa	Exotic	0,5
	Ficus variegata L.	ficus, figueira	Exotic	1,4
Fabaceae Caesalpinioideae	*Bauhinia variegata* L.	pata-de-vaca	Exotic	17,5
	Caesalpinia pluviosa var. *peltop horoides* (Benth.) G.P.Lewis	sibipiruna	Native	1,0
	Cassia fistula L.	cássia-imperial	Exotic	1,0
	Hymenaea courbaril L.	jatobá	Native	0,5
Fabaceae Faboideae	*Machaerium villosum* Vogel	jacarandá-mineiro	Native	0,5
	Schizolobium parahyba (Vell) S. F. Blake.	guapuruvu	Native	0,5
	Poecilanthe parviflora Benth.	coração-de-negro	Native	0,5

Fabaceae Mimosoideae	*Leucaena leucocephala* (Lam.) de Wit	leucena	Exotic-Invader	0,5
Lauraceae	*Persea americana* Mill.	abacateiro	Exotic	2,4
Lythraceae	*Lagerstroemia indica* L.	resedá	Exotic	1,4
Malvaceae	*Hibiscus rosa-sinensis* L.	hibisco	Exotic	2,8
Melastomataceae	*Tibouchina granulosa* (Desr.) Cogn.	quaresmeira	Native	1,9
	Tibouchina mutabilis (Vell.) Cogn.	manacá-da-serra	Native	0,5
Moraceae	*Artocarpus heterophyllus* Lam.	jaqueira	Exotic	1,0
	Morus nigra L.	amora-negra	Exotic	3,8
Myrtaceae	*Eugenia involucrata* DC.	pitanga-preta	Native	3,3
	Eugenia uniflora L.	pitangueira	Native	2,4
	Pimenta pseudocaryophyllus (Gomes) Landrum	cravo-do-mato	Native	0,5
	Psidium cattleianum Sabine	araçá-amarelo	Native	0,5
	Psidium guajava L.	goiabeira	Naturalized	3,8
Pandanaceae	*Pandanus* sp.	pândano	Exotic	3,3
Pittosporaceae	*Pittosporum undulatum* Vent.	pitósporo-ondulado	Exotic-Invader	0,5
Poaceae	*Saccharum officinarum* L.	cana-de-açúcar	Cultivated	4,3
Punicaceae	*Punica granatum* L.	romanzeira	Exotic	0,5
Rosaceae	*Eriobotrya japonica* (Thunb.) Lindl.	ameixa-amarela	Exotic	1,9
Rutaceae	*Citrus* sp.	limoeiro	Exotic	1,4
	Murraya paniculata (L.) Jack	murta	Exotic	1,4
Solanaceae	*Brunfelsia uniflora* (Pohl) D.Don	manacá-de-cheiro	Native	1,0
	Solanum lycocarpum A.St.-Hil.	lobeira	Native	0,5
	Solanum mauritianum Scop.	fumo-bravo	Native	0,5
Verbenaceae	*Duranta repens* L.	pingo-de-ouro	Native	0,5
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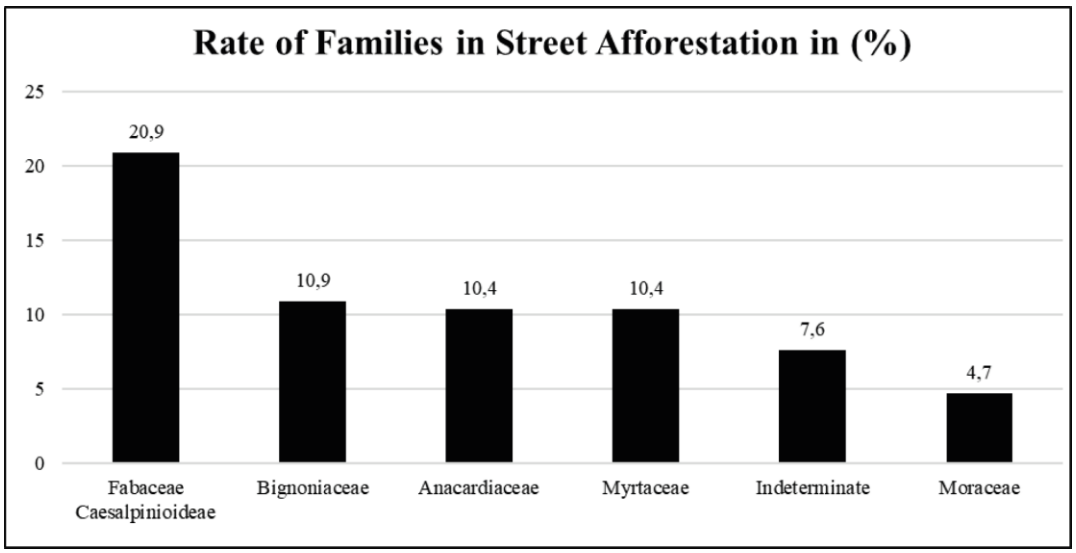
Source: the own authors

The strong presence of the Fabaceae Caesalpinioideae family is due to, mostly, to the big quantity of *Bauhinia variegata* trees. Still, 10,9% of trees belonging to the Bignoniaceae family (Figure 5). Most part of the representants found here are natives and commonly known as “ipês”. Besides a floration welfare they provide, the ipês can be planted in parks and squares or even in sidewalks (CEMIG, 2011).

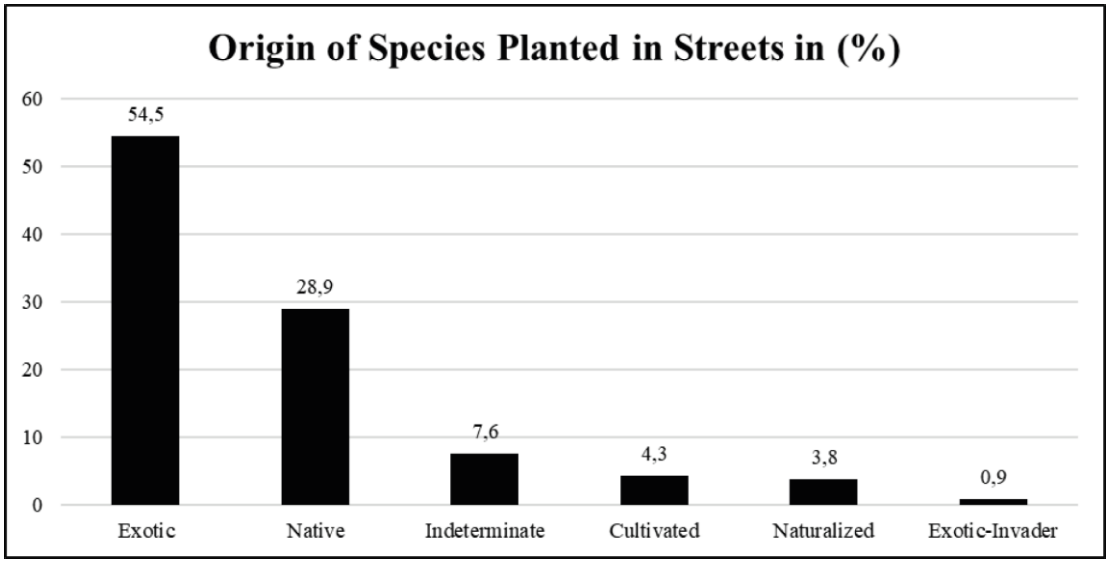
Figure 5 – Rate in percentage of found families in the afforestation of streets in Véu das Noivas neighborhood, Poços de Caldas/MG



Source: the own authors

According to Kramer and Krupek (2012), the usage of native species in the urban afforestation brings the cultural identity of the region. It was observed, however, the predominace of exotic species present in the afforestation of streets, existing 54,5% of exemplars. The naturalized species are constituted only by *Psidium guajava* trees (3,8%) and those cultivated by *Saccharum officinarum* (4,3%) (Figure 6).

Figure 6 – Origin of the trees planted in the streets in Véu das Noivas, Poços de Caldas/MG



Source: the own authors

3.3 Green Spaces Afforestation

It was observed the existence of some green spaces at the entrance of the neighborhood, being well distributed and contributing to the thermal comfort sensation of the local. In this way, it was also observed the existence of 185 trees in these areas, in a total of 44 species. In spite of the variability of existing species, 14 of them own less than 1% of exemplars (Table 4).

Many trees of the species *Cupressus sempervirens* L. were accounted and located, mainly, at the entrance of the neighborhood. Among the found exemplars, 13,5% of them are from this species, going over the maximum value of rate for individuals of a same species, 10% (CEMIG, 2011) (Table 4). As it can be observed in this project, trees of this species were used for vertical landscaping and also for street afforestation.

Due to the time of the year in which data were collected, many trees were without leaves and it contributed to many of them, despite the fact that they had their geographic coordinates gathered, to be not identified (10,8%) (Table 4).

It was also noticed the existence of some fruit trees species, such as *Citrus* sp., *Eugenia uniflora*, *Morus nigra*, *Persea americana* and *Psidium guajava.* It's useful to emphasize that some exemplars of *Psidium guajava* were located in ravines and presented iminent risks of falling. Besides focusing on those trees which may fall, it's necessary to point out possible accidents caused by fruits of the *Persea americana* species.

Table 4 – Family, scientific name, common name, origin and rate (F) in percentage of the found species in the afforestation of green spaces in Véu das Noivas neighborhood, Poços de Caldas/MG

Family	Scientific Name	Common Name	Origin	F %
Anacardiaceae	*Schinus terebinthifolia* Raddi	aroeira-pimenteira	Native	1,1
Araucariaceae	*Araucaria angustifolia* (Bertol.) Kuntze	araucária	Native	2,2
Arecaceae	*Dipsis lutescens* (H.Wendl.) Beentje & J.Dransf.	areca-bambu	Exotic	0,5

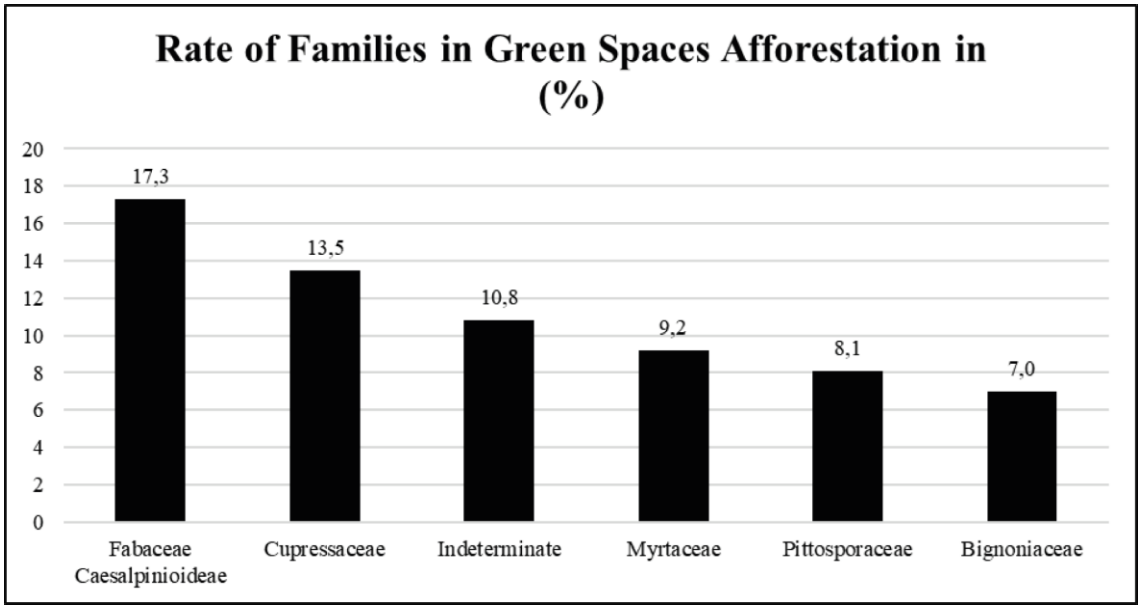
	Livistona chinensis (N. J. Jacquin) R. Brown ex Mart.	palmeira-de-leque-da-china	Exotic	2,2
	Syagrus romanzoffiana (Cham.) Glassman	jarobá	Native	1,6
Bignoniaceae	*Handroanthus albus* (Cham.) Mattos	ipê-amarelo	Native	1,1
	Handroanthus chrysotrichus (Mart. ex A.DC.) Mattos	ipê-amarelo	Native	1,1
	Handroanthus impetiginosus (Mart. ex DC.) Mattos	ipê-roxo-bola	Native	2,2
	Jacaranda mimosifolia D. Don	jacarandá-mimoso	Exotic	1,6
	Tabebuia heptaphylla (Vellozo) Toledo	ipê-argentino ou ipê-rosa	Exotic	1,1
Cactaceae	*Cactus* sp.	cactos	Exotic	0,5
	Opuntia ficus-indica Mill	figo-da-índia	Exotic	0,5
Convolvulaceae	*Ipomoea quamoclit* L.	primavera	Native	0,5
Cupressaceae	*Cupressus sempervirens* L.	cipreste	Exotic	13,5
Cycadaceae	*Cycas circinalis* L.	palmeira-sagu	Exotic	1,1
Euphorbiaceae	*Ficus variegata* L.	ficus, figueira	Exotic	0,5
Fabaceae Caesalpinioideae	*Bauhinia variegata* L.	pata-de-vaca	Exotic	2,7
	Caesalpinia pluviosa var. *peltophoroides* (Benth.) G.P.Lewis	sibipiruna	Native	8,1
	Hymenaea courbaril L.	jatobá	Native	0,5
Fabaceae Mimosoideae	*Machaerium villosum* Vogel	jacarandá-do-campo	Exotic	2,7
	Pterogyne nitens Tul.	amendoim-bravo	Native	3,2
	Inga sessilis (Vell.) Mart.	ingá	Native	2,7
	Leucaena leucocephala (Lam.) de Wit	leucena	Exotic-Invader	0,5
	Piptadenia gonoacantha (Mart.) J.F.Macbr.	pau-jacaré	Native	0,5
Lamiaceae	*Plectranthus barbatus* Andr.	boldo	Exotic	0,5
Lauraceae	*Persea americana* Mill.	abacateiro	Exotic	0,5
Malvaceae	*Ceiba speciosa* (A. St.-Hil.) Ravenna	paineira	Native	0,5
Melastomataceae	*Tibouchina granulosa* (Desr.) Cogn.	quaresmeira	Native	1,1
Moraceae	*Ficus elastica* var. *robusta* Roxb. ex Hornem	fícus	Exotic	1,1
	Morus nigra L.	amora-negra	Exotic	2,2
Myrtaceae	*Eucalyptus* sp.	eucalipto	Exotic	1,1
	Eugenia uniflora L.	pitangueira	Native	1,6
	Psidium guajava L.	goiabeira	Naturalized	6,5
Oleaceae	*Ligustrum lucidum* W. T. Aiton	alfenheiro	Exotic	1,1
Pandanaceae	*Pandanus* sp.	pândano	Exotic	5,4
Pinaceae	*Pinus* sp.	pinus	Exotic	1,1
Pittosporaceae	*Pittosporum undulatum* Vent.	pitósporo-ondulado	Exotic-Invader	8,1
Platanaceae	*Platanus* sp.	plátano	Exotic	0,5
Poaceae	*Saccharum officinarum L.*	cana-de-açúcar	Cultivated	1,1
Proteaceae	*Grevillea robusta* A.M.Cunn. ex R. Br.	grevilha	Exotic	1,1
Rutaceae	*Citrus* sp.	limoeiro	Exotic	1,1
	Zanthoxylum rhoifolium Lam.	mamica-de-cadela	Native	0,5

Sapindaceae	*Matayba guianensis* Aubl.	camboatá-branco	Native	0,5
Solanaceae	*Solanum mauritianum* Scop.	fumo-bravo	Native	1,1
----------	----------	indeterminate	----------	10,8

Source: the own authors

The high rate of Fabaceae Ceasalpinioideae and Cupressaceae families (Figure 7) is due mainly to the found trees of the *Caesalpinia pluviosa* var. *peltophoroides* and *Cupressus sempervirens* species, respectively. Even though, it's still worrisome the quantity of trees which belong to the Pittosporaceae family, once they are considered invaders.

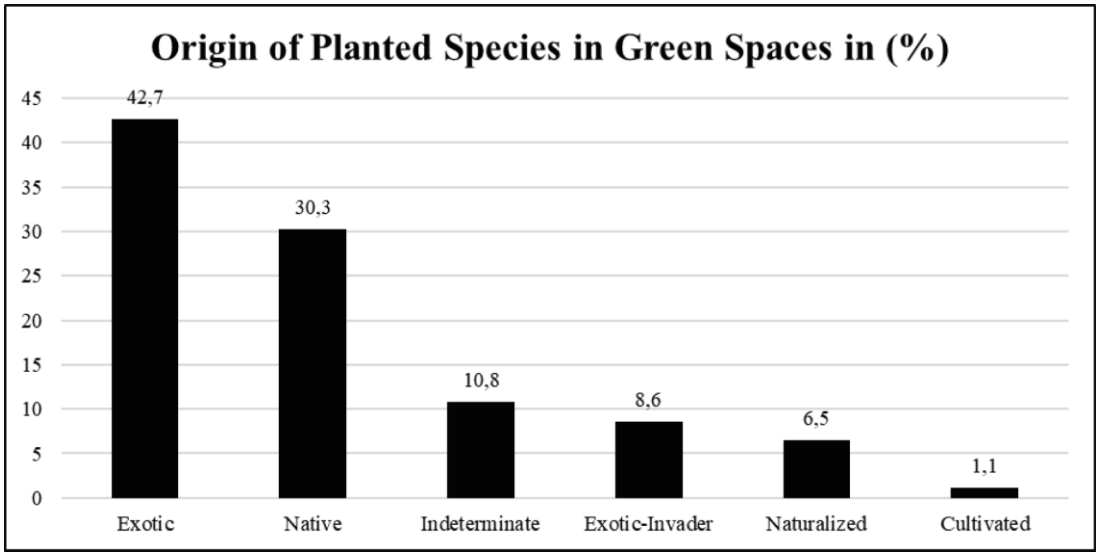
Figure 7 – Rate in percentage of found families in the afforestation of green spaces in Véu das Noivas neighborhood, Poços de Caldas/MG



Source: the own authors

In the green spaces, it was observed a higher rate of exotic species (42,7%) if compared to the natives (30,3%), existing, moreover, 8,7% of trees of an exotic-invader origin (represented by the *Leucaena leucocephala* and *Pittosporum undulatum* species) (Figure 8). This found one is in agreement with Freitas et al. (2015).

Figure 8 – Origin of the planted trees in green spaces in Véu das Noivas neighborhood, Poços de Caldas/MG

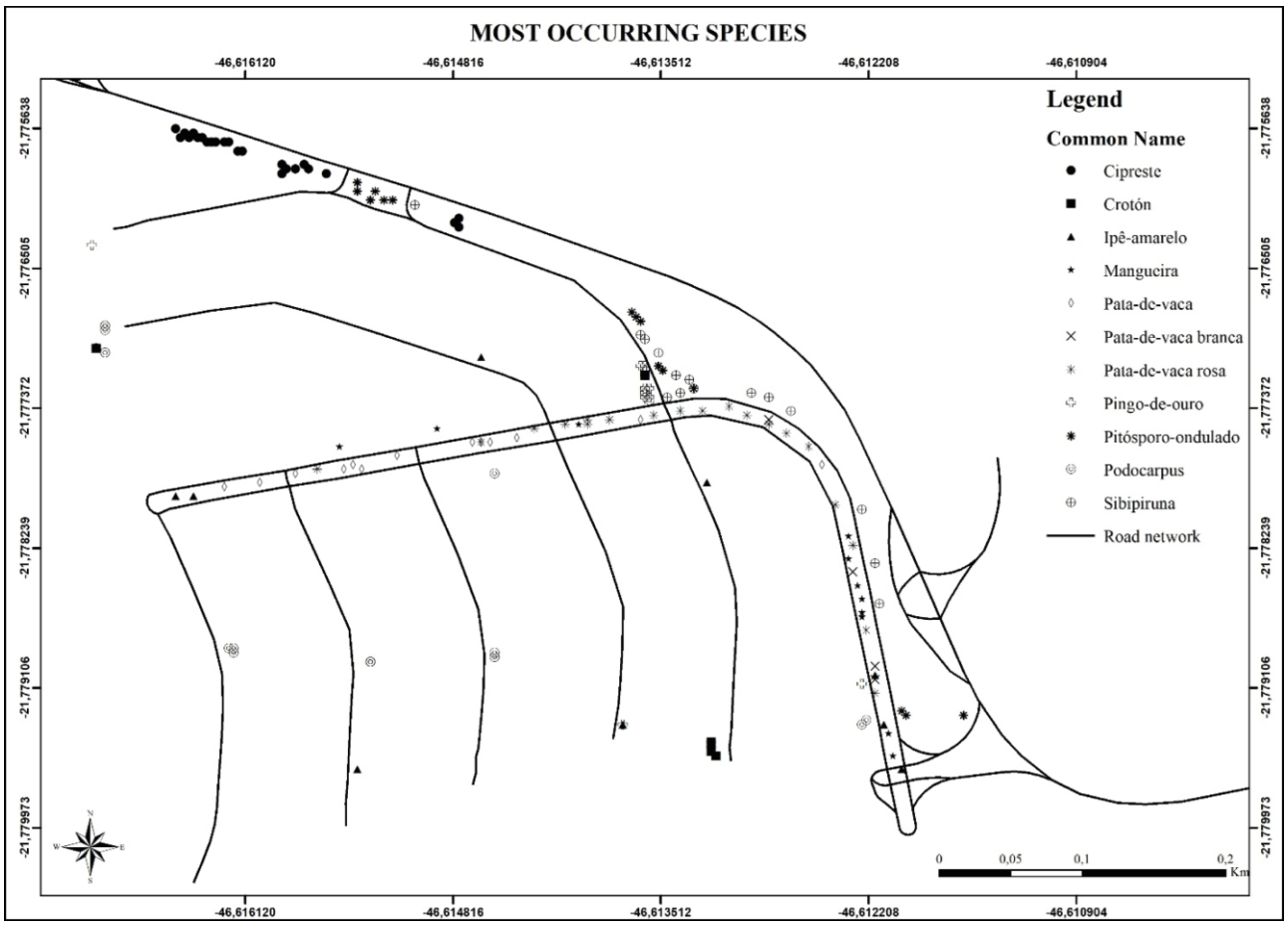


Source: the own authors

3.4 Mapping

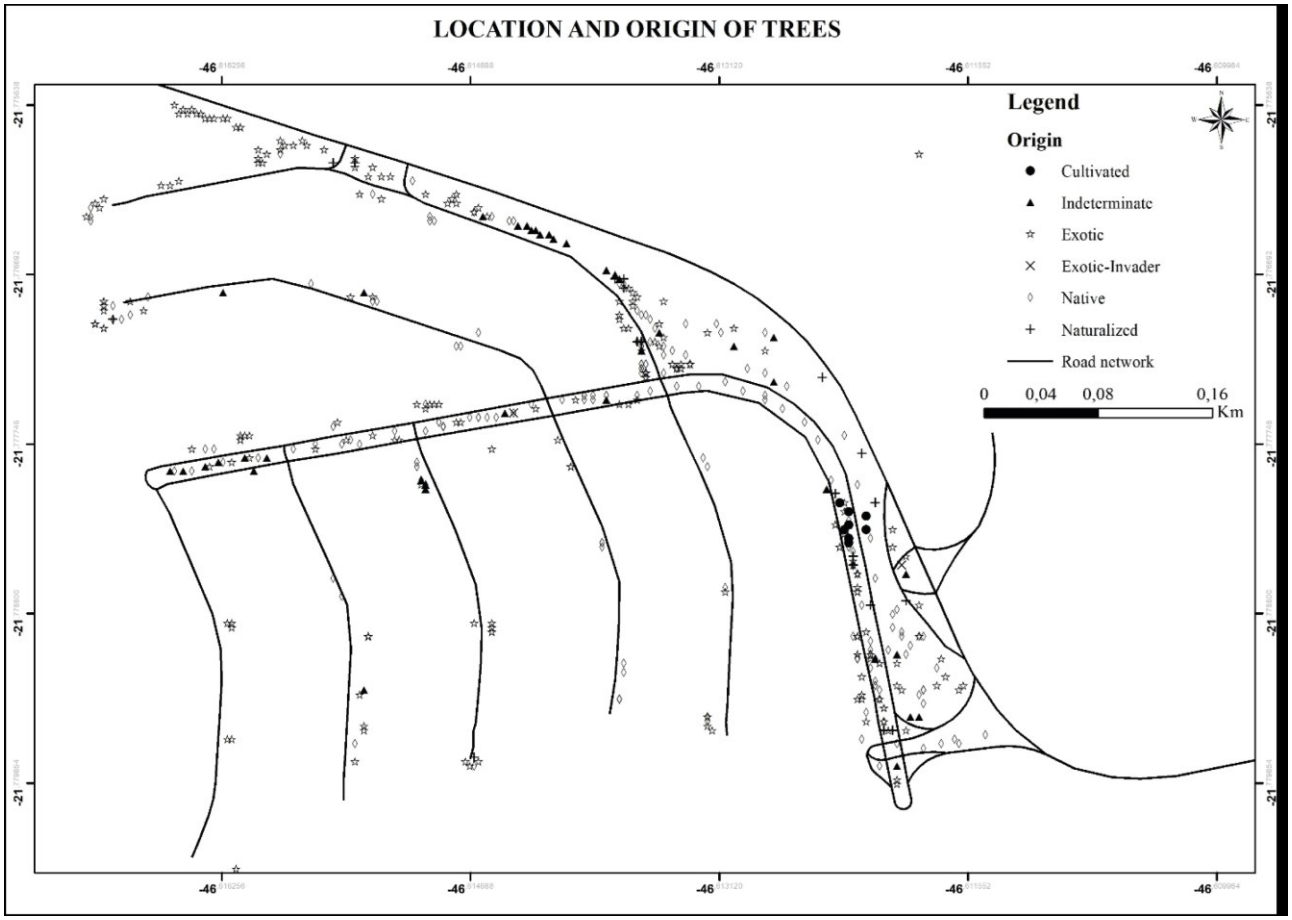
Geotechnology tools are able to enhance the management of green areas and land use and occupation (SAITO et al., 2016), causing improvements in the maintenance and monitoring of these trees and a consequent reduction in public expenses. In this way, according to the gathered coordinates, necessary data was gathered to create maps by geoprocessing softwares, such as *ArcGis* ® (Figures 9 and 10).

Figure 9 – Most occuring species present in Véu das Noivas neighborhood, Poços de Caldas/MG



Source: the own authors.

Figure 10 – Location and origin of trees present in Véu das Noivas neighborhood, Poços de Caldas/MG



Source: the own authors.

Through the Tableed maps visualizations, it was verified the rate of afforestation in the studied neighborhood, being also observed an increase of trees located in the central flowerbed of João Ferrari Avenue and in a green space located at the entrance of the neighborhood. There were found, still, trees in the same location, what contributed for the coordinates to be gathered and, consequently with it, to cause a distortion of the visualization of these spots in the Tableed maps, once there's an overlap.

4 CONCLUSION

Through the gathering of data, it was possible to verify the prevalence of exotic species if compared to the native ones. It generates a serious problem due to the lack of cultural identification with population and it's local environment, just like the loss of the biodiversity of the urban environment. It's expected with it that our project may contribute for providing information about the adequate usage of species and contribute to a more efficient planning of the urban afforestation of Poços de Caldas/MG.

It's suggested that the gathered data are properly cataloged and disponible for the population, in order to contribute for the education and environmental awareness about the benefits of the proper urban afforestation. Generate a database of the trees of the city may contribute to the construction of a better and efficient city management.

ACKNOWLEDGMENT

To the Foundation of Support for Researching of Minas Gerais – FAPEMIG, for the concession of the scholarship of scientific research to the first author.

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