World Forum on Urban Forests Mantova 2018

session **Poster**
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title COnservation of VEteran trees within historical gardens (COVE): A case study applied to *Platanus orientalis* L. in central Italy
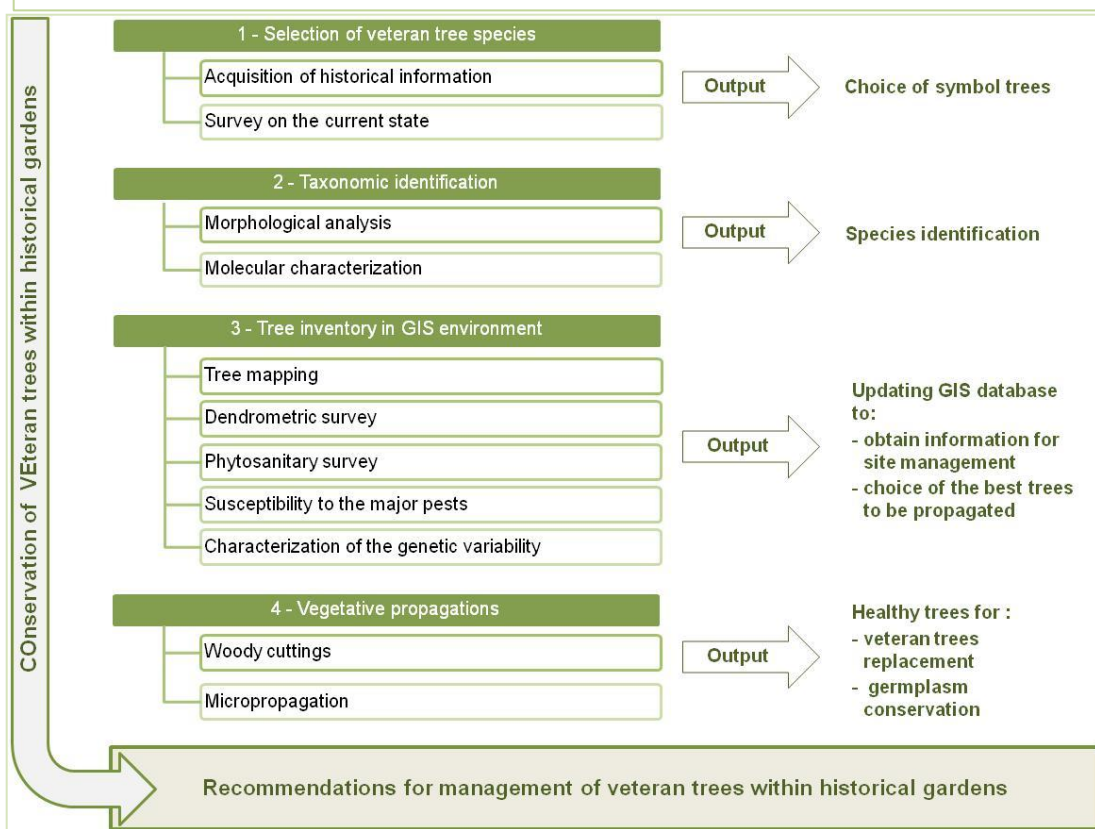
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> Many veteran trees characterize the landscape of Renaissance parks and gardens, representing unique values from historical, cultural, ecological and social point of view


COnservation of VEteran trees within historical gardens

1 - Selection of veteran tree species
- Acquisition of historical information
- Survey on the current state
→ Output → Choice of symbol trees

2 - Taxonomic identification
- Morphological analysis
- Molecular characterization
→ Output → Species identification

3 - Tree inventory in GIS environment
- Tree mapping
- Dendrometric survey
- Phytosanitary survey
- Susceptibility to the major pests
- Characterization of the genetic variability
→ Output → Updating GIS database to:
- obtain information for site management
- choice of the best trees to be propagated

4 - Vegetative propagations
- Woody cuttings
- Micropropagation
→ Output → Healthy trees for:
- veteran trees replacement
- germplasm conservation

→ Recommendations for management of veteran trees within historical gardens

1) Selection of veteran tree species

www.comune.viterbo.it | https://www.google.it

The **COVE model** was applied to the **plane trees** within the Renaissance gardens of **Villa Lante della Rovere** of Bagnaia (Viterbo) and **Palazzo Farnese** at Caprarola (Viterbo, Central Italy). A letter (1576) sent by cardinal Gambara to Ottavio Farnese (Duke of Parma and Piacenza and brother of cardinal Alessandro Farnese) described the establishment of a formal garden with plane trees at Bagnaia.
To date, 23 specimens survive at **Villa Lante della Rovere,** and only two at **Palazzo Farnese**.

------ *P. orientalis* - Villa Lante della Rovere ------ | ------ *P. orientalis* - Palazzo Farnese ------
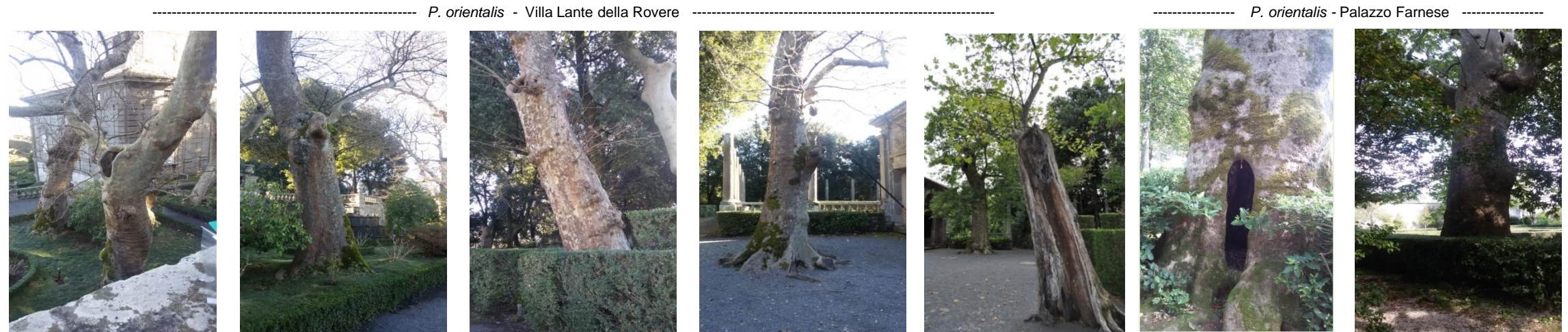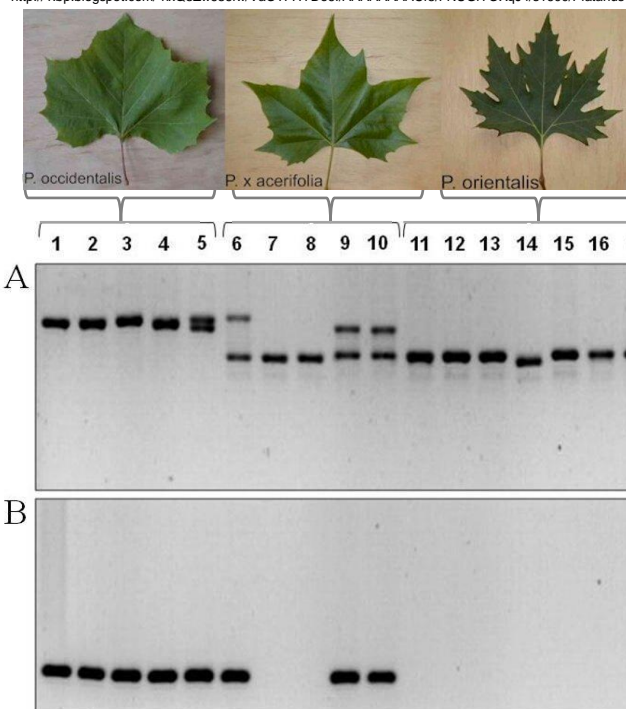

2) Taxonomic identification
All the plane trees within the formal gardens of Villa Lante and Palazzo Farnese showed the typical leaf and bark shape of *P. orientalis.*

Molecular characterization
A LEAFY gene amplification strategy was carried out on the same individuals in comparison with 15 accessions from an ex situ collection (INRA, Avignon - France) of the three main species of genus *Platanus* (*P. orientalis*, *P. occidentalis*, and *P. x acerifolia*).
All the plane trees of Villa Lante and Palazzo Farnese belong to *P. orientalis.*

3) Tree inventory in GIS environment
Tree mapping and dendrometrical survey
Plane trees were measured and mapped.
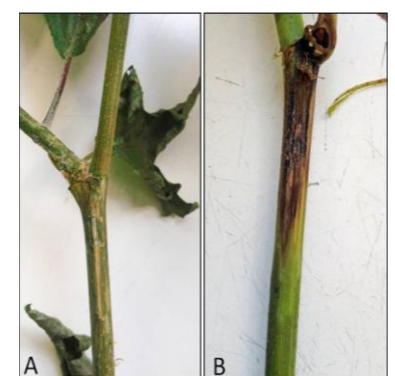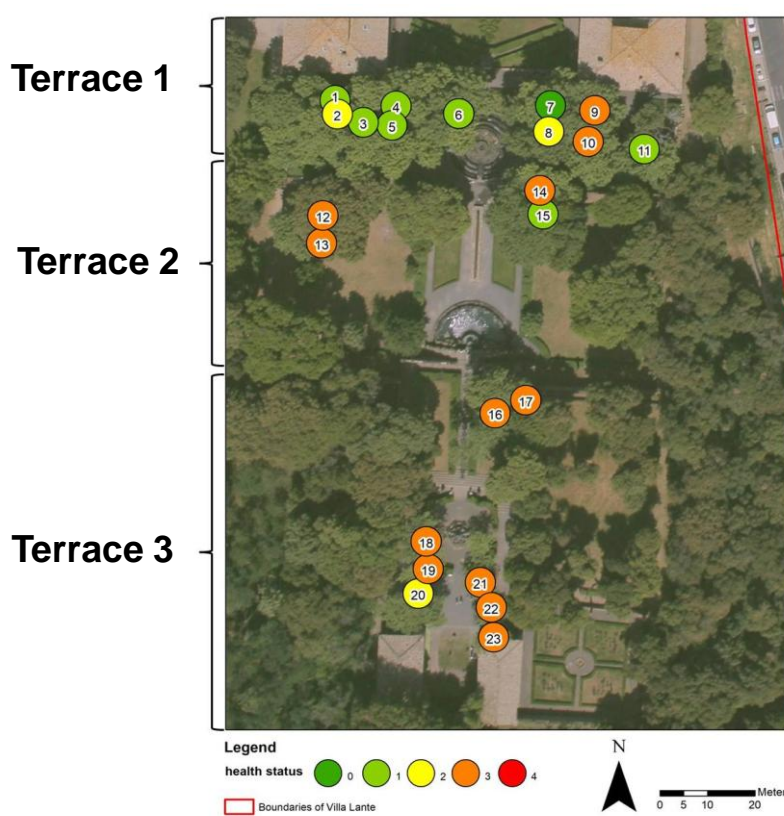Some plants reach exceptional diameter values.

Phytosanitary survey
Five visual classes of desease severity:
from 0 (healthy tree) to 4 (dead tree) were adopted.

Pathogenicity test
Two isolates of *Ceratocystis platani* caused lesions on freshly cut twigs. No significant differences (P > 0.05) in aggressiveness between the isolates were observed.

Characterization of the genetic variability
ISSR molecular markers highlighted a remarkable genetic similarity for both the specimens of Villa Lante and Palazzo Farnese, confirmed their membership to *P. orientalis.*

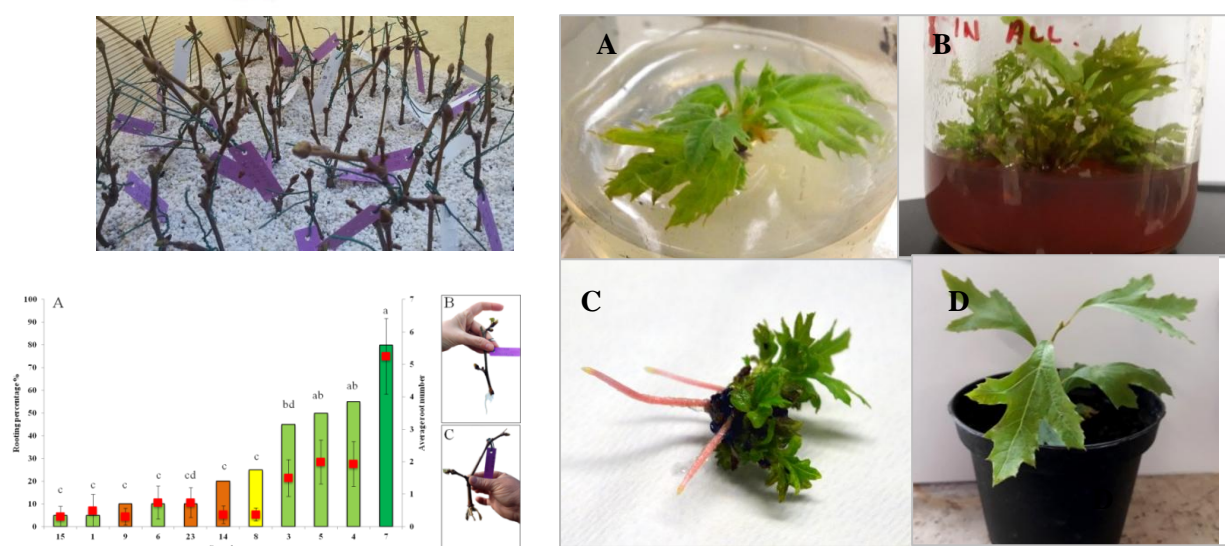## 4) Vegetative propagations
Woody cuttings
Rooting and number of roots per cutting were strictly associated with the phytosanitary status of the 11 mother plants.

Micropropagation
Healthy plants from veteran trees were obtained by node cultures in KROP medium *ad hoc* developed.

Conclusions
❖ Phenotypic and genetic similarity suggest that
  P. orientalis veteran trees of the Renaissance gardens belong to the original planting.
❖ Trees are susceptible to *C. platani*,
  even if the pathogen is not detected in the gardens.
❖ Veteran trees were successfully propagated.
❖ Tree inventory in GIS environment is a relevant
  support for conservation of veteran tree heritage in the management of monumental complexes.

http://1.bp.blogspot.com/-hxQ8Zw686fw/VaOTFHYDe6I/AAAAAAAACf8/FNUGiYOXgJ4/s1600/Platanus-leaves.jpg

P. occidentalis | P. x acerifolia | P. orientalis

Typical leaf shapes of
P. occidentalis, P. x acerifolia ,
and *P. orientalis .*

Agarose gel electrophoresis of PCR products by primer pairs Un.For/Un.Rev (A) and Occ.For/Occ.Rev (B) of accessions used as references of
P. occidentalis (lanes 1-5),
P. x acerifolia (lanes 6-10),
P. orientalis (lanes 11-15)
and two individuals belonging to
P. orientalis fromVilla Lante (lane 16) and Palazzo Farnese (lane 17).

Terrace 1
Terrace 2
Terrace 3

Legend
health status 0 1 2 3 4
Boundaries of Villa Lante
N
0 5 10 20 Meters

Control of
P. orientalis (A) and
sample with inoculation of
Ceratocystis platani (B).

(A) In vitro establishment; (B) Multiplication phase;
(C) Rooting phase; (D) Acclimatized material in *post-vitro*.