



Department of Agriculture,
Food and Environment



Università di Pisa
Corso di Dottorato di Ricerca in
Scienze Agrarie, Alimentari e Agro-ambientali

PhD Program on Agriculture, Food and Environment



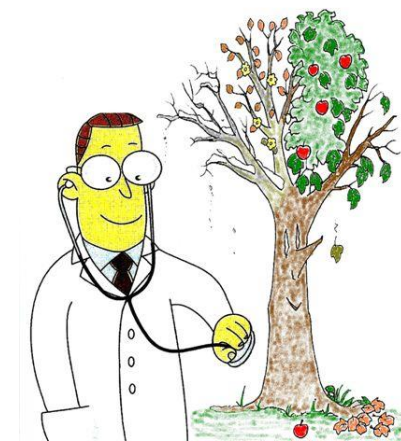
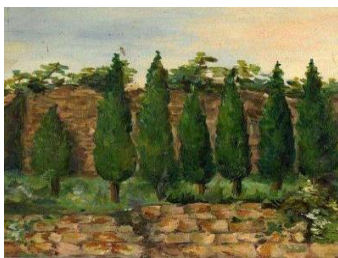
1st International Workshop


PLANT PHYSIOLOGY IN THE URBAN ENVIRONMENT

Pisa, June 23, 2014

A challenging job: Plant Pathology in the urban environment

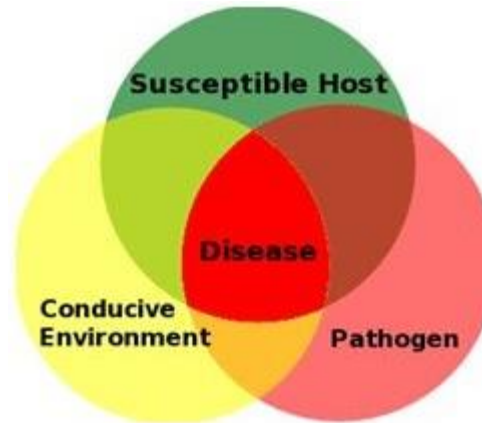
giacomo.lorenzini@unipi.it





*An ornamental tree is a forest
plant which is treated as a fruit
plant, compelled to live in an
hostile environment*

The 'disease triangle'



Natural environment

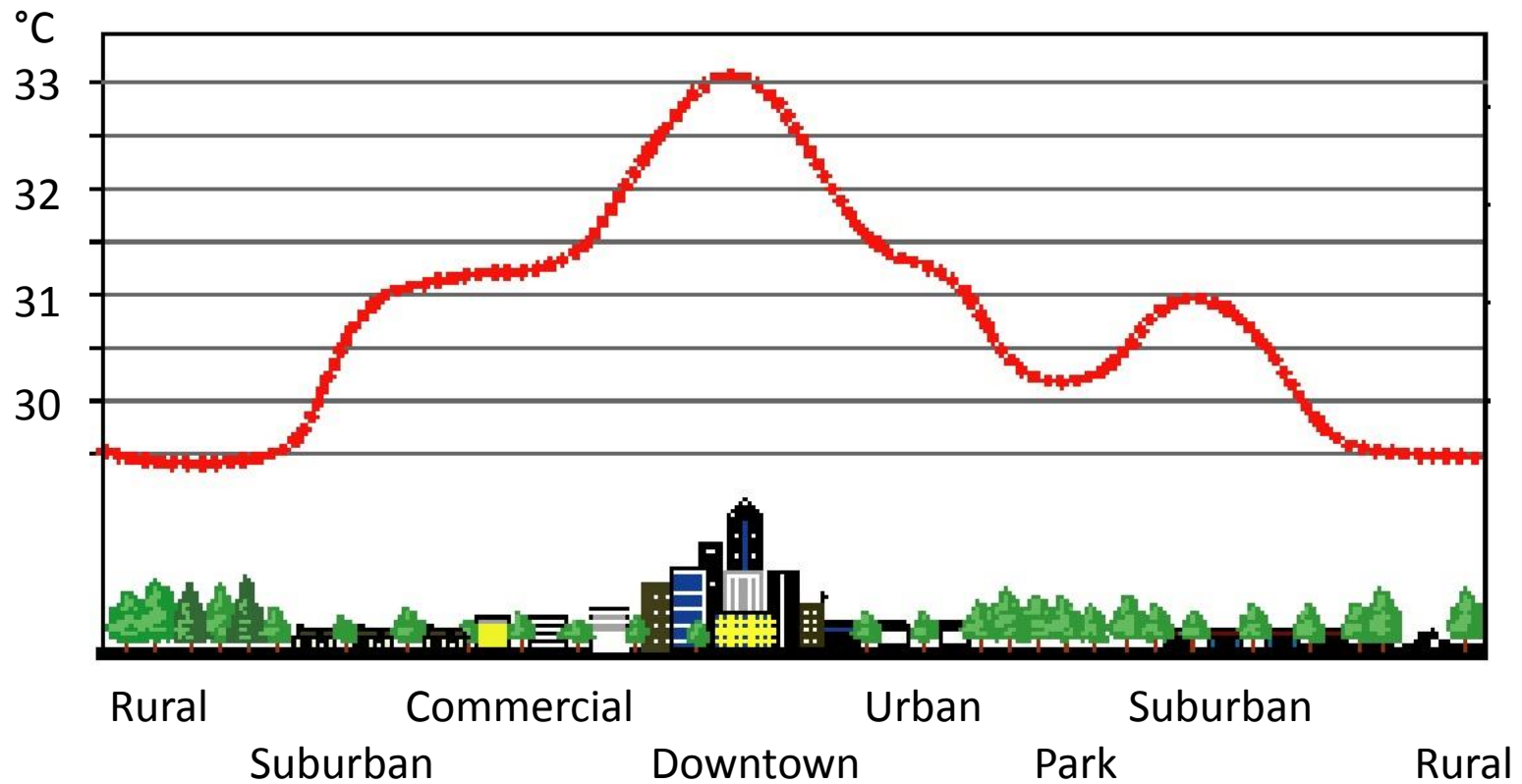


Urban environment

- ✓ soil compaction
- ✓ less oxygen in soil
- ✓ more carbon dioxide in soil
- ✓ poor mycorrhiza infection
- ✓ reduced organic matter in soil
- ✓ reduced root growth
- ✓ anomalous lighting
- ✓ **higher temperature**
- ✓ **toxic elements/substances in soil/water/air**

Street trees are exposed to a variety of site conditions, environmental factors, and physical disturbances which influence their survival in urban areas.

Sketch of an urban heat-island profile



Who is the **worst pathogen** for an urban tree?

MAN!



London plane (*Platanus*) blue canker (*Ceratocystis platani*): the silent killer



Its main vector?

An infected chain saw!

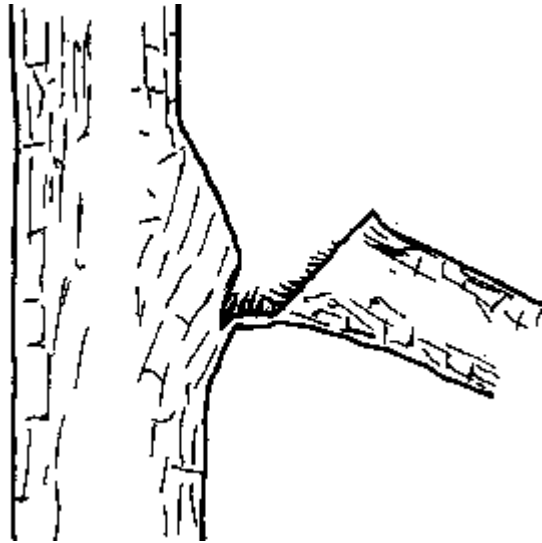


Trees must be shaped and forged when young

codominant leaders with included bark = weak fork

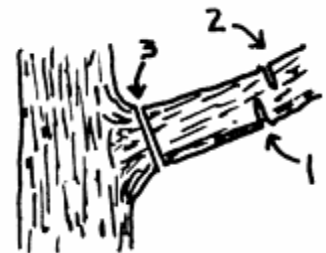


Pruning is an art ...

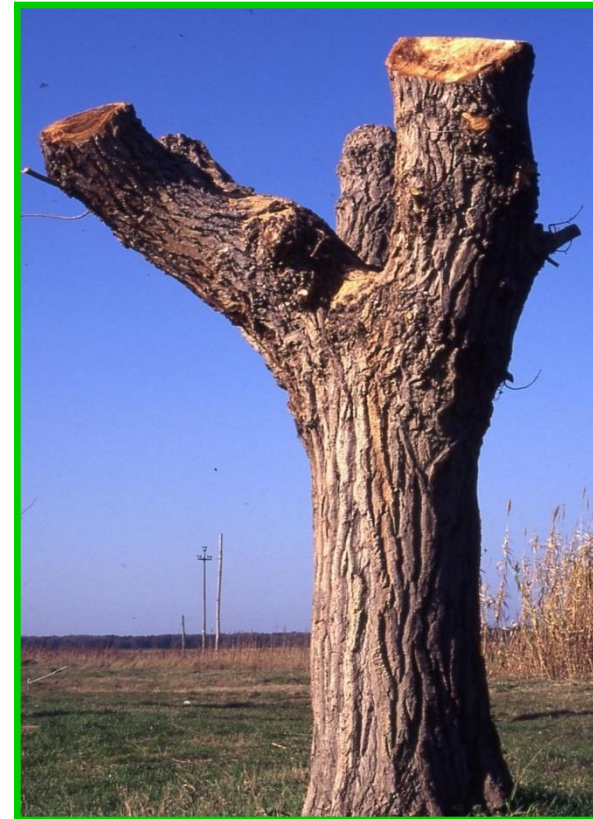


improper pruning = bark ripping

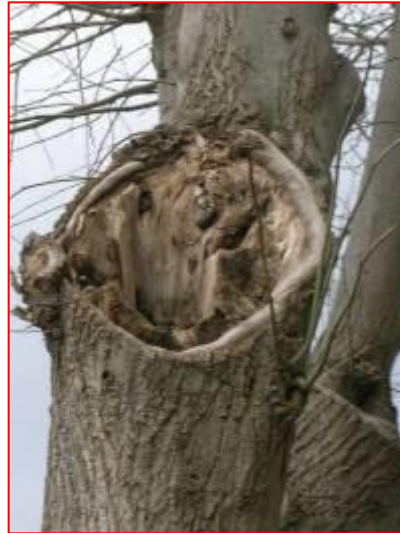
correct pruning is a 3-stage process



... and topping is a crime



Wood decay as a consequence of unskillful pruning



Weak/diseased trees can be dangerous (and killers)



Work in progress = **trees in danger**



Trees in danger = people at risk



Daily tree care (and respect) should be the rule



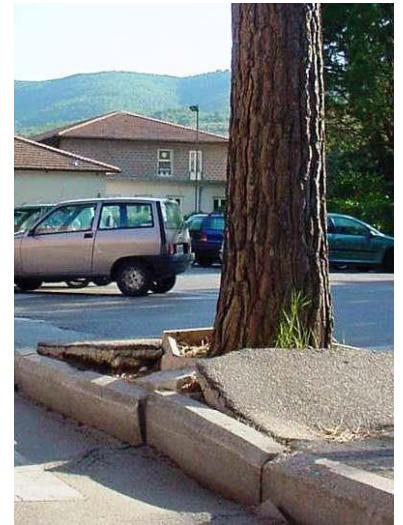
Plants require proper water availability



a laurel hedge died from thirst

Plants need/deserve their critical space

designers must be aware that trees grow in the course of time



Plants need/deserve their critical space, part II



Wrong green maintenance may be detrimental

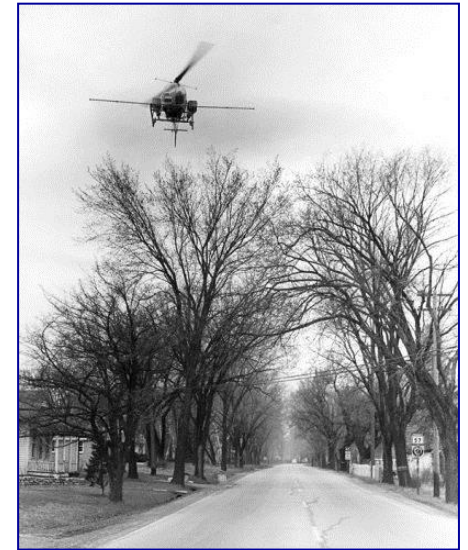
grass trimmer should be kept far from tree collar



or collar should be sheltered

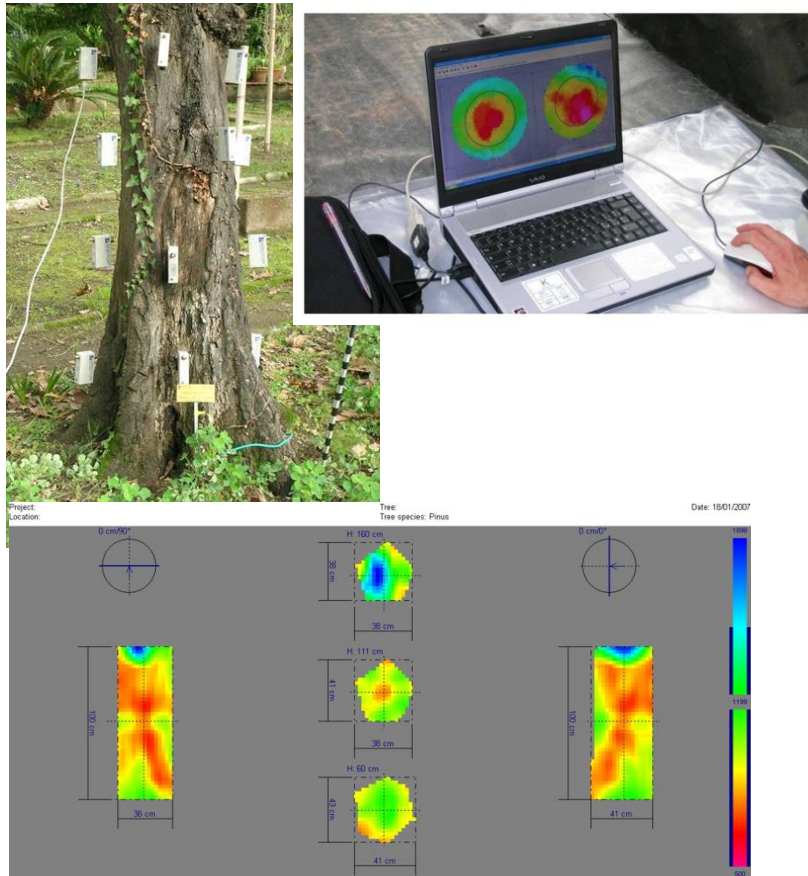


In the urban environment no chemical may be applied to protect plants

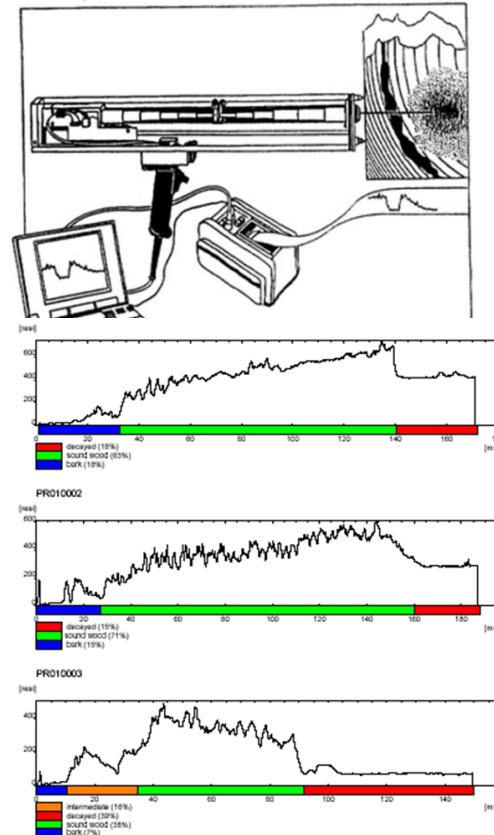


Aerial spraying against
the insect vector of
Dutch Elm Disease.
USA, early '60s

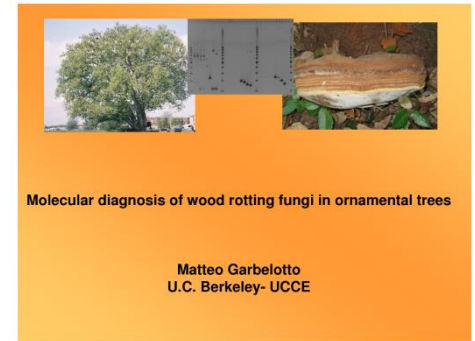
Urban plant pathology may rely on modern technologies for diagnosis



Sonic tomography

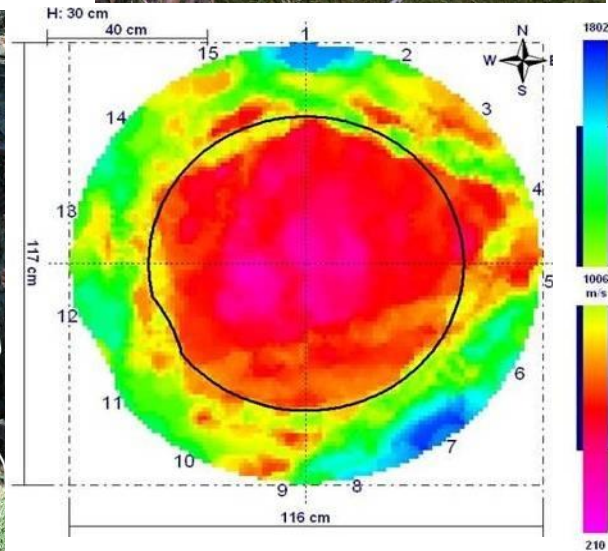


Dendropenetrometry

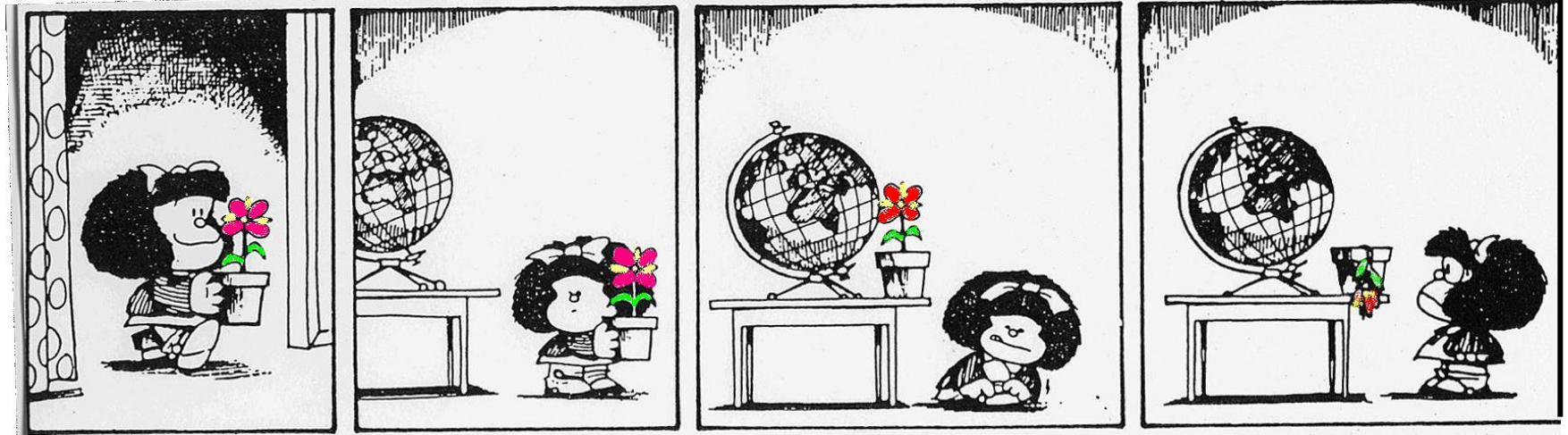


Molecular diagnosis

Quercus ilex in Lucca

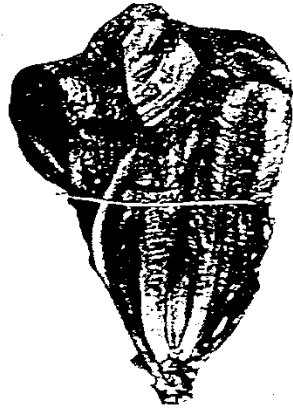


Plants are an easy target of air pollution



Urban air is toxic to plants

1911: *Growth of lettuce plants in plots at different distances from city center (Leeds, UK)*



Garforth.
175 grams.



Weetwood.
140 grams.



Headingley.
120 grams.



University.
104 grams.



Park square.
56 grams.



Hunslet.
44 grams.

Ozone-like symptoms observed on shade trees

a) *Liriodendrum tulipifera*

b) *Carpinus betulus*

c) *Viburnum lantana*

d) *Fraxinus excelsior*

e) *Sambucus racemosa*

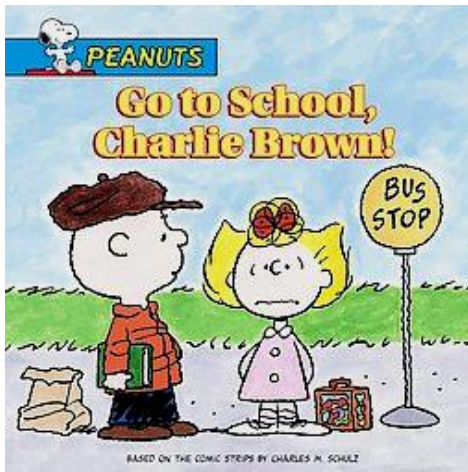
f) *Tilia cordata*



Plant Pathology in the
urban environment
requires specialists!



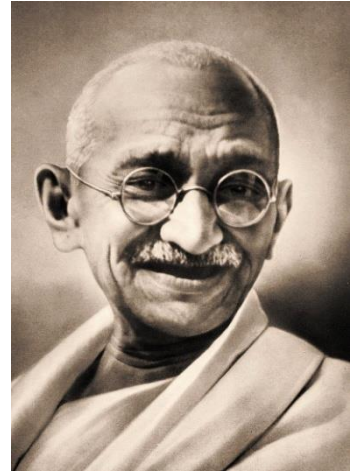
We need specific competences:
the crucial role of formation



YESTERDAY

Mohandas Karamchand (*Mahatma*) **Gandhi** (1869-1948)

The greatness of a nation and its moral progress can be judged by the way its animals are treated

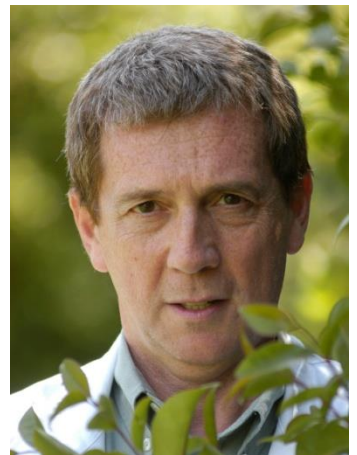


TODAY

Giacomo **Lorenzini** (1951-)

The greatness of a nation and its moral progress can be judged by the way its animals

and its urban trees are treated



Many thanks to
Domenico **Francese**,
the author of the sketches

