




# Invasive plants in the Hungarian forests

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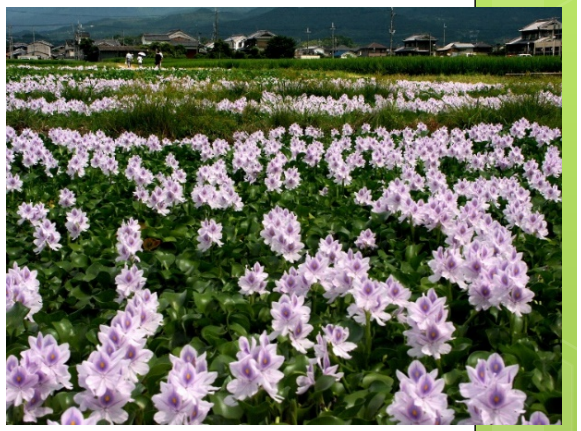
REUFIS meeting 13-17 October 2025
Slovenian Forestry Institute
Ljubljana, Slovenia

"On a global basis...the two great destroyers of biodiversity are, first habitat destruction and, second, invasion by exotic species" - E.O. Wilson

Wilson, E. 0. 1997. Strangers in Paradise. Island Press, Washington, D.C.















# EUROPEAN GUIDELINES IN PROTECTED AREAS AND INVASIVE ALIEN SPECIES (Monaco, A., Genovesi, P. 2014)

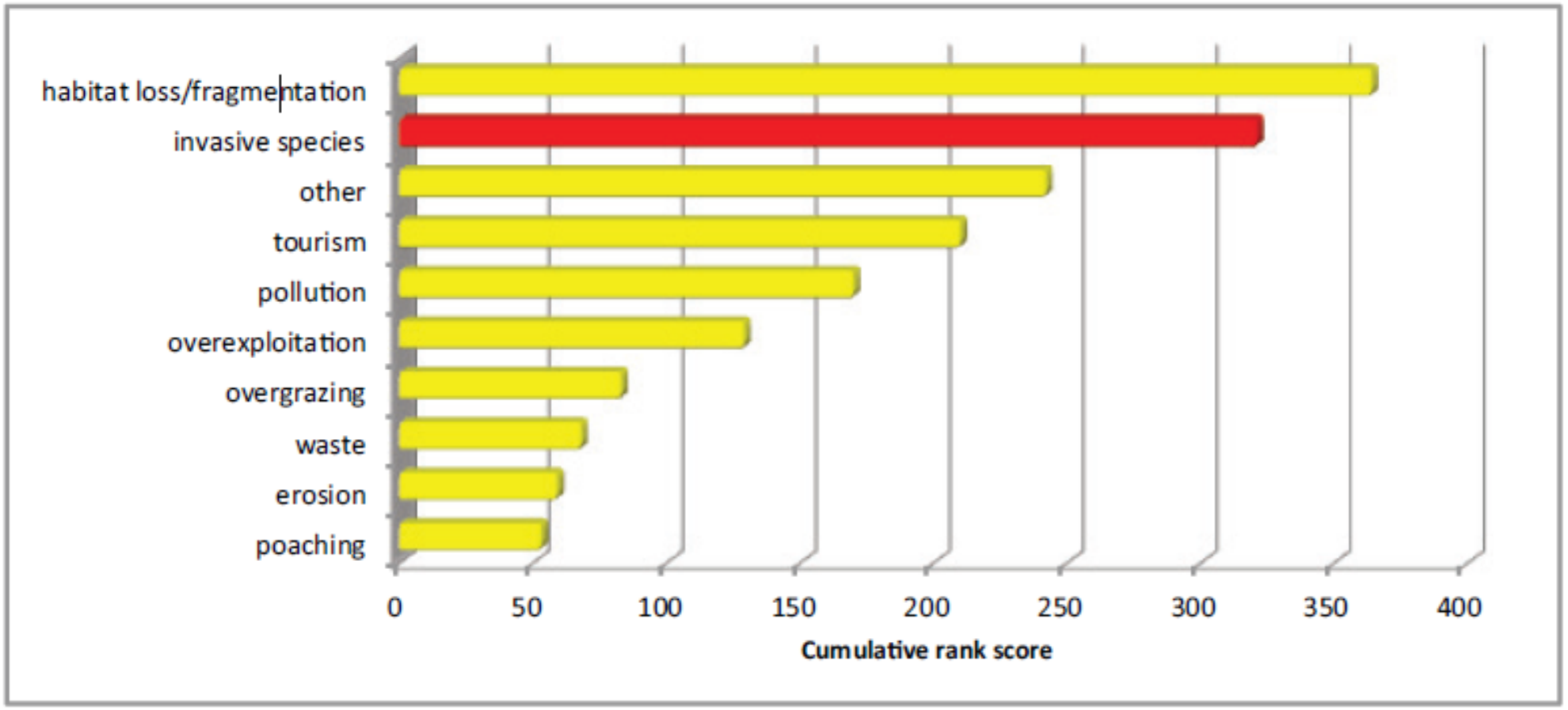



***Figure 2.*** *Major threats to protected areas as perceived by European PAs managers.*

## PLANT TRAITS AND COMMUMNITY CHARACTERISTICS

The combination of biological traits of a plant species and the characteristics of a plant community may help explain how and why some invasions occur.

**Plant species biological traits:**

- Genetic variability
- Self pollination
- Rapid growth
- Rapid lifecycle
- Long flowering and fruiting period
- Large seed production
- Polychory, zoochory
- Persistent seed bank
- High leaf area
- Vegetative propagation
- Allelopathy
- Adaptation to wide range of environmental conditions
- Herbicide tolerance or resistance
- Toxic or bitter chemicals




*Ailanthus altissima*

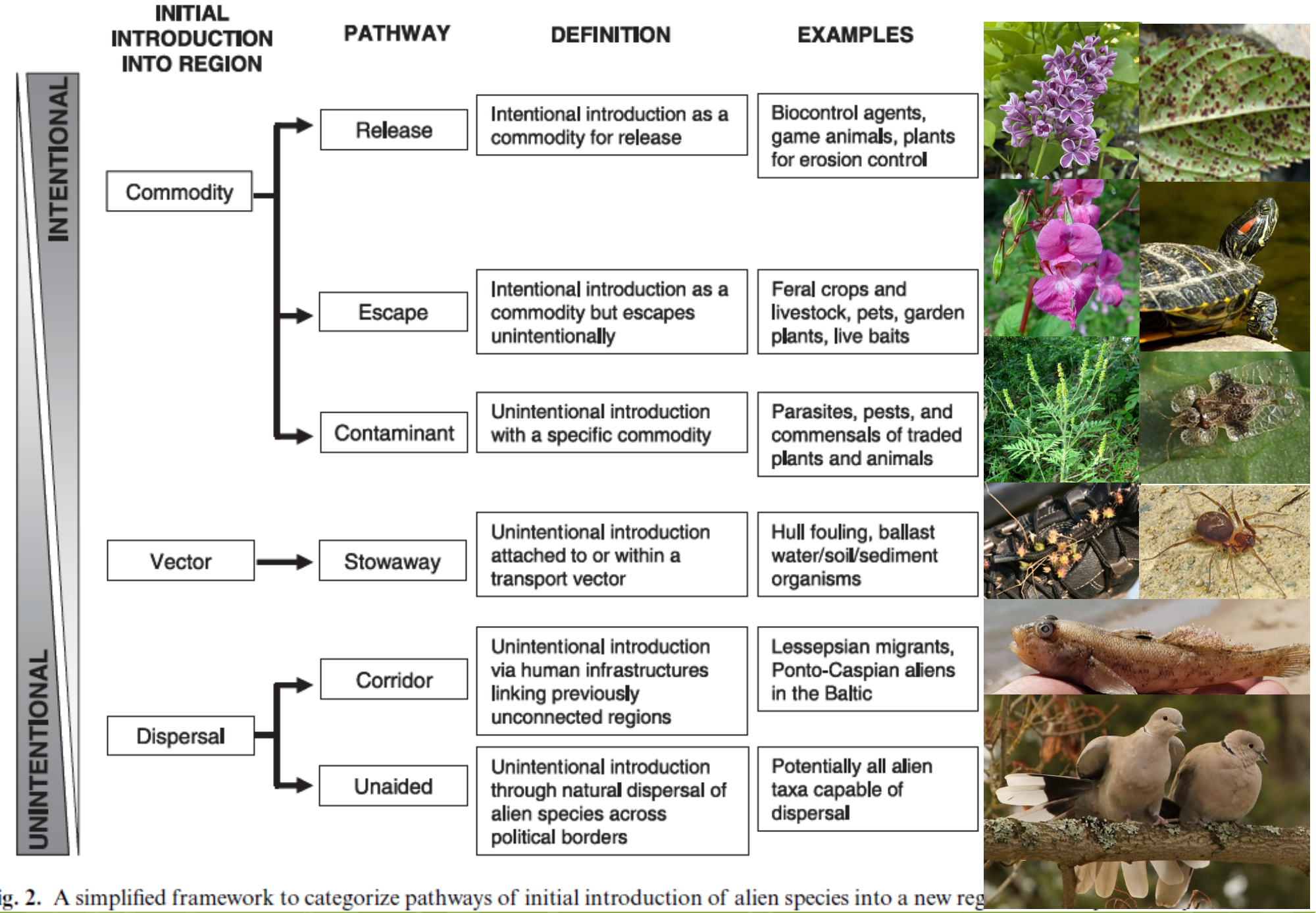



Fig. 2. A simplified framework to categorize pathways of initial introduction of alien species into a new reg

# Pathways in Plant Invasions: intentional

release

*Syringa vulgaris*





*Asclepias syriaca*

agriculture

escape



*Impatiens glandulifera*



*Ailanthus altissima*

garden



*Impatiens parviflora*

botanical garden



*Robinia pseudoacacia*

forestry

# Pathways in Plant Invasions: unintentional











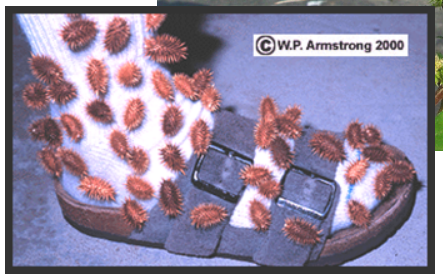










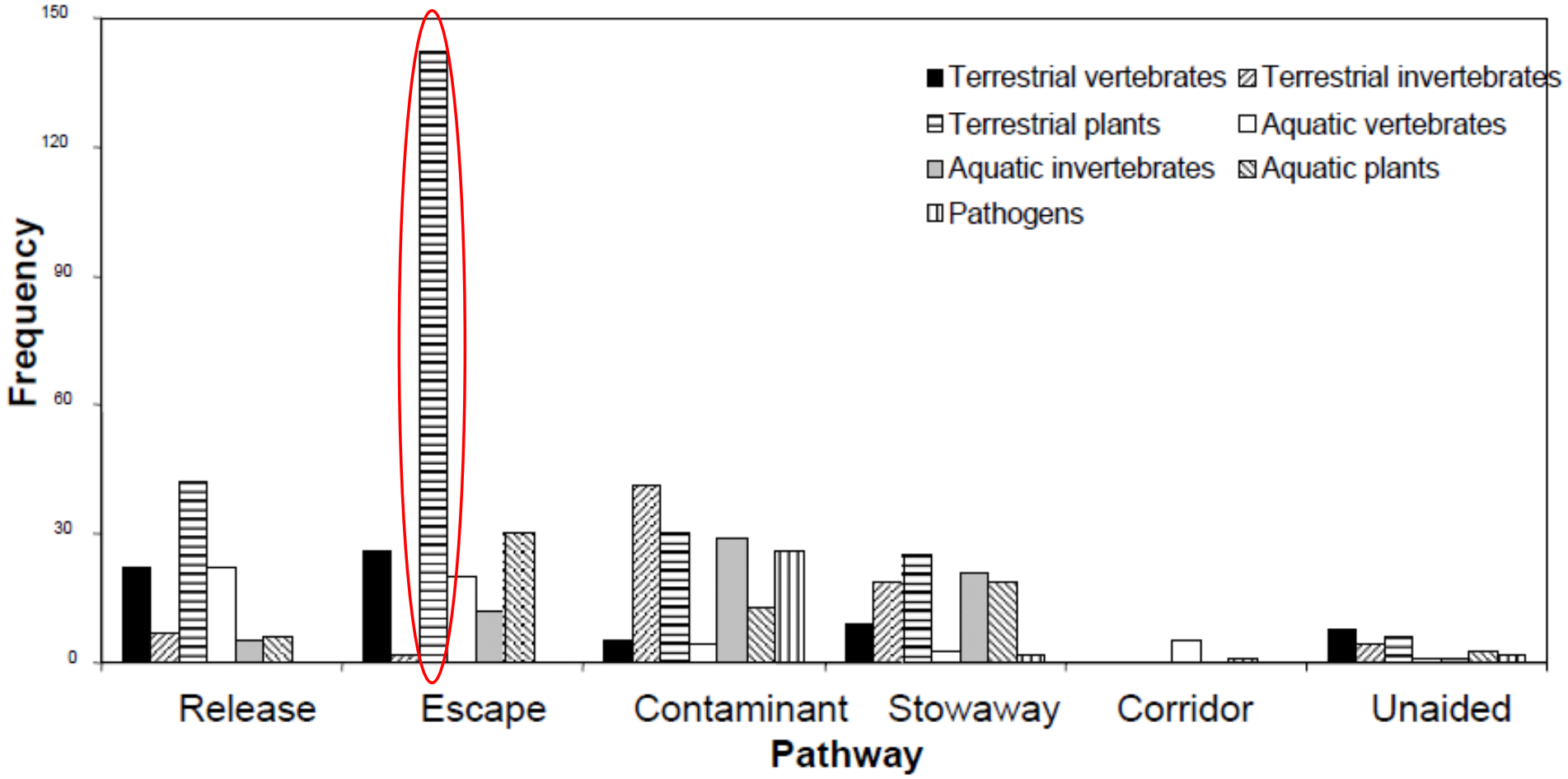





With seeds, soil, goods

With a transport vector

# Frequency of pathways




Hulme et al. 2008, J. Appl. Ecol. 45: 403–414

HELMHOLTZ CENTRE FOR ENVIRONMENTAL RESEARCH – UFZ

http://ias.biodiversity.be/meetings/200905_science_facing_aliens/keynote.pdf

# Time of plant introduction

**Archaeophytes**: species were introduced before 1500 B.C.
spreading since Neolithic agriculture
facilitated by: deforestation, trade, war, settlement organization

**Neophytes:** species were introduced after 1500 B.C.
facilitated by: industrialization, railway construction















# Major invasive plants in Hungarian forests

## *Asclepias syriaca* – Common milkweed







- **Morphology**
  80-150 cm high, perennial plant with „rhizomatic roots”
- 10-25 cm long lanceolate, decussate
- White – pinkish – red flowers in pleiochasium, flowering time: June – August
- 10 cm long follicle, flat seeds with hairs



**Origin, distribution**

- Eastern lowlands of North-America
- Introduced to Europe: 1629.
- Its spontaneous expansion started in the Mediterranean region
- Intensive cultivation in Hungary: 1870-1950

**Spreading factors**

- Wide cultivation area
- Development of roads and railways
- Disturbance of habitats

*Non-native range*

*A. syriaca* is classified as invasive in the majority of its Canadian native range. *A. syriaca* is non-native to Japan, Austria, Croatia, France, Germany, Hungary, Moldova, the Netherlands, Poland, Romania, Serbia, Slovenia, Spain and Sweden. It is considered invasive in Hungary and Serbia (CABI, 2015b) (Figure 4.16).

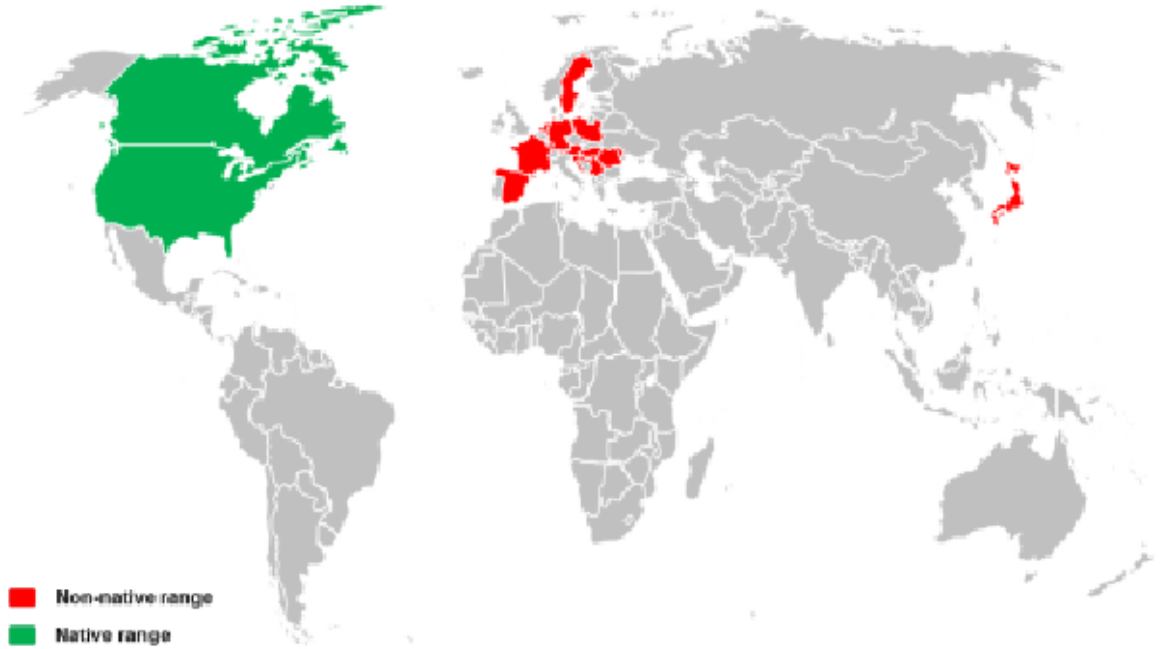
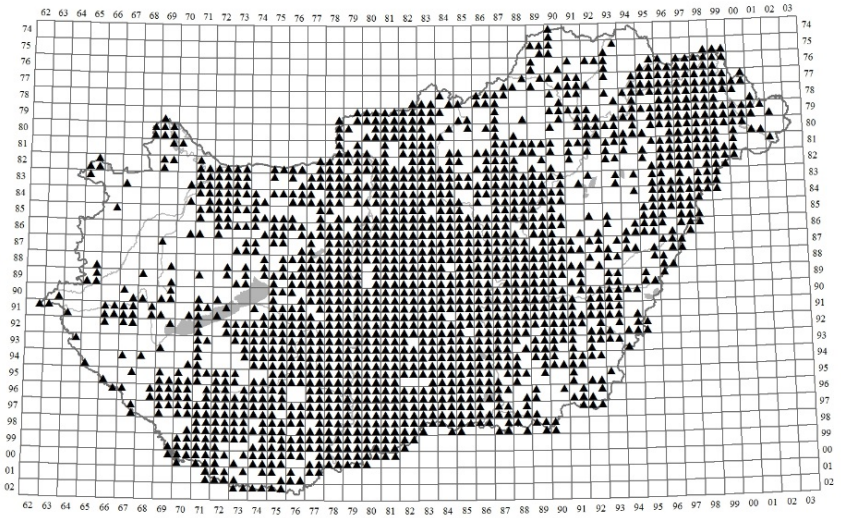



**Figure 4.16:** Current global recorded distribution of common milkweed (*Asclepias syriaca*) (Source: CABI, 2015b).





## Habitat preference

– Loose soils, especially on sand or sandy loess

## Habitats, occurrences

– Plantations, agricultural lands, grasslands, vineyards, gallery forests, disturbed forests





## Lifecycle

- Germination: April – May
- High germination rate
- High seed longevity
- Flowering: June – August
- Pollinators: bees, butterflies, flies, bumblebees, beetles
- Fruit ripening: August – September













## Biotic interactions

- Allelopathy to many cultivated plants and weeds
- Strong competitive ability
- Host plant of cucumber mosaic virus, pathogen fungus
- Consumed by polyphagous beetles, aphids, hemiptera
- Milkweed is hardly eaten by livestock due to its bitter-tasting milk and toxicity

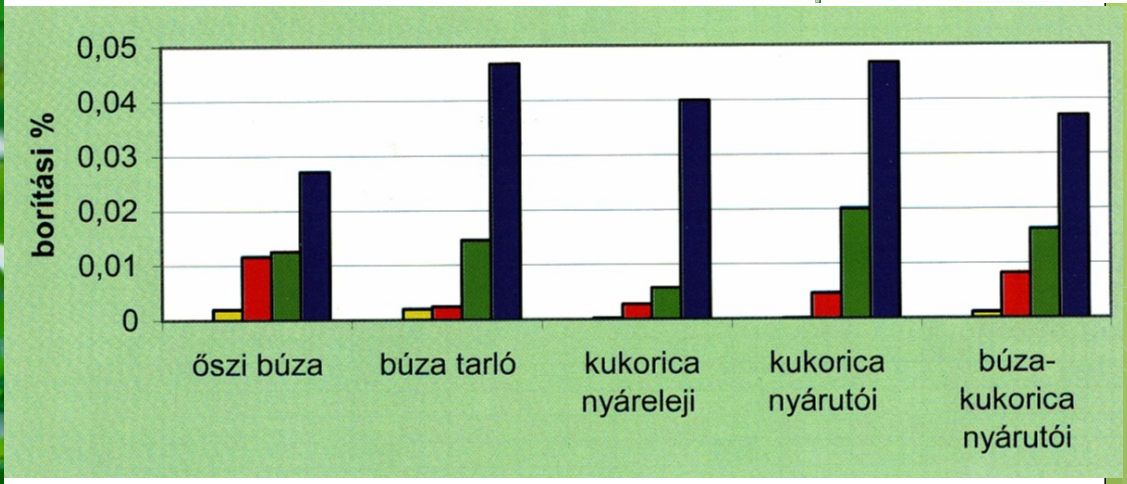







## Economic importance

- Its honey is aromatic
- Peculiar fruits are used in ikebana
- Homeopathic medicine
- Important agricultural weed



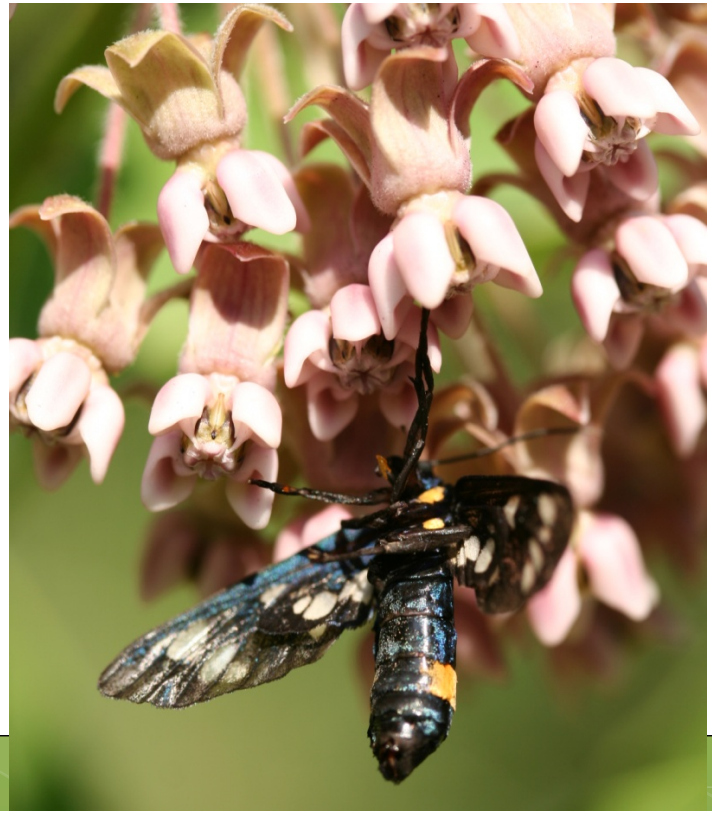

1947-53 (64)
1969-71
1987-88
1996-97
2007-08

**Dominance of milkweed in agricultural land**



## Importance in nature conservation

- Inhibits the regeneration of near-natural plant communities
- Its invasion is significant in disturbed plant communities



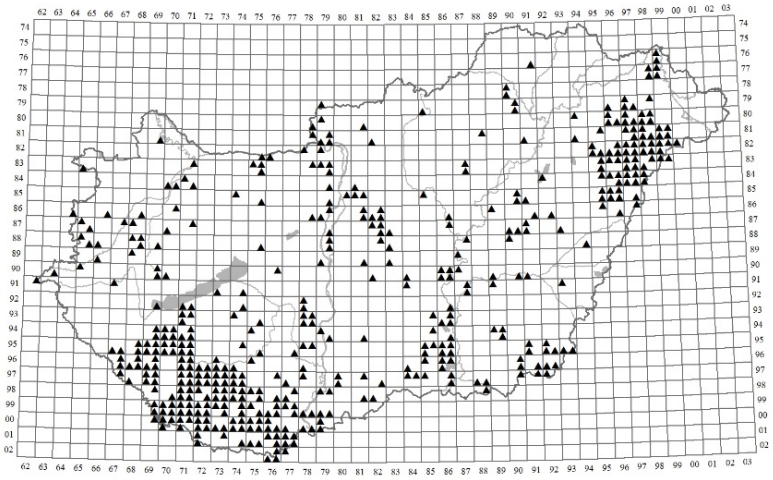
# *Phytolacca americana* – American pokeweed



**Morphology**

- 1-3 m, perennial with red stem
- Ovate – lanceolate, entire, acute leaves
- Flowering time: May – October, erect than nodding raceme with white or pink perianth
- United not divided berries





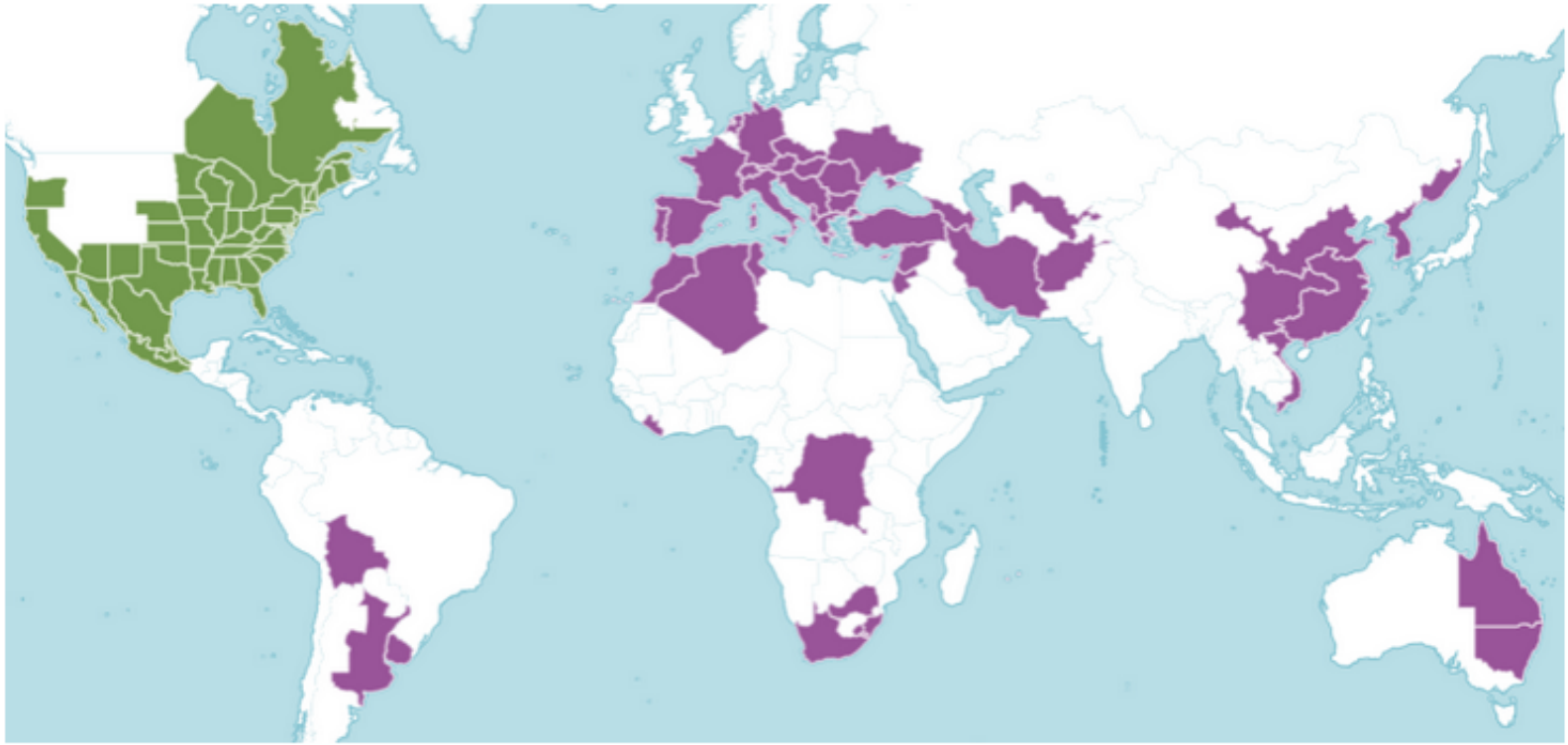
## Origin, distribution

- North-America
- Introduction to Europe in 17. century
- Cultivation from 1650 as colouring plant
- In Hungary ornamental plant
- Naturalisation from 1808

## Habitat preference:

- Mostly in disturbed soils, on sunny and on shady sites alike.
- Mostly under trees or shrubs, under forest plantations.

# *Phytolacca americana* – American pokeweed



Distribution map of *Phytolacca americana* from Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet; http://www.plantsoftheworldonline.org/. Retrieved on April 11, 2020.





**Lifecycle:**

- Germination: April – May
- Flowering: May – August
- Fruit ripening: July – August
- Long seed viability
- Frost sensitive
- Seed dispersal birds





**Biotic interactions:**

- Many bird species consume the fruits
- Herbivores also consume

**Economic importance:**

- Ornamental plant
- Shoots and leaves were eaten in America
- Soap was made from the root
- In Europe important colouring plant: sweets, wines
- Medicinal plant





**Importance in nature conservation**

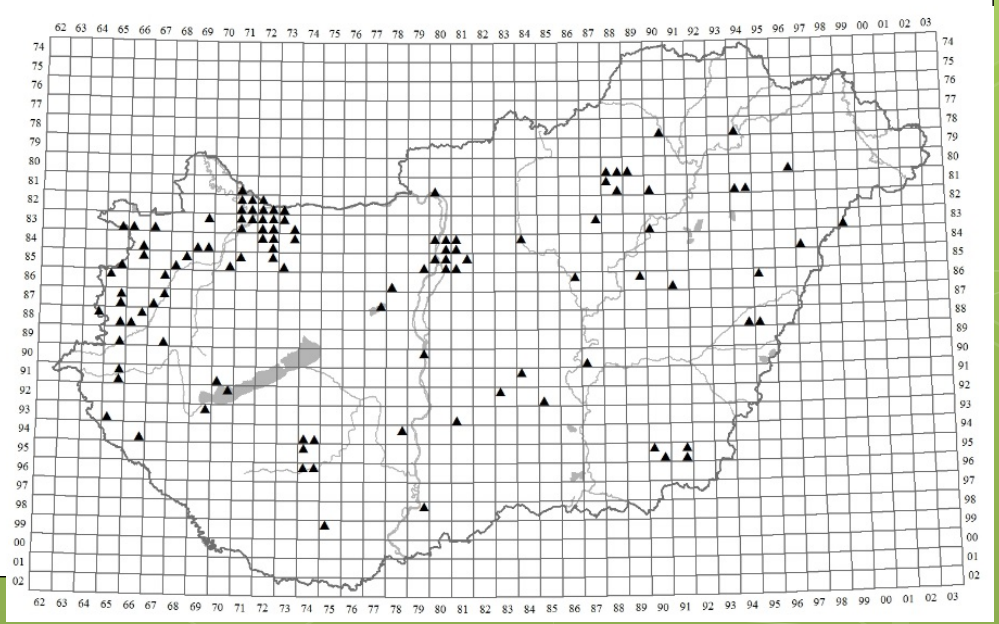
- Toxic plant
- Reproduce in large numbers on a slightly disturbed natural habitats
- Over-compete the native species by its shade, in the different forest communities can reduce the conservation value



# *Phytolacca esculenta* – Chinese pokeweed



- 1-2,5 m, perennial
- Wide ovate, rounded leaf base, entire leaf
- Erect raceme, white perianth
- Divided berries







# *Fallopia* spp. – Knotweed species







**Morphology**

- 100-300 cm, perennial, with storage rhizome
- Leaves are large, broad or elongated ovate, +/- cuspidate with entire margin
- Flowering time: July – September, composed raceme, with perianth
- Achene

# Knotweed species – *Fallopia* spp.

**Japanese knotweed**

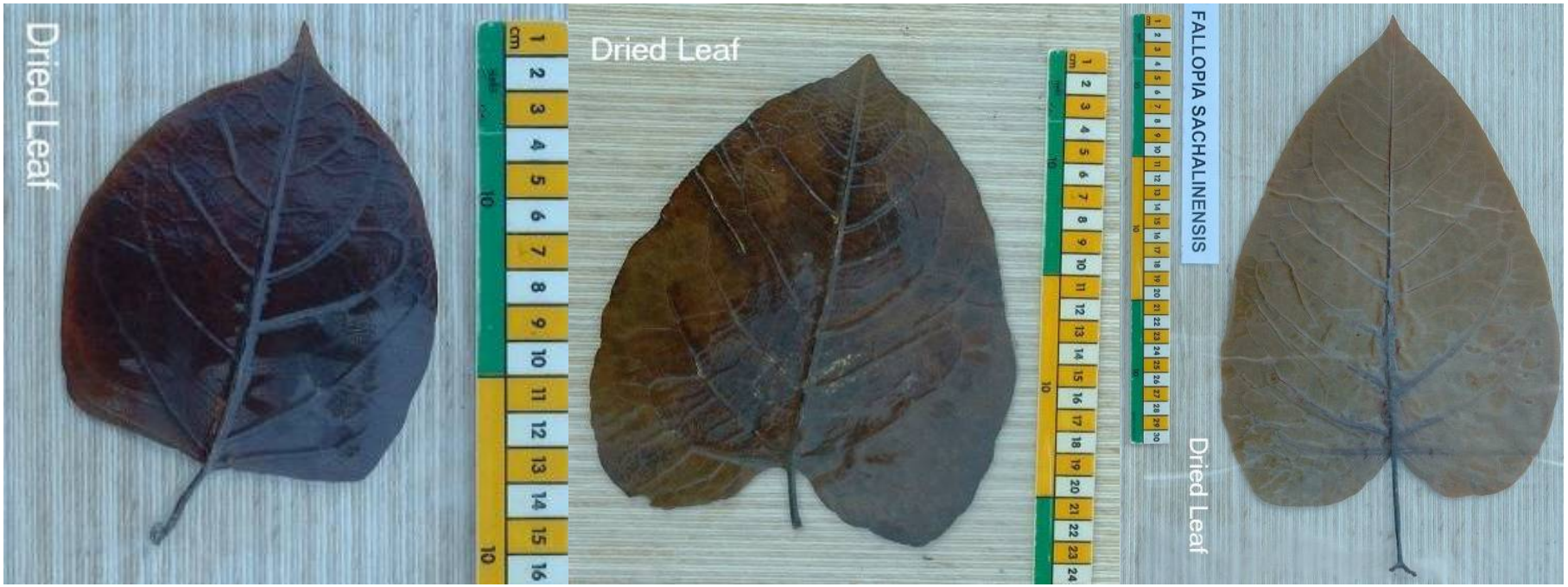
(*Fallopia japonica*)

**Sakhalian knotweed**

(*Fallopia sachalinenis*)

**Bohemian knotweed**

(*Fallopia* x *bohemica*)





**Origin, distribution**

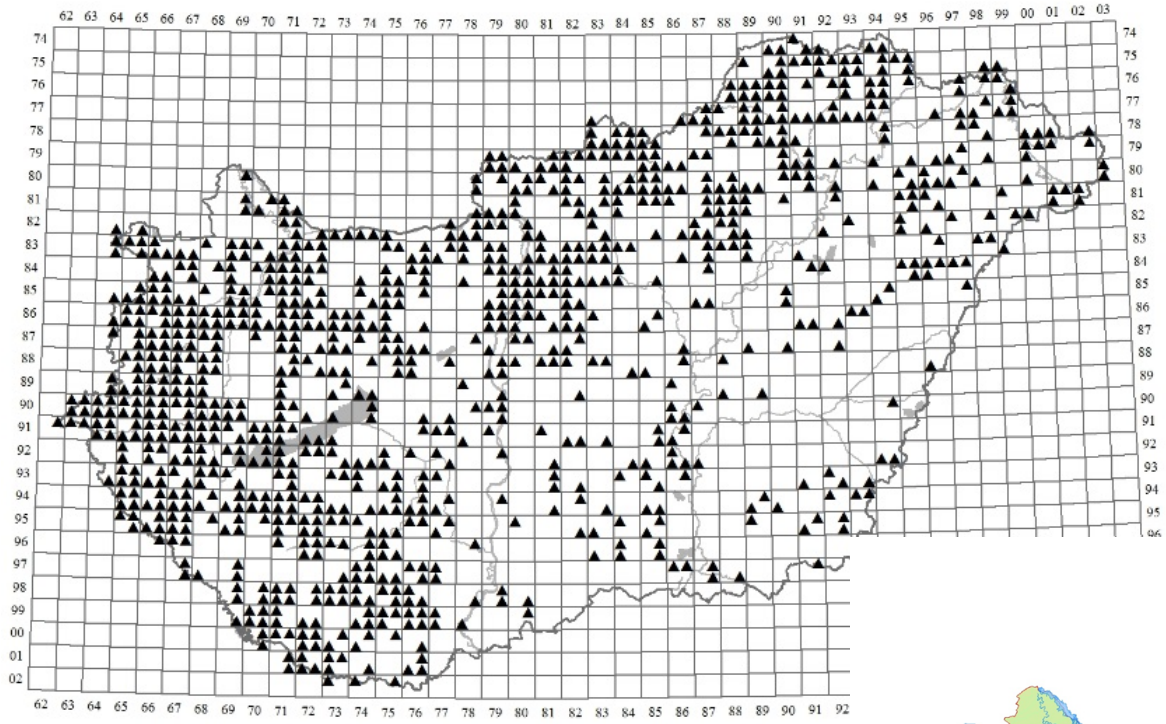
- East-Asia
- Introduction to Europe in 19th century as ornamental plants
- First data of hybrid: 1983
- Data of naturalisation in Hungary: 1920
- In Hungary hybrid is common

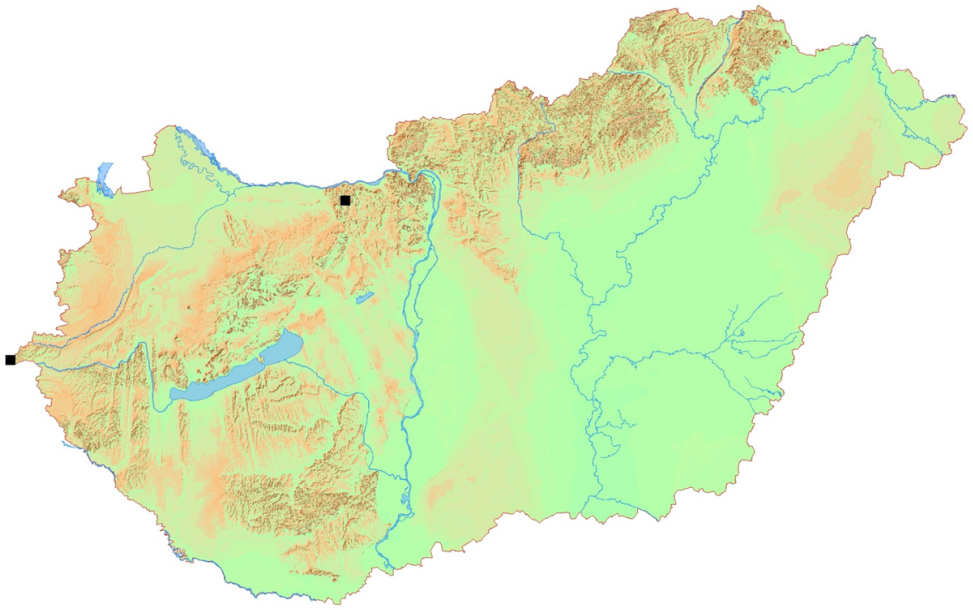
**Habitat preference**

– Japanese knotweed: disturbed habitats, settlements, roadsides

– Bohemian knotweed: moist seminatural communities, along streams, rivers, floodplain forests

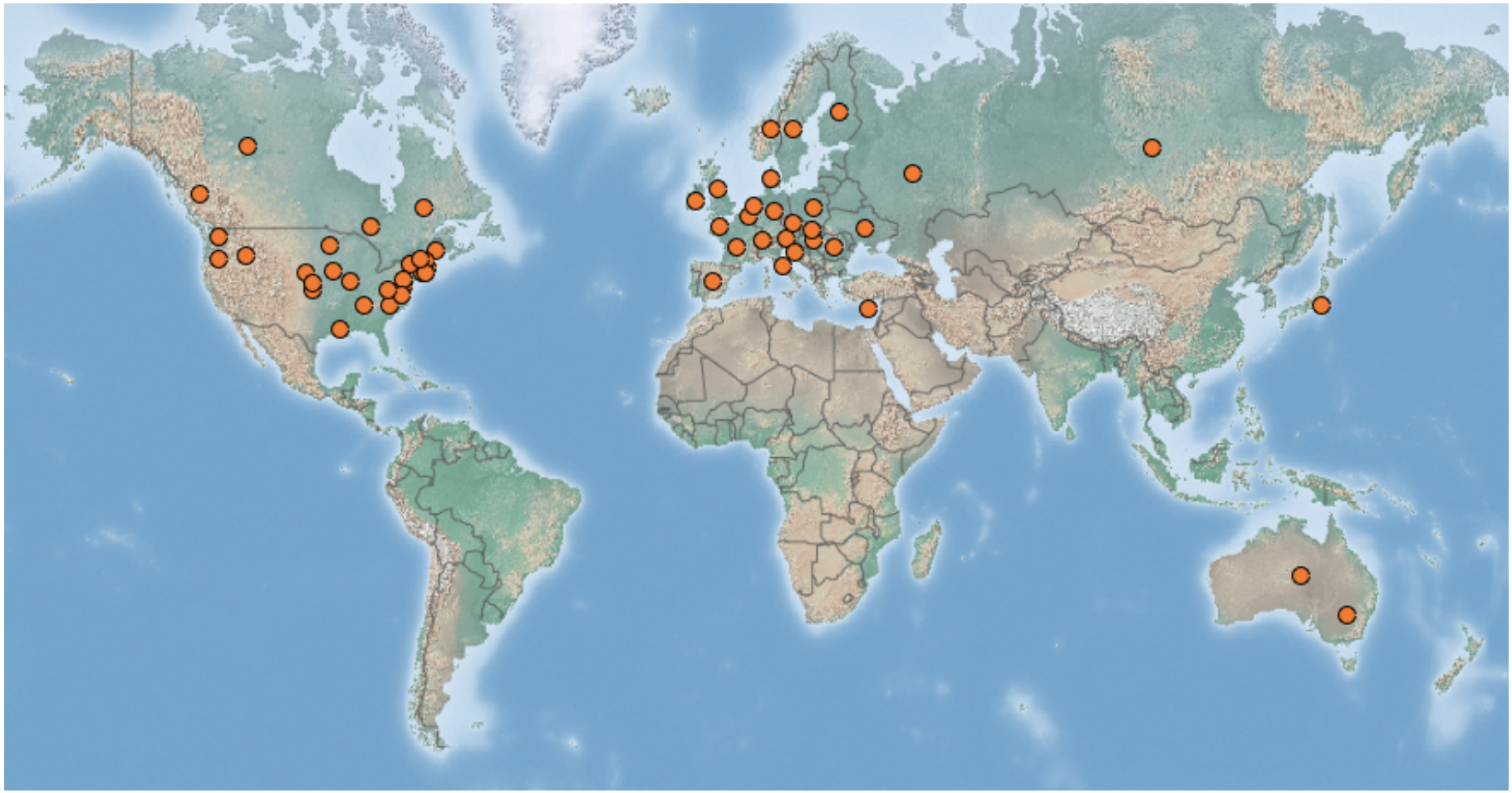
# *Fallopia japonica* and *F.* x *bohemica*



# *Fallopia sachalinensis*

# Knotweed species – *Fallopia* spp.



https://www.cabi.org/isc/datasheet/108332#toDistributionMaps



**Lifecycle**

- Shoot growth period: from March
- Flowering: July – October
- Seed ripening: September, October
- Insect pollinated flowers
- Good vegetative regeneration capacity

**Biotic interactions**

- Allelopathy
- Strong competitive capacity
- Monodominant stands
- Toxic rhizome



**Economic importance**

- Ornamental plants
- Edible shoot,  leaf extract used as herbicide
- Heavy metal accumulation
- Used in habitat restoration

**Importance in nature conservation**

- Inhibits the regeneration of near-natural plant communities
- Its invasion is significant in disturbed plant communities

# *Ailanthus altissima* – Tree of heaven



## Morphology

- Up to 27 meters height
- Pinnate leaf, can be 1 m long, consisting of 13-41 leaflets
- Flowering in June, may be bisexual or staminate
- Fruit is a samara cluster, turned longitudinally















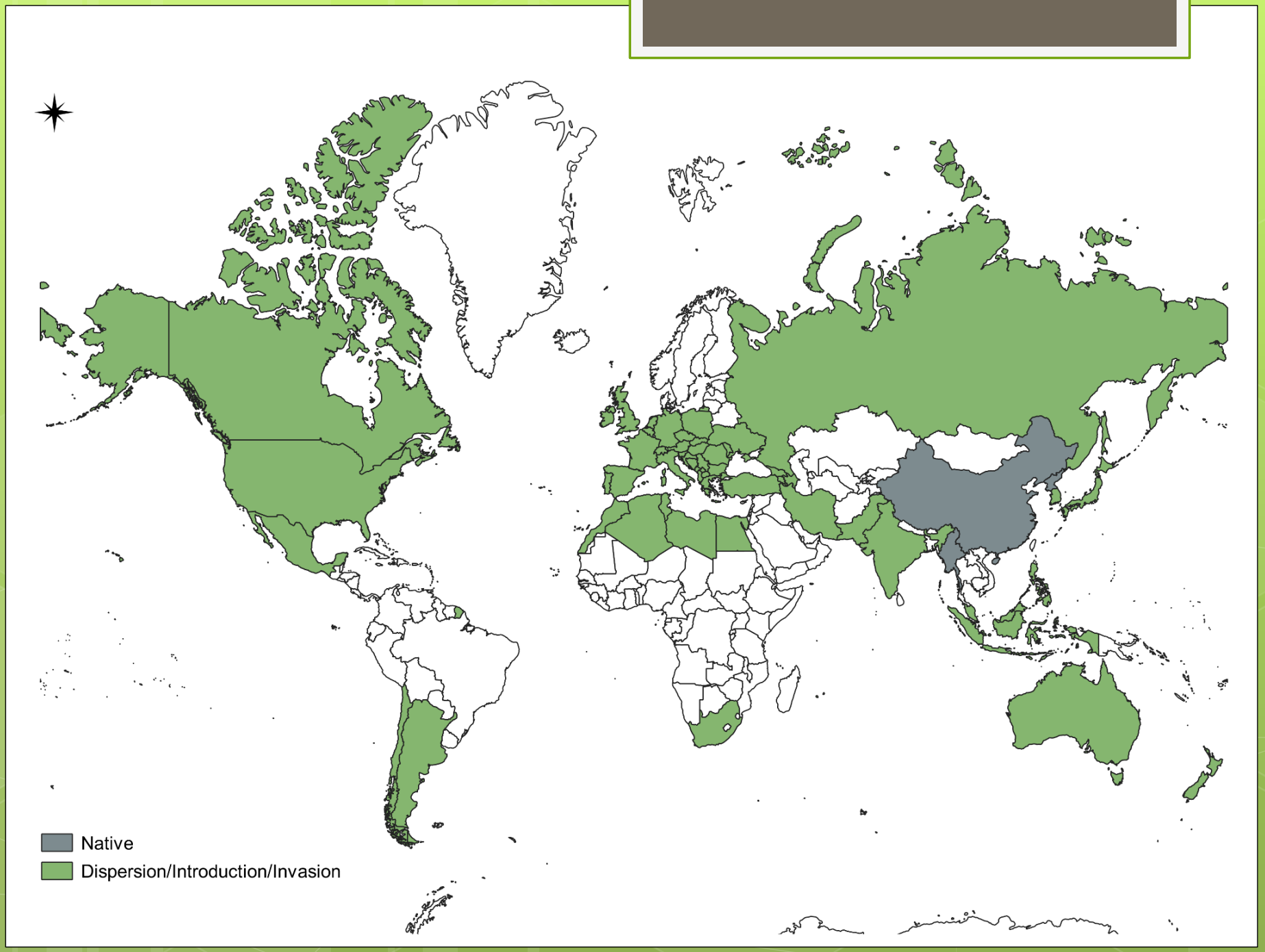



## Origin, distribution

- Asia (China, Korea)
- Introduced to Europe as ornamental tree and purpose of silk production
- First data in Hungary: 1841

## Life cycle

- Germination: May,
- Leaf growing: April, flowering: June, fruiting: August
- Good honey producing tree
- Vegetative propagation by adventitious buds
- Storage roots




Nunes et al. 2022









## Habitat preference

- Mainly on plain and hilly lands
- Warm, dry habitats, in cities, next to train roads, in grasslands

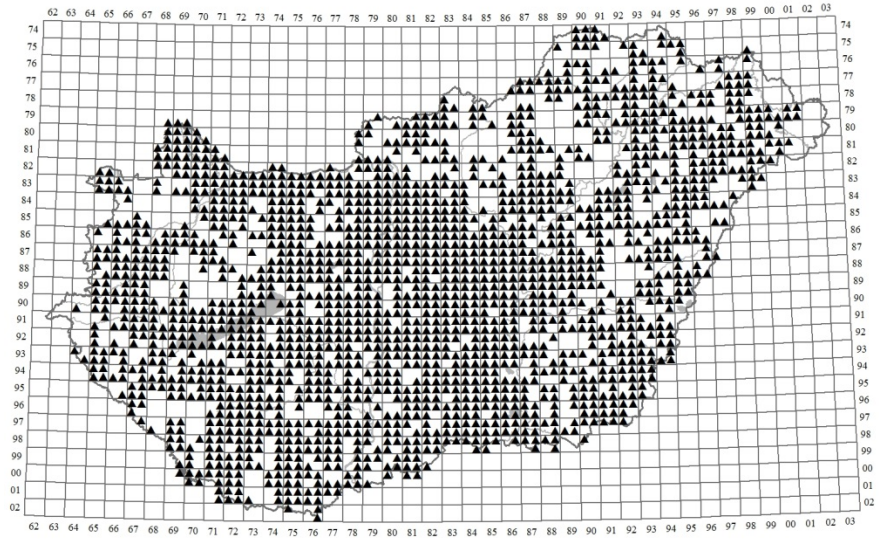
## Biotic interactions

- Strong allelopathic effect
- No pests or disease

## Economic importance

–Widespread cultivation:

- wood- and paper production
- ornamental tree
- nectar source





# Invaded habitats

- From hills to flatlands:
  - significantly endangers dry grasslands, xerothermophilous oak forests, sandy habitats
  - anthropogenic habitats, along roads and railways, in settlements causing damage of pavements and buildings
  - increasing significance in forestry and agriculture








## Nature Conservation significance

– Transform the natural semi-natural habitats by its competition, shade and allelopathic potential.

## Control

– Young specimen can pull out
– After cutting intensive sprouting
– Chemical control
– Shading by native species

# *Acer negundo* – Box elder











**Morphology**

- medium size (12-15 m), deep main root, lateral branches root easily.
- Pinnately compound leaves, 3-7 leaflets.
- March – May, reduction of flower parts
- Winged samaras, the angle separating the two wings is less than 60 degrees.



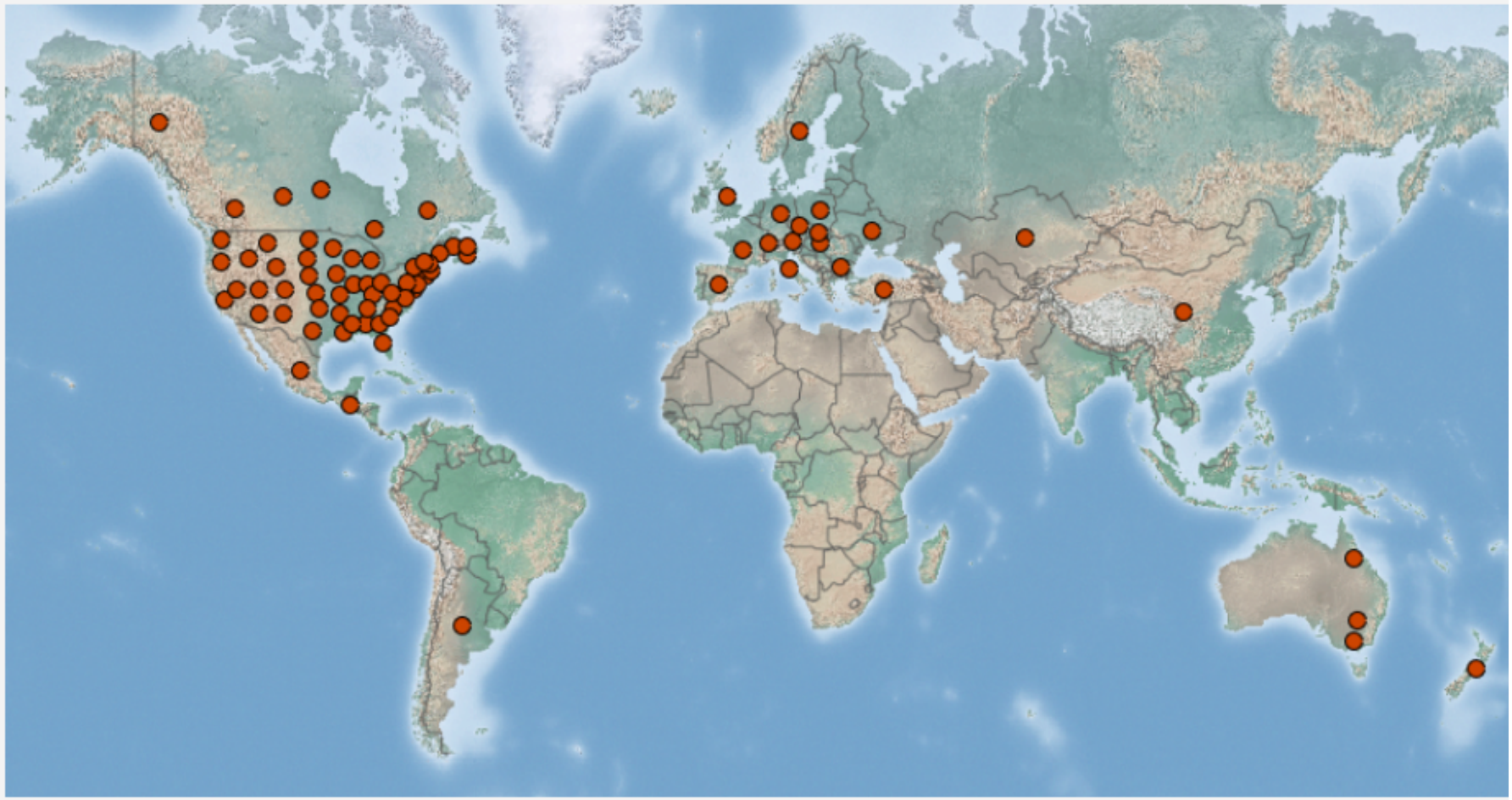
## Origin, distribution

- North America, from Canada to California
- Europe: 17th century
- First data from 1872 in Hungary

## Life cycle

- Germination April - September
- Long seed viability
- Large seed production every year
- Flowering before canopy development
- Good regeneration
- Fast growing in young age

# Worldwide distribution



CABI 2019: https://www.cabi.org/isc/datasheet/2862#toDistributionMaps







**Habitat preference**

- Growing mostly in lowlands
- Tolerates water and dry conditions
- Low nutrient demand
- Moderately shade tolerant

**Biotic interactions**

- Allelopathic affect
- Most important pest is fall webworm (*Hypantria cunea*)

**Economic importance**

- Ornamental tree, tolerance of urban environment
- Source of sweet syrup
- Used for furniture and paper production (boxes)







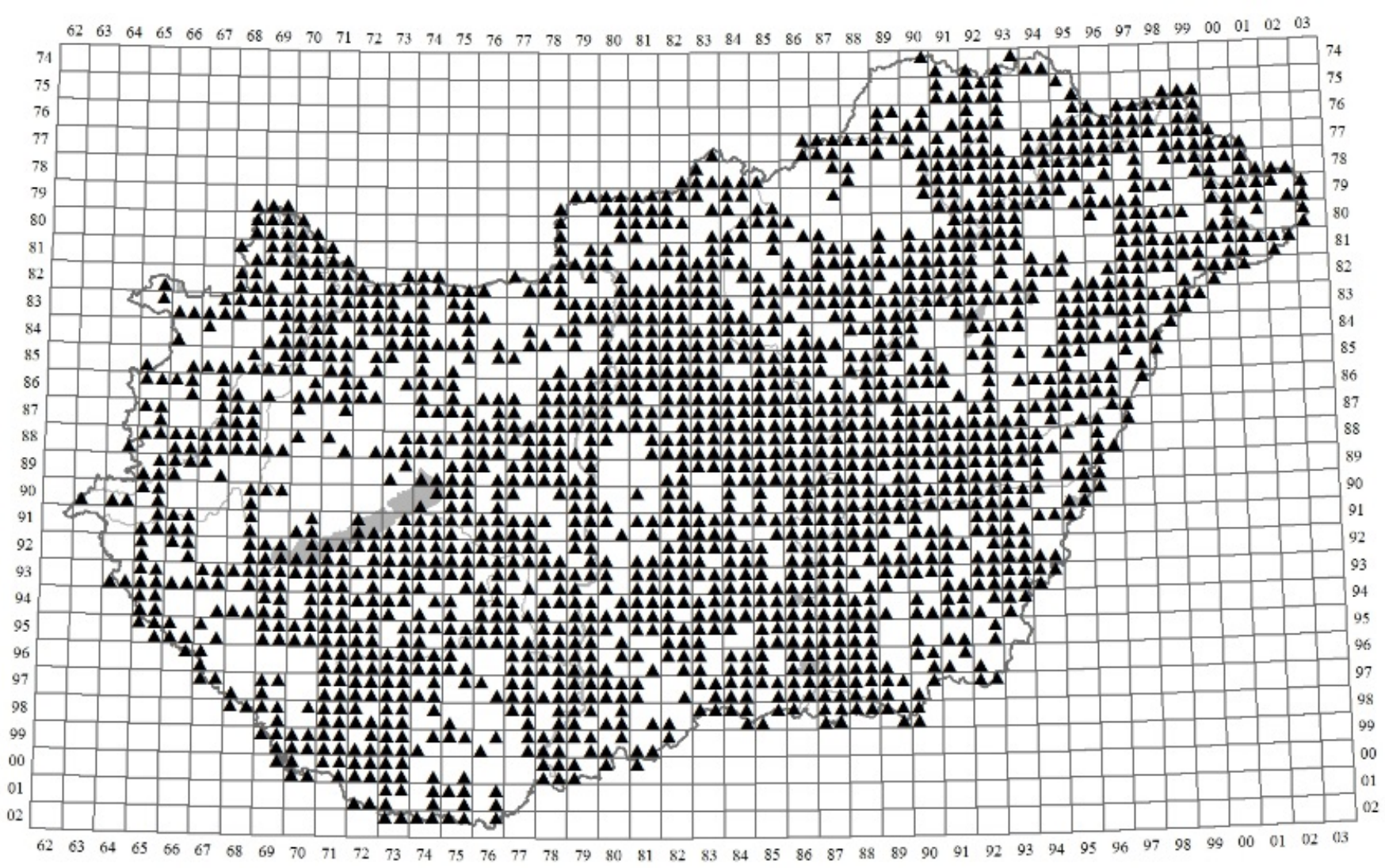

## Nature Conservation significance

- Transforming softwood floodplain forests
- Fall webworm is causing serious damages in horticulture
- Host plant of heteroptera species

## Control

- Damaging of roots
- Mechanical control
- Chemical control
- Shading by native species

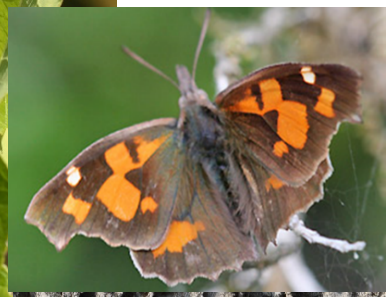
# *Acer negundo* – Box elder



# *Celtis occidentalis* – Common hackberry







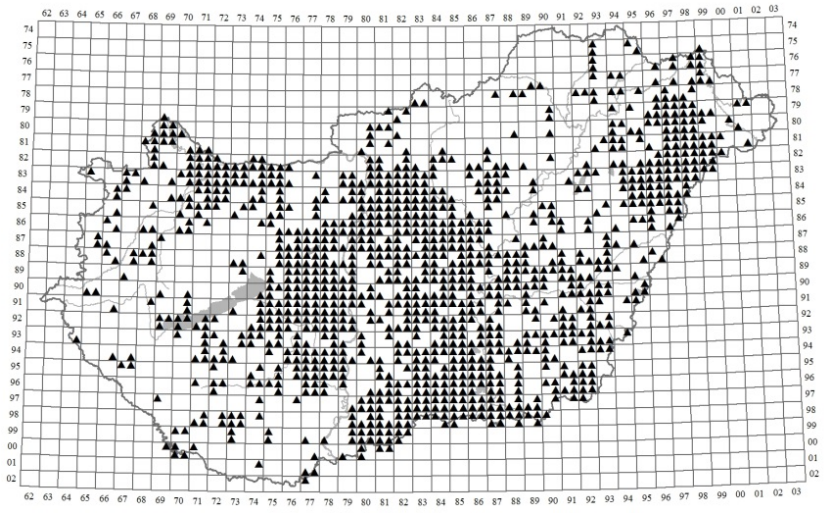




## Morphology

- Medium height, 25-30 m
- Leaves are elliptic, finely serrate, asymmetric
- April – May, poligamous flowers
- Fruit is brown, nutlet is coarse



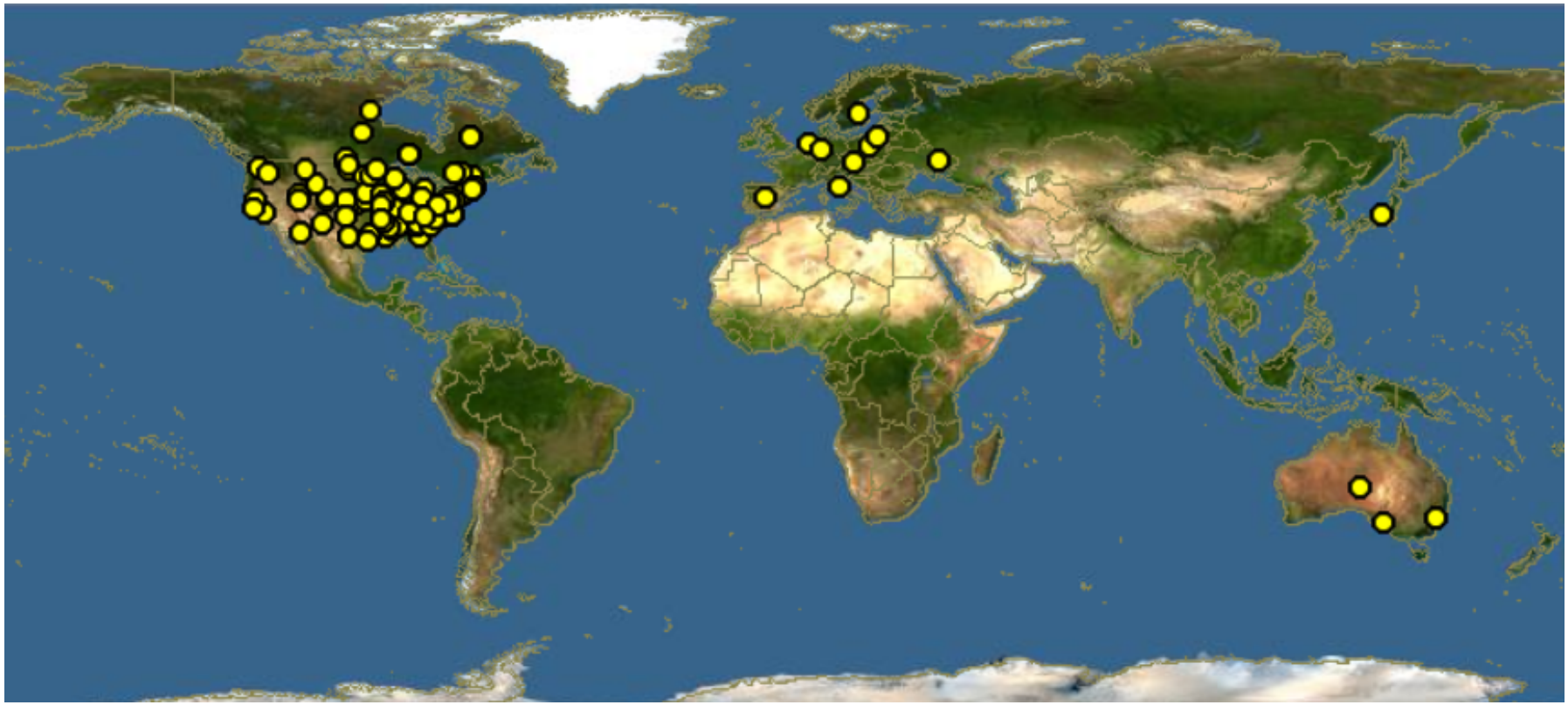




## Invasion background

- Widespread cultivation:
  - soil amelioration
  - in understory layer of different forest plantations
- Spontaneous spread:
  - high seed production
  - good seed dispersal
  - trunk sprouting ability
  - wide soil and water tolerance
  - rapid growth
  - competitive ability
  - allelopathy

# *Celtis occidentalis* – Common hackberry



https://www.discoverlife.org/nh/maps/Plantae/Dicotyledoneae/Ulmaceae/Celtis/map_of_Celtis_occidentalis.jpg

# *Robinia pseudoacacia* – Black locust







**Morphology**

- medium size (30-15 m)
- Pinnately compound leaves, 9-19 leaflets.
- May – June, white flowers in raceme
- Legumes, with 4-8 kidney form seeds.



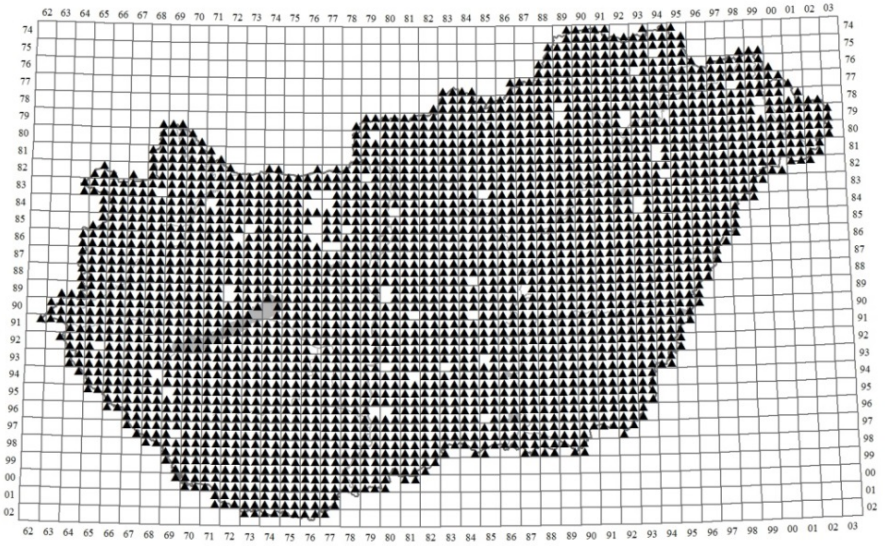


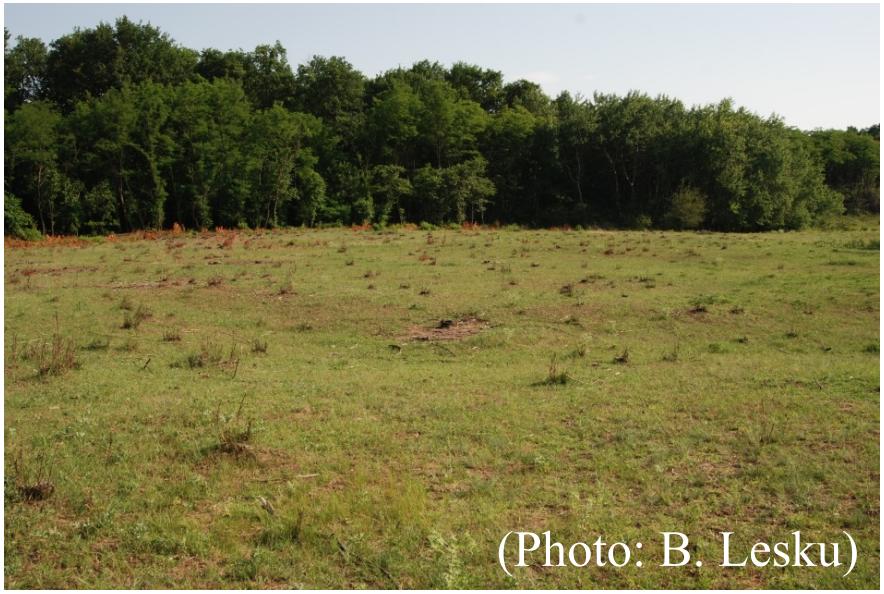




## Invasion background

- Widespread cultivation:
  - wood and honey production
  - erosion shelter, recultivation
- Spontaneous spread:
  - persistent seed bank
  - root suckering ability
  - good vegetative regeneration
  - drought tolerance
  - low nutrient demand
  - rapid growth
  - competitive ability
  - allelopathy

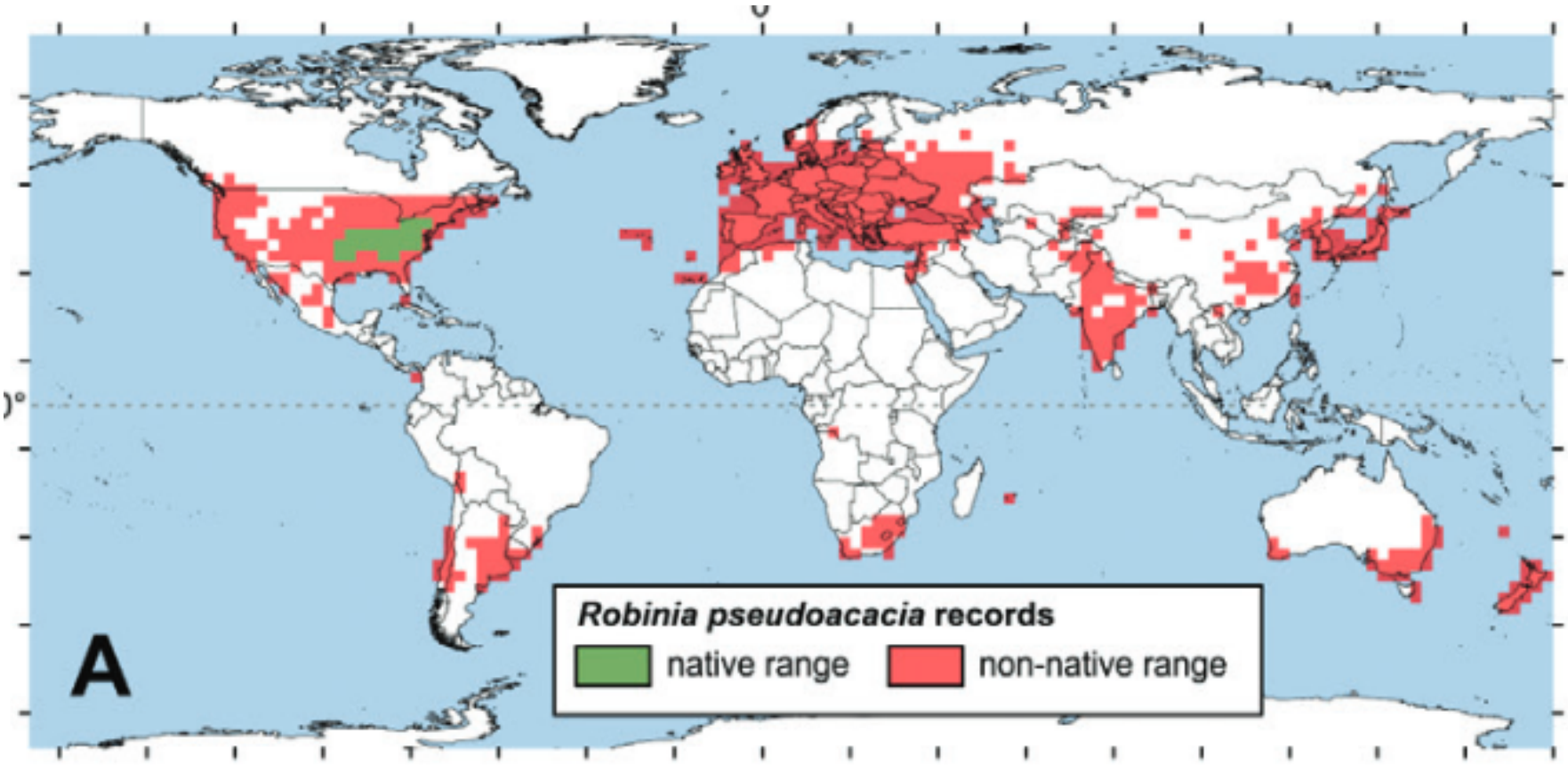




(Photo: B. Lesku)

## Invaded habitats

- From hills to flatlands:
  - covers 23.9 % of all forested areas
  - significantly endangers dry grasslands, xerothermophilous - mesic forests, sandy habitats
  - increasing significance in forestations




Mally R, Ward SF, Trombik J, Buszko J, Medzihorsky V, Liebhold AM (2021) Non-native plant drives the spatial dynamics of its herbivores: the case of black locust (Robinia pseudoacacia) in Europe. NeoBiota 69: 155–175. https://doi.org/10.3897/neobiota.69.71949

# *Fraxinus pennsylvanica* – Green ash

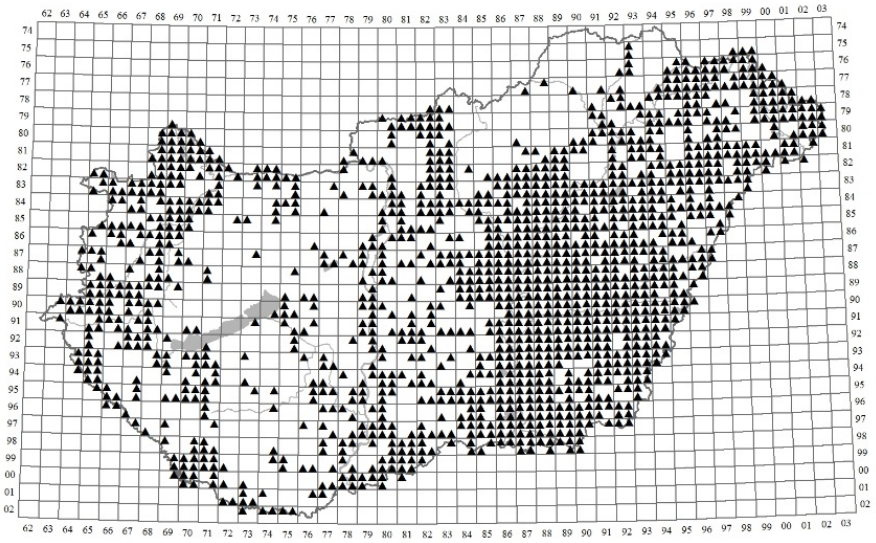


- **Morphology**
  Height ≤ 25 m
- Pinnate leaves,
  leaflets are 7-10 cm long,
  with short petioles.
- April, dioecious
- Samaras







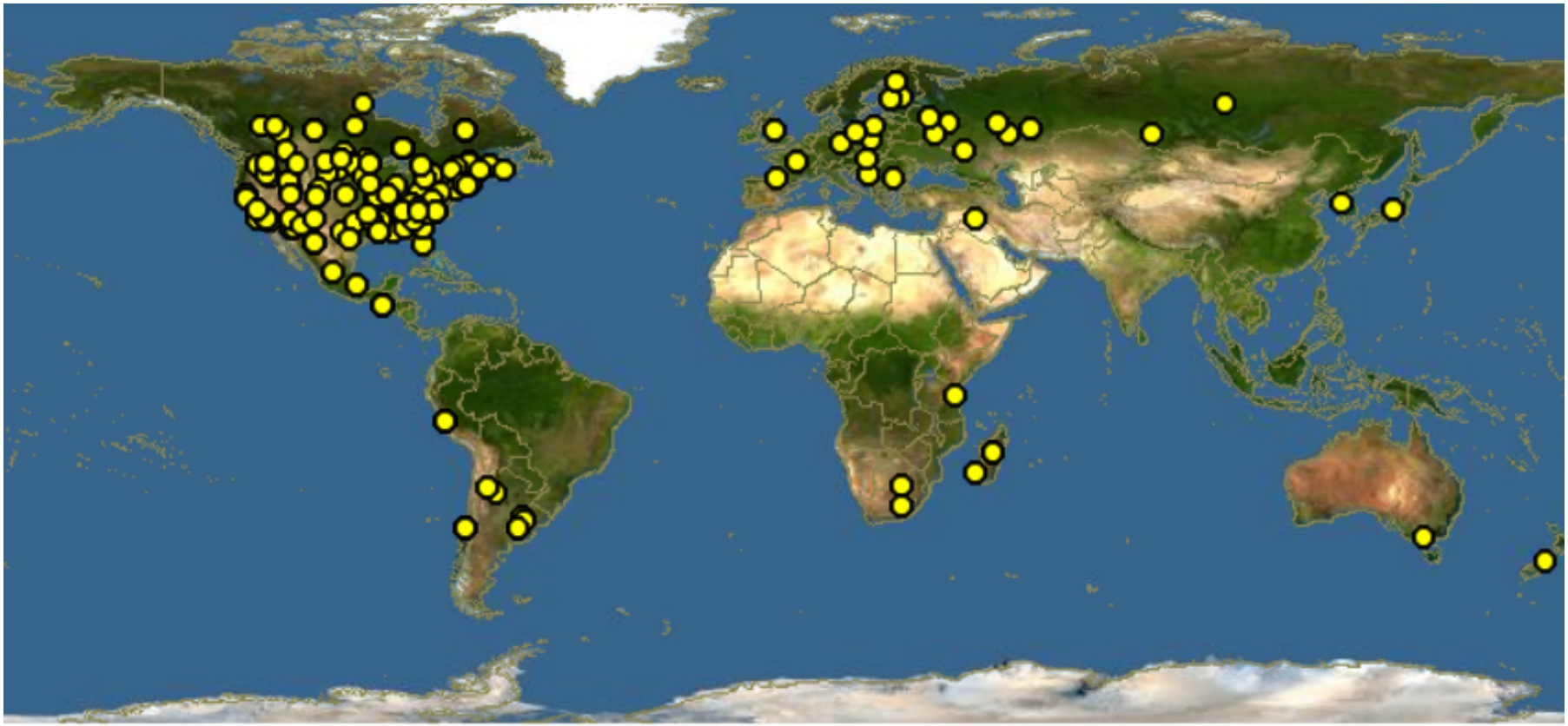


## Origin, distribution

- Atlantic North America
- Introduced into Europe 1780.
- First report from the early 1900s
- Planted to floodplain forest, poplar plantation, saline areas

## Life cycle

- Seed production already at the age of 6-7 years
- When young it grows fast, every year 1 m
- Starts flowering before canopy occurs
- Good regeneration



https://www.discoverlife.org/nh/maps/Plantae/Dicotyledoneae/Oleaceae/Fraxinus/map_of_Fraxinus_pennsylvanica.jpg





**Habitat preference**

- Prefers lowlands
- Thermofrequent, salt tolerance, frost resistant
- Low nutrient requirement, excellent water tolerance, high light demand

**Biotic interactions**

- Allelopathic affect
- Leaves contain high amount of cumarin



**Nature Conservation significance**

- Transforming floodplain forests

**Economic importance**

- Ornamental tree
- Good tolerance of urban environment
- Furniture industry







# *Prunus serotina* – Black cherry

- **Morphology**
  Medium height, up to 24-25 m
- Leaves are elliptic, finely serrate, underside along the midvein rusty hairs
- May – June, 8-14 cm long, white raceme
- Fruit is black, nutlet is egg shaped, smooth, inside the lonely seed is black.






## Origin, distribution

- Eastern North America
- It was planted in Europe in 1623 as ornamental, in forestry was used from the end of 19th century
- Spreading is mostly in disturbed forests

## Life cycle

- Fast growth in young age
- Foliage in April, flowering in May, fruits ripen late in September
- Seeds spread by birds
- Renews well with offsets of the trunk

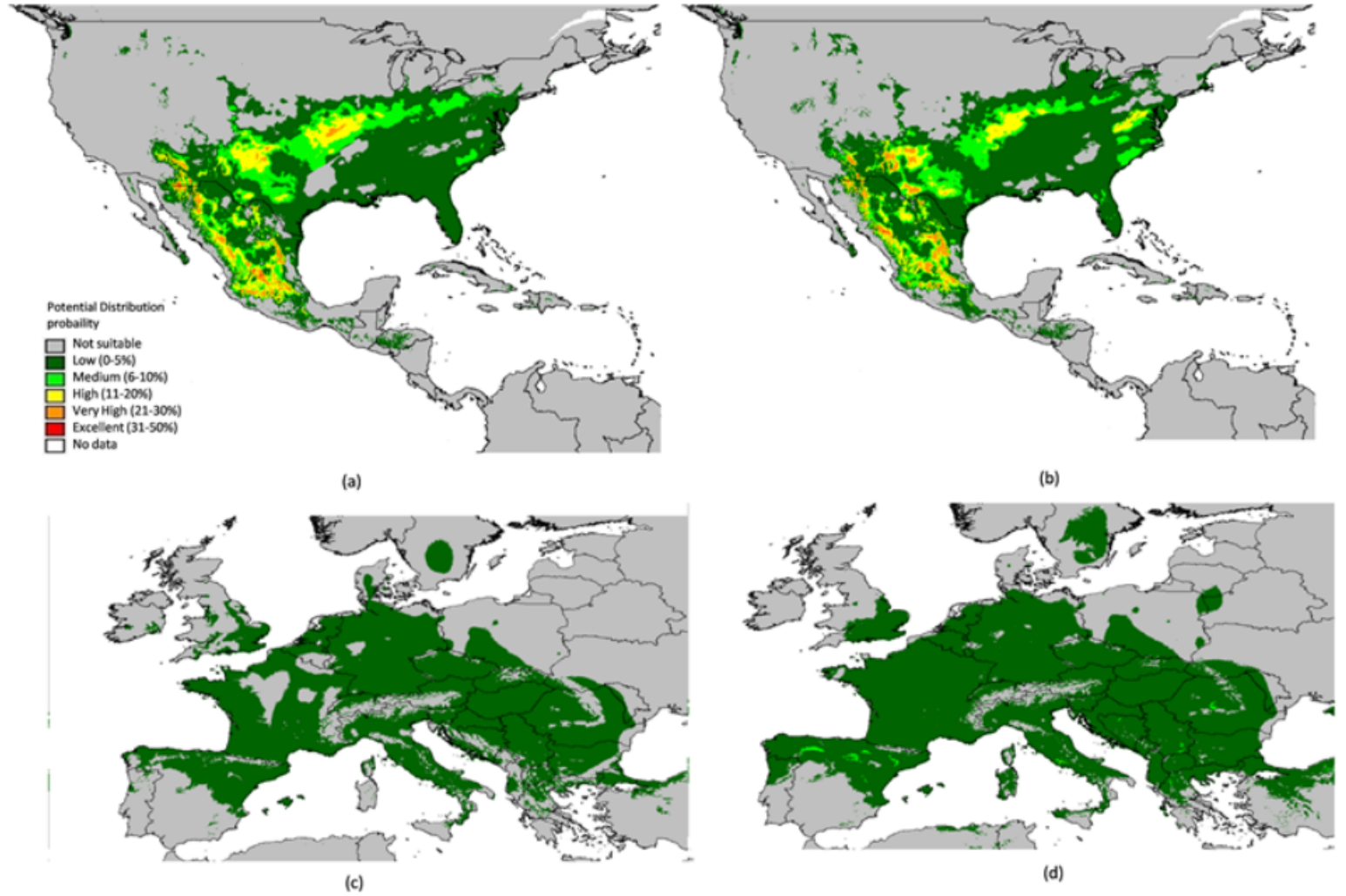
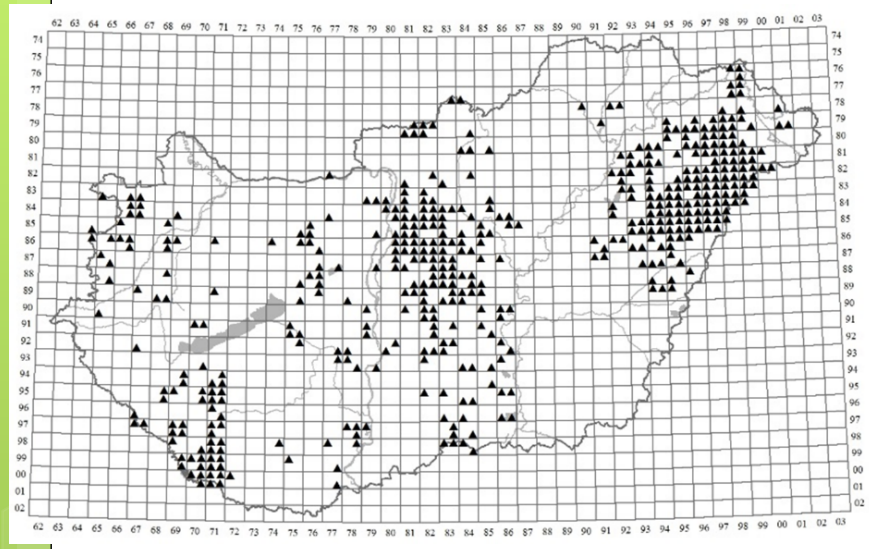



**Figure 3**. Current potential distribution ((a) and (c)) and climatic change potential distribution ((b) and (d)) of Prunus serotina in NorthAmerica and Europe. In both continents patterns are expanded subtly by the effect of climate change (NOAA-CCM3 model used). More information in text.

Segura et al. 2018






## Habitat preference

- Mainly in flatlands:
- Especially in sandy areas, scots and black pine forests, black locust and poplar plantations
- Occurs in wet areas too, floodplain and gallery forests

## Biotic interactions

- Seedling bank
- Overgrow the native species and repress them by its strong shading
- Fruits are consumed by birds and small vertebrates, other parts of the tree toxic





**Economic importance**

- Timber is hard, is not suitable for industry
- Prohibit the forest renewing, and forest producing
- Nutrient and water competitor of native and planted species.
- Was planted in parks as an ornamental tree

**Nature Conservation significance**

- Prohibit the forest renewing of native species, decreasing the biodiversity of the herb layer

# *Amorpha fruticosa* - False indigo

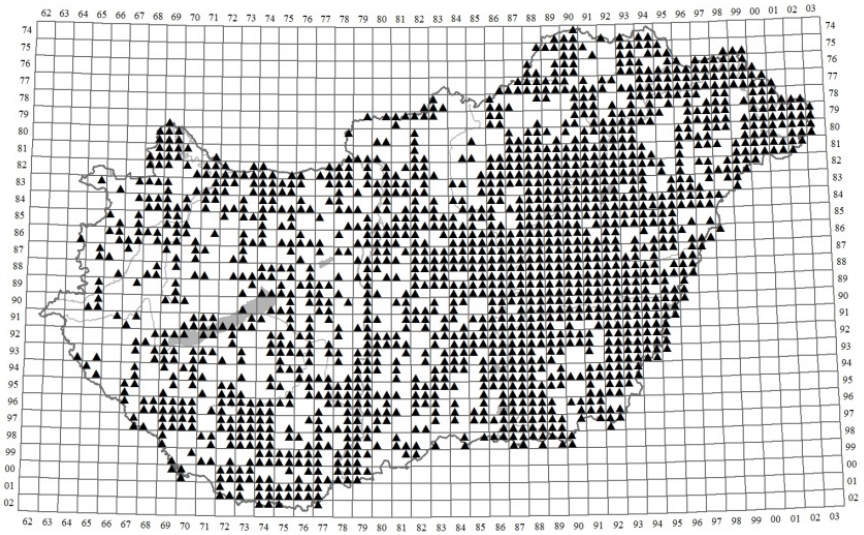






**Invasion background**

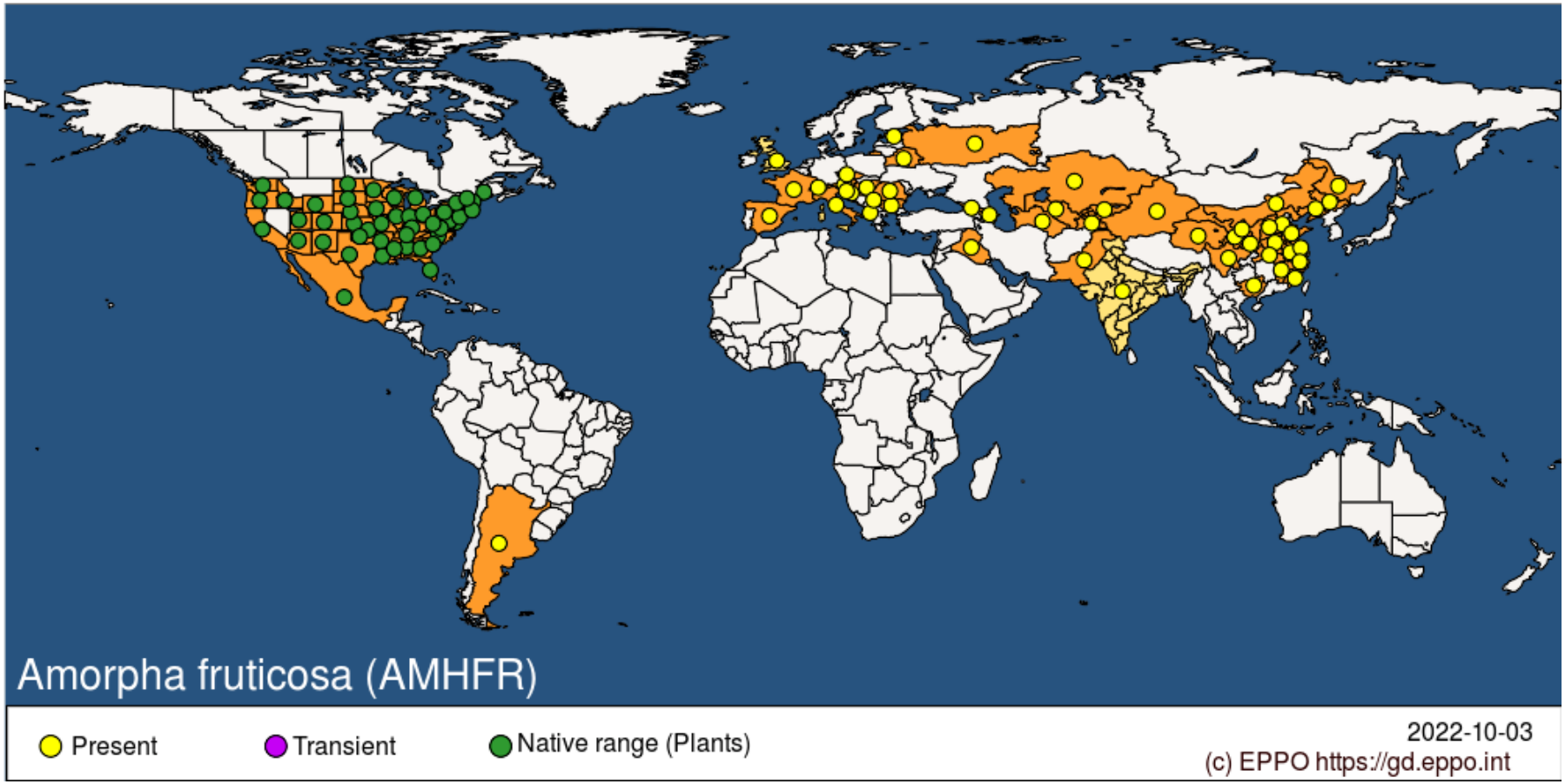
- Widespread cultivation:
  - soil amelioration
  - erosion shelter, recultivation
- Spontaneous spread:
  - persistent seed bank
  - good seed dispersal
  - good regenerative capacity
  - low nutrient demand
  - rapid growth, early flowering
  - competitive ability
  - allelopathy





## Invaded habitats

- Mainly in flatlands:
  - especially in floodplain and gallery forests, along streams channels, wet meadows.


Amorpha fruticosa (AMHFR)
Present
Transient
Native range (Plants)
2022-10-03
(c) EPPO https://gd.eppo.int

# *Elaeagnus angustifolia* - Russian olive

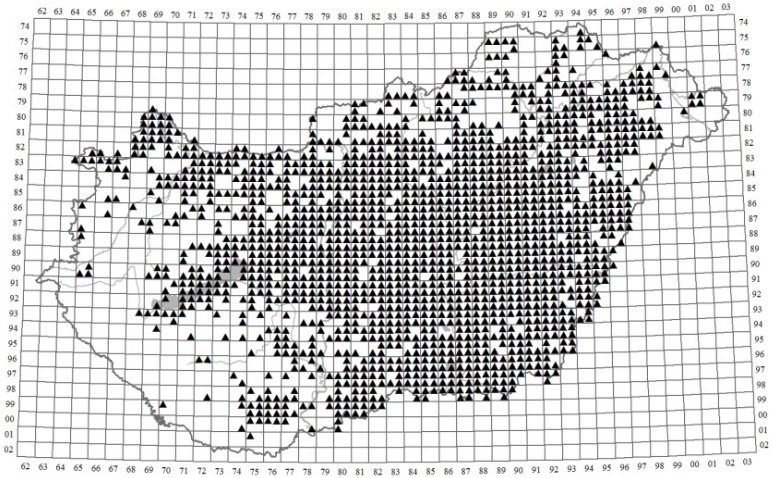






**Invasion background**

- Widespread cultivation:
  - soil amelioration
  - erosion shelter, recultivation
  - in forest edges, wind-breaks, shelter-belts, hedgerows
- Spontaneous spread:
  - good seed dispersal by birds
  - good regenerative capacity
  - low nutrient demand
  - wide soil and water tolerance
  - competitive ability



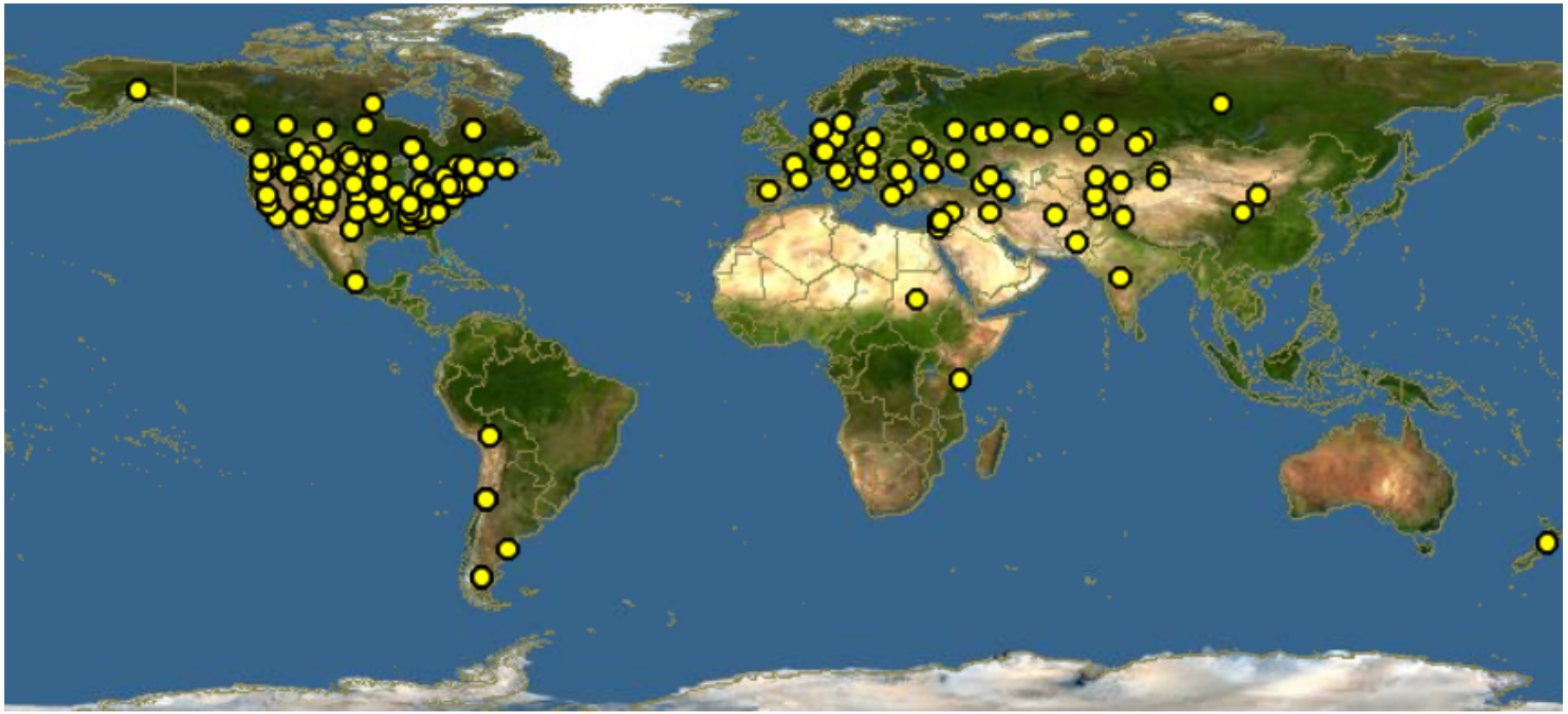
## Invaded habitats

- Mainly in flatlands:
  - from loose sandy and saline soil to wet meadows, along streams and channels




(Photo: Cs. Vadász)



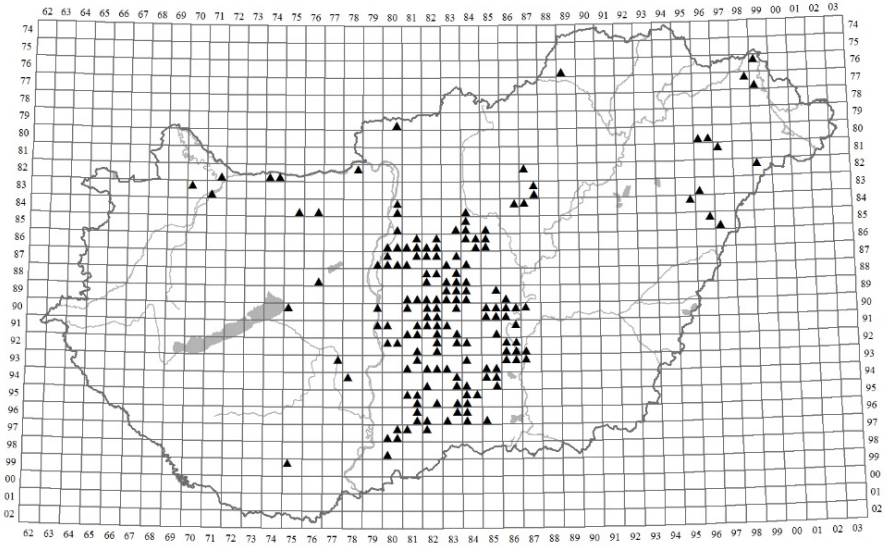


# *Ribes aureum* – Golden currant







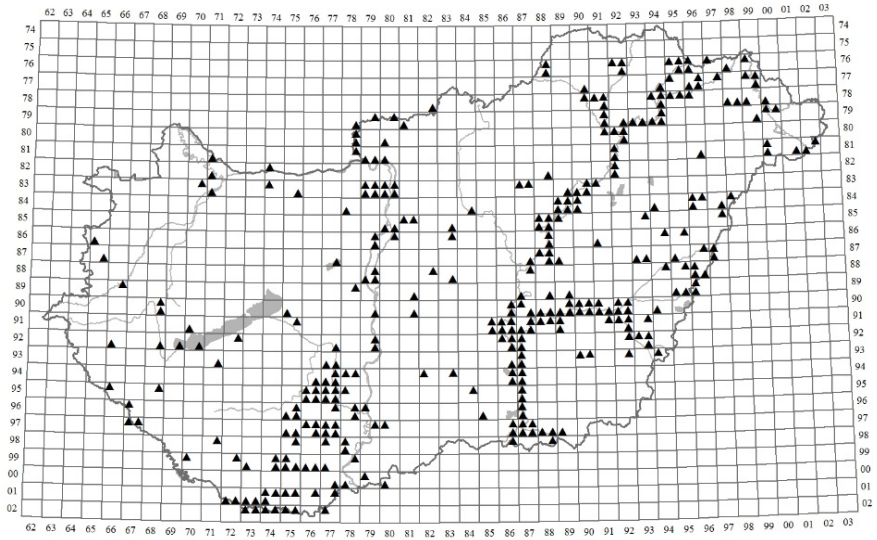




# *Vitis vulpina* – Frost grape, Fox grape





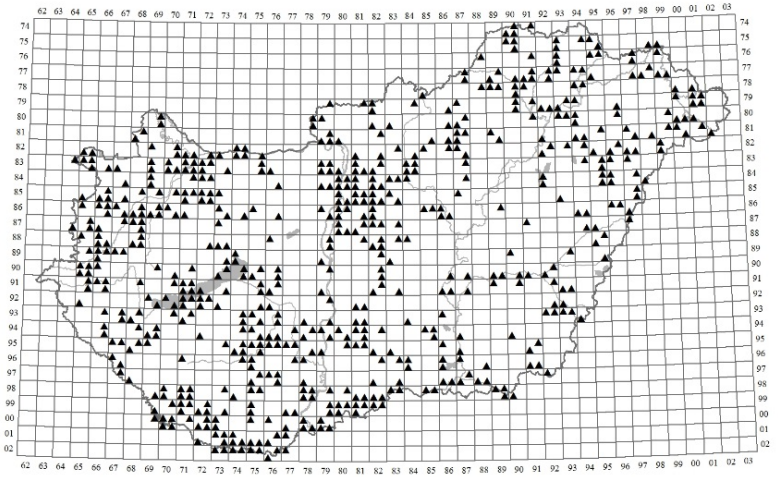




# *Parthenocissus inserta* – Thicket creeper







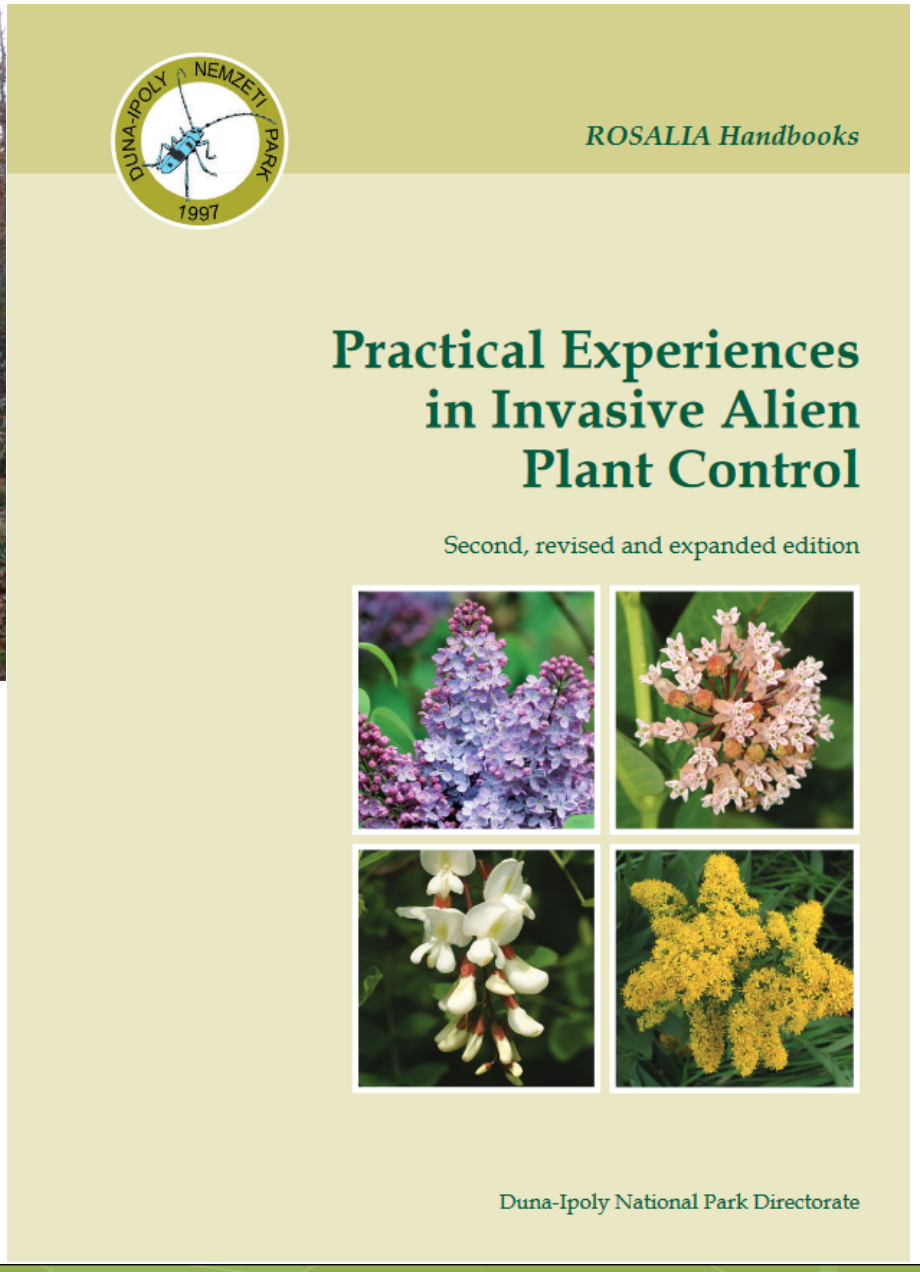













https://oakprotection.eu/sites/default/files/tudastar/rosalia_handbooks_3_en.pdf

# Thank you for your attention!

