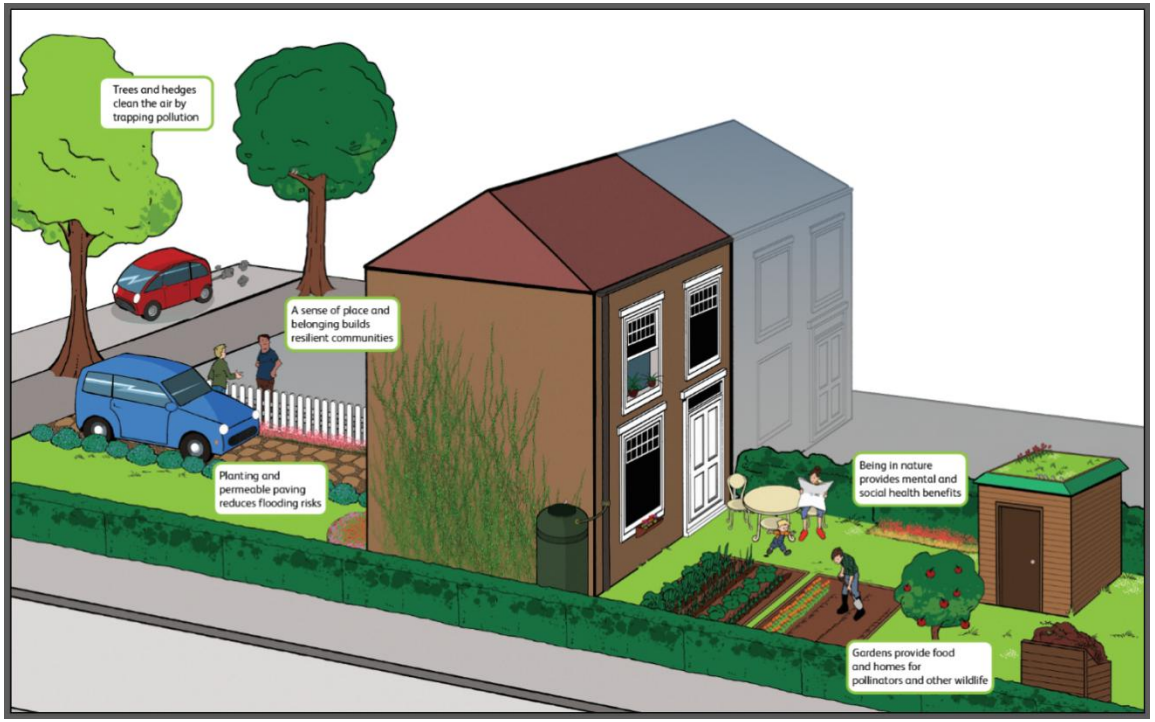
Royal Horticultural Society

Sharing the best in Gardening

Environmental benefits of urban vegetation



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Vegetation can help with urban and CC challenges…

.. but the **extent of cover ,**

choice of species* and management are important!!

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ANNALS OF BOTANY

Green infrastructure and ecosystem services – is the devil in the detail?

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• **Background** Green infrastructure is a strategic network of green spaces designed to deliver ecosystem services to human communities. Green infrastructure is a convenient concept for urban policy makers, but the term is used too generically and with limited understanding of the relative values or benefits of different types of green space and how these complement one another. At a finer scale/more practical level, little consideration is given to the composition of the plant communities, yet this is what ultimately defines the extent of service provision. This paper calls for greater attention to be paid to urban plantings with respect to ecosystem service delivery and for plant science to engage more fully in identifying those plants that promote various services.

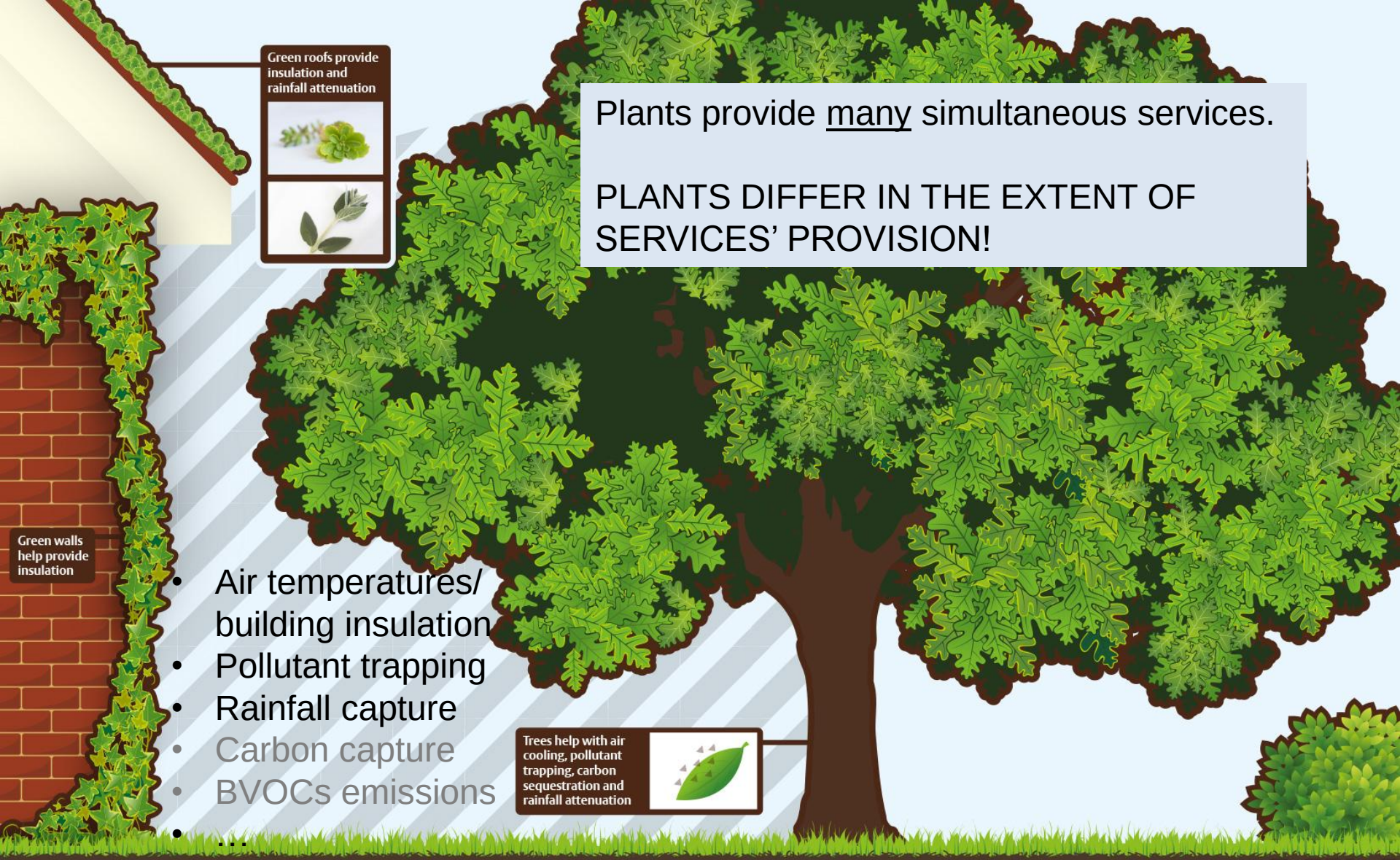
• **Scope** Many urban plantings are designed based on aesthetics alone, with limited thought on how plant choice/composition provides other ecosystem services. Research is beginning to demonstrate, however, that landscape plants provide a range of important services, such as helping mitigate floods and alleviating heat islands, but that not all species are equally effective. The paper reviews a number of important services and demonstrates how genotype choice radically affects service delivery.

• **Conclusions** Although research is in its infancy, data are being generated that relate plant traits to specific services, thereby helping identify genotypes that optimize service delivery. The urban environment, however, will become exceedingly bland if future planting is simply restricted to monocultures of a few 'functional' genotypes. Therefore, further information is required on how to design plant communities where the plants identified (1) provide more than a single benefit (multifunctionality), (B) complement each other in maximizing the range of benefits that can be delivered in one location, and (3) continue to maintain public acceptance through diversity. The identification/development of functional landscape plants is an exciting and potentially high-impact arena for plant science.

• **Key words:** Alien plants, biodiversity, building energy efficiency, carbon sequestration, ecosystem services, green infrastructure, human health and well-being, policy, pollution, storm-water management, temperature regulation, urban.

*** habit, colour, physiological activity, longevity, etc ...**

Cameron and Blanusa, 2016, Annals of Botany
http://aob.oxfordjournals.org/content/early/2016/07/19/aob.mcw129.abstract



Plants provide <u>many</u> simultaneous services.

PLANTS DIFFER IN THE EXTENT OF SERVICES' PROVISION!

- Air temperatures/ building insulation
- Pollutant trapping
- Rainfall capture
- Carbon capture
- BVOCs emissions
- …

Plant traits which can be linked to enhanced services delivery:

University of Reading

Cooling *Vaz Monteiro MM*

High ETp rate

Light colour, presence of hairs

Large LA

Rainfall capture *Kemp S*

High ETp rate

Presence of hairs and rough surfaces

Large LA

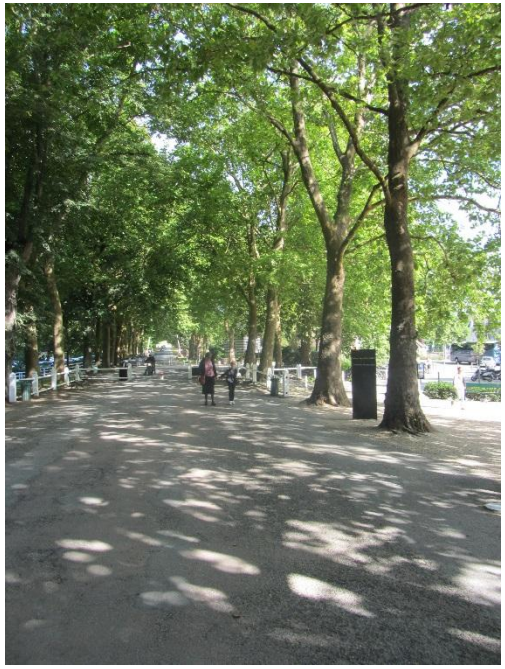
Pollutant trapping *Fantozzi F*

Presence of hairs and rough surfaces

Large LA

Vegetation and cooling

- Shading by a (large) canopy
- Reflection of incoming energy
- **Providing latent heat loss *via* evapo-transpiration**



Plants in cities can help to reduce summertime heat, but ….

Truth
Localised effect unless the planting is on a large scale
Large canopies, strongly transpiring plants
Leaf colour IS important for cooling, BUT only when plants are well watered and have high transpiration rates

Vegetation and precipitation

- Retaining water droplets on canopy

- **Restoring soil's water holding capacity via evapo-transpiration**

→ Reduced pressure on urban drainage system

Plants in cities can help to reduce flooding risk, but ….

Truth	Caution!
Localised effect	No amount of planting will offer protection from rare, catastrophic events
Large canopies, strongly transpiring plants	
SOIL is paramount, plants are ‘icing on the cake’	

Vegetation and particle pollutant capture

- Deposition
- Dispersion

Removal of particles from the air by increasing the area onto which they can be deposited

Plants in cities can help to reduce aerial pollution, but ….

Truth
Rough and hairy leaf surfaces attract and retain more particles
Large, open canopies provide good ‘service’
Evergreen is better than deciduous
Local effect that is proportional to the extent of the greenery

What does this mean for practice?

- Planners, architects, builders

'anything, everything, a tree'

(L. Hunt ☺)

- Landscapers, horticultural specialists

Consider environmental impact of the plants, and <u>which plant traits</u> would be useful to improve the delivery of environmental benefits (cooling, noise, pollutant trapping*, rainwater capture…)*

Perennial, physiologically active plants, with high ETp (strong 'pumps'), light, rough/hairy foliage

https://www.rhs.org.uk/communities/pdf/Greener-Streets/rhs-front-garden-guide