COST FP1204 GreenInUrbs
GREEN INFRASTRUCTURE
Nature based solutions for sustainable and resilient cities
ORVIETO, ITALY 4-7 April 2017

Between tree lovers and tree haters

drivers of public perception regarding street trees and its implications on green infrastructure planning

Cláudia Oliveira Fernandes, Isabel Martinho da Silva, Leonardo Costa, Isabel Lufinha, Catarina Teixeira

U.PORTO FACULDADE DE CIÊNCIAS UNIVERSIDADE DO PORTO
CIBIO Research Center in Biodiversity and Genetic Resources
CATÓLICA UNIVERSIDADE CATÓLICA PORTUGUESA | PORTO
Porto. Câmara Municipal

Eucalyptus globulus in a wood at the city park

Pinus pinaster in a wood at the Pasteleira park

Araucaria heterophyla and *Phoenix canariensis* in Passeio Alegre garden

Platanus x acerifolia in Dr. Sousa Rosa street

TREES IN THE CITY OF PORTO

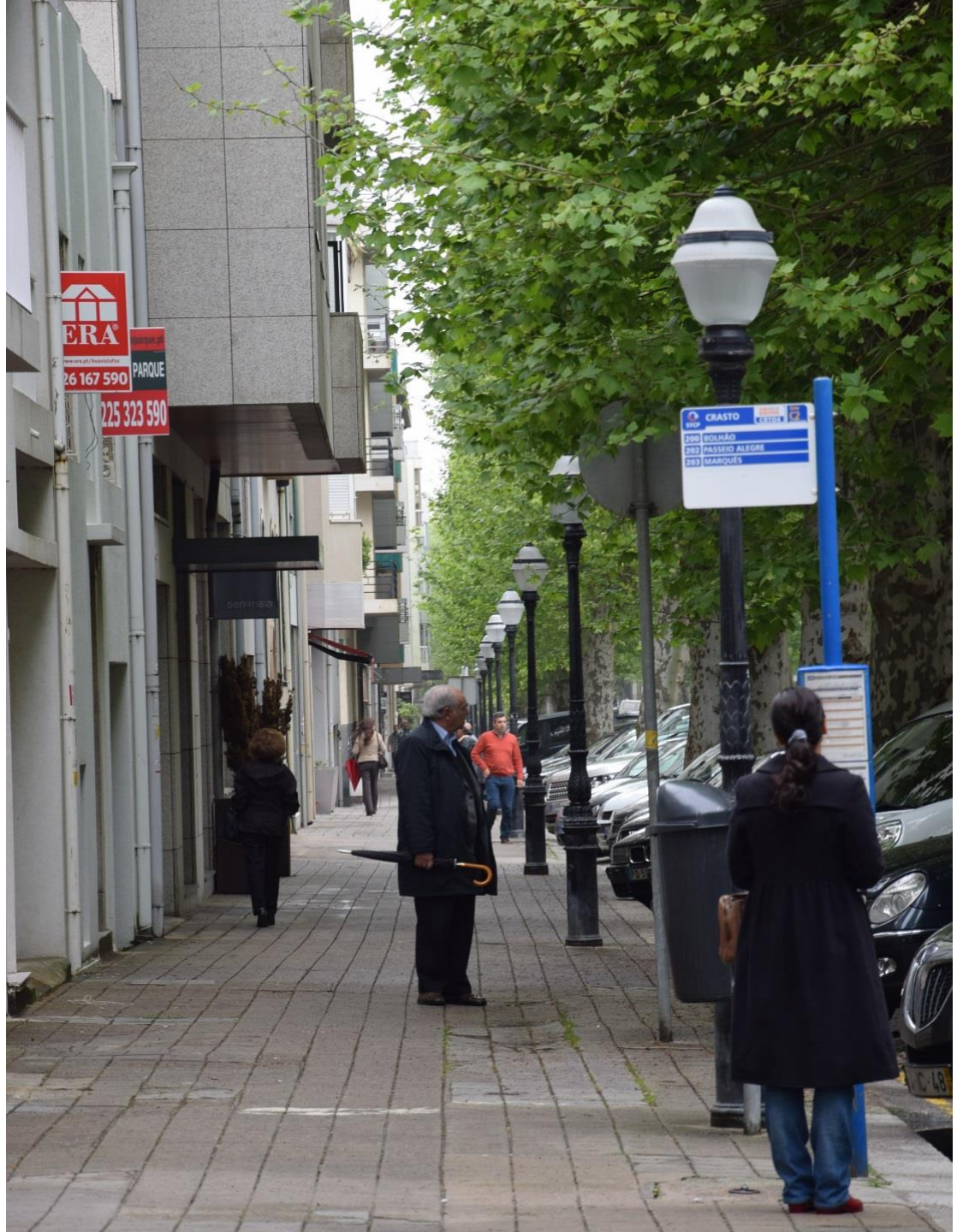
- 33 290 trees

- 238 species:
  192 broadleaf and 46 coniferous,
  129 deciduous and 109 perennial

- 30% of the trees belong to just 5 species:

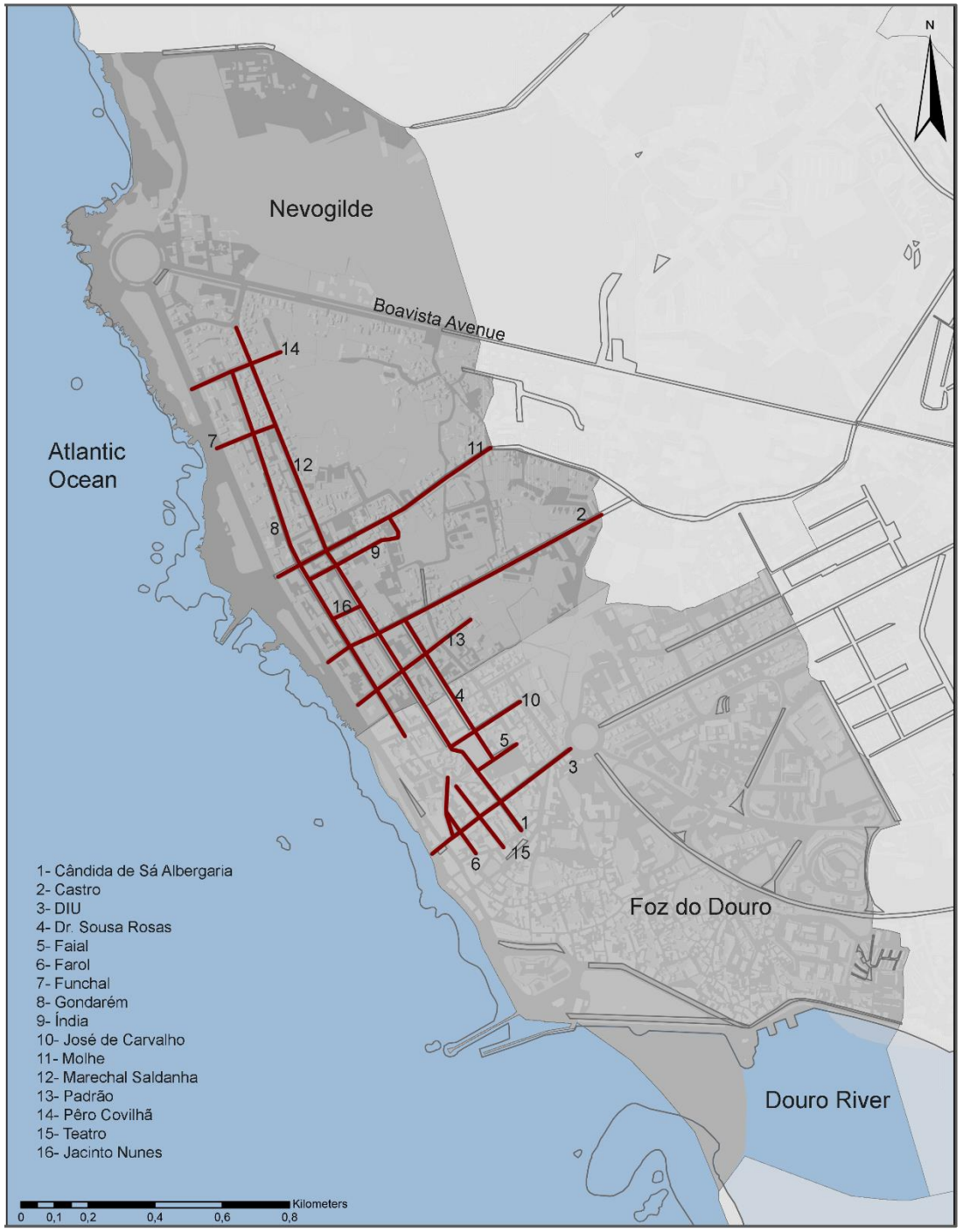
  Platanus x acerifolia (Plane tree),
  Acer negundo (Box elder),
  Celtis australis (Mediterranean hackberry),
  Populus nigra (Black poplar)
  Camellia japonica (Camellia)

- 151 Km of tree-lined streets in Porto.


ERA
26 167 590
PARQUE
225 323 590
CRASTO
200 BOLHÃO
202 PASSEIO ALEGRE
203 MARQUÊS


Atlantic Ocean
AMP
Spain
Portugal
Kilometers
0 25 50 100 150 200


Ave River
Este River
Porto
Douro River
Atlantic Ocean
Kilometers
0 2,5 5 10 15 20


N
Nevogilde
Boavista Avenue
Atlantic Ocean
Foz do Douro
Douro River
1- Cândida de Sá Albergaria
2- Castro
3- DIU
4- Dr. Sousa Rosas
5- Faial
6- Farol
7- Funchal
8- Gondarém
9- Índia
10- José de Carvalho
11- Molhe
12- Marechal Saldanha
13- Padrão
14- Pêro Covilhã
15- Teatro
16- Jacinto Nunes
Kilometers
0 0,1 0,2 0,4 0,6 0,8

STUDY AREA


PORTO — II — PRAIA DA FOZ DO DOURO.
ED.P.C.

Source: https://www.bing.com/maps/

SOME QUESTIONS

What **TREES** are these?

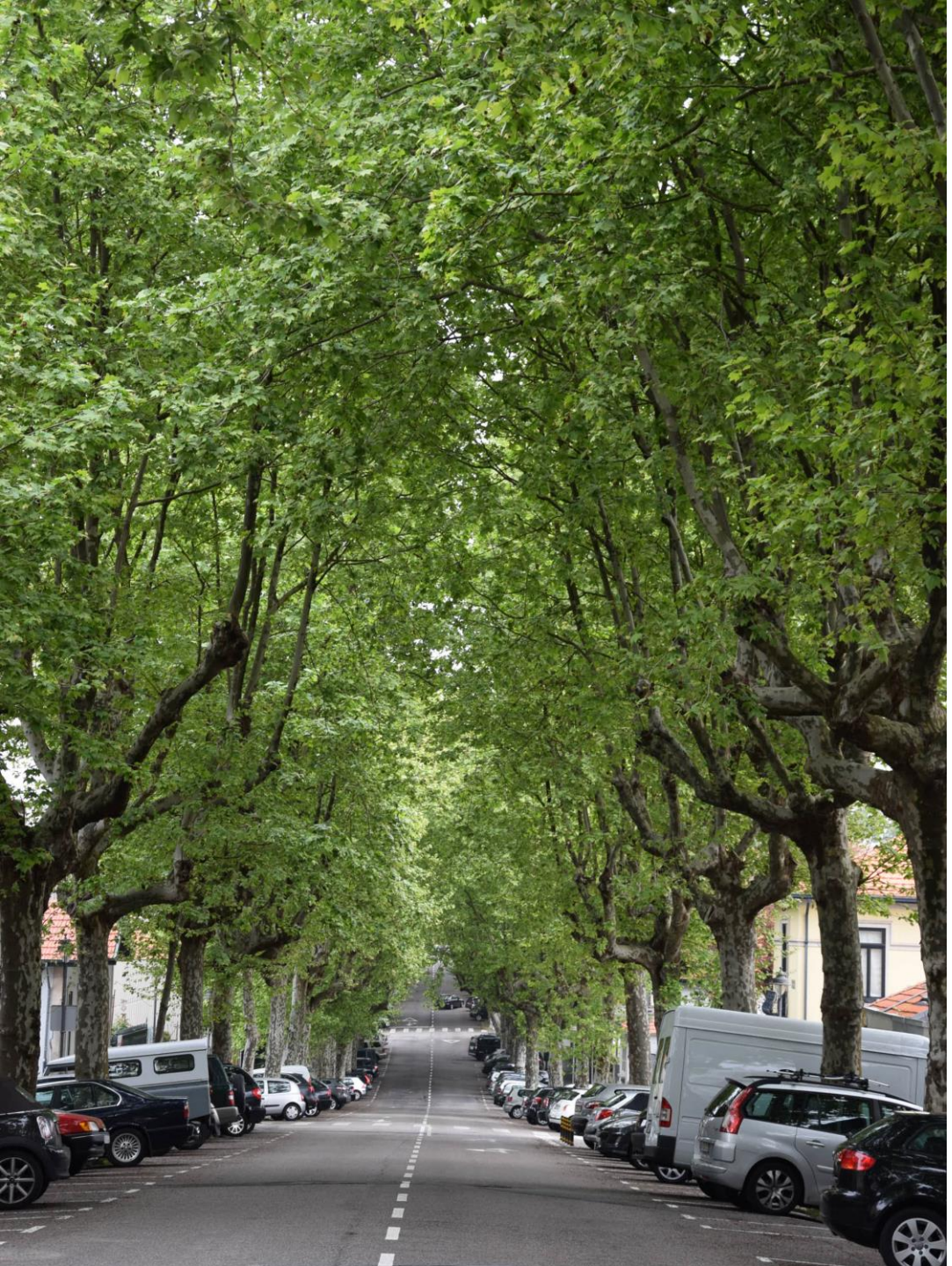
- From what species?
- How were they planted?
- What is their health condition?

What **STREETS** are these?

- Are they large or narrow ?
- How is the traffic?
- What is the dominant housing type?

What **PEOPLE** think about street trees?

- Do people like trees and street trees?
- What are the main positive and negative characteristics of the trees perceived by the population?
- Do people think that the trees of the study area should be adjusted to the new urban fabric? How?



METHODS

1. Field survey:

    a) for street characterization,

    b) for tree inventory and diagnosis

2. Questionaires to evaluate public attitudes, perceptions and motivations regarding street trees

3. Data analysis: descriptive statistics and probabilistic model

RESULTS | Field survey syntesis_ Streets and Street Trees Assessment

Street code	Nº of street trees /Km2	Dominant species				CD/DBH	% of trees in conflict	Type of plantation				Dominant housing type		Traffic intensity			Traffic direction	
		Platanus x acerifolia	*Celtis australis*	*Populus nigra*	*Acer negundo*			Single row	Tree Alley	With tree pit	Without tree pit	Single house	Multistory	High	Moderate	Low	1	2
CSA	8				x	22,1	14,3	x		x		x			x		x	
C	10	x				16,9	10,3		x		x	x			x			x
D	9		x			20,5	33,9		x	x		x		x				x
JN	7	x				17,1	40,0	x					x			x	x	
SR	11	x				16,3	25,6		x		x	x			x		x	
FR	9		x			23,3	48,3		x	x		x			x		x	
G	5	x				17,9	63,1		x		x		x	x			x	
I	4	x				18,8	40,0	x		x		x				x	x	
JC	15		x			21,5	50,0		x	x		x				x	x	
M	7			x		16,6	19,2		x		x	x		x				x
MS	8	x				22,9	14,6		x	x			x	x			x	
T	10		x			24,8	44,1		x	x		x			x		x	
FL	21	x				22,2	25,0		x	x		x			x		x	

Crasto Street – *Populus nigra & Platanus x acerifolia*

C. S. Albergaria Street – *Acer negundo (Box Elder)*

Diu Street – *Celtis australis*

Gondarém Street – *Platanus x acerifolia*



RESULTS | Questionnaires

- A very simple and short questionnaire was prepared in order to maximize the willingness to respond

- Questionnaires were mainly done in the streets but some respondents were also inquired in shopping facilities and houses located in the surveyed streets.

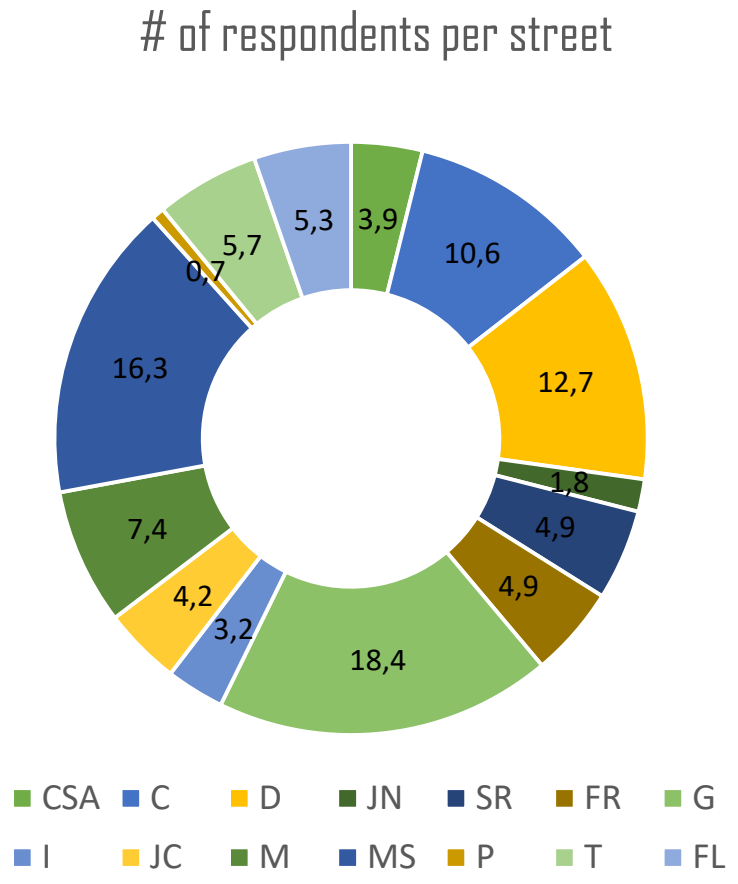
- The questionaire has two groups of questions:

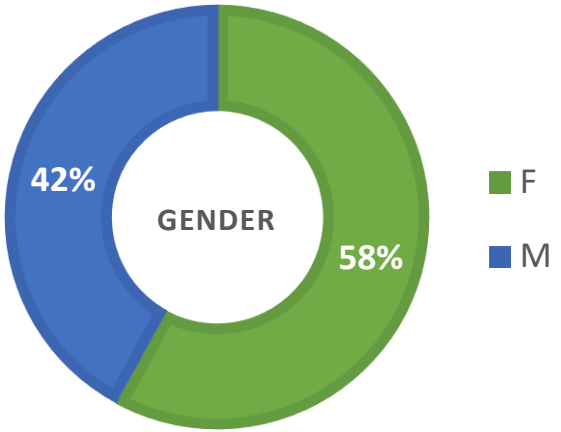
    Group I concerning the general attitudes regarding trees;

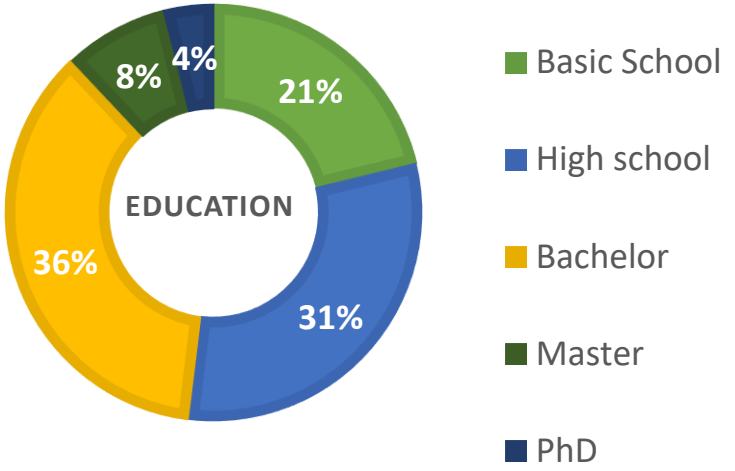
    Group II concerning the perception of the street trees of the study area;

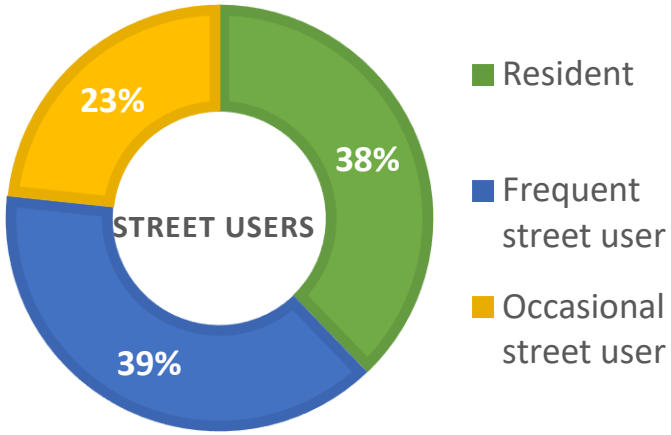
RESULTS | Descriptive statistics

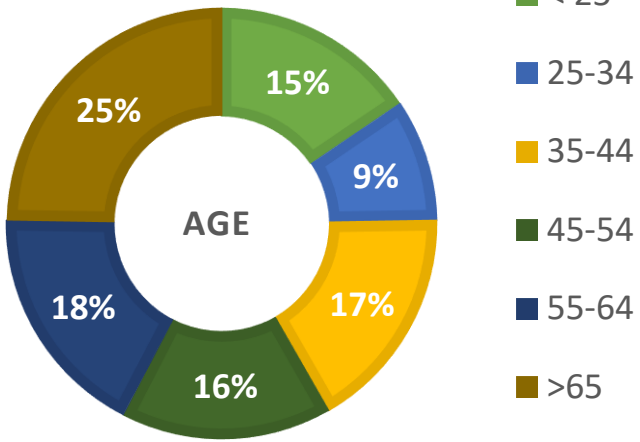
283 respondents





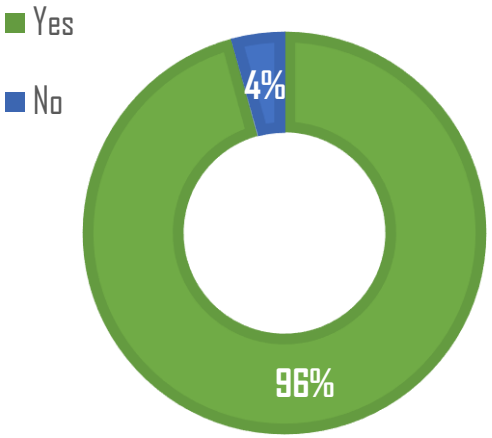


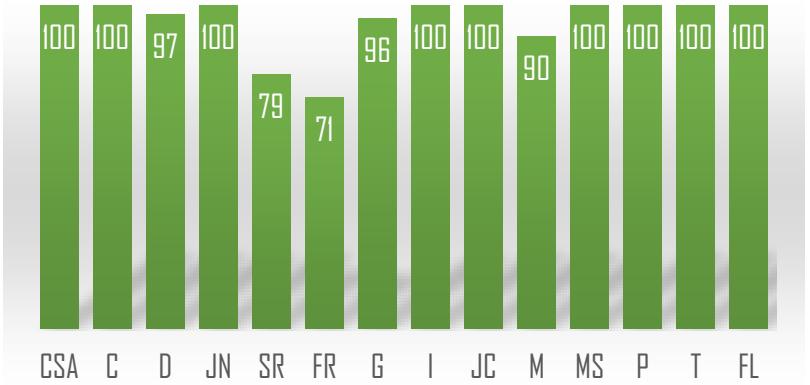




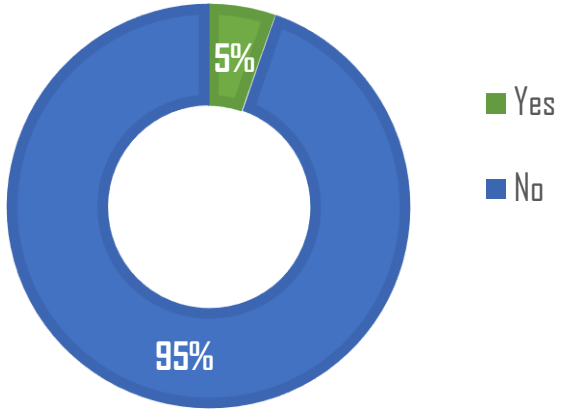
RESULTS | Descriptive statistics

Do you like trees?

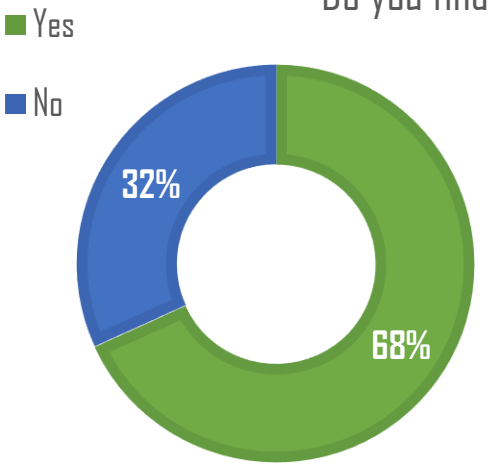


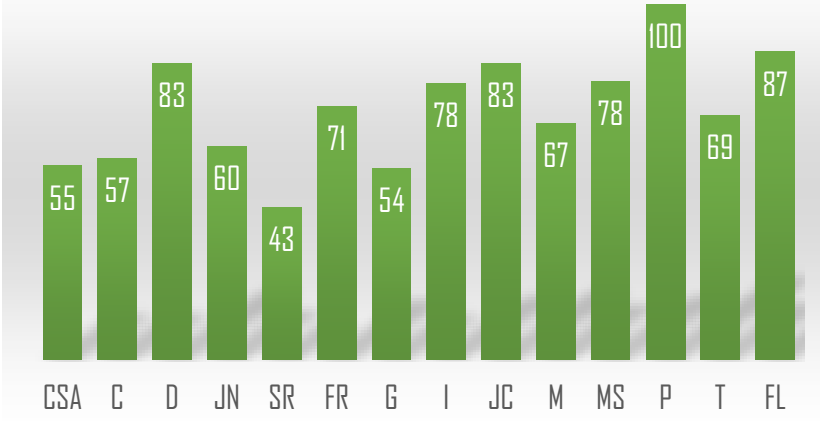


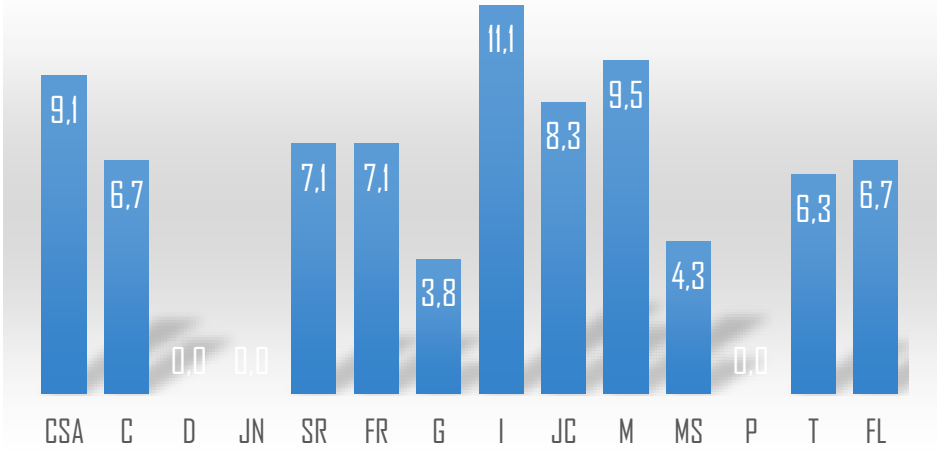
Have you ever made a complaint?



Do you find the trees of this street well planted?







RESULTS | Probabilistic model

Logistic model: to relate the characteristics of the respondents (x) and the street (s) where the questionaire took place to the answers (y)

Dependent variables (y): general attitudes regarding trees (Y1), motivations for loving trees (Y2b to Y5b), motivations for hating trees (Y6b to Y10b), perception regarding the street trees of the study area (Y12), claims about street trees (Y13).

Odds ratio (level of significance 1%***, 5%**, 10%*)

	Y1	Y2b	Y3b	Y4b	Y5b	Y6b	Y7b	Y8b	Y9b	Y10b	Y12	Y13
x1			3,253335**								0,4854532**	
x2			4,723235**			0,3684583**		0,2432059**		0,1770165**		
x3												0,2269507**
x4								1,331943**	1,345351**	1,422387*		1,477241*
x5						0,6316494**		0,5604976***	0,560460**	0,6057181*		2,046291**
S1									9,032194**			11,95173*
S2		0,1738053*							5,45248**	12,51976***		
S3				0,0801686**							4,706104***	
S4					0,0815463*							
S5						4,514719*	5,366537**		8,303615**			
S6										6,405092*		
S7												16,97135*
S8						5,616285**				6,54599*	4,698116*	14,13677*
S9	0,0803717**			0,0832838*					5,259986*			11,50496*
S10				0,1019494*		3,387558**			7,888389***		3,674382***	
S11												23,63068**
S12											6,443708**	
Log likelihood	-20,68081	-39,534001	-75,389797	-40,867031	-35,404822	-118,44982	-90,022186	-107,82129	-88,836337	-54,756104	-160,31051	-45,186994
Number of obs	283	283	283	283	283	283	283	283	283	283	283	283
LR chi2(8)	8,91	13,94	13,56	11,28	8,97	30,09	11,31	38,84	38	35,03	33,34	21,1
Prob > chi2	0,2592	0,3041	0,483	0,3362	0,6247	0,0175	0,7302	0,003	0,0009	0,0062	0,0102	0,0991
Pseudo R2	0,1772	0,1499	0,0825	0,1213	0,1124	0,1127	0,0591	0,1526	0,1762	0,2423	0,0942	0,1893

RESULTS | Probabilistic model _ The likelihood of ...

general attitudes regarding trees (Y1)

... liking trees decreases in the Molhe Street. This street is planted with *Populus nigra*, which might be the reason for this result, as the population usually reacts very negatively to the cotton produced by this species.

motivations for loving trees (Y2b to Y5b)

... liking tree shade decreases in Crasto Street. This street is one of the narrower streets in the study area, as it was an ancient rural road. The size of the alley of *Platanus x acerifolia* together with the street size are the possible cause behind this result.

... liking tree variations throughout the year increases for residents, as they are closer witnesses of this variation.

... agreeing that trees contribute to wellbeing decreases in Molhe Street as the cotton of black poplar is perceived as source of allergies decreasing wellbeing.

... agreeing that trees are important to city environment decreases in JN street. The lower education of this street respondents might be at the basis of this result.

RESULTS | Probabilistic model _ The likelihood of …

motivations for hating trees (Y6b to Y10b)

… agreeing that trees are big decreases for occasional users (less aware of tree dimension) and respondents with higher education (more aware of tree services) and increases in JN, JC and MS streets (Plane trees and Mediterranean hackberry (*Celtis australis*) alley; high tree density.

… agreeing that trees are dangerous increases with age, as perception of danger increases with age and decreases for occasional users (less concerned with tree danger) and respondents with higher education (more aware of tree services).

… agreeing that trees damage houses increases with age, as perception of danger increases with age, and decreases with higher education (give more importance to services than to disservices).

… agreeing that trees should only be planted in parks and gardens increases with age and decreases for occasional users and respondents with higher education.

RESULTS | Probabilistic model _ The likelihood of ...

perception regarding the street trees of the study area (Y12)

... agreeing that street trees are well planted decreases for residents and increases in Diu, JC, MS, FL streets.

In all these streets trees are planted in a tree pit and organized in na alley.

claims about street trees (Y13)

... complaining about street trees decreases for women respondents and increases with age, in correspondence with their perception of excessive size, danger and damage to houses.

RESULTS | Probabilistic model _ main findings

Cottonwood is unwanted as a street tree due to the cotton it produces, perceived as a source of health problems (allergies).
Plane trees are disliked for their large dimensions.

The higher the education of respondents, the higher the perception of street tree services and the love for trees. The opposite is also true.
Occasional users reveal some indifference regarding the benefits of street trees.

Older respondents tend to dislike the larger trees, as they perceived them as a threat to themselves and their houses, and a source of increased house maintenance problems.

Street characteristics seem to be main drivers of public liking of street trees.
Respondent characteristics seem to be main drivers of public desliking of street trees.

FINAL REMARKS_ planning and design of green infrastructure

These results demanded for a character preservation - **streets with trees**

Any intervention should aim at **increasing diversity** and mitigating existing and predictable conflicts.

A strong focus should be putted in environmental education and participatory methods

THANK YOU FOR YOUR ATTENTION