



## INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

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Lesnická  
a dřevařská  
fakulta

## INTRODUCTION, INTRODUCED TREE SPECIES

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INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

# INTRODUCED PLANTS

- plants that have been introduced to new areas (usually new continents)  
(introduction x repatriation)
- deliberately vs. accidentally introduction

# Native x non-native species

- **Native species**
- **Non-native (exotic) species**
  - temporarily introduced species
  - naturalized species
  - invasive species
    - Archeophyts
    - Neophyts

# Invasive x Expansive species

- Invasive plant – always introduced
- Expansive plant – always native

# Reasons for introduction

- high production of wood
- resistance to air pollution
- resistance to biotic and abiotic factors
- high quality of wood
- good effect on site
- production of fruits or food for wild animals
- ornamentals

# Requirement for introduced sp.

10 requirements:

- sufficient produce potential
- quality of wood
- site adaptability
- positive or at least indifferent influence on soil
- resistance to abiotic factors, pests and diseases
- without dangerous pests
- resistance to possible global changes of climate
- exclusion of invasive effect on native plants
- ability to growth with native trees
- natural regeneration
- for conditions of central Europe are suitable locations particularly – north America, north eastern Asia

## Preconditions for successful introduction

1. knowledge of growth and characteristics of tree species in native habitat
2. economic advantage
3. similarity of climatic and edaphic conditions
4. resistance to diseases and pests
5. adaptability of tree species



# Methods of introduction

- species tests
- series of provenance sites

# Results of introduction

- 1) unsuccessful introduction
- 2) successful introduction
- 3) successful introduction – but invasive

# Possible problems and risks

- invasive effect
- changes in native species composition
- spread of diseases and pests
- disturbing of soil chemistry
- soil erosion
- development of vulnerable monoculture forest stands

# Invasive species

- non-native species of animals, plants, microorganisms or pathogens
- usurp the habitat of other species
- forcing the native species to decline in population
- Invasive species are introduced accidentally or intentionally by human

# Invasive species

- tend to be highly competitive
- highly adaptive
- highly successful at reproducing
- lack of natural predators - key factor
- many of the invasive species were introduced by way of ships

# Invasive species - attributes

- The ability to reproduce both asexually and sexually
  - Fast growth
  - Rapid reproduction
  - High dispersal ability
  - Tolerance of a wide range of environmental conditions
  - Time to first reproduction
  - Seed size and seed germination
- **small and numerous seeds, physiological robustness and good dispersal ability**

# Invasive species – control methods

- physical control methods
- chemical control methods
- biological control methods

# Invasive species

- [Global Invasive Species Database](http://www.issg.org/database/)

[www.issg.org/database/](http://www.issg.org/database/)

- Ecology and Control of Introduced Plants
  - J. H. Myers, D. R. Bazely



# Giant hogweed *Heracleum mantegazzianum*



# Japanese Knotweed *Reynoutria japonica*



# Giant Knotweed *Reynoutria sachalinensis*



# Himalayan Balsam *Impatiens glandulifera*



# Kudzu Vine *Pueraria lobata*



Pue  
Photo  
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# Salt Cedar



# Tree of Heaven



# History of introduction

- since 16. century, but mainly since 19. century
- 3000 species
- *Juniperus sabina* (1562)
- *Thuja occidentalis* (1566)
- *Juglans regia* (1629)
- *Platanus occidentalis* (1691)
- *Quercus rubra* (1691)
- *Pinus strobus* (1705)

# Current state in Czech republic

- approx. 35 000 ha
- approx. 1,5% of forest area
- long-term prediction – 2-7%
- locust tree - 14 000 ha
- spruce exotic species – 12 500 ha



# *Pseudotsuga menziesii* Douglas Fir



# *Pseudotsuga menziesii* – range map

- natural range: western part of North America



- two varieties:
  - Pseudotsuga m. var. glauca*  
inland
  - Pseudotsuga m. var. viridis*  
coastal area

*Pseudotsuga menziesii*

## *Pseudotsuga menziesii*

- to the Europe 1827
- to our country 1843
- approx. 4900 ha

## *Pseudotsuga menziesii*

- suitable for western and central Europe
- high produce potential
- resistant to against biotic factors
- damages by early freeze
- game damages
- pruning

## *Pseudotsuga menziesii*

- good experience in Czech rep.
  - establishment of forest stands in mixture with native species
- artificial and natural regeneration

## *Pseudotsuga menziesii* – stand tending

- strong clearings and thinnings in advance growth
- periodical intervention three times in decade
- silvicultural goal – distance between individuals 2 x 2 m at forest top height 3 – 3,5 m

## *Pseudotsuga menziesii* – stand tending

- to the small pole stage – moderate thinning, interval 3 – 4 years
- from the age of 40 – more intensive thinning
- marking of target trees
  - (100-200/ha)

*Abies grandis*

Grand Fir, Giant Fir

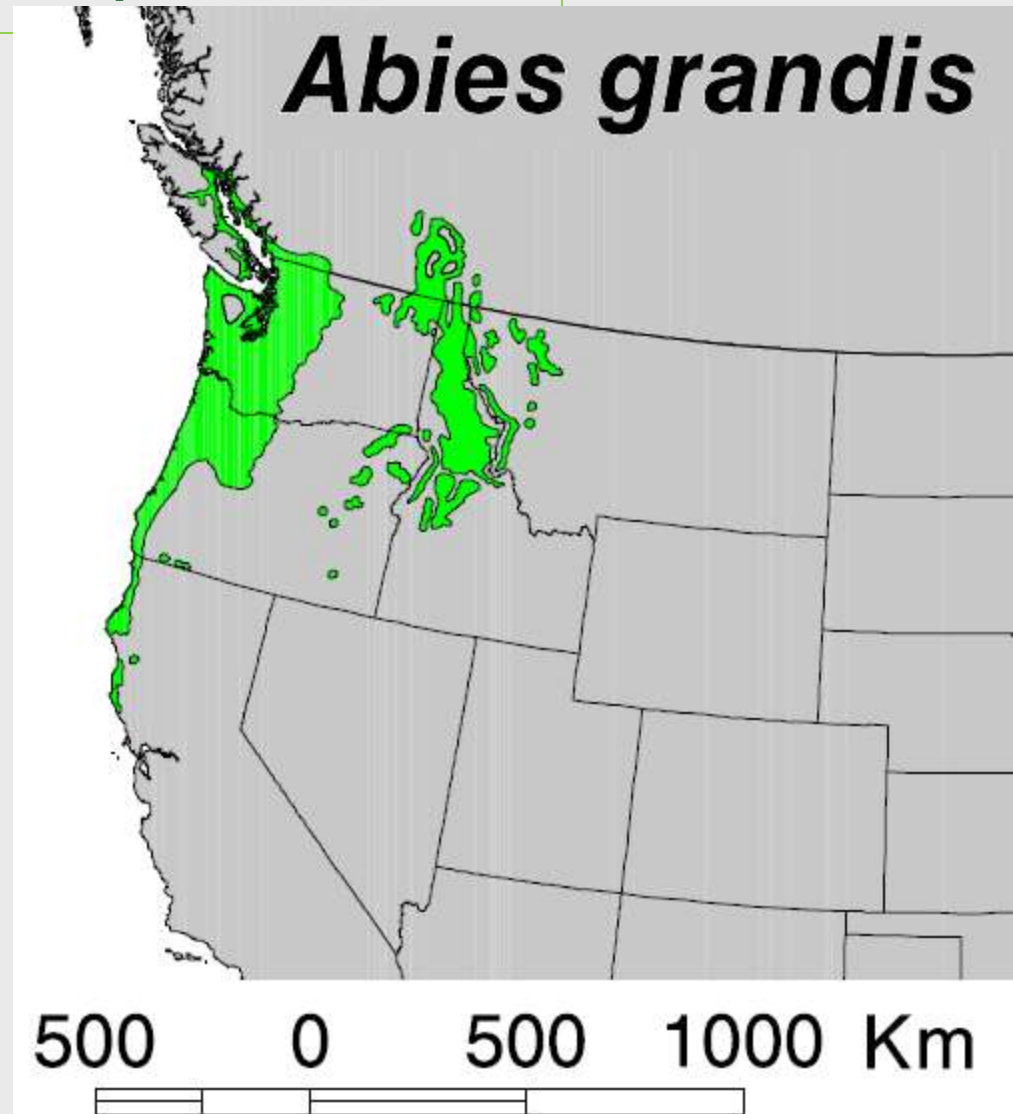




## *Abies grandis* - range map

Natural range:

- north-west of USA
- south-west of Canada



# *Abies grandis*

- to the Europe 1831
- to our country 1910
- approx. 950 ha

## *Abies grandis*

- high produce potential
- tolerant to shade
- sufficient amount of precipitation and humidity
- doesn't like swamped habitat

## *Abies grandis*

- small monospecific groups
- mixture with spruce or beech
- strong dependence on light conditions
- thinning interval – 5 years
- silvicultural treatment to target trees
- total protection against game and forest weeds to the age of 5

# *Pinus strobus* – Eastern White Pine



# *Pinus strobus* – Eastern White Pine

Natural range:

- north-east of USA
- south-east of Canada



# *Pinus strobus*

- to the Europe 1605 (1705)
- to our country 1812
- approx. 3100 ha

# *Pinus strobus*

- heliophilous tree species
  - young trees tolerate shade
- sufficient amount of precipitation
- permeable and acid soil
  
- best habitat – permeable, sandy soils with sufficient amount of water



## *Pinus strobus*

- bigger produce potential than Scotch pine
- very good natural regeneration
- in some parts of Czech rep. is invasive
- tolerant of air pollution
- *Cronartium ribicola* – white pine blister rust

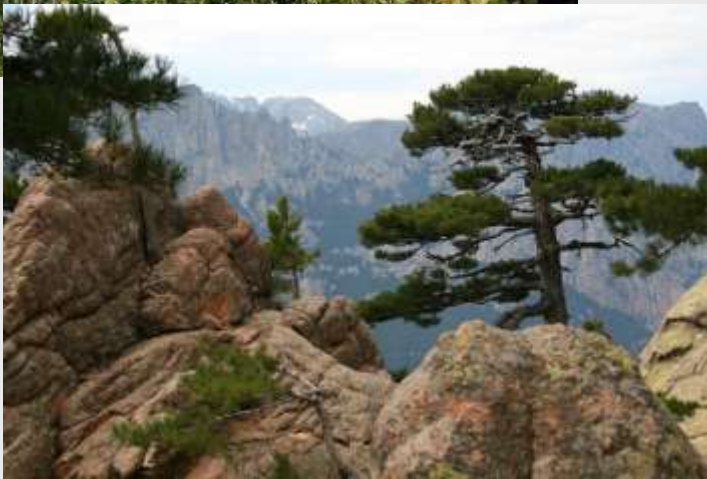
# *Pinus strobus*

## stand tending

- natural regeneration
- clearings tree times in decade
- to the age of 40 – strong low thinning
- from the age of 40 – strong crown thinning
- shorter rotation period – approx. 90 - 100 years

*Pinus nigra*

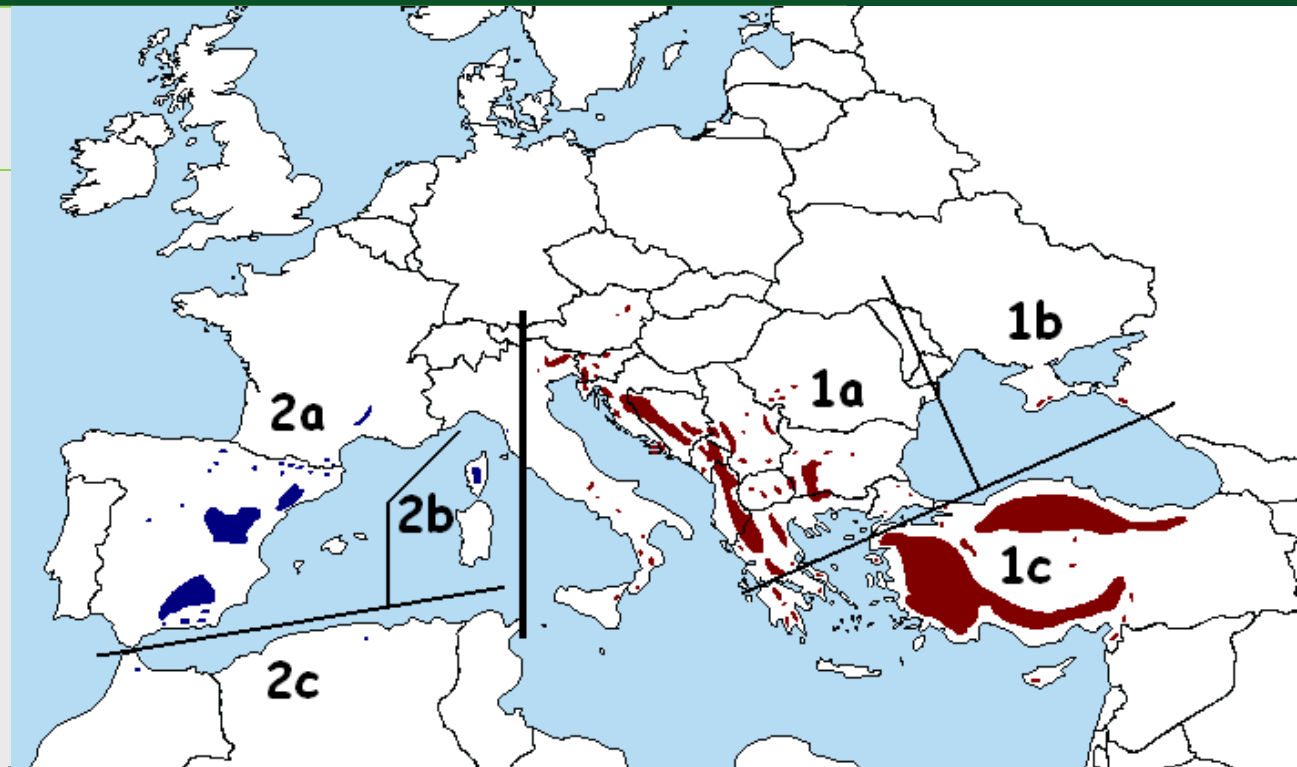
European Black Pine



# *Pinus nigra*

Very large  
discontinuous  
range:

- north part of North Africa
- southern Europe
- Asia Minor



# *Pinus nigra*

- to the central Europe in 1759
- to our country in 1824
- approx. 3700 ha

# *Pinus nigra*

- heliophilous tree species
- extremely resistant to dry habitats
- tolerant of poor soils
  - typical habitat – limestone rocks
- tolerant of air pollution
- tolerant of frost and windbreakages

# *Pinus nigra*

- moderate clearing
- moderate low thinning

*Quercus rubra*

Northern Red Oak

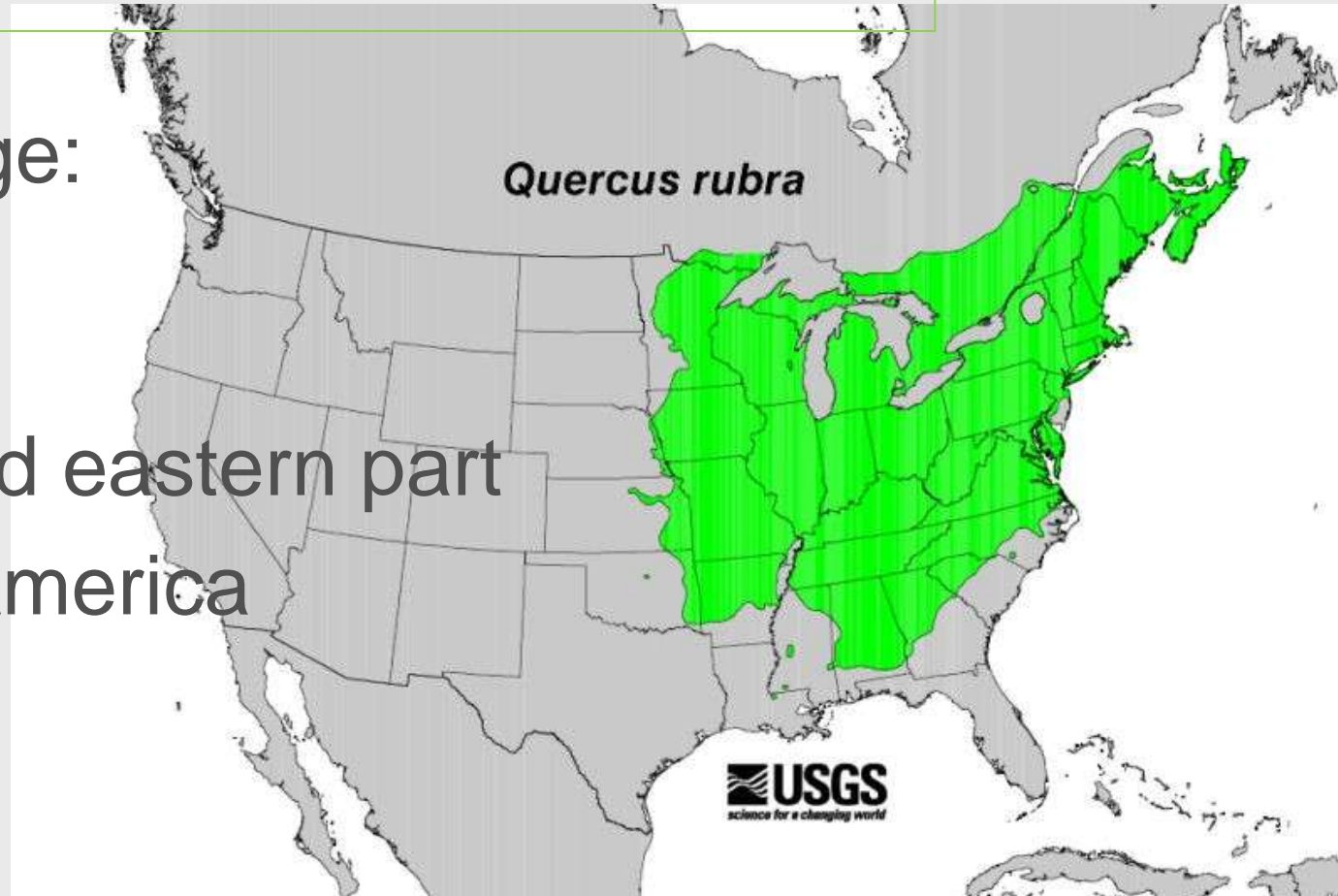




# *Quercus rubra*

Natural range:

- central and eastern part of North America



## *Quercus rubra*

- to the Europe - end of 17. century
- to our country – end of 18. century
- approx. 5100 ha

## *Quercus rubra*

- heliophilous tree species, lower demands on sunlight
- sufficient amount of precipitation
- tolerant of soil fertility
- faster growth than our oaks, worse quality od wood

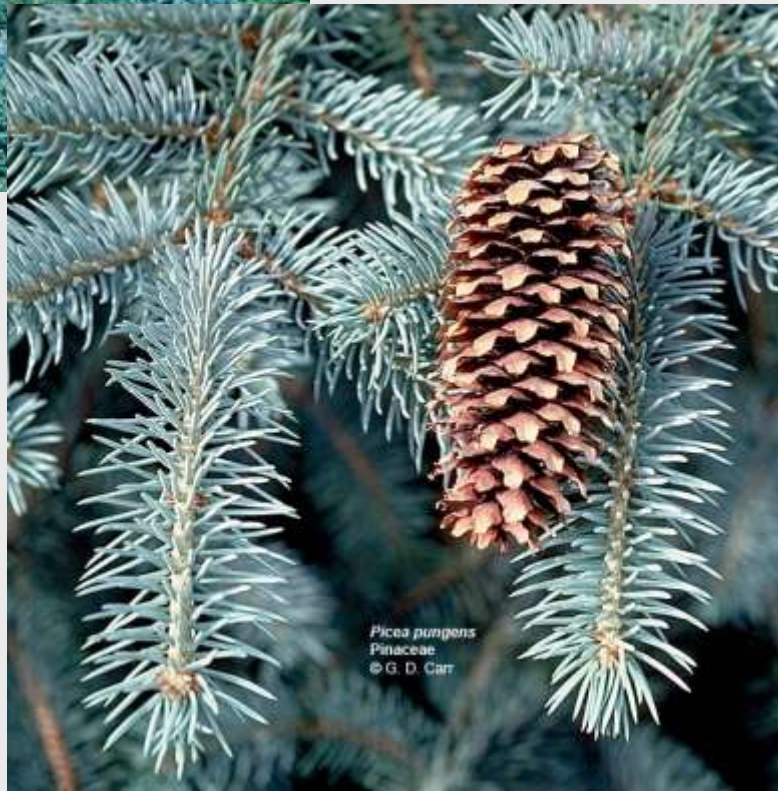
## *Quercus rubra*

- good ability to reproduce naturally
  - shelterwood felling
- to the small pole stage – negative selection (wolf trees, overtopping trees)
- from the small pole stage – positive selection (target trees)

# Spruce exotic species

- approx. 12 500 ha
- primarily for their resistance to air pollution

# *Picea pungens* – Blue spruce



*Picea pungens*  
Pinaceae  
© G. D. Carr



# *Picea mariana* – Black spruce



# *Picea omorika* – Serbian spruce





# *Pinus contorta* - Lodgepole Pine



# *Pinus peuce* - Macedonian Pine



JBF