



**“Understanding and managing urban EcM fungal communities to increase the health and ecosystem service provisioning of urban trees”**

## **UrbanMycoServe**

Olivier Honnay (KU Leuven, Belgium)

Funded projects final conference, 12-13 November 2019, Brussels

BiodivERsA COFUND Call (2015-2016)

« Understanding and managing biodiversity dynamics to improve ecosystem functioning and delivery of ecosystem services in a global change context: the cases of soils and sediments, and land- river and sea-scapes »

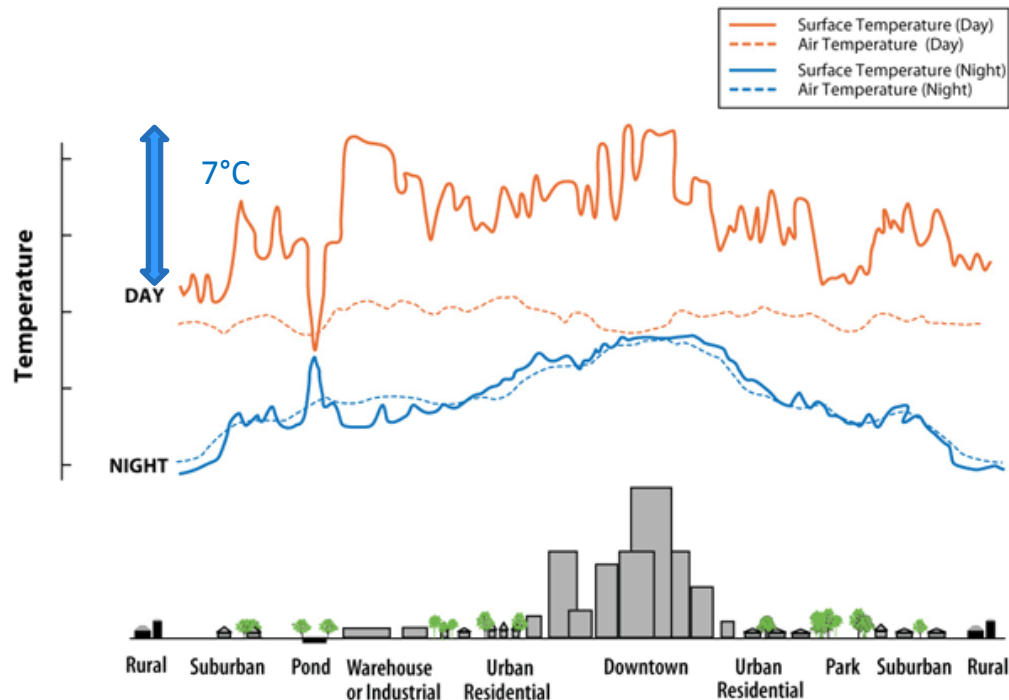
# CONSORTIUM DESCRIPTION

- Partner 1 (co-ordinator): *Olivier Honnay, Department of Biology, **KU Leuven**, funded by BelSPo.*
- Partner 2: *Ben Somers, Department of Earth & Environmental Sciences, KU Leuven, funded by FWO Vlaanderen.*
- Partner 3: *Paula Castro, Escola Superior de Biotechnologia, **Catholic University of Portugal**, funded by FCT.*
- Partner 4: *Thierry Ameglio, INRA, **Université Clermont Auvergne**, funded by ANR.*
- Partner 5: *Pierre Kastendeuch, Laboratoire des sciences de l'ingénieur, de l'informatique et de l'imagerie, **Strasbourg University**, funded by ANR.*



# PROJECT DESCRIPTION

**Cities suffer from a range of environmental problems, negatively impacting human well being**

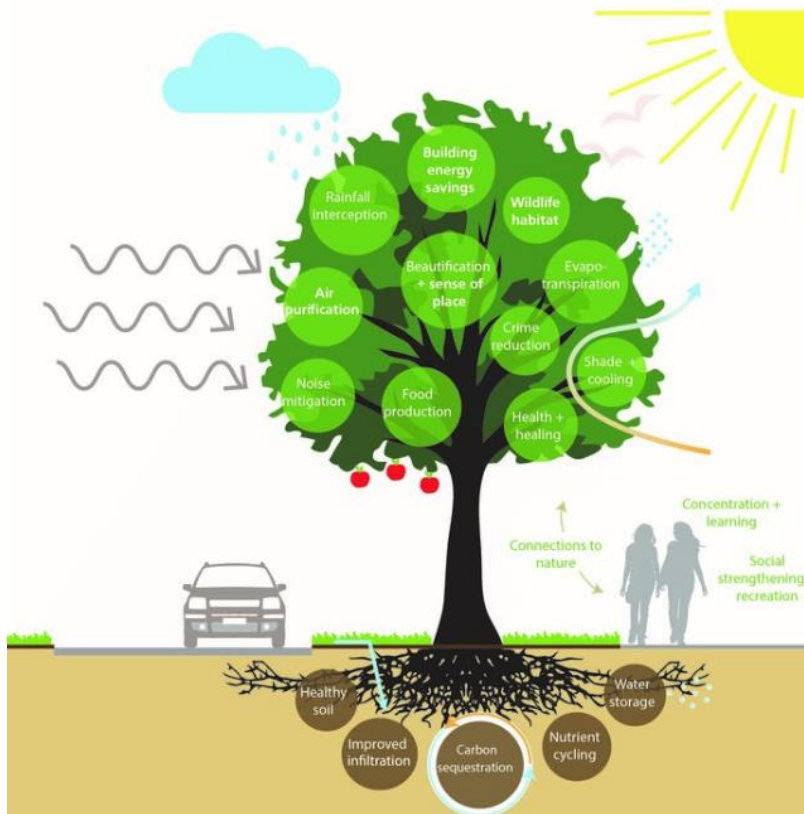


- Air pollution (NO<sub>x</sub>, Ozone, PM)
- Stormwater run-off and flooding
- Adverse microclimatic conditions : UHI

*Due to dark surfaces that absorb more solar radiation, heat capacity materials used & absence of cooling vegetation*

# PROJECT DESCRIPTION

**Urban trees mitigate environmental problems**



**Yet they face harsh environmental conditions, resulting in reduced health, jeopardizing ecosystem service provisioning.**

- Soil compaction and loss of aeration
- Nutrient & water shortages
- Salt and heavy metal pollution
- Pests and diseases



**General Hypothesis:**

**Symbiotic Ectomycorrhizal Fungi may mitigate these adverse environmental conditions**



# PROJECT DESCRIPTION

*Tilia tomentosa*

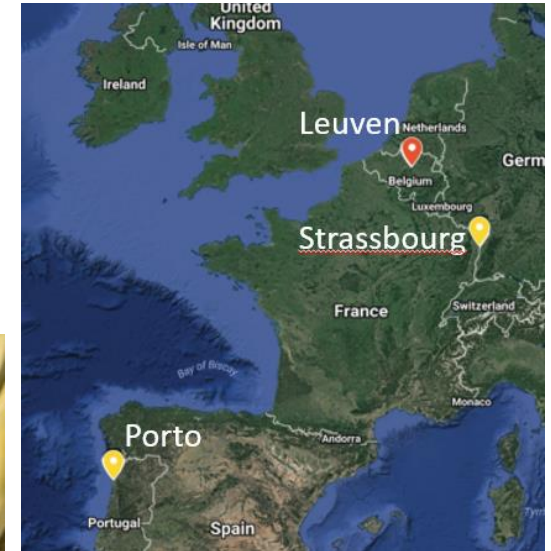


Linear Variable Displacement Transformer

H  
S  
R



Illumina sequencing



Different planting conditions

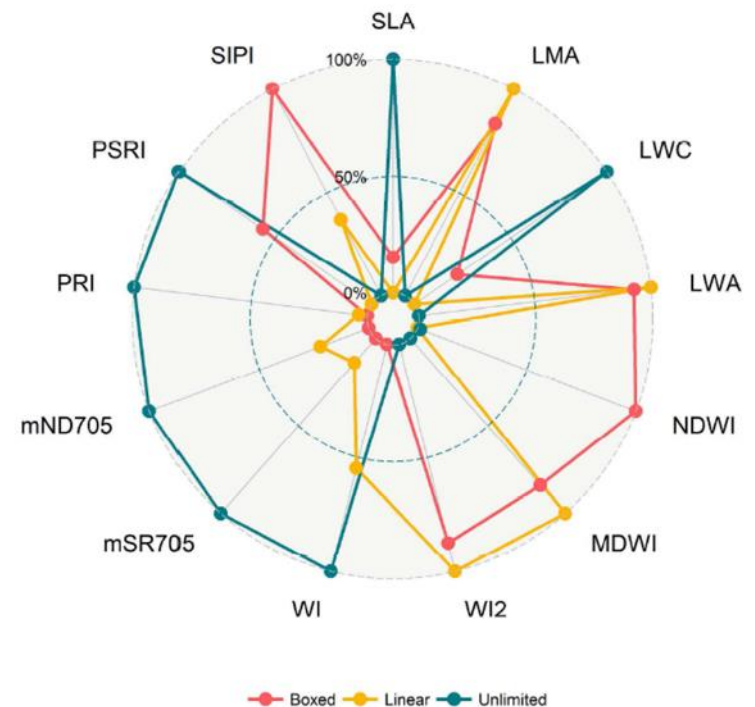
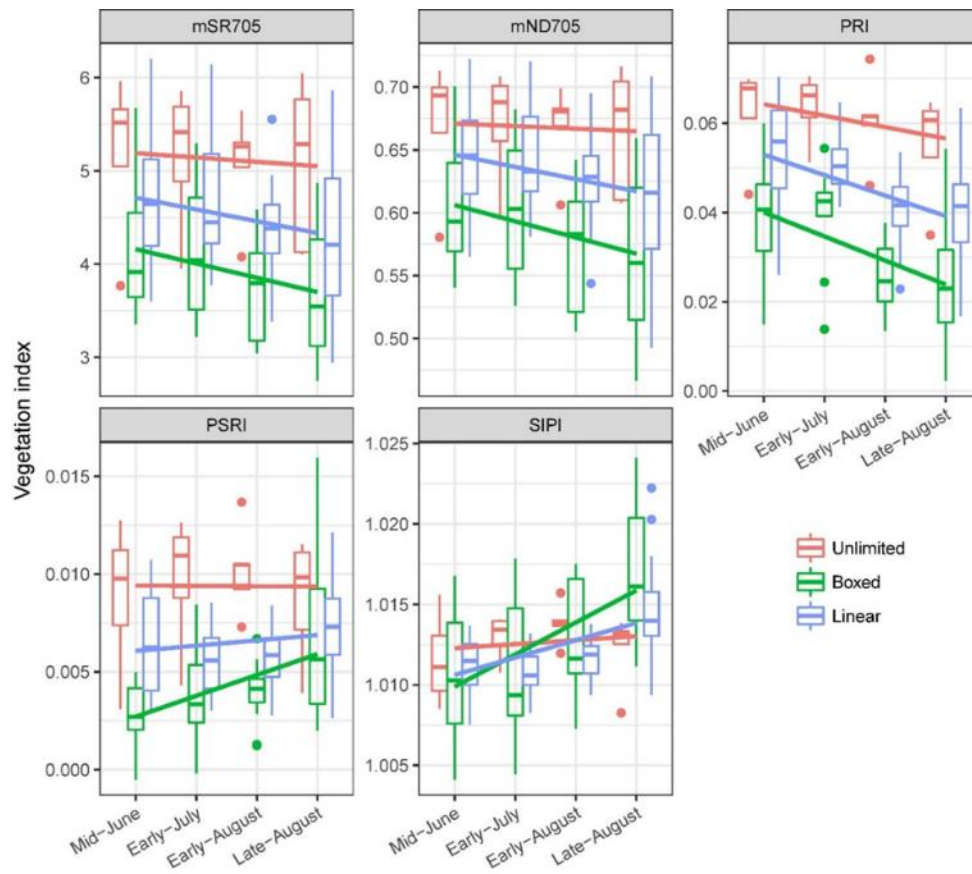


Inoculation experiments



# SCIENTIFIC OUTPUTS

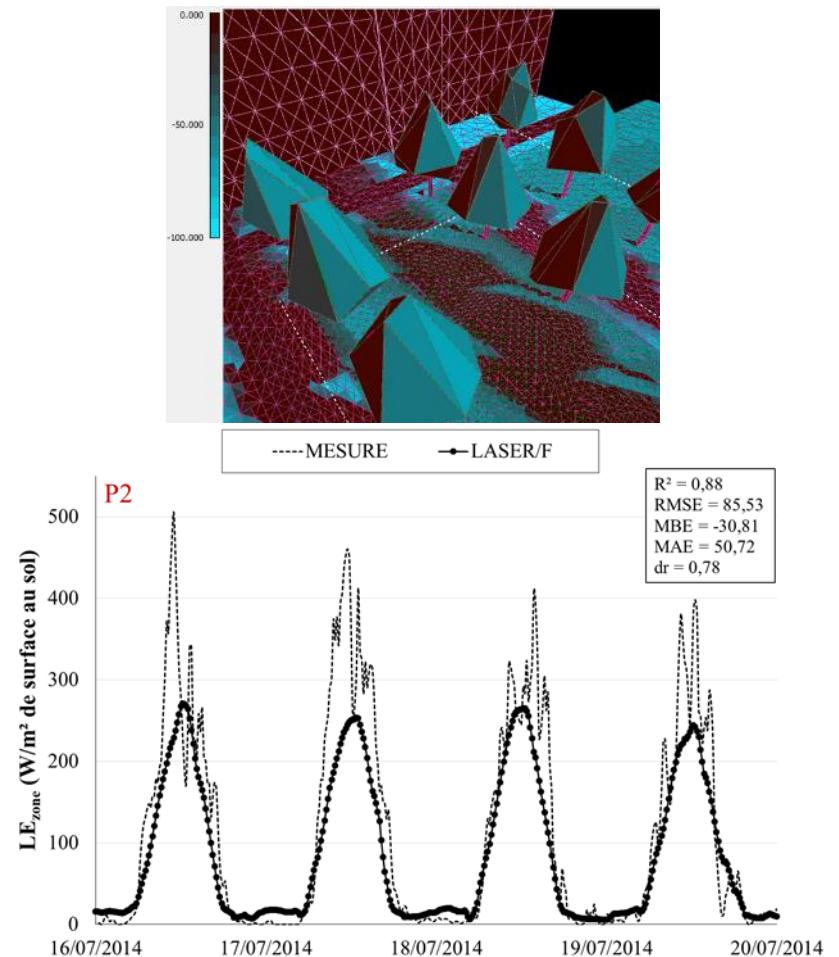
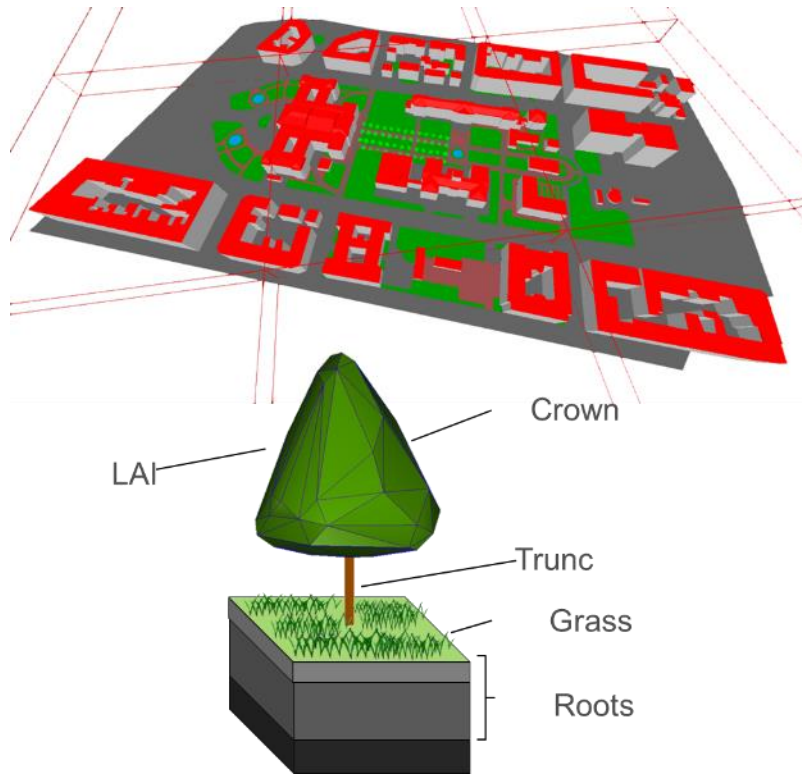
1. We developed a set of cost-effective hyperspectral image-based tree health indicators and quantified their response on planting conditions





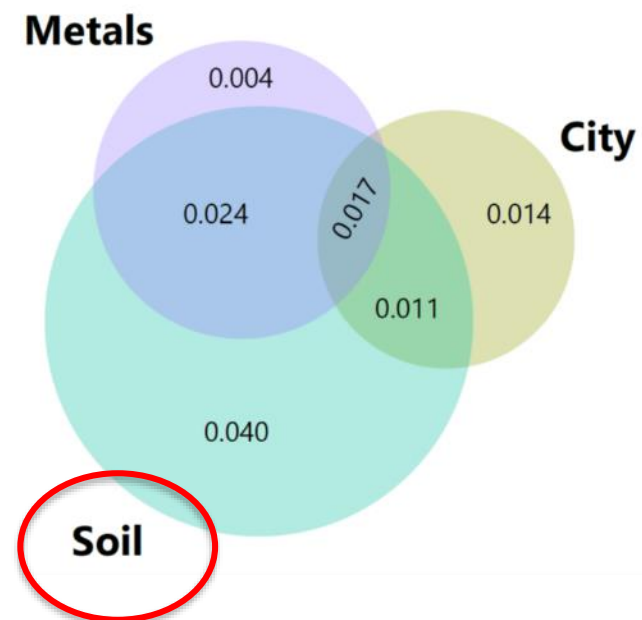
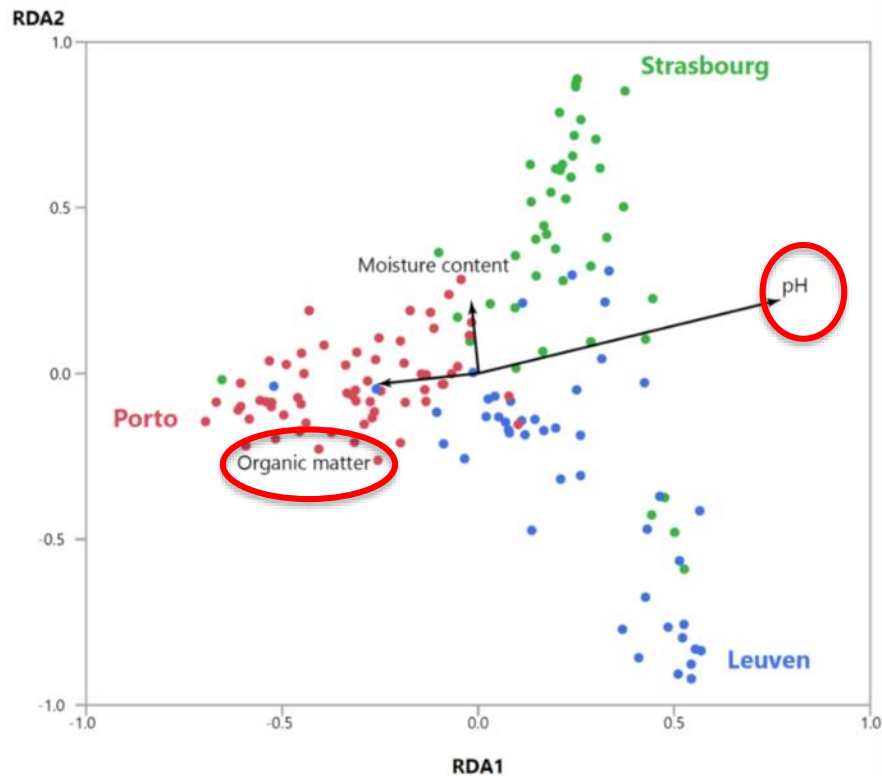
# SCIENTIFIC OUTPUTS

2. We developed and optimized a physical model to predict the impact of *individual* trees on the urban microclimate



# SCIENTIFIC OUTPUTS

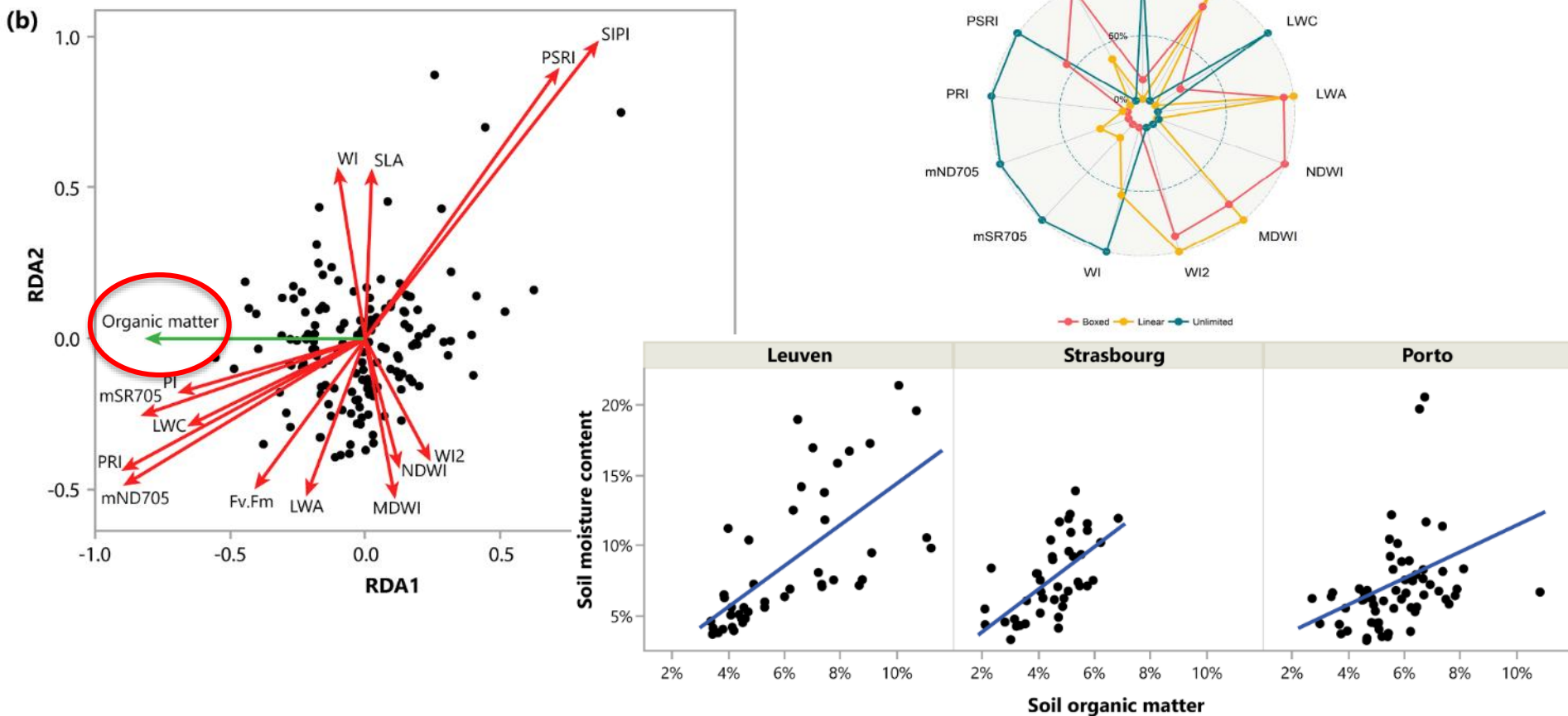
3. We quantified the environmental drivers of EcM richness and community composition of urban trees across tree European cities





# SCIENTIFIC OUTPUTS

4. We quantified the relative effects of (i) soil characteristics and (ii) EcM communities on tree health indicators



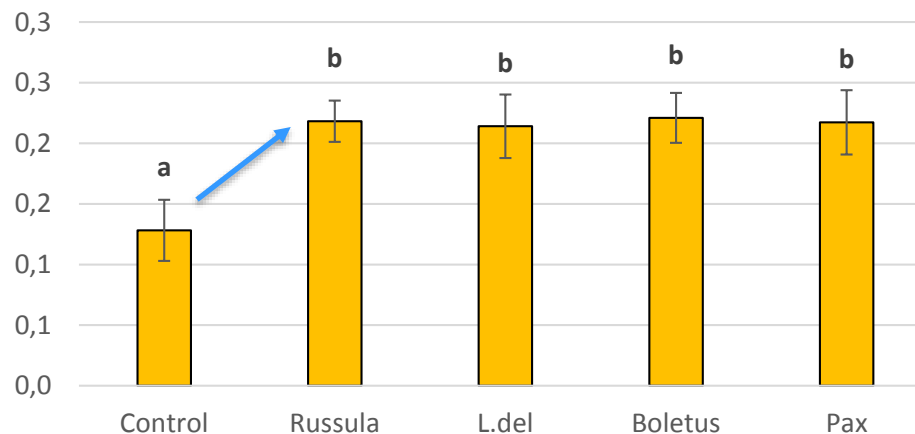
# SCIENTIFIC OUTPUTS

## 4. We developed and tested an EcM inoculum (*ex situ*) to improve urban tree health

Substrate pH	EcM fungi species	Inoculum type
Acid (~5,8)	<i>Russula parazurea</i>	Solid PDA
Alkaline (~7,5)	<i>Lactarius deliciosus</i>	Liquid MMN
	<i>Boletus edulis</i>	Alginate (3%) MMN
	<i>Paxillus involutus</i>	



ACID



# SCIENTIFIC OUTPUTS

4. We developed and tested an EcM inoculum (*in situ* and *ex situ*) to improve urban tree health (---ongoing---)

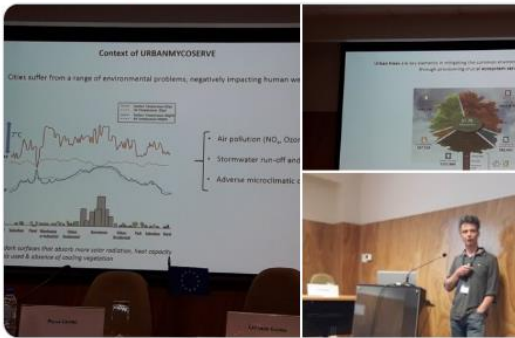


Linear Variable Displacement Transformer



# SOCIETAL / POLICY OUTPUTS

**PhytoSUDOE** @PhytoSUDOE · 17 apr. 2018  
 @olivierhonnay from the Project **#urbanmycoserve** explaining the important role of **#ectomycorrhizal** communities of **#urbantrees** in d **#ecosystems-services** in the 2nd **#PhytoSUDOE** stakeholders's works! **#kuleuven** **#Phytotechnologies**



**Olivier Honnay** @olivierhonnay · 6 mrt.  
 Mounting PepiPIAF dendrometers on Tilia trees in Porto for the **@BiodivErsA3** **@belspo** **#urbanmycoserve** project. Evaluating effects of mycorrhizal inoculation.  
 As it was an official holiday for the city greenery service, we got help from the Porto firefighters.



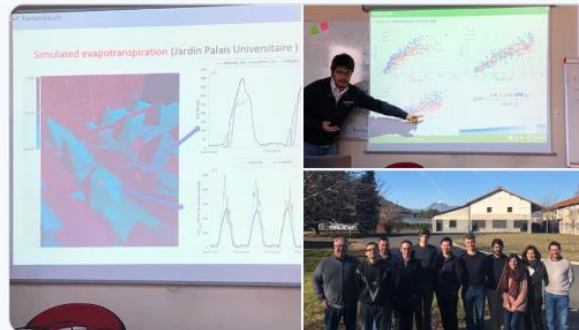
**UMR PIAF** @UMR\_PIAF · 13 apr. 2017  
**UrbanMycoServe**, a new **@BiodivErsA3** project of **@UMR\_PIAF**, launches its web site: [urbanmycoserve.org](http://urbanmycoserve.org)



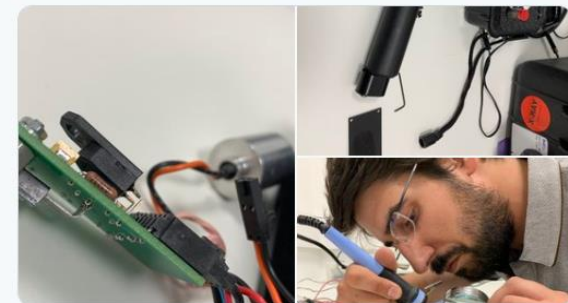
**Wouter Florizoone** @wflorizoone · May 30, 2018  
 Civic Lab tonight with Dr. Kang Yu explaining preliminary results on integration of **#leuvenair** data with remote sensing data to assess urban tree health in **#Leuven** @dforNatLan @LeuvenU **#citizenscience**



**Olivier Honnay** @olivierhonnay · 5 feb.  
 Third **@BiodivErsA3** **#urbanmycoserve** meeting. In the shadow of the Puy de Dome. Discussing urban heat islands and urban trees.



**K'ong Yu** @kan9yu · 11 sep.  
 Sep 6 an unexpected episode that the lamp of Spectravista leaf clip didn't work just when our leaf samples were prepared, but luckily Miguel has everything to fix the broken welded joint! enjoyed fieldwork in Porto **#urbanmycoserve**





# SOCIETAL / POLICY OUTPUTS

<http://www.urbanmycoserve.org/>



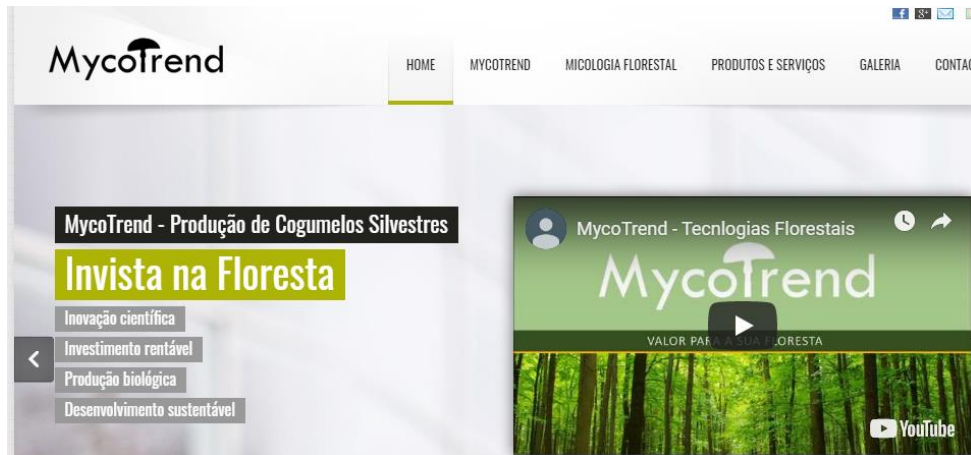
<https://youtu.be/yZ6R1Sfhyuw>

# SOCIETAL / POLICY OUTPUTS



**Porto city council** has shown interest in the application of the technology.

The council will search for funding opportunities to establish mycorrhization as good practice of urban transplantation.



Mycotrend was involved in improving effectiveness of the inoculum in the field. Optimization EcM carriers

# SOCIETAL / POLICY OUTPUTS

Further dissemination activities when results of *in situ* inoculation experiment are available.



## Afspraak, openingsuren en contact

Afspraak maken | Openingsuren stadskantoor  
| Stadsdiensten | Zwembaden | Dienst  
mobiliteit | [Toon meer](#)

## Vrije tijd

Agenda | Bibliotheek | Koopzondagen |  
Bezoek Leuven | Kinderen, jongeren | Sport  
| [Toon meer](#)

## Aanvragen en documenten

Verhuizen | Identiteit en reizen | Geboorte en  
overlijden | Trouwen en samenwonen |  
Rijbewijzen | Akten en attesten | [Toon meer](#)

# ACKNOWLEDGEMENTS



**FCT** Fundação  
para a Ciência  
e a Tecnologia



ANR