

BARK BEETLE OUTBREAK IN THE ARBORETUM OF BUDAFAPUSZTA

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Introduction

In Hungary, Norway spruce (*Picea abies*) is a non-native conifer species that has been planted for timber production. During the last two decades bark beetle outbreaks occurred in this stands in several regions of Hungary, causing considerable economic losses.

The arboretum of Budafapuszta was established 50 years ago (1959) in SW-Hungary (Figure 1.). There is a large collection of non native coniferous tree species (altogether 132 taxa) (Figure 2. & 3.).



Figure 1. Location

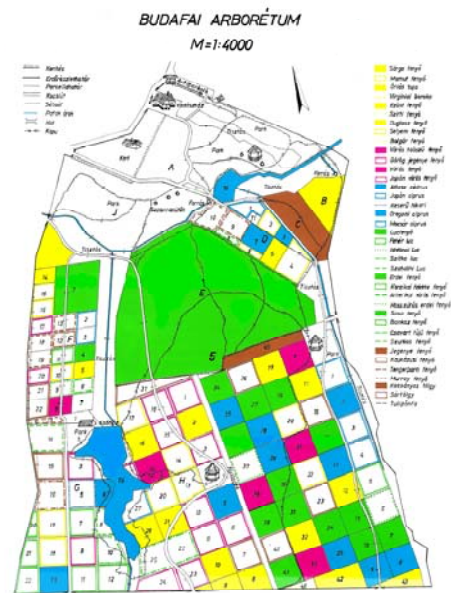


Figure 2. Tree species composition

Table 1. Tree species with minimum attack

<i>Abies amabilis</i>
<i>Abies cilicica</i>
<i>Abies excelsior</i>
<i>Abies homolepis</i>
<i>Abies pinsapo</i>
<i>Calocedrus decurrens</i>
<i>Cedrus atlantica</i>
<i>Chamaecyparis pisifera</i>
<i>Cryptomeria japonica</i>
<i>Cunninghamia lanceolata</i>
<i>Cupressocyparis leylandii</i>
<i>Juniperus chinensis</i>
<i>Pfitzeriana</i>
<i>Juniperus communis</i> Bakony
<i>Juniperus sabina</i> Blue Danube
<i>Juniperus squamata</i> Meyer
<i>Juniperus virginiana</i>
<i>Metasequoia glyptostroboides</i>
<i>Picea orientalis</i>
<i>Picea pungens</i> Kostér
<i>Pinus nigra</i> Corsicana
<i>Taxus baccata</i>
<i>Thuja koraiensis</i>
<i>Thuja occidentalis</i>

Table 3. Tree species with heavy attack

<i>Abies alba</i>
<i>Abies cephalonica</i>
<i>Abies nordmanniana</i>
<i>Abies numidica</i>
<i>Larix eurolepis</i>
<i>Larix laricina</i>
<i>Larix leptolepis</i>
<i>Picea abies</i>
<i>Picea engelmanni</i>
<i>Picea glauca</i>
<i>Picea glauca</i> (Alberta)
<i>Picea glauca</i> (Ontario)
<i>Picea glauca</i> (Saskatchewan)
<i>Picea glehnii</i>
<i>Picea mariana</i>
<i>Picea omorica</i>
<i>Picea polita</i>
<i>Picea rubens</i>
<i>Picea sitchensis</i>
<i>Pinus aristata</i>
<i>Pinus banksiana</i>
<i>Pinus contorta</i>
<i>Pinus contorta latifolia</i>
<i>Pinus flexilis</i>
<i>Pinus monticola</i>
<i>Pinus nigra</i> var. <i>pallasiana</i>
<i>Pinus pinaster</i>
<i>Pinus ponderosa</i>
<i>Pinus ponderosa scopulorum</i>
<i>Pinus resinosa</i>
<i>Pinus silvestris</i>
<i>Pinus strobus</i>
<i>Pinus wallichiana</i>
<i>Pseudotsuga menziesii</i> viridis
<i>Taxodium distichum</i>
<i>Thujaopsis dolobrata</i>

Table 2. Tree species with moderate attack

<i>Abies concolor</i>
<i>Chamaecyparis lawsoniana</i>
<i>Larix decidua</i>
<i>Pinus ayacahuite</i>
<i>Pinus jeffreyi</i>
<i>Pinus nigra</i>
<i>Pinus peuce</i>
<i>Pinus rigida</i>
<i>Sequoiadendron giganteum</i>
<i>Thuja plicata</i>
<i>Tsuga heterophylla</i>

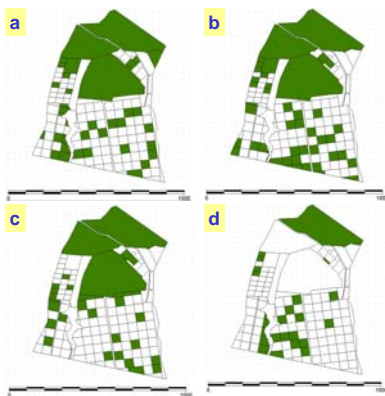


Figure 3. Presence of the different tree genera in the arboretum (a: *Picea*, b: *Pinus*, c: *Abies* d: *Larix*)

Results

The mass mortality of trees was observed first in the large Norway spruce (*Picea abies* Karsten) stand. In 2003-04 the damage exceeded the borders of this stand and spread to the areas covered by other coniferous tree species.

Damages caused by the beetles were at three different levels:

- Minimum attack: Entrance hole in the bark, sometimes the mating chamber was constructed as well, however no mother galleries observed. All of these trees survived (Table 1., Figure 4a.).
- Moderate attack: On some other species larger (up to 5 cm) galleries made by the imagines, but without any eggs laid. All these trees survived the attack too (Table 2., Figure 4b.).
- Heavy attack: Mother galleries have been made, then (after copulation and oviposition) larval galleries have been also recorded. All these tree species dyed, except of some individuals (Table 3., Figure 4c.).

There were two bark beetle species involved in the mass mortality: the dominant species was *Ips typographus*, but some *Pityogenes chalcographus* were also found.



Figure 5. Damage caused by the bark beetles. a: Sep. 2002, b: Sep. 2003, c: Sep. 2004

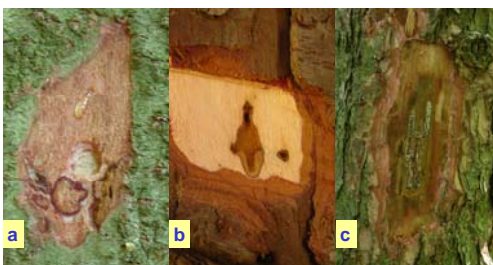


Figure 4. Different level of beetle attack (a: minimum, b: moderate, c: heavy)

Conclusions

The following tree species are listed as possible host trees for *Ips typographus* in the literature: *Picea abies*, *P. jezoensis*, *P. omorica*, *P. obovata*; *Larix decidua*; *Pinus koraiensis*, *P. sylvestris*, *P. sibirica*, *P. strobus*; *Abies alba*, *A. sibirica* and *Pseudotsuga* species. Because of the large number of the beetles they attacked other (non host) coniferous tree species in the neighbouring area too. Several *Picea*, *Pinus*, *Abies*, *Larix*, *Pseudotsuga*, *Taxodium* and *Thujaopsis* species have been attacked here, however the level of damage was different on the tree species. There was not any damage observed on *Calocedrus*, *Cedrus*, *Cryptomeria*, *Cunninghamia*, *Juniperus*, *Metasequoia* and *Taxus* genera (Figure 5. & 6.). Offspring-generation developed only on Norway spruce.



Figure 6. View of the arboretum in a: 2003 and b: 2004