Quick and dirty: The sustainable urban tree

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Photo: Hartmut Balder, Beuth Hochschule Berlin

The sustainable urban tree/forest

***The Sustainable Urban Forest** includes everything needed to assure that the entire forest system achieves and maintains a healthy overall extent and structure sufficient to provide the desired benefits, or ecosystem services, over time.*

USDA Forest Service (2016): The sustainable urban forest

Provisioning	Regulating	Supporting	Cultural
Food	Climate mitigation	Soil formation	Social cohesion
Wood	Carbon storage and sequestration	Biodiversity / habitats for species	Visual amenity
	Pollution mitigation (air and water)	Oxygen production	Recreation, mental and physical health
	Flood and water protection		Landscape and sense of place
	Soil protection		Education

Rogers et al. (2015): Valuing Lodon's Urban Forest – Results of the London iTree Eco Project


reflected radiation
(10% of visible +
50% of solar infrared)
incoming solar radiation
(visible + solar infrared)
transmitted radiation
(10% of visible +
30% of solar infrared)
Brown & Gillespie 1995

- We take water from roofs and pavements through inlets to the ventilated bearing layer and the structural soil.

If the percolation layer is full, the storm water flows into the old street inlet.

Examples courtesy of Johan Östberg, SLU

London's Urban Forest – Key Statistics				Total
Number of Trees	Inner London	1,587,000		8,421,000
	Outer London	6,834,000		
Tree Cover	Inner London	13%		14%
	Outer London	14%		
Canopy Cover	Inner London	18%		21%
	Outer London	21%		
Most Common Species	Inner London	Birch, Lime, Apple		
	Outer London	Sycamore, Oak, Hawthorn		
Pollution Removal (per annum)	Inner London	561 tonnes	£58 million	£126.1 Million
	Outer London	1680 tonnes	£68.1 million	
Stormwater Alleviation (per annum)	Inner London	705,000m³	**£568,935**	**£2.8 Million**
	Outer London	2,709,000m³	**£2.2 million**	
Carbon Storage (whole value)	Inner London	499,000 tonnes	£30.9 million	£146.9 Million
	Outer London	1,868,000 tonnes	£116 million	
Carbon Sequestration (per annum)	Inner London	15,900 tonnes	£987,000	£4.79 Million
	Outer London	61,300 tonnes	£3.8 million	
Building Energy Savings (per annum)	Inner London	£223,000		£260,600.00
	Outer London	£37,600		
Building Avoided Carbon Emissions (per annum)	Inner London	£23,600		£54,600
	Outer London	£31,000		
Replacement Cost (whole value)	Inner London	£1.35 Billion		£6.12 Billion
	Outer London	£4.77 Billion		
Amenity Value (CAVAT) (whole value)	Inner London	£17.6 Billion		£43.3 Billion
	Outer London	£25.7 Billion		
TOTAL ANNUAL BENEFITS	Inner London	£59.54 Million		£132.7 Million
	Outer London	£73.16 Million		

Rogers et al. (2015): Valuing Lodon's Urban Forest – Results of the London iTree Eco Project

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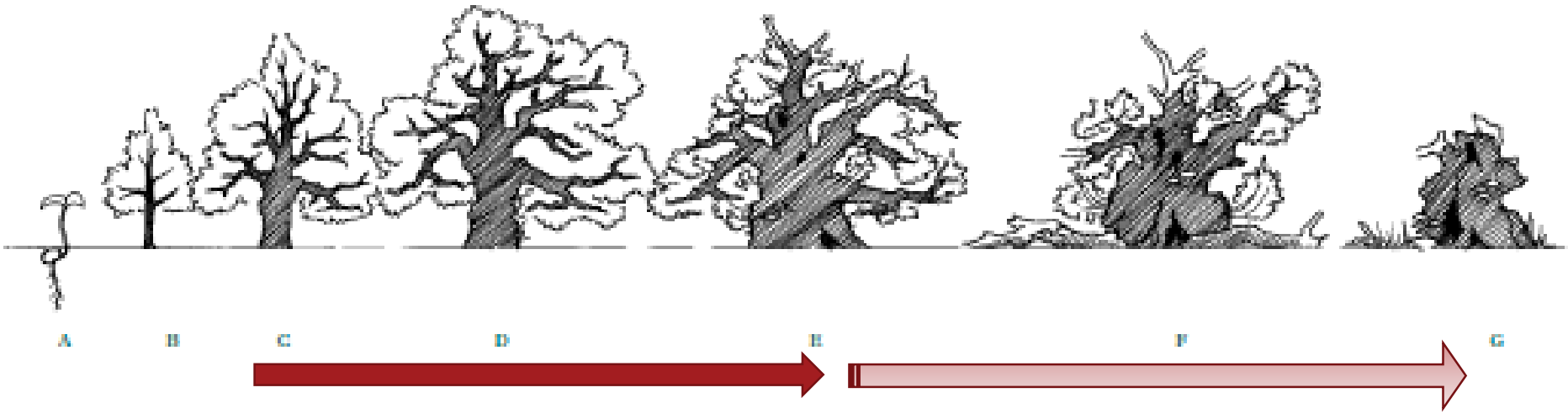
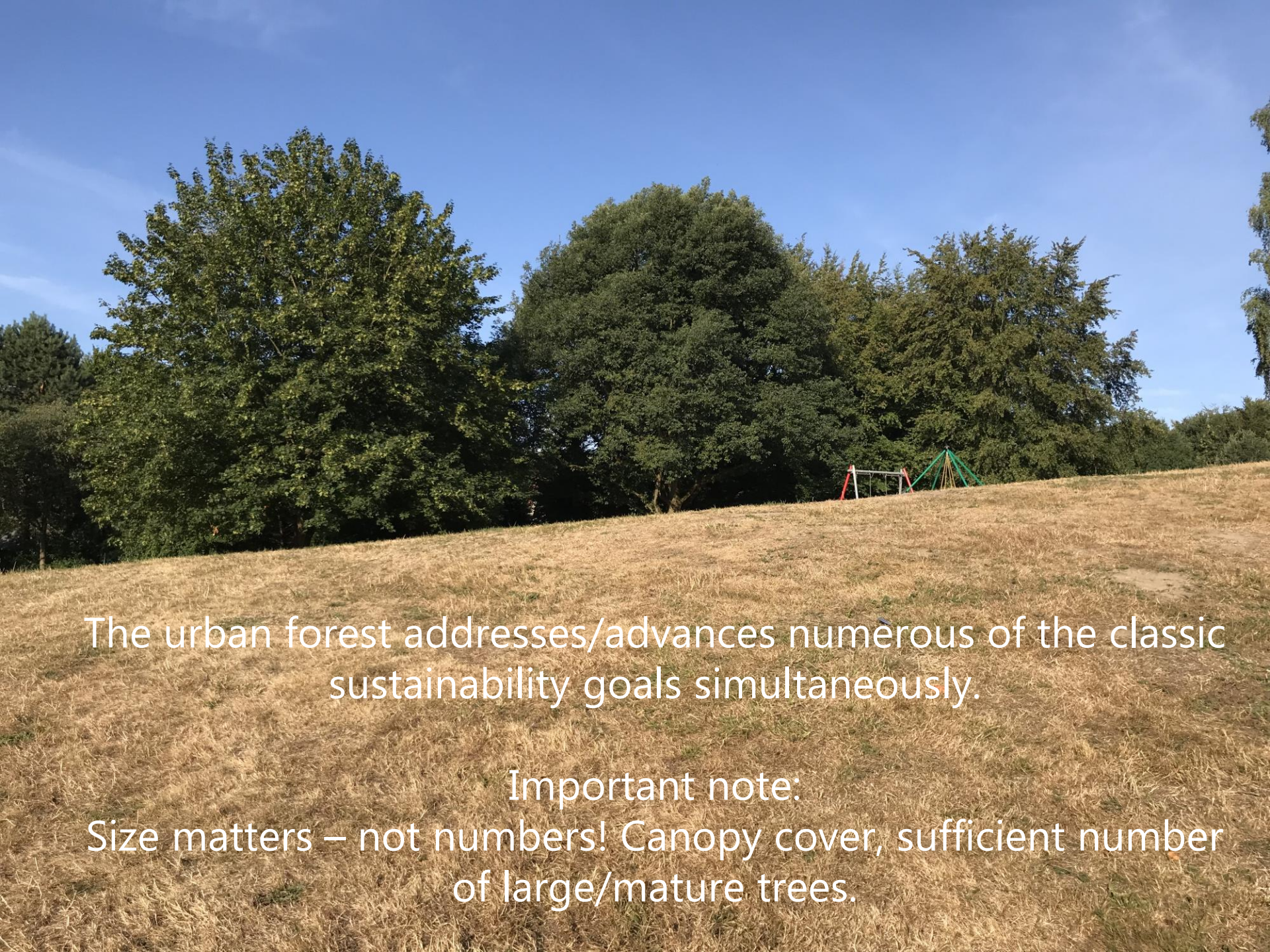


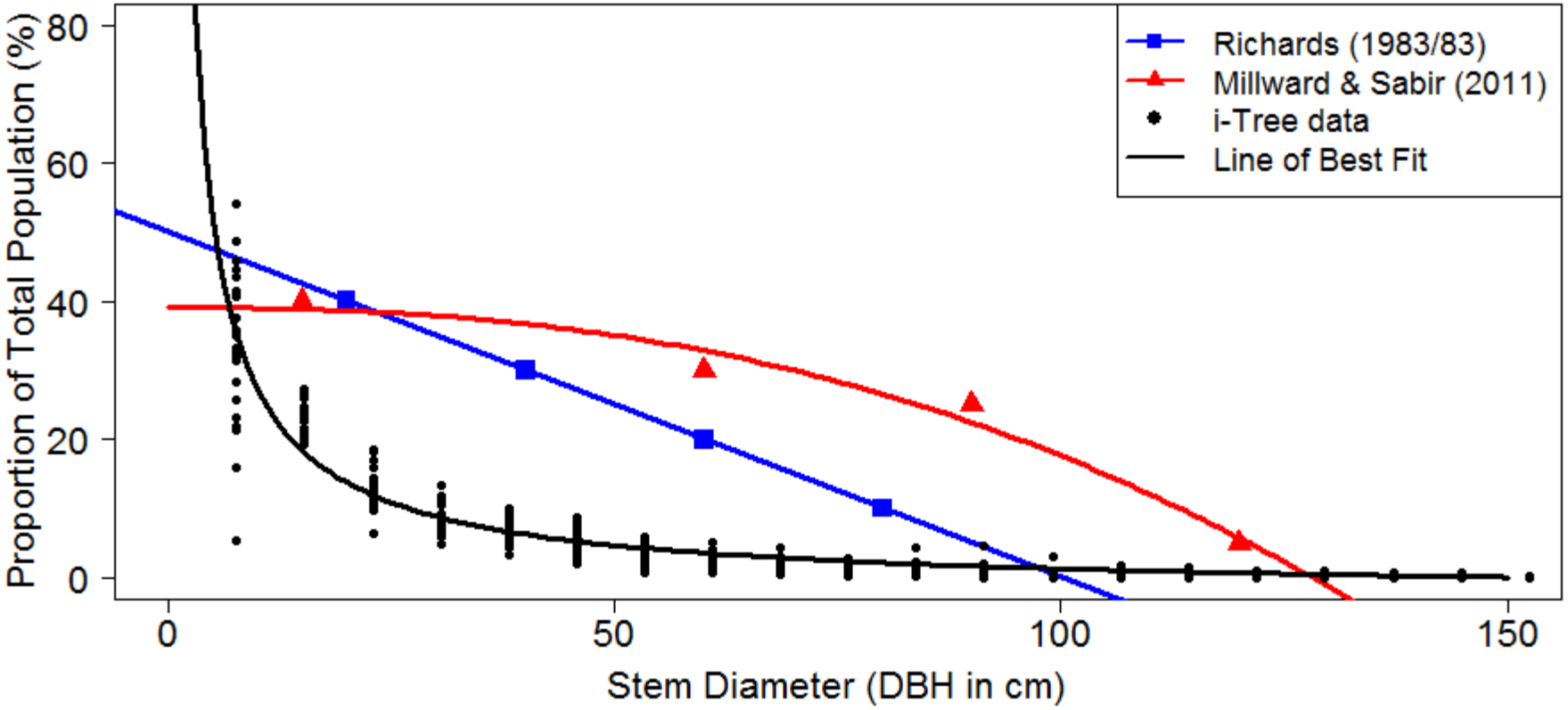

-25%
GW 57 944



The urban forest addresses/advances numerous of the classic sustainability goals simultaneously.

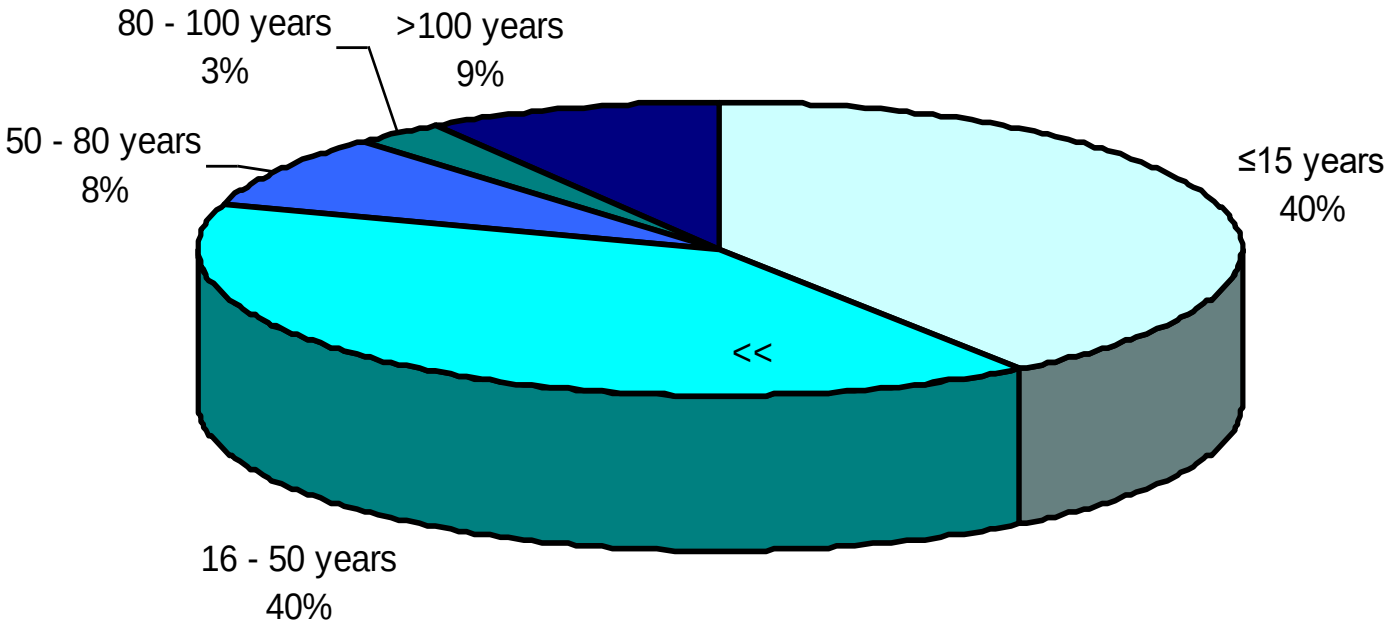
Important note:
Size matters – not numbers! Canopy cover, sufficient number of large/mature trees.

Age structure: Diameter Class Distributions



Courtesy of Justin Morgenroth, Univ. of Canterbury

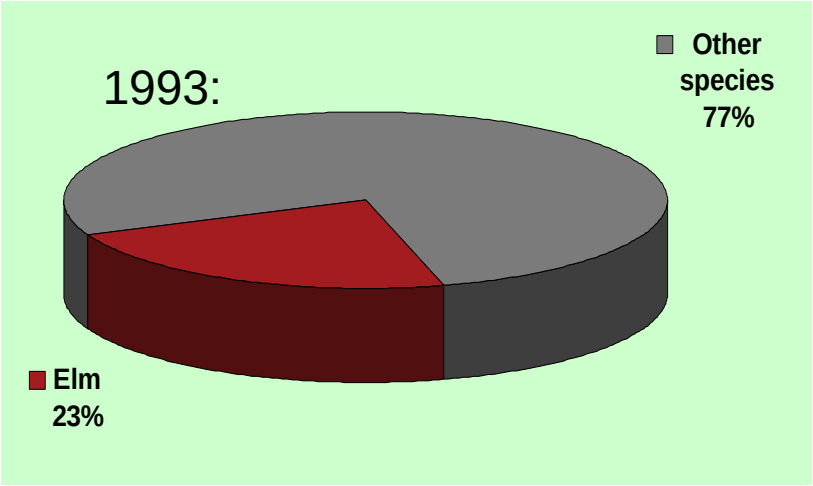
Age structure: Road side trees, Copenhagen

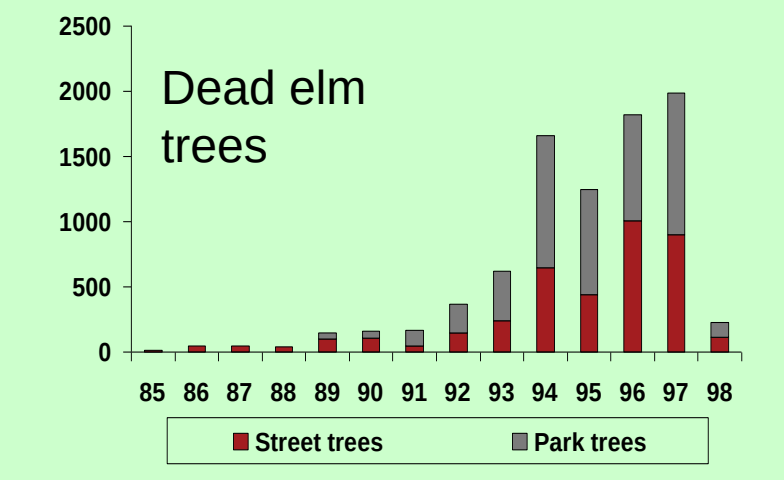



ROCKWOOL

Heavy impact of Dutch Elm Disease in the 80'ies and 90'ies

- Elm was the backbone of street tree plantations
- Over 4000 elm street trees were removed during the 80ies and 90ies, ≈25 % of total street tree population
- Old and large trees left distinctive gaps





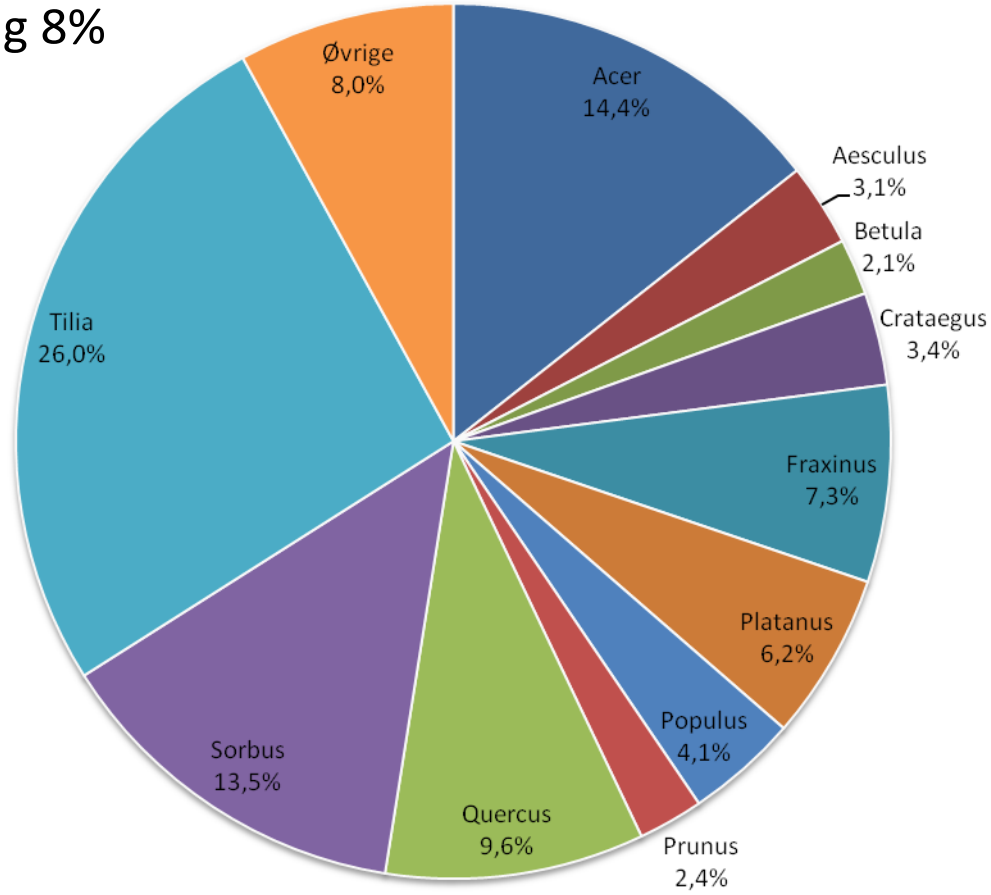
Santamour (1990)

- "10-20-30" formular
- Max 10 % of the same species
- Max 20 % of the same genus
- Max 30 % of the same family

Courtesy of: Bytrædiversiteten i danske kommuner
v. Landskabsarkitekt Pernille Thomsen

Diversity of road side trees – a Denmark study

- 50 genera in total
- 11 genera represent 92% of the total number of urban trees (street trees)
- 39 genera represent remaining 8%



Bytrædiversiteten i danske kommuner
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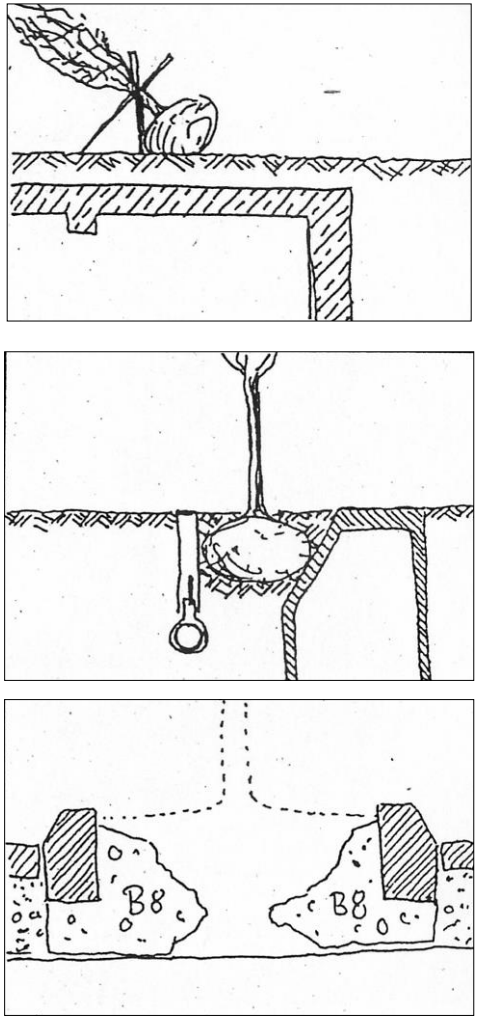
Essentials: The root zone in the built environment

Below ground structures…

…infrastructure…

…and supporting concrete.



Courtesy of: Hartmut Balder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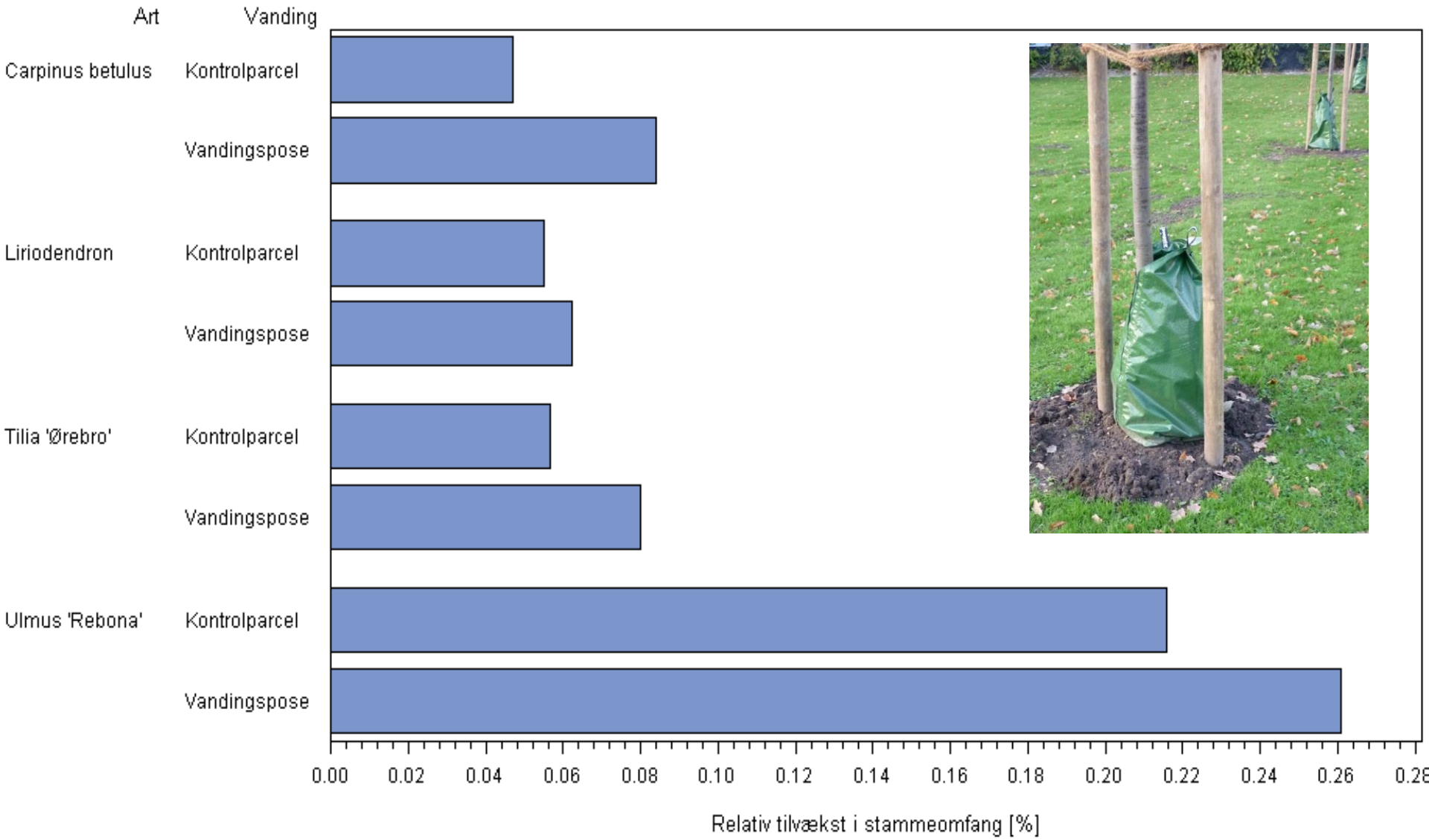
MAN-FREDAG
9-20
LØRDAG
8-17

Essentials: Irrigation during the etsbalishment period



Essentials: Pruning of roadside trees

How to: The four lanes of creating a sustainable urban forest (draft)

Political level

- Consensus, acceptance & money

Planning level

- Suitable locations (space / infrastructure conflicts), species …

Technical level – project planning / technical design

- Soil quality and volume, drainage etc.

Cultivating level (during/after planting)

- Systematic irrigation, pruning, weed control etc.

Thank you for your attention!