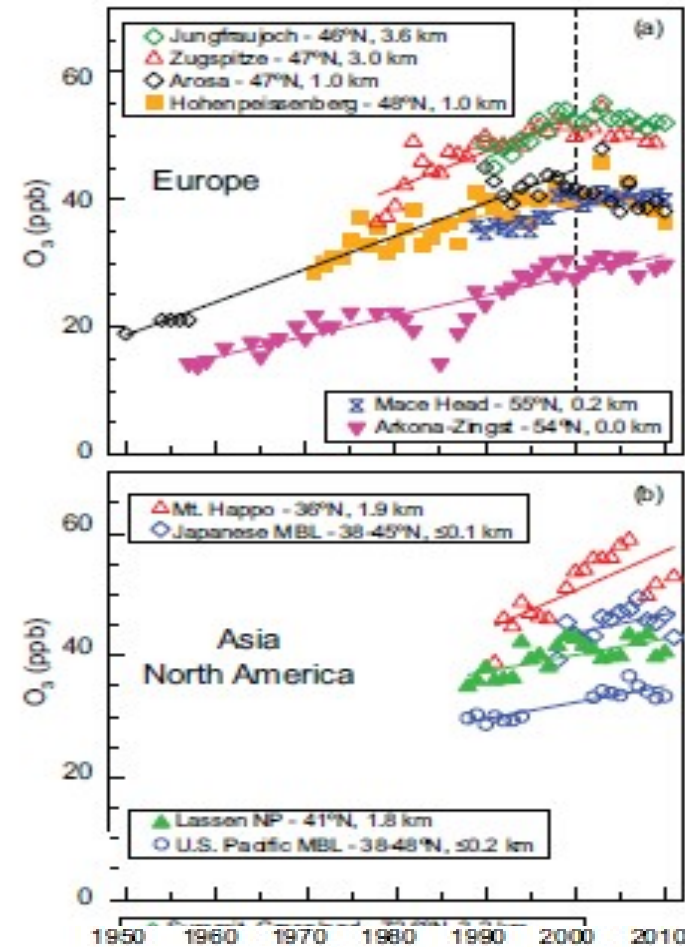
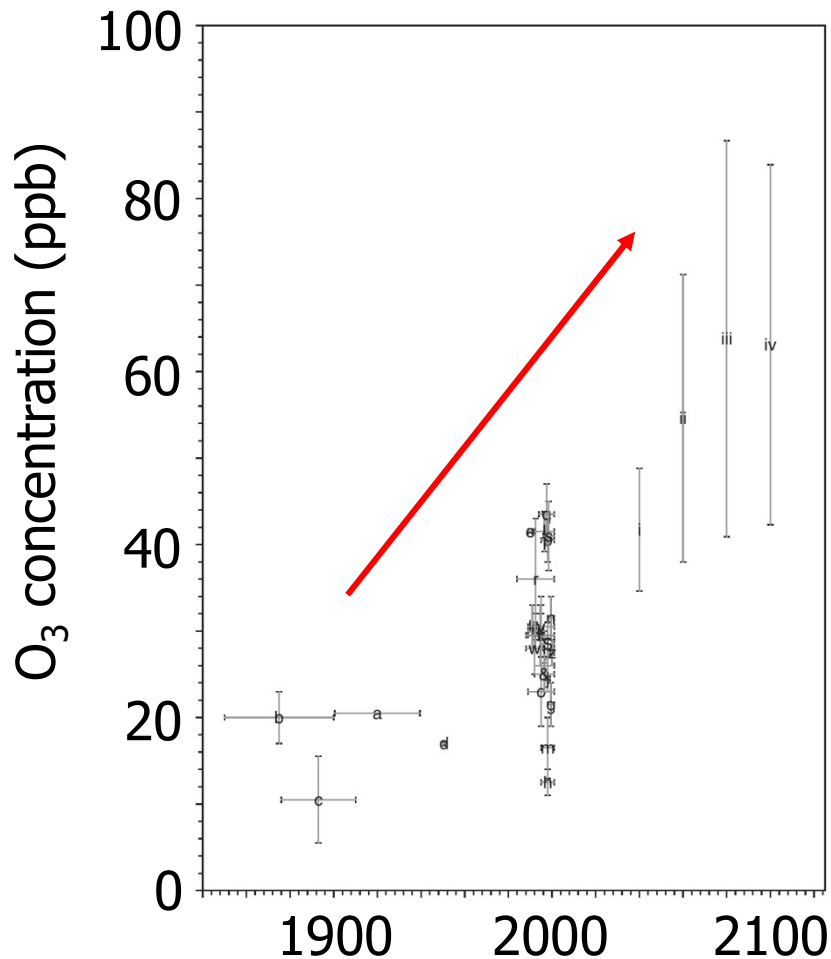


Simulazione degli effetti dell'ozono in *free air* in Italia



Elena Paoletti and *Yasutomo Hoshika
IPSP-CNR, Italy

Tropospheric ozone (O_3) concentration has increased in northern hemisphere.



Source: Vingarzan, 2004 (*Atmos Environ*) Hartmann et al., 2013 (*IPCC report*)

Experimental approaches



Open top chamber



Environmental control room



Open top chamber



O₃ FACE (Free-Air Controlled Exposure)

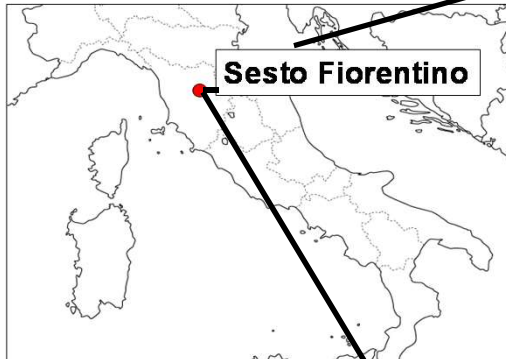
In this presentation:

A new-generation 3D Free-Air O₃
FACE is now available in Italy for
testing plant responses to O₃.

Here we introduce this facility and
propose a risk assessment
approach.

(Paoletti et al., 2016, *Sci Tot Environ*; Hoshika et al.,
in prep)

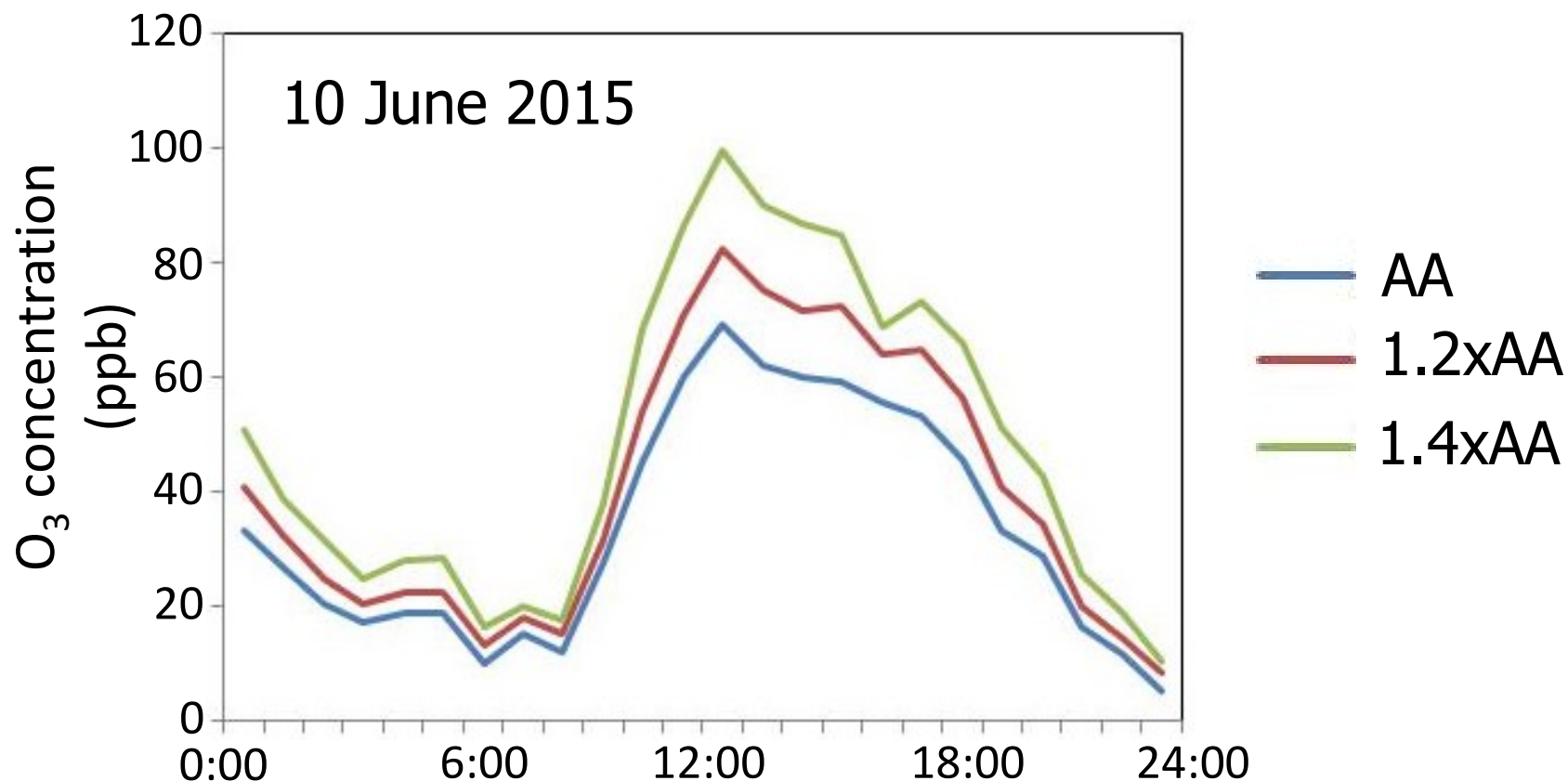
New O₃ FACE in Italy (Florence)



Three O₃ levels (in 2015)

1. Ambient (AA),
2. Ambient x 1.2 (1.2xAA),
3. Ambient x 1.4 (1.4xAA).

New O₃ FACE in Italy (Florence)



Three O₃ levels (in 2015, daily mean average)

1. Ambient (AA): 35.0 ppb,
2. Ambient x 1.2 (1.2xAA) 43.0 ppb,
3. Ambient x 1.4 (1.4xAA) 49.0 ppb.

Current Projects in the new O₃ FACE

In 2015:

- (i) Stomatal responses to O₃ in Oxford poplar,
- (ii) Growth and performance of oaks to O₃ and drought
- (iii) Responses of two sugarcane cultivars to O₃.

In 2016:

- (i) Growth and physiology of Oxford poplar clone exposed to O₃, nitrogen and phosphorus
- (ii) Snapbean responses to O₃ and antioxidants
- (iii) Growth of Brazilian tree species under O₃



Risk assessments based on the data from the new O₃ FACE

Species:

Quercus robur, *Q. pubescens* (deciduous)
Q. ilex (evergreen)

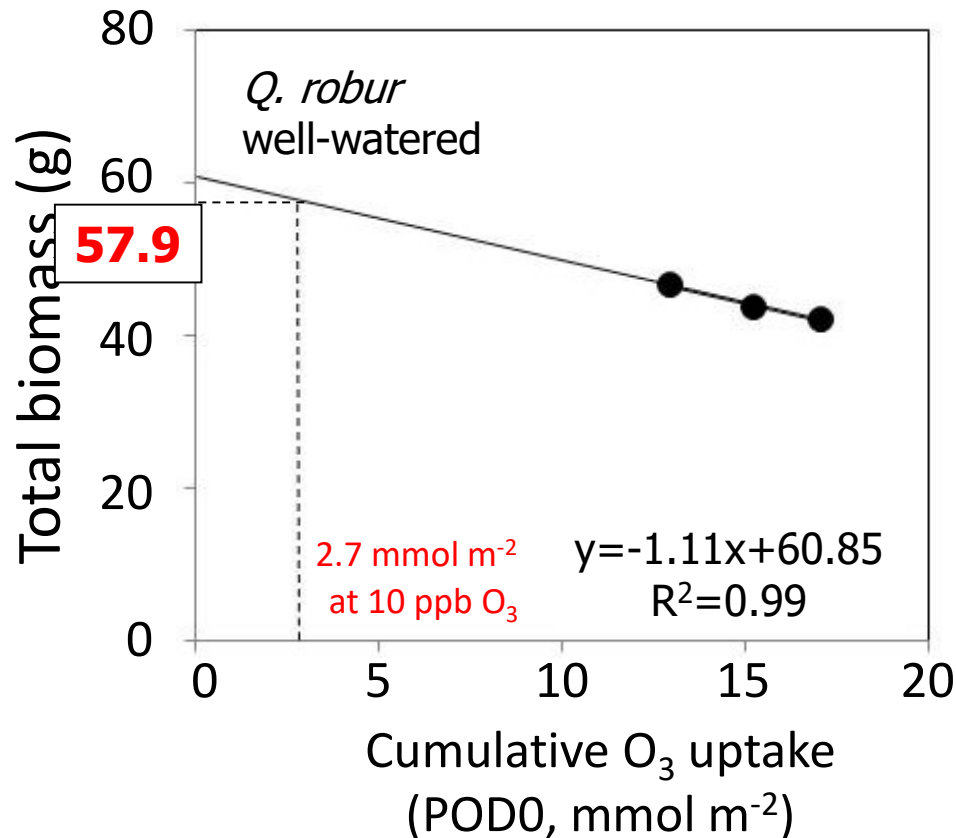
Three levels of O₃ treatments
AA, 1.2xAA, 1.4xAA

Three levels of water treatments
1.2L/day (well-watered),
0.6L/day (intermediate),
0.12L/day (water-stressed)



Risk assessment (O₃ FACE)

*Relative biomass was assumed to be 1.0 based on the stomatal O₃ uptake estimated from the pre-industrial level (10 ppb) (Paoletti et al., 2016, *Sci Tot Environ*)

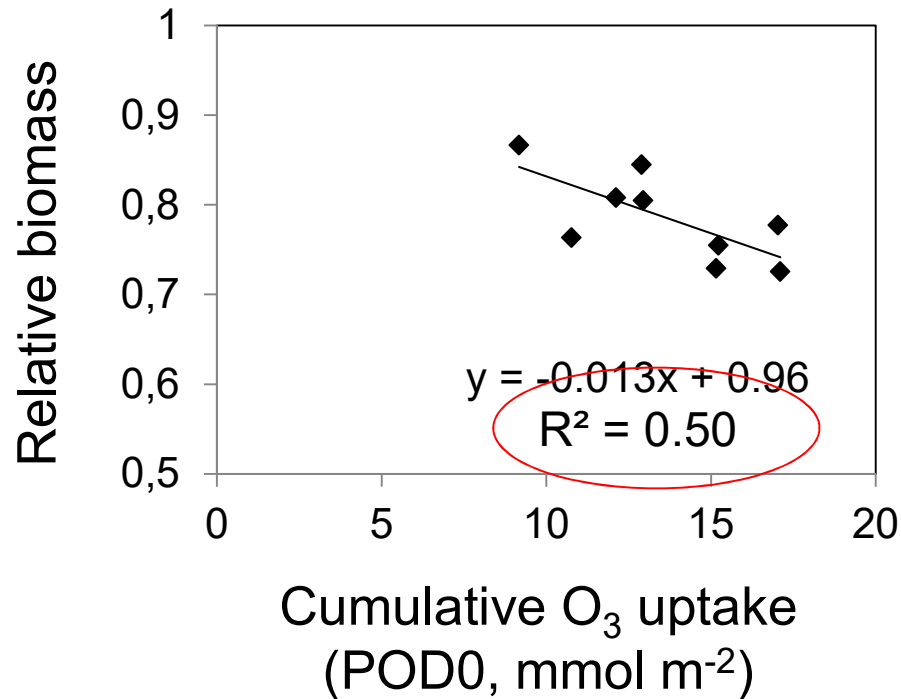


Relative value = 1
Q. robur

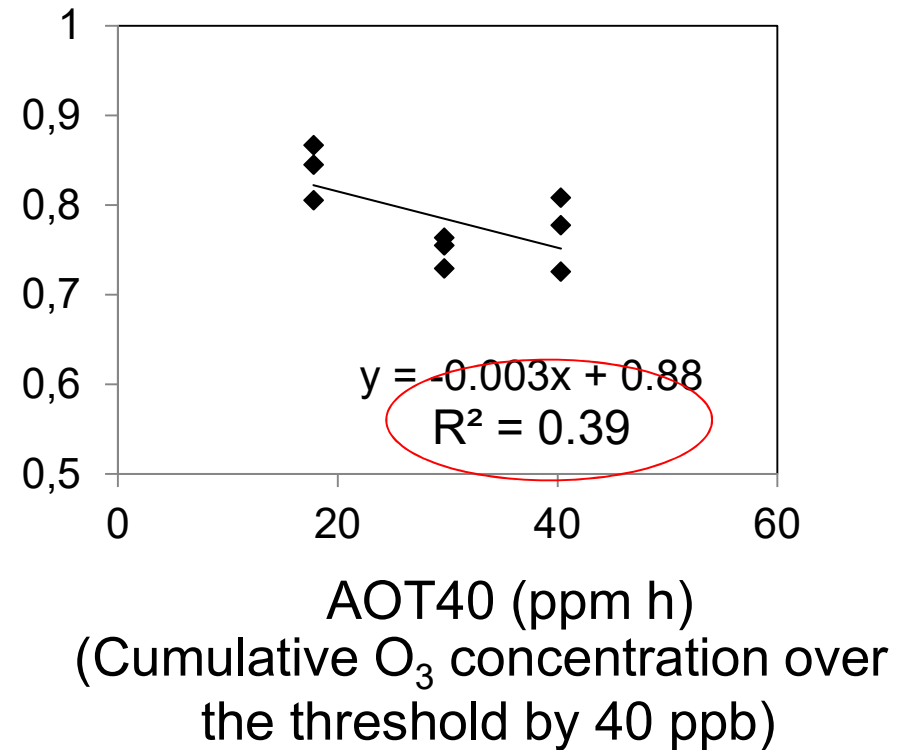
Well-watered: 57.9 g
Intermediate: 51.8 g
Water-stressed: 37.0 g

AOT40 vs stomatal O₃ uptake (*Q. robur*)

Stomatal flux-based approach

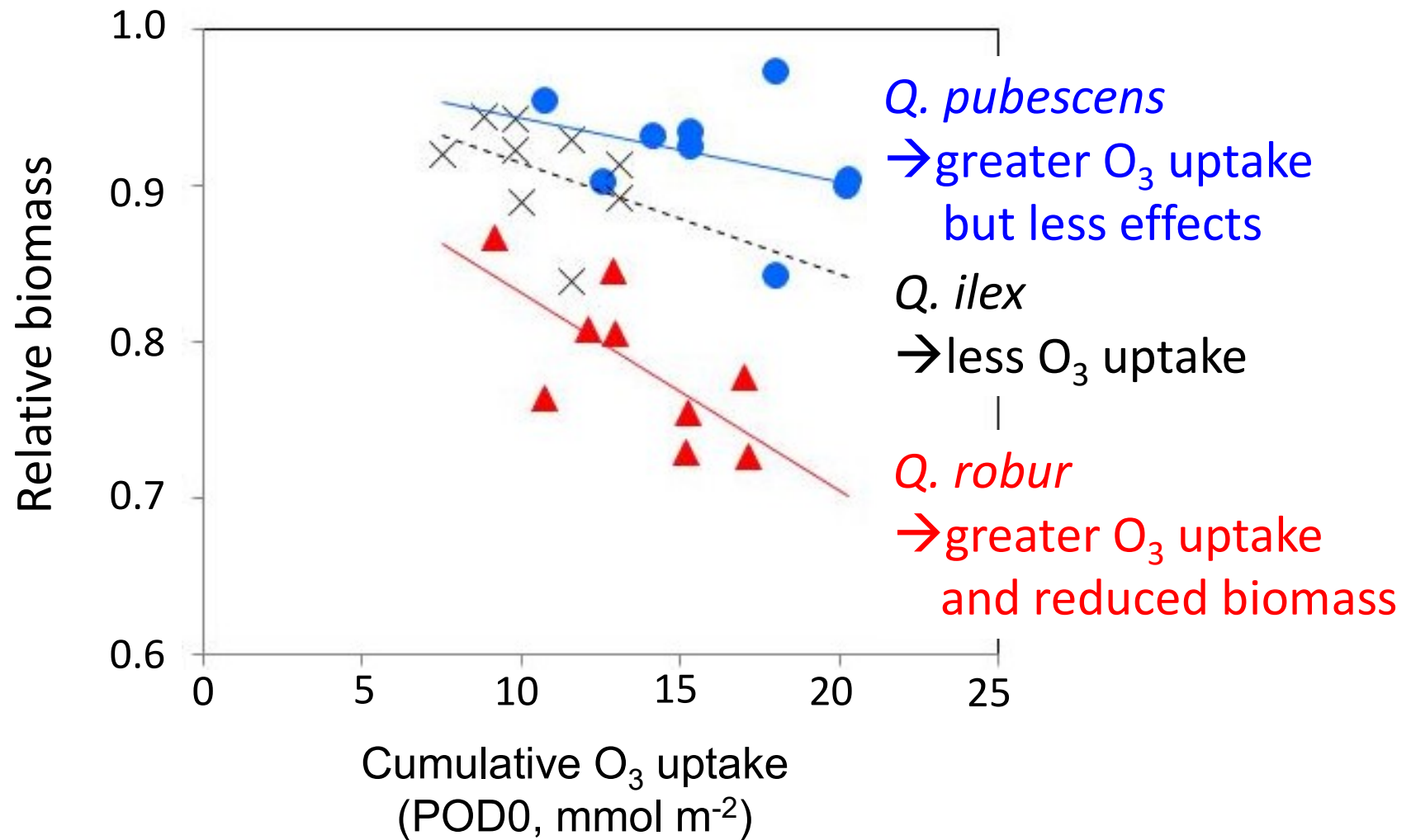


Concentration-based approach



R^2 is higher in the stomatal flux-based approach.

Stomatal-flux based risk assessments



Sensitivity:

$Q. robur > Q. pubescens \geq Q. ilex$

Acknowledgement

We thank the heartfelt collaborators:

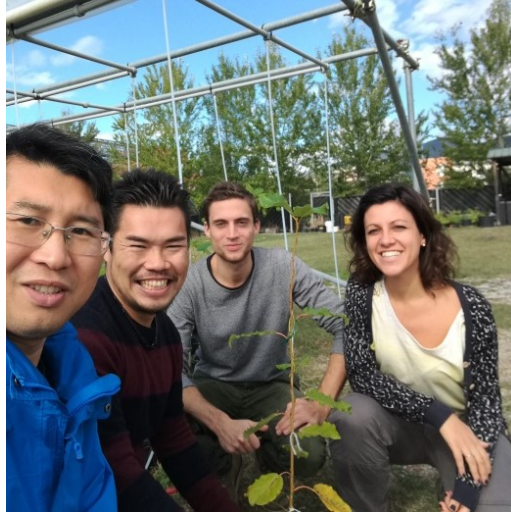
Prof.ssa. Cristina Nali (Univ. Pisa),
Dott. Marcello Vitale (La Sapienza Univ.),
Dott. Silvano Fares (CREA),
Dott.ssa. Hojka Krajgher (SFI, Slovenia),
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Dott. Rafael V. Ribeiro (UNICAMP, Brazil),
Dott. Pierre Vollenweider (WSL, Switzerland),
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The new collaboration is always welcome!!



Thank you for your attention!!