



Food and Agriculture  
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**THE ROLE OF INVASIVE SPECIES IN URBAN FOREST PLANNING**  
Skopje, North Macedonia  
4-6 June 2024



**UNIVERSITY**  
*of* **SOPRON** |

# MAJOR PESTS AND DISEASES OF TREES IN URBAN AREAS

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# Content

- Introduction
  - Terminology: Urban forests, Urban green, trees outside of forests, Green infrastructure
- Threats for health of woody plants
- Material and Methods
- Major pests and diseases
- Conclusions





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## Introduction

- Managed forests/Urban forests
- Trees outside of forests (TOF): the main source of landscape connectivity absent from forest inventories.
- Green infrastructure
- Native and non-native trees and shrubs



## Possible threats for woody plants in urban region

- Biotic and abiotic factors have a negative impact on woody species:
  - Pathogenic organisms: nematodes, fungi, bacteria, viruses
  - Harmful insects
  - Solar radiation
  - Lack of precipitation
  - Wind extremes
  - Damage caused by humans
    - Inappropriate planting
    - Not suitable microhabitat for trees and shrubs
    - Wrong pruning
    - Mechanical damage (traffic accident)
    - Damage by construction works
    - Lack of irrigation





# Threats for woody plants in urban region

- Invasive forest pathogens increased exponentially in the last four decades (Santini et al., 2013).
- Tourism, trade and transport increase distribution of non-native and invasive insect pests,
- Climate change supports biological invasions.
- Mediterranean plants are, due to changed climate conditions, successfully grown in continental part of Europe, South East Europe.
- Pests from Mediterranean region follow their host plants and migrate to the continent and in the direction east.
- Plant health monitoring in urban area is likely not enough successful, nor regulated.

## In Europe 449 non-native species are related to:

- Ornamental shrubs 23%
- Ornamental trees 23%
- Conifers 16,3%
- First records from southern countries: 297 records (66,5%)
  - Mainland Italy: 107 records
  - Mainland France: 80 records
- First records from western Europe: 87 spp.
  - Great Britain 47 records
- First records from Eastern Europe: 25 records
- First records from Central Europe: 20 records
- First records from Northern Europe (7 records).



# Material and Methods

- Visual tree inspections,
- Parts of plants are sampled grown in laboratories for determination of insects and pathogens.
- Pheromone traps Sticky color traps



# Major trees in urban area

- *Abies* spp.
- *Cedrus atlantica*, *C. deodara*
- *Chamaecyparis* spp.
- *Juniperus* spp.
- *Thuja* spp.
- *Picea* spp.
- *Pinus* spp.
- *Taxus baccata*
- *Acer* spp.
- *Aesculus hippocastanum*
- *Buxus sempervirens* and cv.
- *Fraxinus* spp.
- *Ginkgo biloba*
- *Malus* spp.
- *Platanus* spp.
- *Prunus* spp.
- *Quercus* spp.
- *Robinia pseudoacaccia* and cv.
- *Tilia* spp.
- *Ulmus* spp.



## Major pests and diseases of *ABIES* spp. (*A. alba*, *A. nordmanniana*, *A. pinsapo*) in urban areas

- **Fungi:** *Phytophthora cinnamomi*

**Insects:** *Dreyfusia nordmannianae* – silver fir adelges,  
non-native;

natural area: North America

*Cinara curvipes* - Bow-legged fir aphid

Occurs on the trunk or branches of *Abies* spp., *Cedrus deodora* and *Pinus contorta*.

natural area: North America

In the 1990s it was first recorded in the UK, and is now widely distributed in Europe





## Major pests and diseases of *Cedrus* spp. in urban areas



- **Fungi:** *Diplodia sapinea*,  
*Botryosphaeria dothidea*  
(Botryosphaeriaceae) (Zlatkovic et al., 2016)
- **Insects:** *Cinara cedri* Common in Mediterranean region.
- Expanding range all over the world.
- *Phloeosinus* spp.

- Aphid of body length 3-4 mm, bronze or red-brown with dark spots on upper part of thorax and covered with wax powder
- In large and dense colonies on the bark of 1-5 cm thick branches. They produce large quantities of honey dew.
- Attacked trees are sometimes defoliated, produce no cones and the growth is reduced.



# Major pests and diseases of *Chamaecyparis* spp., *Juniperus* spp., *Thuja* spp. trees in urban areas

- **Fungi:** *Pestalotiopsis funerea* - Pestalotiopsis dieback

Shoots turn brown and die back, often from the tips. Infections occur mainly in spring and summer in wet conditions

*Diplodia seriata*

- **Mites:** *Oligonychus ununguis*, Tenuipalpidae
- **Insects:** *Lamprodila festiva* (Coleoptera: Buprestidae).
- **Native range:** South Europe; expansion with favourable climate conditions and available plants
- *Callidiellum rufipenne* (Coleoptera: Cerambycidae)
- **Native range:** East Asia
- Polyphagous in coniferous trees (*Cryptomeria*, *Pinus*, *Abies*, *Larix*, *Chamaecyparis*, *Thuja*)

*Planococcus vovae* (Hemiptera: Pseudococcidae)



## Major pests and diseases of *Pinus* spp. trees in urban areas

- **Fungi:** *Dothistroma septosporum*, *D. pini*, *Diplodia sapinea*. The diseases symptoms include: damping off and collar rot of seedlings, stem canker, root disease, and shoot blight.
- **Insects:** *Neodiprion sertifer* (Hym.:Diprionidae)
- *Leptoglossus occidentalis* (Heteroptera, Coreidae)
- *Thaumetopoea pytiocampa*
- *Phaenops cyanaea* (Coleoptera: Buprestidae)
- *Ips sexdentatus*
- *Orthotomicus erosus* (Coleoptera: Curculionidae: Scolytinae)



(Picture: G. Csoka, Hungary Forest Research Institute, bugwood.org)



## Outbreak of *Orthotomicus erosus* at the Mt Marjan in Croatia



- Recorded outbreaks:
- Israel (Mendel 1983)
- Turska, Iran, Alžir (Sarikaya & Sen 2017)
- Tunis (Bepen Jamaa et al. 2007)
- Croatia, (Pernek, 2019)





## Major pests and diseases of *Acer* spp. trees in urban areas

- Pathogens: *Phytophthora* spp.
- *Rhytisma acerinum*
- Insects: *Agrilus viridis*,
- *Zeuzera pyrina*
- *Metcalfa pruinosa*
- *Cameraria ohridella*



## Major pests and diseases of *Buxus* spp. trees in urban areas

- **Fungi:** *Cylindrocladium buxicola*  
– box blight
- *Pseudonectria buxi* (formerly *Volutella buxi*) - Volutella Blight Disease
- **Insects:** *Psylla buxi*
- *Metcalfa pruinosa*
- *Cydalima perspectalis*
- **Mites:** *Eurytetranychus latus* (*Acari Tetranychidae*)



# Major pests and diseases of *Quercus* spp. trees in urban areas

- **Fungi:** *Phytophthora* spp.
- *Armillaria mellea*
- **Insects:** Early spring defoliators: *Tortrix viridana*, *Operophtera brumata*, *Noctuidae*
- *Corythucha arcuata* (Hemiptera: Tingidae)
- *Metcalfa pruinosa* (Hemiptera: Flatidae)
- *Neoclytus arcuatus*





## Major pests and diseases of deciduous trees in urban areas

- *Neoclytus acuminatus*  
(Coleoptera, Cerambycidae)
- Non – native. First report in Europe in XIX century.
- Native range: North America.
- Local outbreak in Veliko Gradiste Municipality on Danube (eastern part of Serbia).
- Host plant: *Fraxinus angustifolia*  
'Raywood'
- Green infrastructure: tree row (age 13 years (+8 years app.))
- Vector of *Geosmithia morbida*  
(EPPO Reporting Service, 2019).





## Major pests and diseases of *Fraxinus* spp. in urban areas

- *Phytophthora* – root rot
- **Fungi:** *Hymenoscyphus fraxineus*
- **Insects:** *Tomostethus nigrinus* (Hymenoptera: Tenthredinidae)
- *Zeuzera pyrina* (Lepidoptera: Cossidae)
- *Neoclytus arcuatus* (Coleoptera Cerambycidae)
- *Agrilus* spp.:
- *Metcalfa pruinosa* (Hemiptera: Flatidae)
- *Stereonychus fraxini* (Coleoptera Curculionidae)
- Scale insects, miner moths etc.



## Major pests and diseases of *Tilia* spp. in urban areas

- *Phytophthora* – root rot
- **Fungi:** *Hymenoscyphus fraxineus*
- **Insects:** *Eucallipterus tiliae* (Hemiptera: Aphididae)
- *Phyllonorycter issikii* (Lepidoptera: Gracillariidae) - the Lime Leaf Miner, non-native
- *Neoclytus arcuatus* (Coleoptera Cerambycidae), non-native
- *Zeuzera pyrina* (Lepidoptera: Cossidae)
- *Agrilus viridis* (Coleoptera: Buprestidae)
- *Ovalisia rutilans* (Coleoptera: Buprestidae)



# Conclusions

- Mayor pests and diseases of trees in urban areas are native and non-native species.
- Number of non-native species mainly originate from Asia and North America
- Main pathway of introduction of non-native species is trade with ornamental trees and active flight of some species. Danube is also one of corridors for invasive species.
- Climate change is favorable for expansion of Mediterranean plants and they are followed by their pests, which are established and tend to outbreak (*Lamprodila festiva*, *Orthotomicus erosus*).
- Emerging pests, - native species which tend to outbreak in changed climate conditions (*Tomostethus nigritus*, *Zeuzera pyrina*).
- Preventive measures: education of staff, nursery producers, landscape architects.
- Select a tree that is suited to the circumstances at the site. Native trees should prevail because of their coevolution with pests and diseases..
- Raising public awareness

