

# Urban ash trees as monitoring opportunity for *Agrilus planipennis*

Benno Augustinus, Eckehard G. Brockerhoff,  
Deborah G. McCullough, Andrew M. Liebhold,  
Valentin Queloz

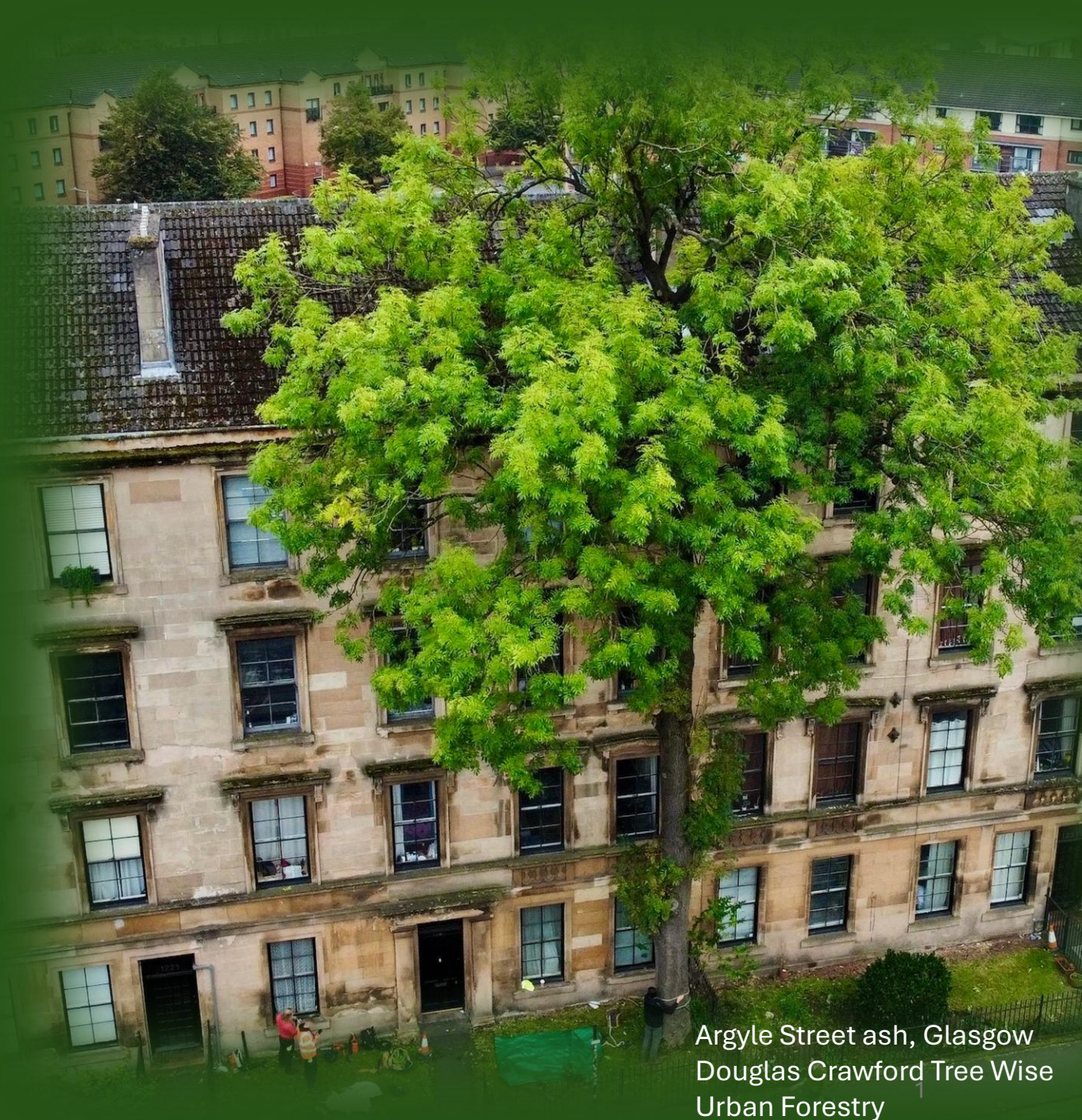
[Benno.augustinus@wsl.ch](mailto:Benno.augustinus@wsl.ch)

EPPO – FAO-REUFIS – BFW Conference, Vienna,  
AUT

22.04.2026



**BFW** AUSTRIAN  
RESEARCH  
CENTRE  
FOR FORESTS



Argyle Street ash, Glasgow  
Douglas Crawford Tree Wise  
Urban Forestry

# Urban trees and invasions

- Urban areas: first location of introductions of invasive forest pests
- (Long-distance) trade goes to urban/peri-urban environments first
- Urban trees: stressed, more susceptible for invasive forest pest
- Important for forest biosecurity



Biol Invasions (2017) 19:3515–3526  
DOI 10.1007/s10530-017-1595-x



URBAN INVASIONS

**Urban trees: bridge-heads for forest pest invasions  
and sentinels for early detection**

Trudy Paap · Treena I. Burgess · Michael J. Wingfield

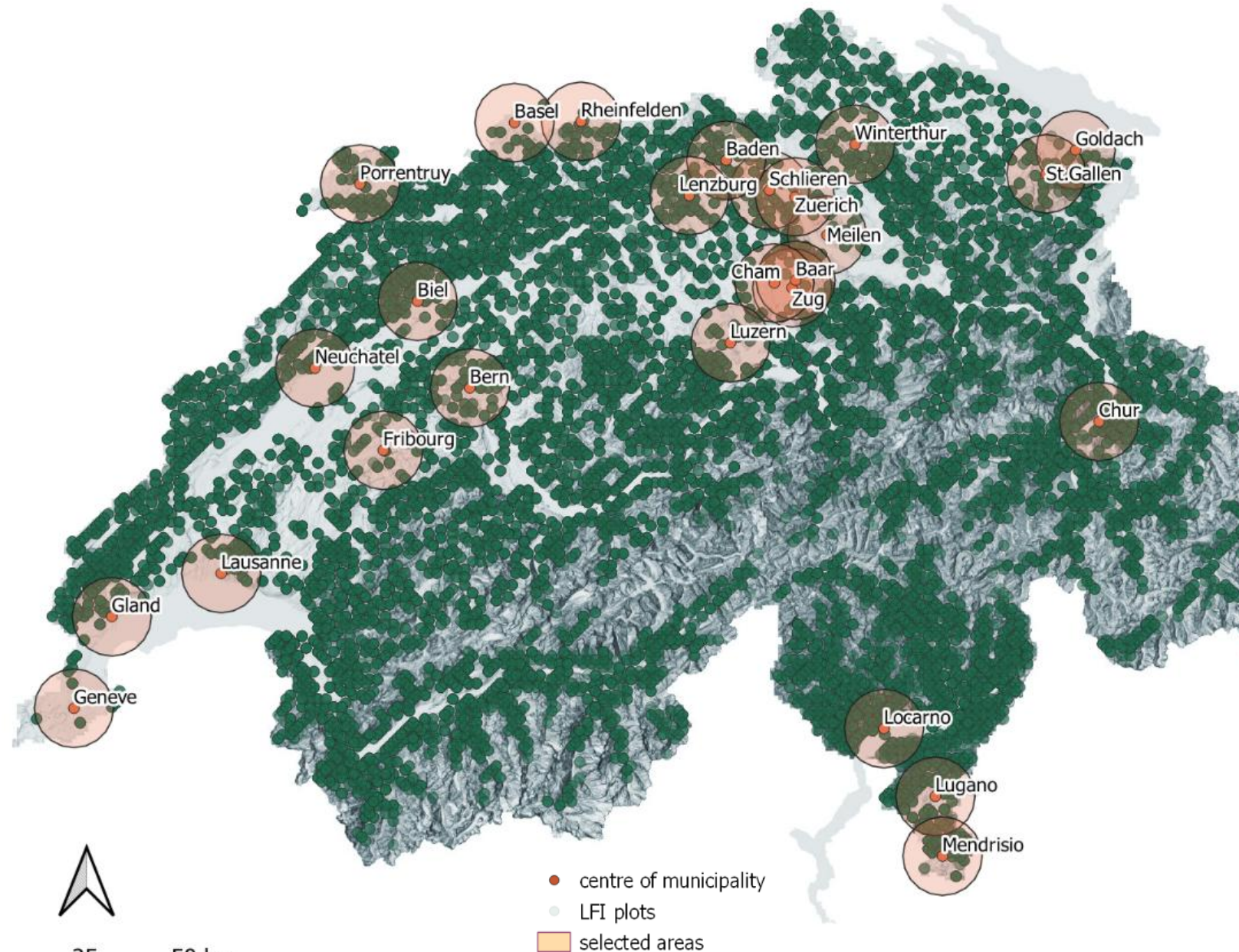
**Urban trees facilitate the establishment  
of non-native forest insects**

Manuela Branco<sup>1</sup>, Pedro Nunes<sup>1</sup>, Alain Roques<sup>2</sup>,  
Maria Rosário Fernandes<sup>1</sup>, Christophe Orazio<sup>3</sup>, Hervé Jactel<sup>4</sup>

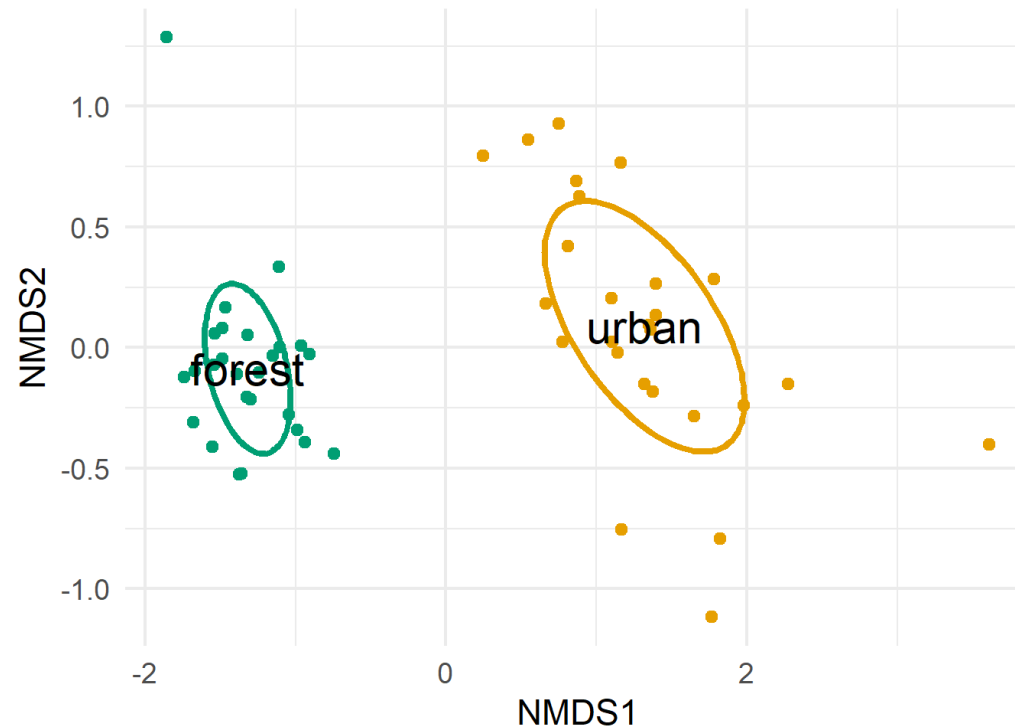
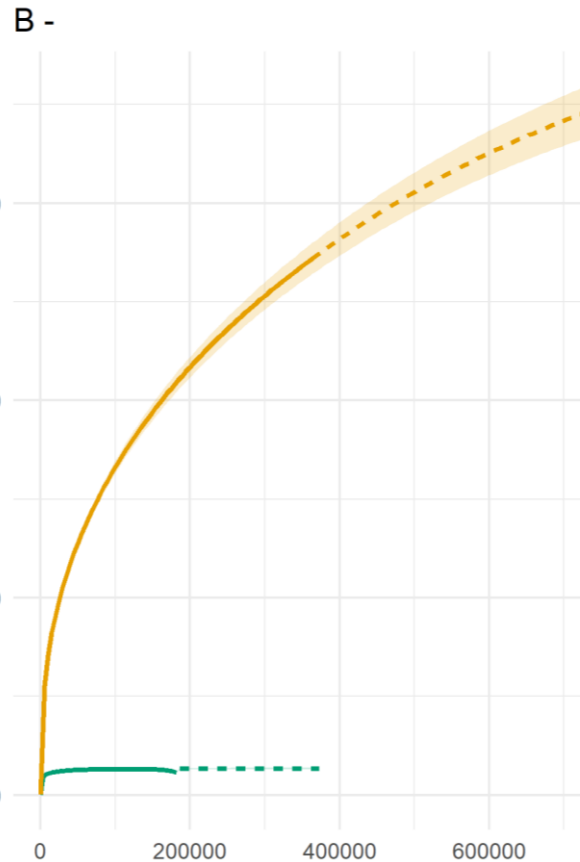
## Questions asked

How different is urban tree composition (species and genera) compared to the tree composition of surrounding forests?

What are implications for urban and surrounding forest health?



# Urban trees vs. forest trees

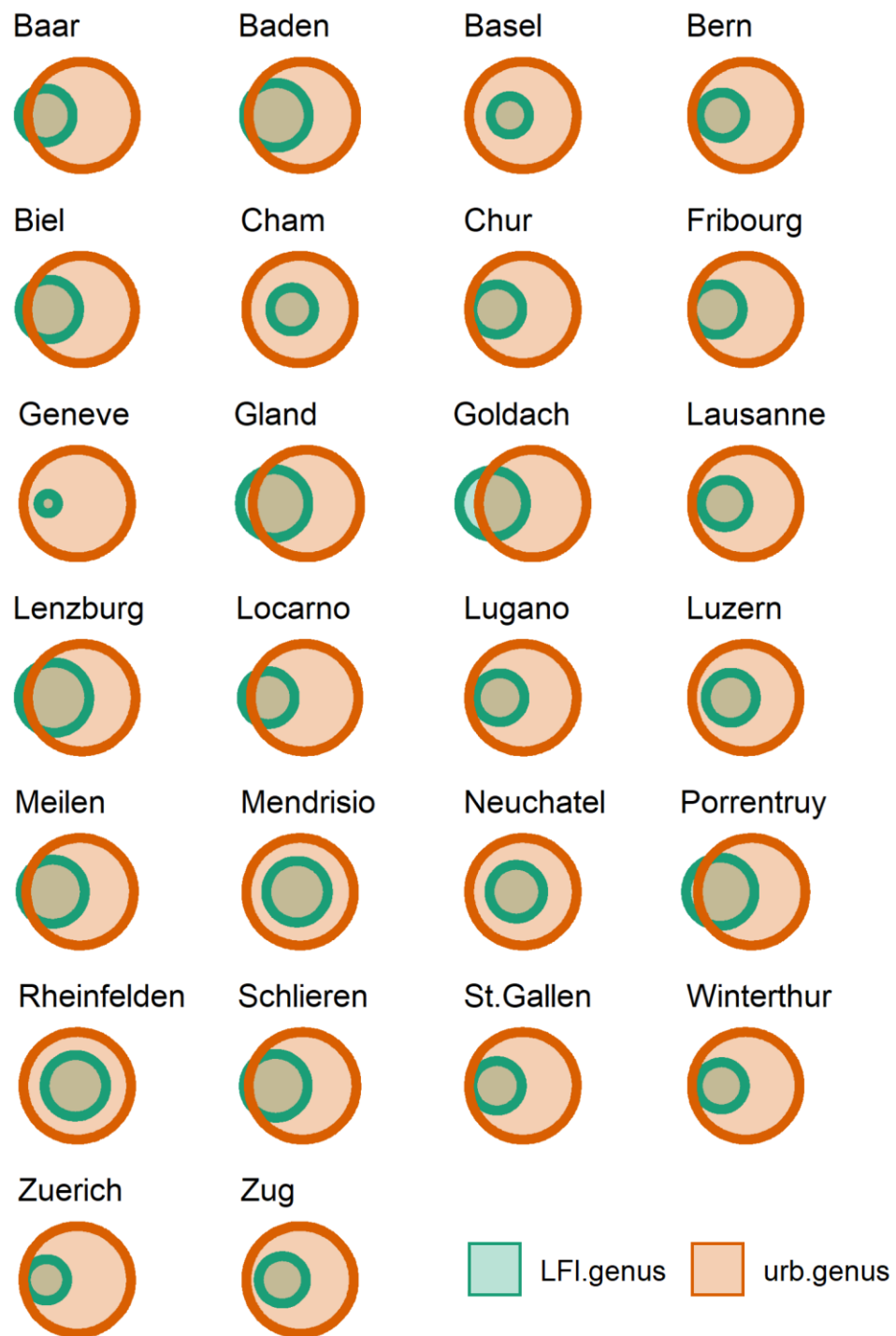


- Many more tree species in cities than in forests (1306 vs. 76)
- Therefore: tree species composition different (PERMANOVA)



# Genera

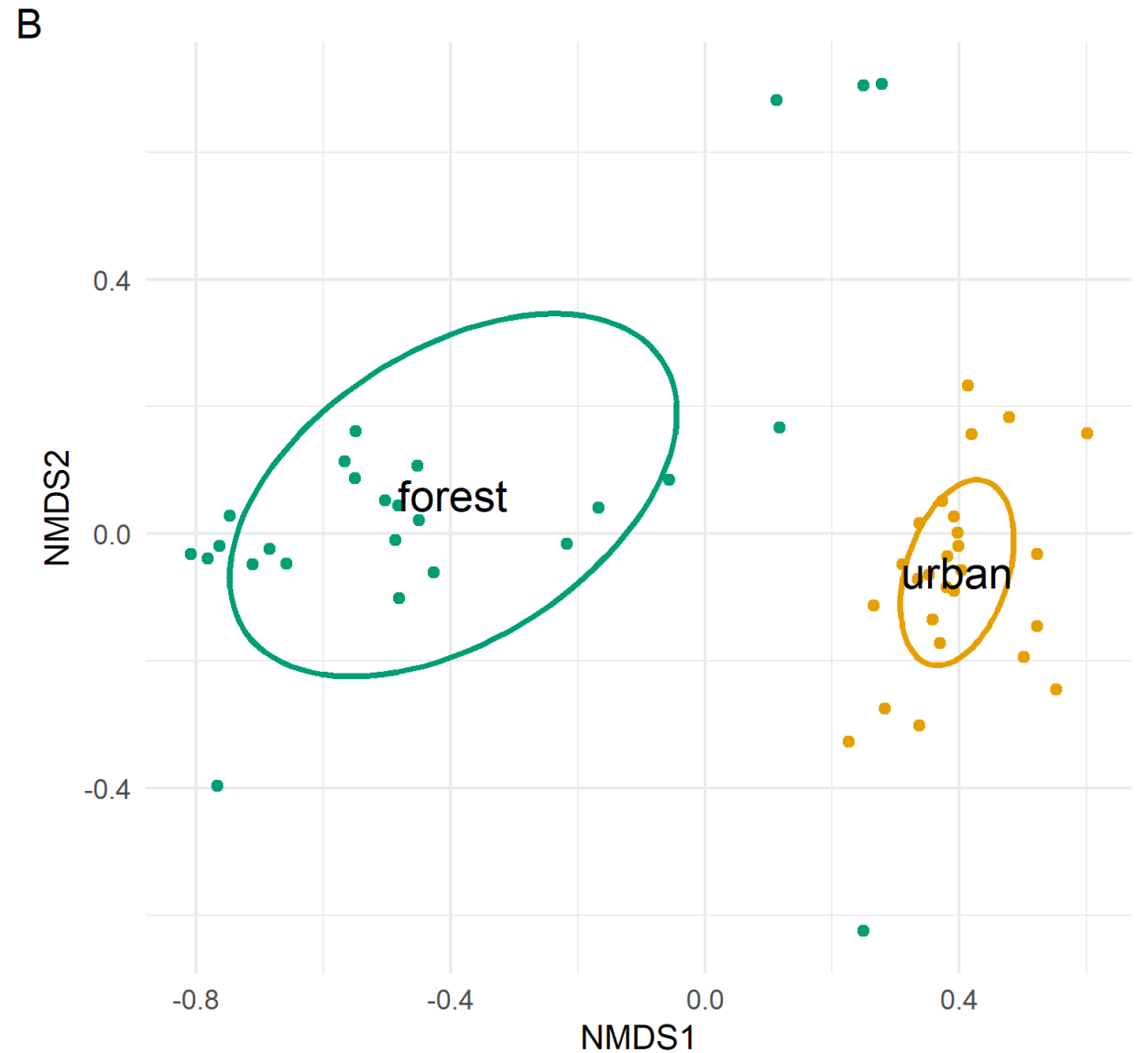
Genera in forest:  
subsets of genera in  
urban tree datasets



Augustinus et al., 2024, LandUP  
<https://doi.org/10.1016/j.landurbplan.2024.105144>

# Urban tree diversity

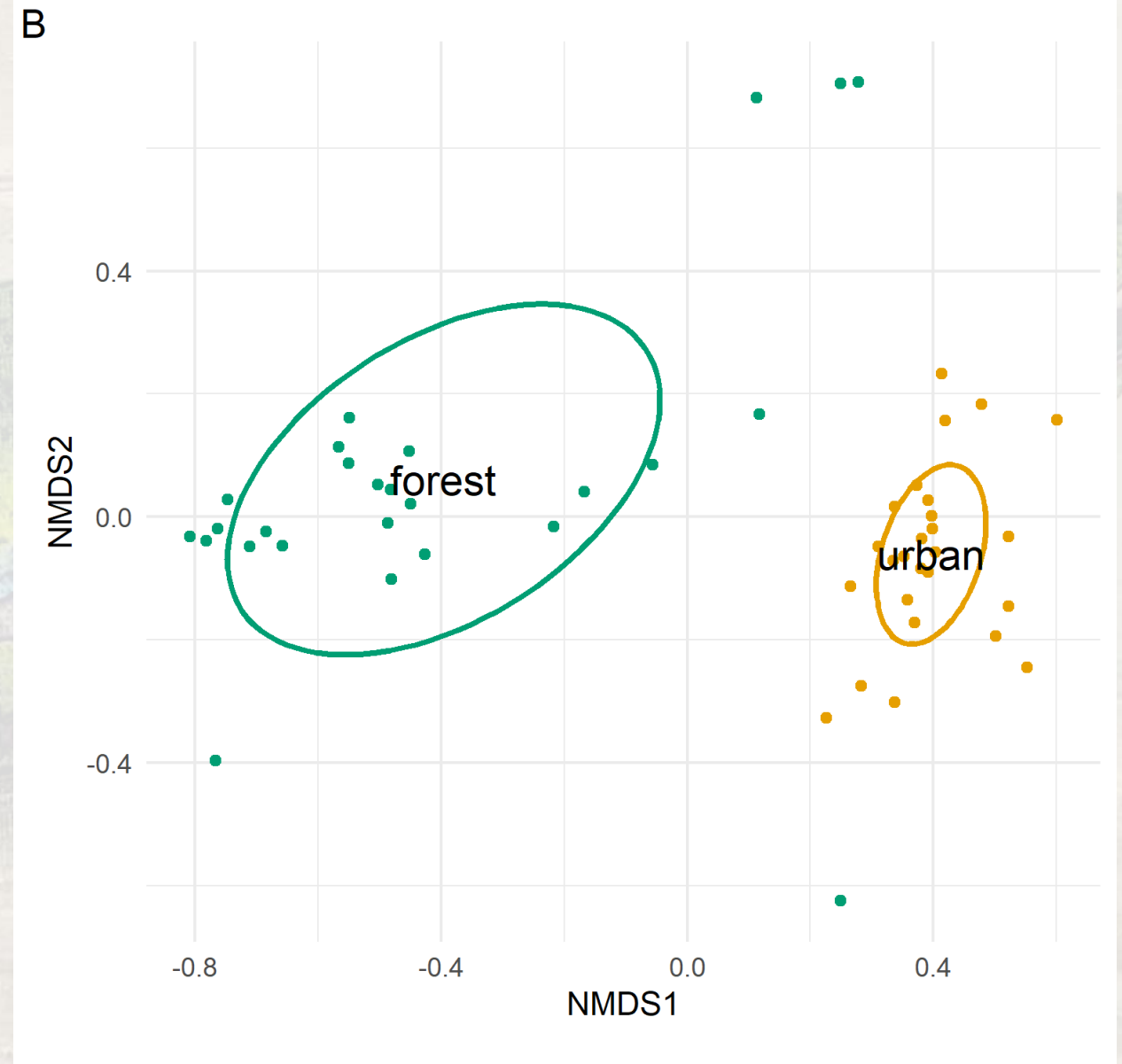
- Extremely high diversity in cities
- → more hosts



Urban areas characterized by hosts for different pests than forest areas

# Urban trees and EAB

- EAB: highly mobile
- Hosts in every Swiss city\*
- What if no tree inventory available



# Urban trees in Switzerland – species composition

- No spatial autocorrelation

```
Mantel statistic based on Pearson's product-moment correlation

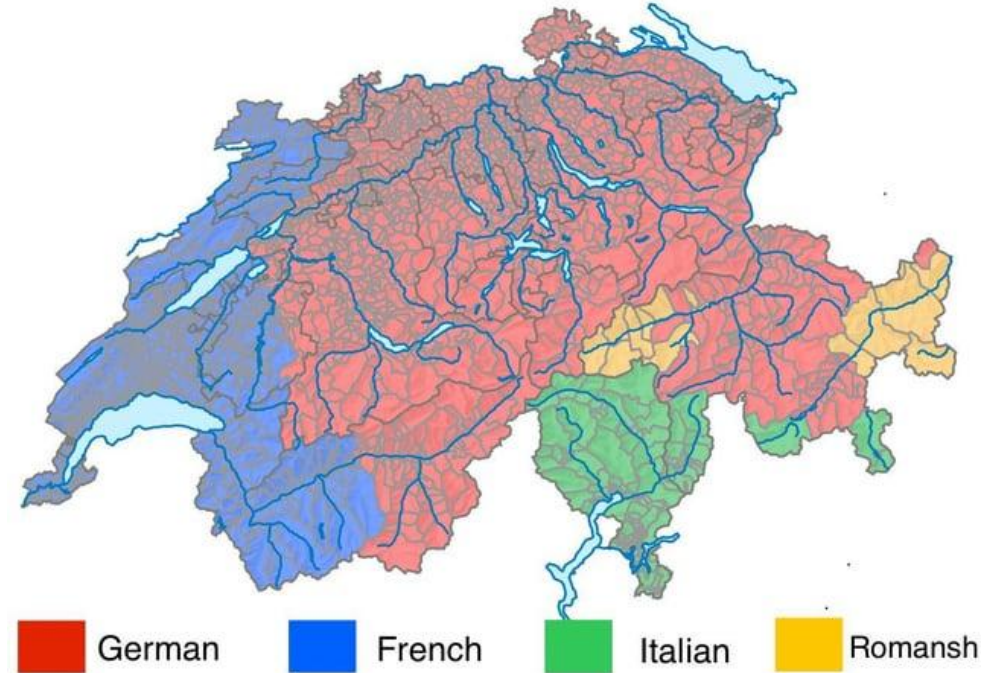
Call:
mantel(xdis = distance_matrix, ydis = genus_matrix)

Mantel statistic r: 0.01931
Significance: 0.134

Upper quantiles of permutations (null model):
 90%  95%  97.5%  99%
0.0223 0.0291 0.0354 0.0456
Permutation: free
Number of permutations: 999
```

## Linguistic Map of Switzerland

Source: Swiss Federal Statistical Office



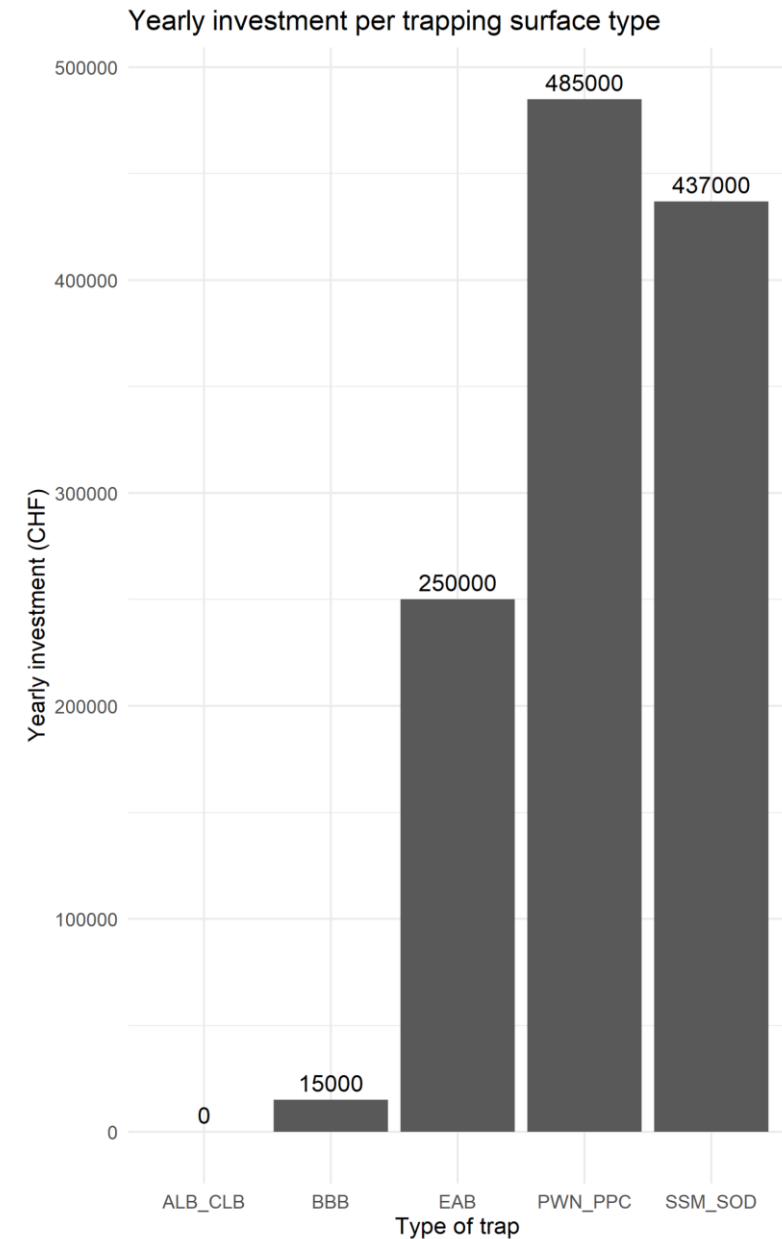
Source: r/MapPorn

- Region (language) explains the difference! (Adonis)

	De	De/Fr	Fr	It
De	x			
De/Fr	0.125	x		
Fr	<b>0.001</b>	<b>0.037</b>	x	
It	<b>0.001</b>	0.306	<b>0.001</b>	x

# Bioeconomic arguments for EAB surveillance

- Used a bioeconomic model to weigh off investment for 8 priority quarantine pests
- Traps for EAB: better investment than traps for ALB and CLB



# Private vs. Public trees in Switzerland

- Urban tree inventories generally only contain urban trees in city care
- Private trees could be completely different!
- MSc thesis Sarina Christen:
  - Comparison species composition of
    - Public urban trees
    - Private urban trees
    - Trees for sale

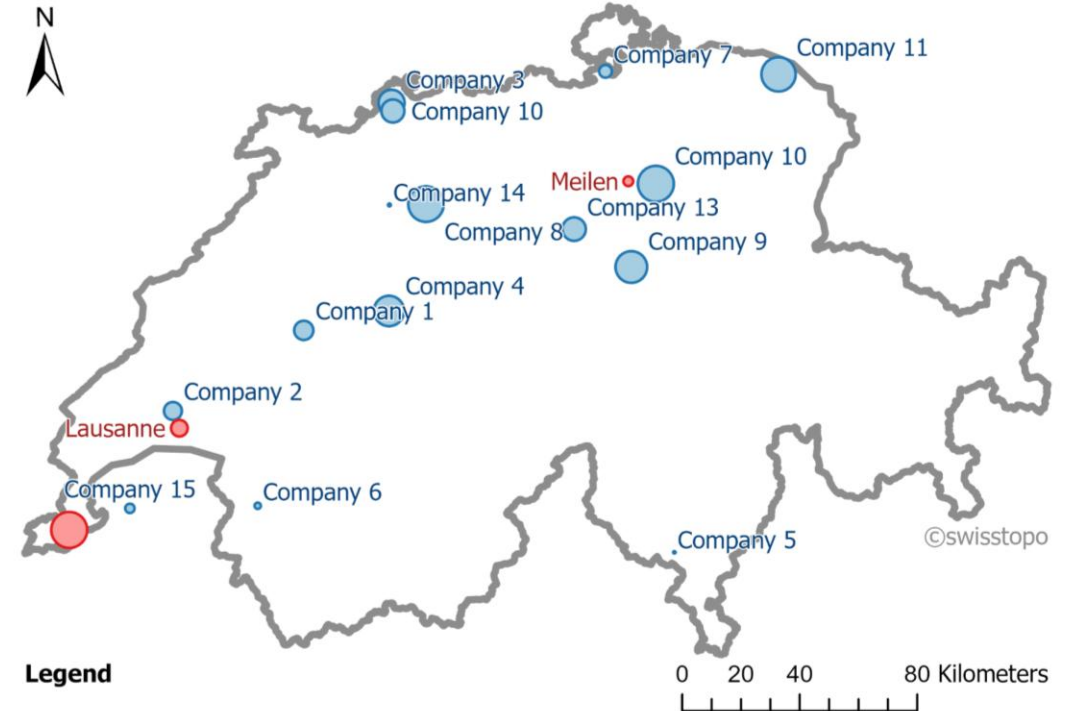


Waldschutz Schweiz  
Protection de la forêt suisse  
Protezione della foresta svizzera



Christen et al., 2024, UFUG, <https://doi.org/10.1016/j.ufug.2024.128529>

## Spatial distribution of companies and municipalities



### Companies



### Cities



# Private vs. Public trees in Switzerland

## Species composition

- On genus level:
  - no statistically significant difference between public and private trees
- Species level: most common species in both datasets
  - Top 10 species Geneva e.g.:
- Surprising (?) similarity

Private urban trees species frequencies Geneva		Public urban tree species frequencies Geneva	
Species name	Percentage	Species name	Percentage
<i>Quercus robur</i>	9.27	<i>Quercus robur</i>	9.81
<i>Carpinus betulus</i>	7.85	<i>Carpinus betulus</i>	9.05
<i>Fraxinus excelsior</i>	4.85	<i>Acer campestre</i>	6.03
<i>Prunus avium</i>	4.75	<i>Acer platanoides</i>	5.05
<i>Malus domestica</i>	4.66	<i>Fraxinus excelsior</i>	4.73
<i>Acer platanoides</i>	4.56	<i>Acer pseudoplatanus</i>	4.07
<i>Taxus baccata</i>	3.83	<i>Taxus baccata</i>	3.53
<i>Acer pseudoplatanus</i>	3.81	<i>Malus domestica</i>	3.45
<i>Juglans regia</i>	3.64	<i>Pinus sylvestris</i>	3.39
<i>Acer campestre</i>	3.38	<i>Prunus avium</i>	3.02

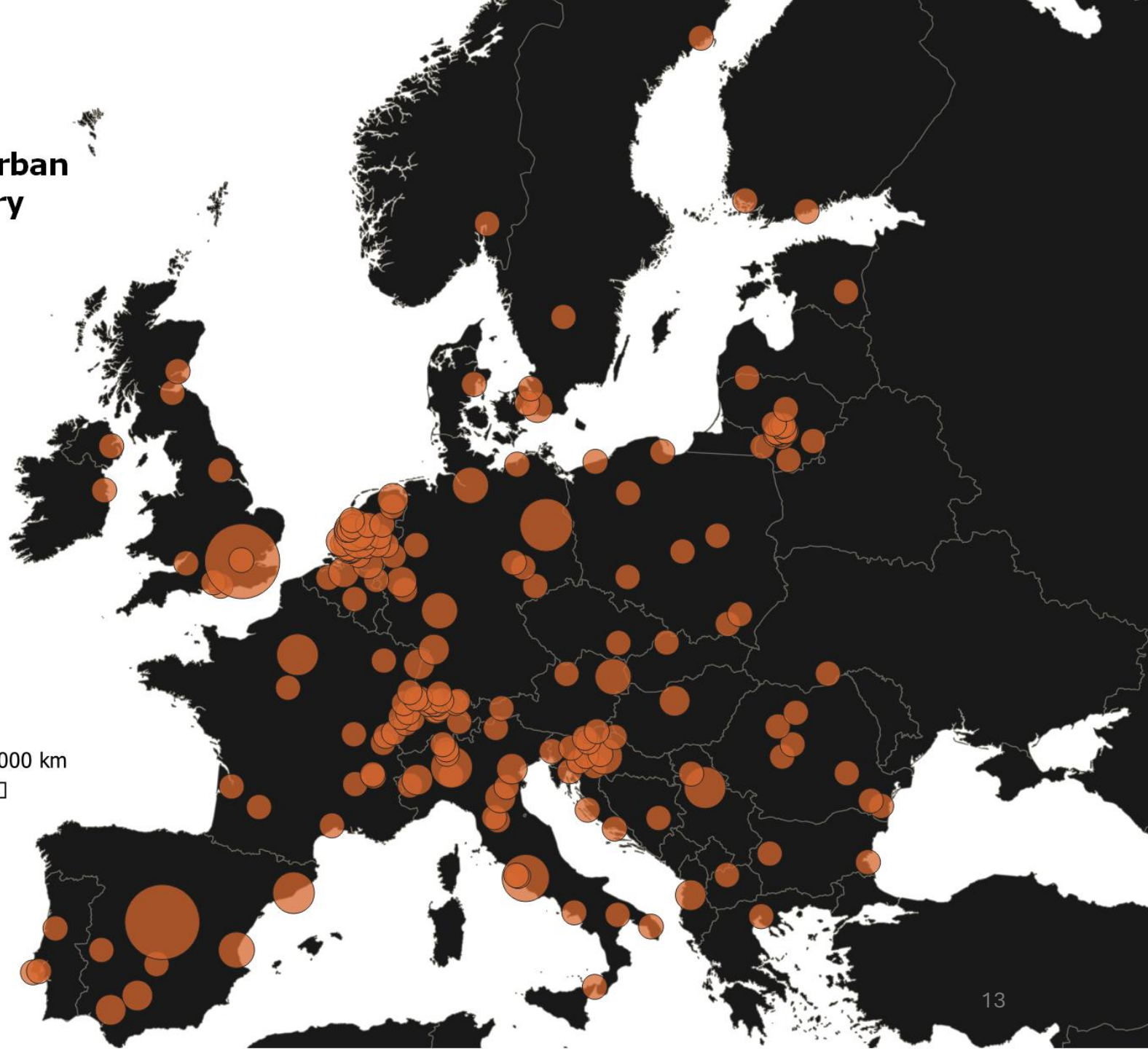
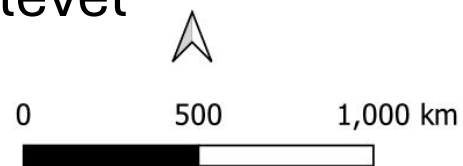
CH ≠ EU



## The European Urban Tree Inventory (EUTI)

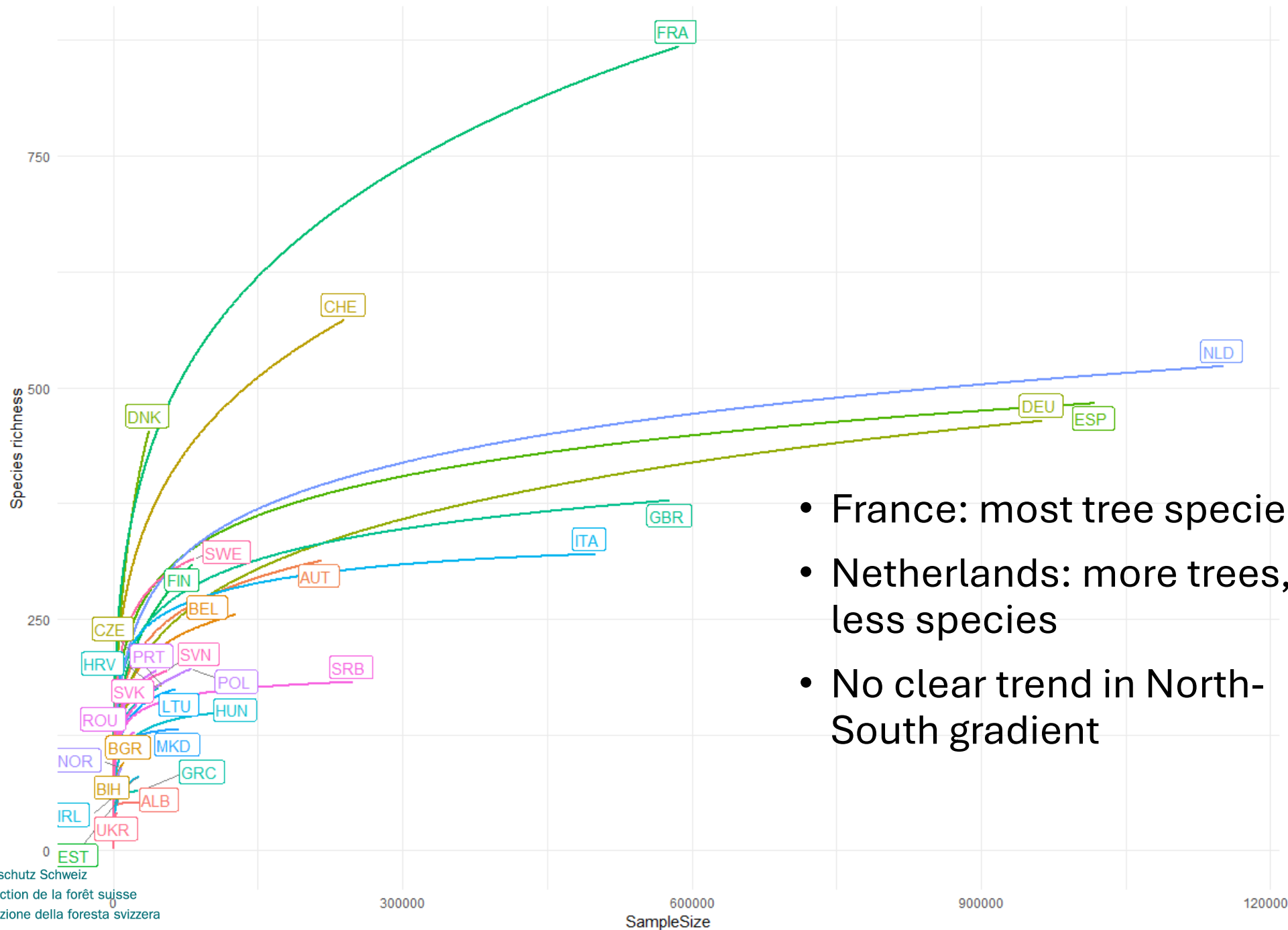
(20.04.2026)

- 200 cities
- Datasets: ~200 - ~700000 trees
- 31 countries
- After cleaning ~8.9 mio trees
- ~7.8 mio to species level



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Rarefaction plot of species per country



- France: most tree species
- Netherlands: more trees, less species
- No clear trend in North-South gradient



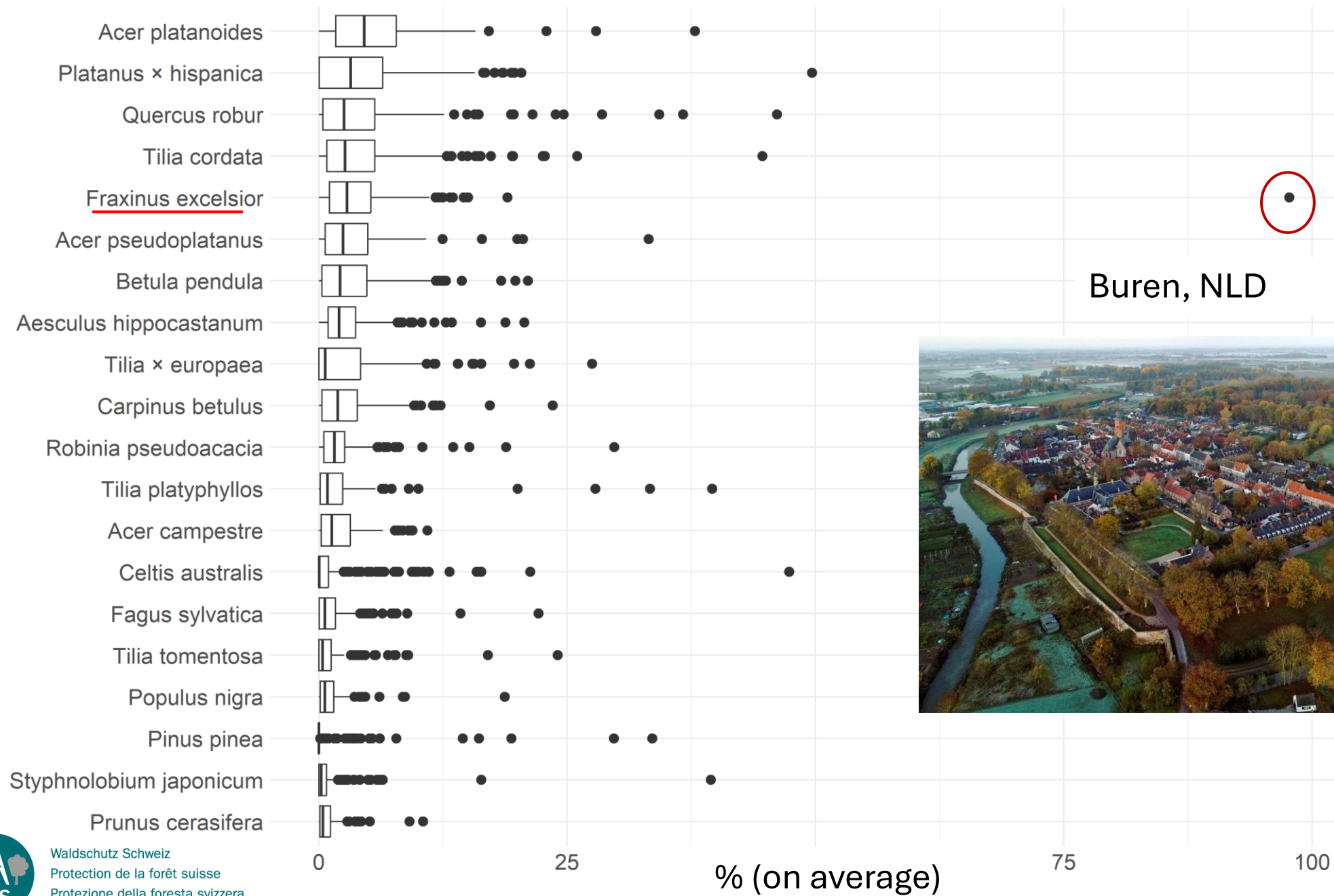
# Percentage of ash in EUTI

	Species	%
1	<i>Platanus × hispanica</i>	6.9
2	<i>Acer platanoides</i>	5.4
3	<i>Quercus robur</i>	5.2
4	<b><i>Fraxinus excelsior</i></b>	<b>4.4</b>
5	<i>Tilia cordata</i>	3.7
6	<i>Acer pseudoplatanus</i>	3.5
7	<i>Tilia × europaea</i>	3.2
8	<i>Aesculus hippocastanum</i>	2.7
9	<i>Carpinus betulus</i>	2.6
10	<i>Robinia pseudoacacia</i>	2.6

- Common ash : 4<sup>th</sup> most common tree sp. in dataset
- Most common ash species include North-American ash species

	Species	# (rounded)
1	<i>Fraxinus excelsior</i>	340'000
2	<i>Fraxinus angustifolia</i>	57'000
3	<i>Fraxinus ornus</i>	45'000
4	<i>Fraxinus americana</i>	27'000
5	<i>Fraxinus pennsylvanica</i>	11'000

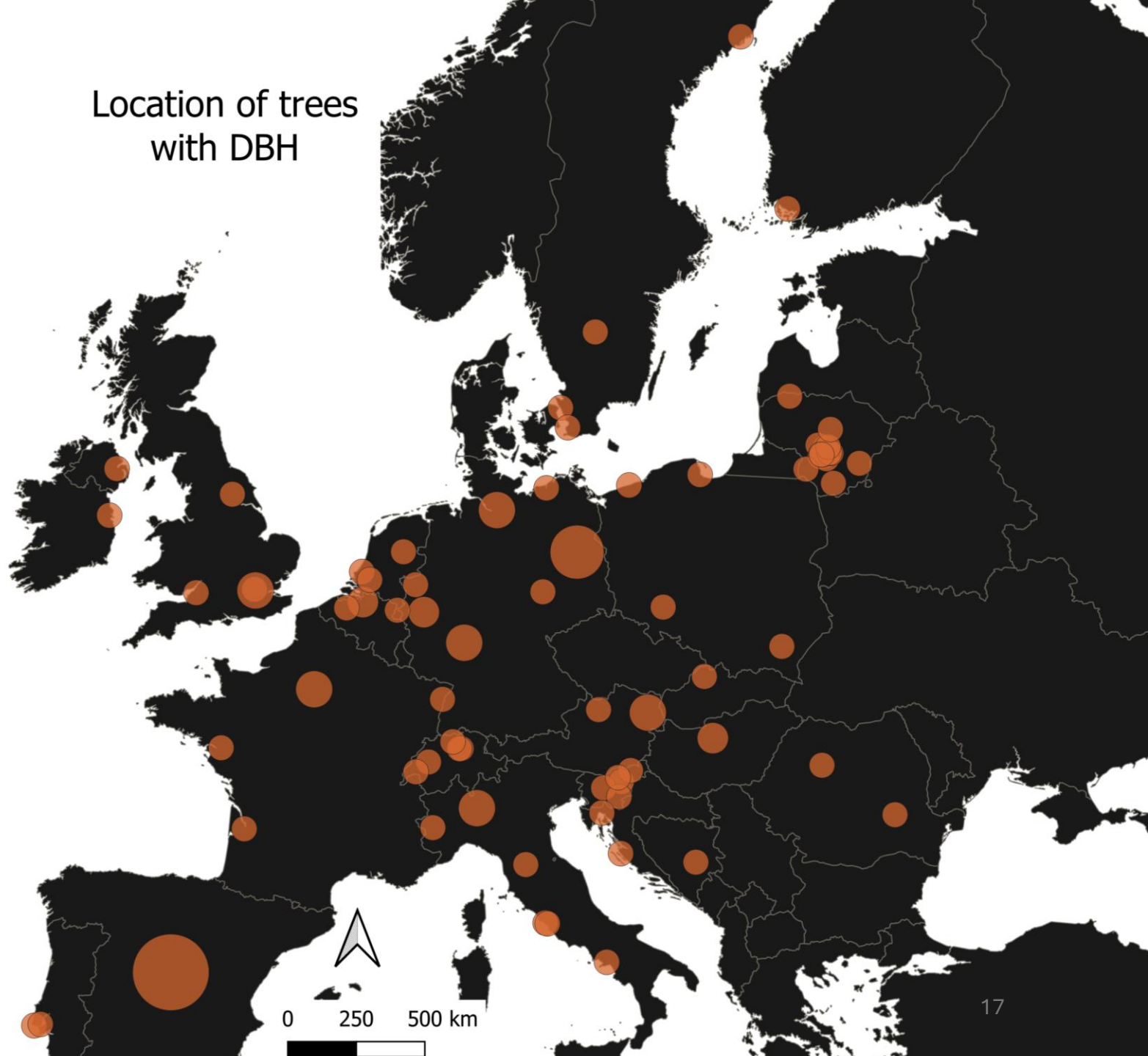
# 20 most common tree species per city



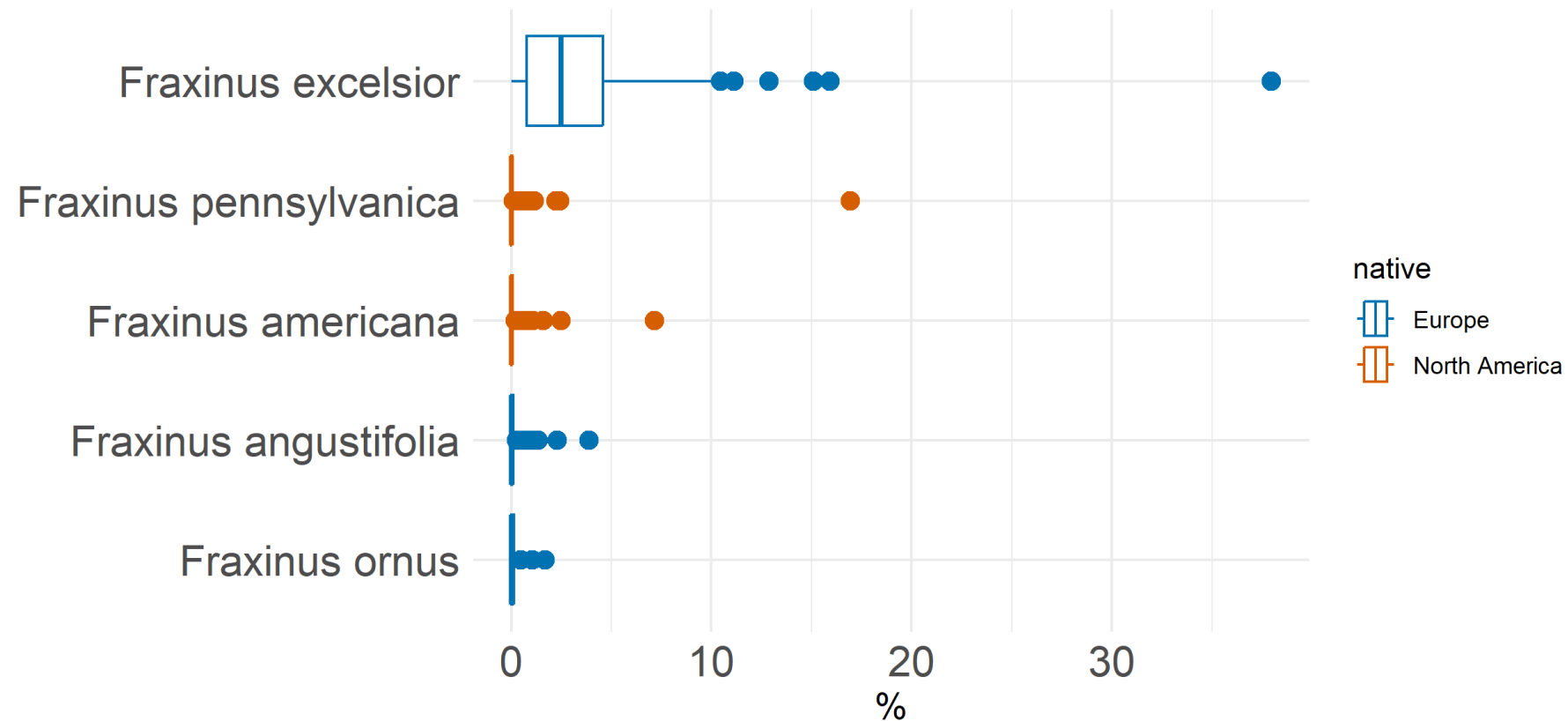
- Tree records that contain information on DBH

- ~3.7 mio

Location of trees  
with DBH



# Basal area of five most common *Fraxinus* species



- Basal area of ash trees considered
  - Common ash contributing 9<sup>th</sup> most to European urban trees
  - # or basal area: no spatial intercorrelation % ash

# ZUKUNFTSBÄUME FÜR DIE STADT

AUSWAHL AUS DER GALK-STRASSENBAUMLISTE

# GALK (Conference of Heads of Municipal Horticultural Departments) Top 60 'future proof trees'

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**A**  
Acer campestre  
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Acer campestre  
'Elsrijk'  
Seite 11

Acer campestre  
'Huibers Elegant'  
Seite 12

Acer monspessulanum  
Seite 13

Acer platanoides  
Seite 14

Acer platanoides  
'Allershausen'  
Seite 15

Acer platanoides  
'Cleveland'  
Seite 16

Acer platanoides  
'Columnare'  
Seite 17

Acer platanoides  
'Deborah'  
Seite 18

Acer platanoides  
'Royal Red'  
Seite 19

Alnus x spaethii  
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Amelanchier arborea  
'Robin Hill'  
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**C**  
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'Fastigiata'

Cornus mas  
Seite 27

Corylus colurna  
Seite 30

Crataegus lavallei  
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Seite 31

Crataegus x prunifolia  
Seite 32

**E**  
Eriolobus trilobatus  
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**F**  
Fraxinus americana  
'Autumn Purple'  
Seite 34

Fraxinus ornus  
Seite 35

Fraxinus ornus  
'Louisa Lady'  
Seite 36

Fraxinus ornus  
'Mecsek'  
Seite 37

Fraxinus pennsylvanica  
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Fraxinus pennsylvanica  
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**G**  
Ginkgo biloba  
Seite 40

Ginkgo biloba  
'Fastigiata Blagon'  
Seite 41

Gleditsia triacanthos  
'Inermis'  
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**K**  
Koelreuteria paniculata  
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**L**  
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Liquidambar styraciflua  
'Worplesdon'  
Seite 48

Liriodendron tulipifera  
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**M**  
Magnolia kobus  
Seite 50

Malus tschonoskii  
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Metasequoia glyptostroboides  
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**O**  
Ostrya carpinifolia  
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**P**  
Parrottia persica  
Seite 56

Platanus acerifolia  
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Populus nigra  
'Italica'  
Seite 58

**Q**  
Quercus cerris  
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Quercus frainetto  
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Quercus petraea  
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Quercus rubra

**S**  
Sophora japonica  
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Sophora japonica  
'Regent'  
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Sorbus aria  
'Magnifica'  
Seite 69

Sorbus intermedia  
'Brouwers'  
Seite 70

Sorbus x thuringiaca  
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**T**  
Tilia americana  
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Tilia cordata  
'Rancho'  
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Tilia tomentosa  
'Brabant'  
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Tilia x euchlora  
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Tilia x europaea  
'Pallida'  
Seite 76

Tilia x flavescens  
'Glenleven'  
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**U**  
Ulmus-Hybride  
'Columella'  
Seite 78

Ulmus-Hybride  
'New Horizon'

# GALK on *F. pennsylvanica* and *F. americana*

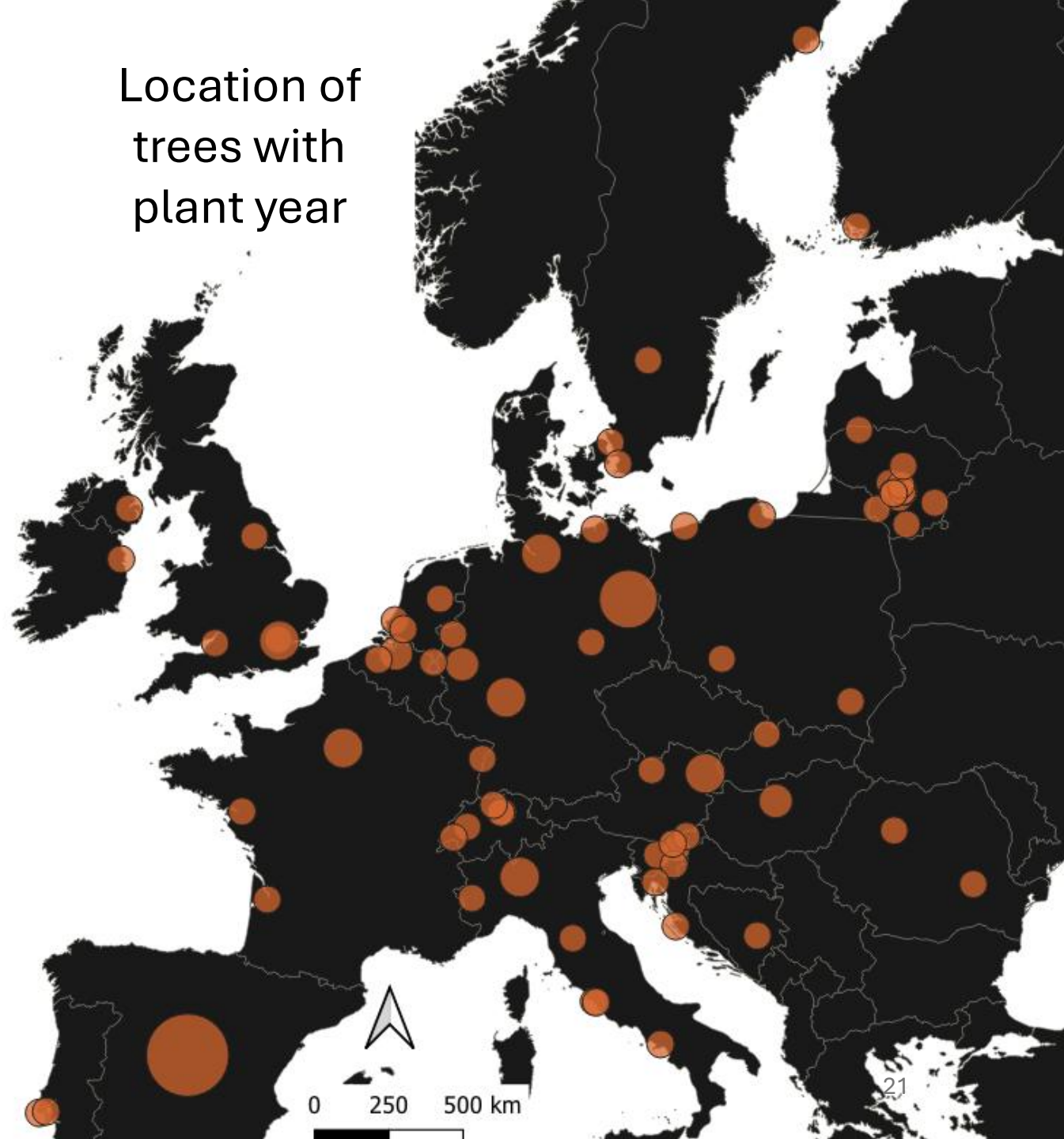
- More susceptible than European ash to EAB
- ‘still in test’
- Comments on ‘resistance’ to ash dieback
- → Awareness, but not for EAB

Gummiulme						vermeiden, im Straßenbaumtest 2 seit 2022
Fraxinus americana 'Autumn Purple' syn. Fraxinus americana 'Junginger', Weißesche	15-18	12-15	stark	1	noch im Test	männliche Selektion, ohne Früchte; auffallende Herbstfärbung, bisher noch <u>noch kein Eschentriebsterben</u> zu beobachten, Laubentfernung mindert den Befallsdruck, im Straßenbaumtest 2 seit 2007/08
Fraxinus angustifolia 'Raywood'	10-15 (20)	10-15	stark	2	geeignet mit E.	hitzeverträglich und Wärme liebend, gebietsweise frostempfindlich, stadtklimafest, ohne Früchte,
Fraxinus ornus 'Rotterdam', Blumenesche, Manna- Esche	8-12	6-8	mittel	1	geeignet	wie die Art, jedoch mit regelmäßiger und kegelförmiger Krone, durchgehendem Leittrieb, trockenheits- und hitzeverträglich, nicht in befestigten Flächen verwenden, für Kübel und Container geeignet, auffällige Blüte, Bienenweide, kein Befall mit Eschentriebsterben
Fraxinus pennsylvanica, Rotesche, Grünesche	15-20	10-15	stark	2	noch im Test	teils pyramidale, teils breit eiförmige Krone, im Alter ausladend, gerader, durchgehender Stamm, Wärme liebend und hitzeverträglich, trockenheitverträglich, stadtklimafest, Bienenweide, kein Befall mit <u>Eschentriebsterben</u> , im Straßenbaumtest 2 seit 2005
Fraxinus pennsylvanica 'Summit', Rotesche	14-16	5-7	stark	2	noch im Test	regelmäßig aufgebaute Krone, anfangs oval, im Alter rundlich, durchgehender Stamm, tief wurzelnd, schöne Herbstfärbung, Bienenweide, kein Befall mit Eschentriebsterben, im Straßenbaumtest 2 seit 2015

# Are European urban green managers still planting ash trees?

- For 52 inventories: data on plant year
- ~160'000 trees planted from 2018-2023
- From which 4.7% *Fraxinus* sp.
- ~7600 trees
- Do we make the issue clear enough?

Location of trees with plant year



# Preaching to the choir

*Article*

## **Southern Range Expansion of the Emerald Ash Borer, *Agrilus planipennis*, in Russia Threatens Ash and Olive Trees in the Middle East and Southern Europe**

Marina J. Orlova-Bienkowskaja \*<sup>ORCID</sup> and Andrzej O. Bieńkowski

### **2. Materials and Methods**

#### *2.1. Surveys of Ash Trees in the Regions South to the Known Range of *A. planipennis* in European Russia*

In 2021, we surveyed ash trees in eight cities in four regions in south Russia outside

- To reach the urban manager, one needs to give perspectives

# (More) resistant ash species

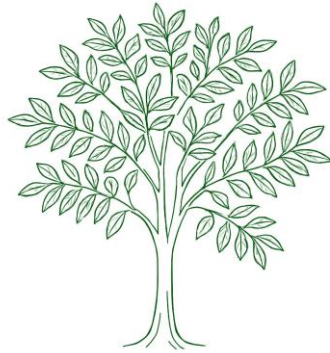
- Asian ash species: co-evolved with EAB
- *Fraxinus mandshurica* apparently (more) resistant
- *Fraxinus chinensis*: might be – conflicting info \*\*, \*\*
- Asian species in European cities: rare
- Why?

Rank	Species	#	native
1	<i>F. excelsior</i>	~341,000	Europe
2	<i>F. angustifolia</i>	~57,000	Europe
3	<i>F. ornus</i>	~45,000	N America
4	<i>F. americana</i>	~27,000	N America
5	<i>F. pennsylvanica</i>	~11,000	N America
...			
12	<i>F. sieboldiana</i>	77	Asia
...			
16	<i>F. mandshurica</i>	32	Asia
17	<i>F. chinensis</i>	26	Asia
18	<i>F. bungeana</i>	13	Asia

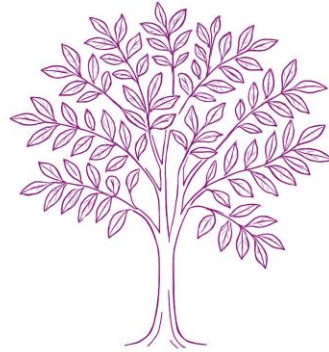
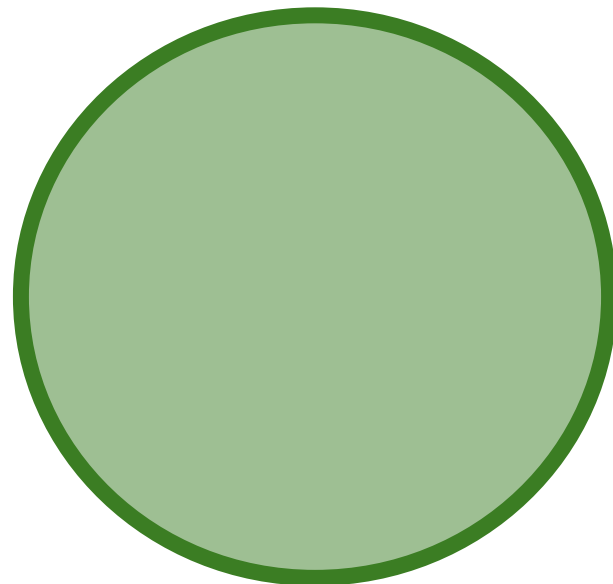
\*: Mathieu&McCullough, 2025 EnvironEntomol

\*\* : Musolin et al., 2017, BaltFor

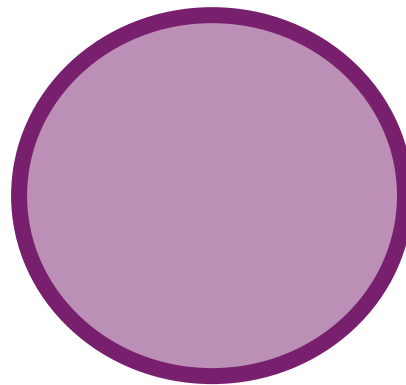
# Biodiversity on native vs non-native ash sp.



Native ash in forest

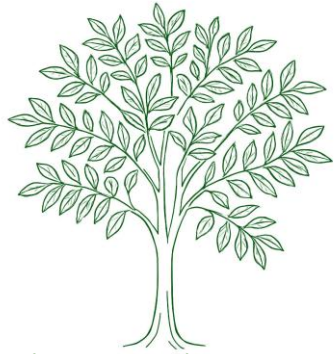


Non-native ash in forest



- Did not co-evolve with local specialists
- Therefore: lower potential supported biodiversity

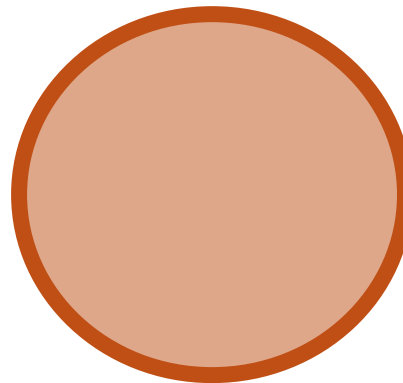
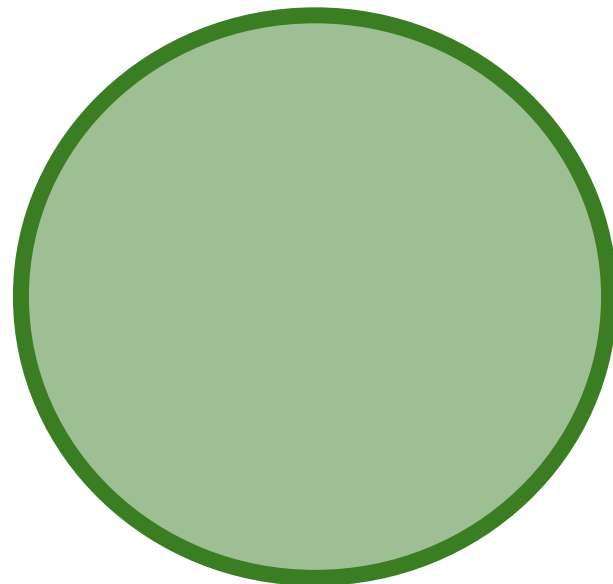
# Biodiversity on urban vs rural ash trees



Native ash in forest



Native urban ash



- Urban trees support less biodiversity than forest trees
  - Urban heat island effect
  - Management
  - Impervious surface
- Urban trait syndrome\*
  - Less generalistic?
  - More mobile?
  - Thermophilic?
- Taxon, group, and context-dependent

# Non-native, urban trees

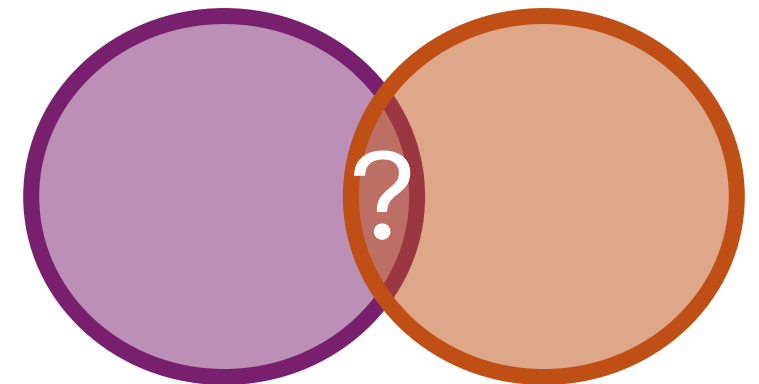
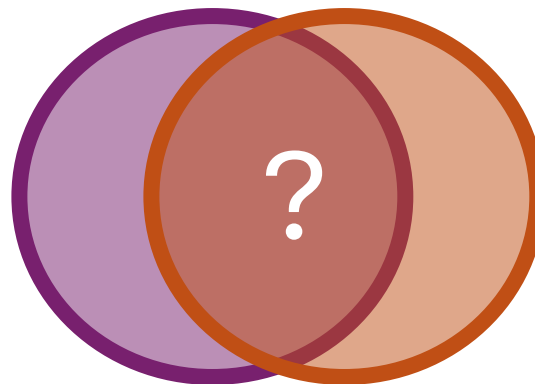
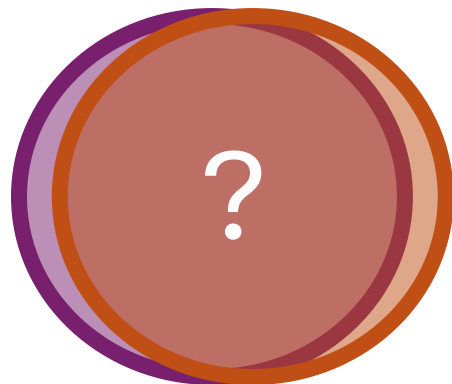


Non-native ash in forest



Native urban ash

- Not know whether urban trees support same associated biodiversity as non-native, rural trees
- If they do, planting non-native trees in cities will result in no (or low) net loss of urban biodiversity



# Future of ash trees in European cities

- Communication about future of ash trees in cities
- Given that EAB outbreaks are likely: test Asian ash species
- Consider (chemical?) management
- At least: have a plan



Creekside home and garden

# Conclusions

- Cozy up to urban tree managers and arborists: eyes and ears
- Urban tree inventories: useful forest biosecurity tools
- NPPO's and researchers: get your hands on them
- If you want to protect your forest, look in the city!

# Thank you



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Protezione della foresta svizzera



Bundesamt für  
Umwelt BAFU