


Practical Experiences in Invasive Alien Plant Control in Hungary

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European Workshop on Control and Eradication of Invasive Alien Plant Species

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Introduction

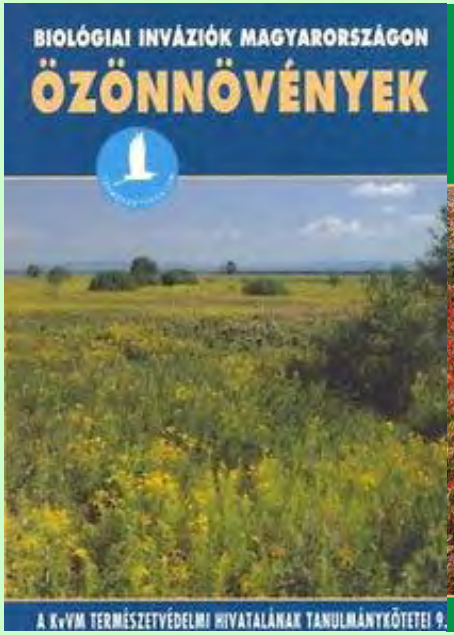
Books about invasive alien plants:

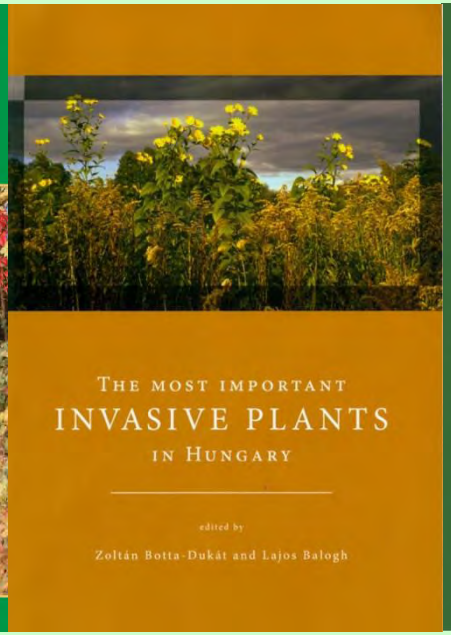
2004: Mihály B. − Botta-Dukát Z. (eds.): Özönnövények.

2006: Botta-Dukát Z.− Mihály B. (eds.): Özönnövények II.

2008: Botta-Dukát Z.− Balogh L. (eds.): Most important invasive plants in Hungary

2012: Csiszár Á. (ed.): Inváziós növényfajok Magyarországon





Downloadable: http://www.dunaipoly.hu/uploads/2016-02/20160202200313-rosalia-handbook-ver2-6xtoafsq.pdf

DUNA-IPOLY NEMZETI PARK 1997

ROSALIA Handbooks

Practical Experiences in Invasive Alien Plant Control

Duna-Ipoly National Park Directorate

Summary of invasive plant control experiments

Non-chemical methods for controlling Russian olive (*Elaeagnus angustifolia*)

Method		Stand characteristics	Timing	Number of treatments	Effectiveness	Comments
Uprooting	With sand loader or tractor equipped with a lifting fork	For trunks of any diameter that can be lifted out with the loader (2-3.5 tons depending on the type of machine)	Anytime during the year except for the nesting period	1	Effective	– Under suitable soil conditions – Minimum root suckers can be observed, which can be treated in the following year with partial bark stripping method treatment
Felling and removal of sprouts		Any trunk diameter	Outside the vegetation period (all year if necessary)	The treatment needs to be repeated at least once	Ineffective	– Continuous resprouting – Chemical follow-up treatments needed

Results of chemical treatment experiments performed on Russian olive (*Elaeagnus angustifolia*)

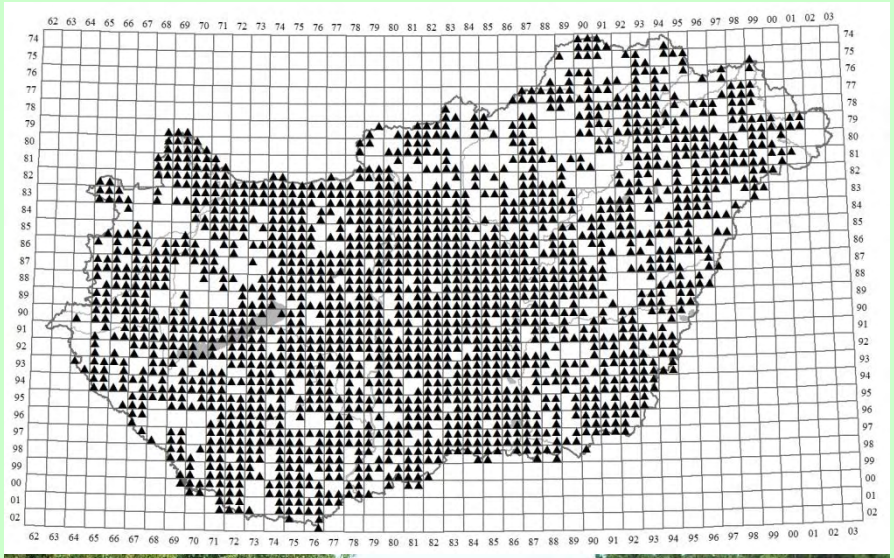
Method	Treatment			Stand characteristics	Timing	Number of treatments	Effectiveness	Comments
	Chemical	Additive	Concentration					
Spraying	Medallon Premium	Nonit or Silwet Star and N-fertilizer	33–50 % vol.	Trunk diameter < 5 cm	September	1–2	Effective	– High weather sensitivity and high risk of drift
	Dominátor	Nonit	3.5%	shoots	In the vegetation period	1	Effective	– More effective in sunny and warm weather
Partial bark stripping	Medallon Premium Fozát 480 Figaro Clinic 480 SL NASA	–	100%	Trunk diameter < 8 cm	August–October	1–2	Effective	– Repeat treatment rarely necessary – 100% selective
Trunk injection	Medallon Premium Fozát 480 Figaro Clinic 480 SL NASA	–	100%	Trunk diameter > 8 cm	In the vegetation period	1–2	Effective	– Most effective from end of August to September
					August–October	1–2	Effective	– 1 drill hole per every 5 cm of trunk girth – 100% selective
Cut stump treatment	Medallon Premium	–	100%	Any trunk diameter	In the vegetation period	2	Effective	– Higher effectiveness if mixed with diesel oil
		Oil emulsion		Trunk diameter > 5 cm	September	1	Moderate	– Cost effective – Medium level of weather sensitivity and risk of drift

Tree of heaven (*Ailanthus altissima*)

Invasion background

- Widespread cultivation:
  - wood- and paper production
  - ornamental tree
  - nectar source
- Spontaneous spread:
  - special winged samaras
  - root suckering ability
  - good vegetative regeneration
  - drought tolerance, storage roots
  - rapid growth, neoteny
  - competitive ability, allelopathy
  - no important enemy

Tree of heaven (*Ailanthus altissima*)



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

Tree of heaven (*Ailanthus altissima*)


(Photo: G. I. Kocsis)


(Photo: I. Szidonya)

Control methods

- Chemical treatments:
  - ❖ Spraying:
    - seedlings, sprouts up to 30 cm
    - glyphosate herbicides
    - 1-3 treatments: 1. May-June, 2. August-October, 3. next spring
    - in warm, sunny weather
  - ❖ Wiping herbicides:
    - seedlings, sprouts
    - glyphosate herbicides
    - 1-3 treatments: 1. May-June, 2. August-October, 3. next spring
    - in warm, sunny weather

Tree of heaven (*Ailanthus altissima*)


(Photo: G. Takács)


(Photo: G. I. Kocsis)

- ❖ Partial bark stripping:
  - all trunk sizes (< 8 cm)
  - glyphosate herbicides
  - 1-2 treatments: August-October
  - 100 % selective
  - repeating rarely necessary

- ❖ Bark treatment without cuts stripping:
  - young trees with thin bark
  - glyphosate herbicides + oil emulsion
  - 3 treatments: August-October
  - min. 3 years
  - 10-15 cm strip with 40 cm width

Tree of heaven (*Ailanthus altissima*)


(Photo: G. I. Kocsis)


(Photo: G. Takács)

- ❖ Trunk injection:
  - trunk diameter >8 cm
  - 1 drill hole / 5 cm of girth
  - 1 ml solution / drill hole
  - glyphosate herbicides
  - 1-(2) treatments: August-October
  - 100 % selective
  - repeating rarely necessary

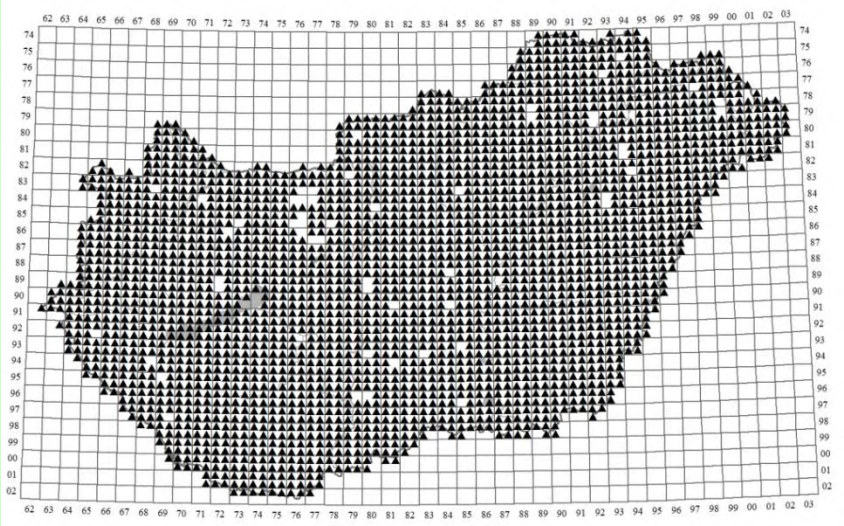
- ❖ Cut stump treatment:
  - trunk diameter >5 cm
  - glyphosate herbicides
  - 1-(2) treatments: August-September

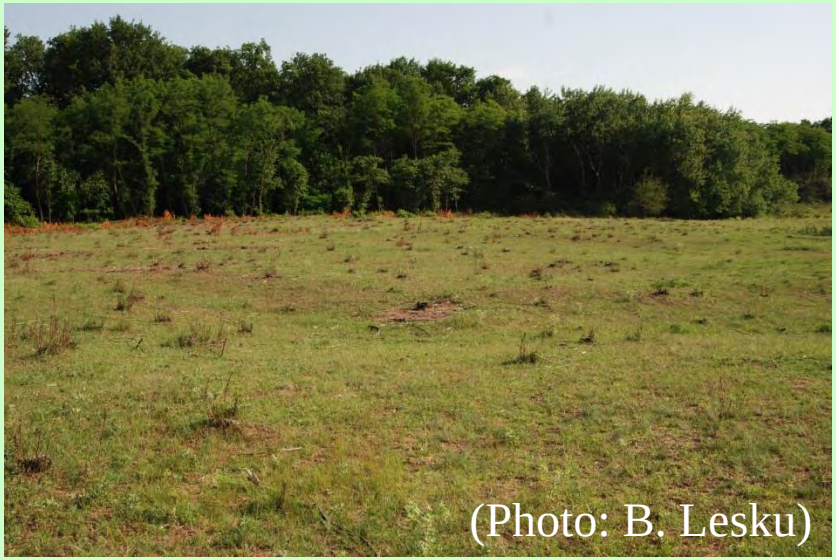
Black locust (*Robinia pseudoacacia*)

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

Black locust (*Robinia pseudoacacia*)





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

Control methods

- Non-chemical treatments:
  - ❖ Grazing:
  - young sprouts only
  - by sheep and cattle
  - continuously at least 2 years

Black locust (*Robinia pseudoacacia*)

- Chemical treatments:
  - ❖Spraying:
  - sprouts up to 150 cm
  - glyphosate or klopiralid herbicides
  - 1-2 treatments: 1. October, 2. May,
  - in warm, sunny weather

  - ❖ Partial bark stripping:
  - trunk diameter < 8 cm
  - glyphosate herbicides
  - 1-2 treatments: August-October
  - 100 % selective
  - repeating rarely necessary

Black locust (*Robinia pseudoacacia*)

❖Trunk injection:

- trunk diameter >8 cm
- 1 drill hole / 5 cm of girth
- glyphosate herbicides + (fertilizer)
- 1-(2) treatments: May-August-October
- 100 % selective, environmentally friendly
- time consuming, high living labour
- repeating rarely necessary

❖Cut stump treatment:

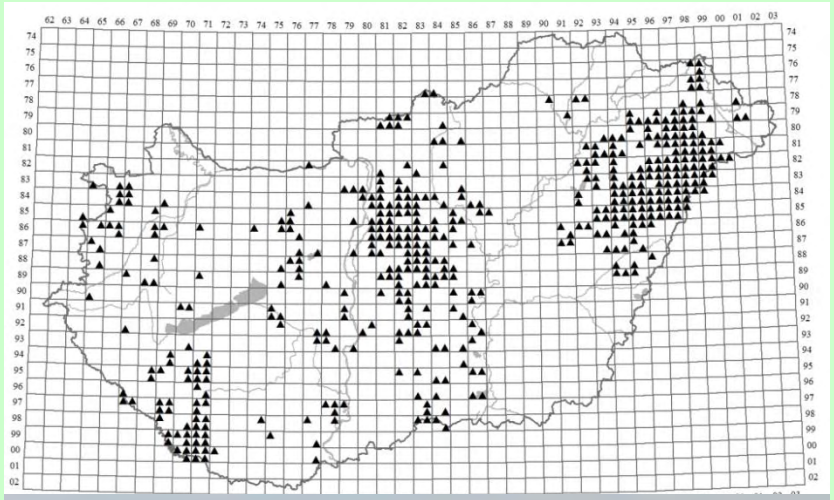
- all trunk diameter
- glyphosate herbicides + colouring matter + diesel oil
- (1)-2 treatments: June-October
- root- and stump suckers may spring up
- less selective
- less time consuming

Black cherry (*Prunus serotina*)

Invasion background

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

Black cherry (*Prunus serotina*)



Invaded habitats

- 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

Control methods

- Non-chemical treatments:
  - ❖ Manual removal:
  - seedlings up to 1-1,5 m

Black cherry (*Prunus serotina*)

- ❖ Girdling:
  - trunk diameter 1-20 cm
  - by chain saw or machete
  - 2 rings with double chains
  - 15-20 cm wide girdle
  - lower trunk part can survive

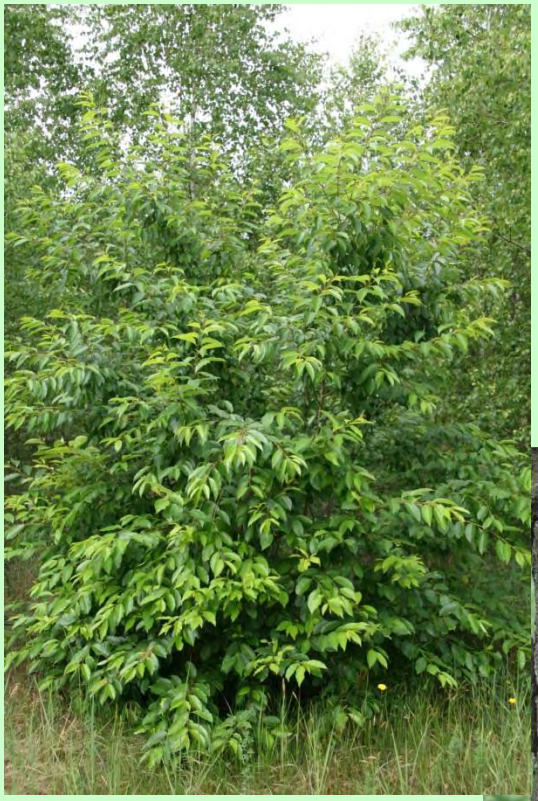
- Chemical treatments:
  - ❖Spraying:
    - sprouts
    - glyphosate herbicides
    - 1-2 treatments in vegetation period
    - leathery leaves: surfactant necessary

Black cherry (*Prunus serotina*)

❖Partial bark stripping:
- trunk diameter < 5 cm
- glyphosate herbicides
- 1-2 treatments: August-October
- 100 % selective
- repeating rarely necessary

❖Bark treatment without cuts stripping:
- trunk diameter < 5 cm
- glyphosate herbicides
- 1-2 treatments: August-September
- all around the girth at 0.5-1 m length

Black cherry (*Prunus serotina*)



❖Trunk injection:
- trunk diameter >8 cm
- 1 drill hole / 5 cm of girth
- glyphosate herbicides
- 1-(2) treatments: August-October
- 100 % selective, environmentally friendly

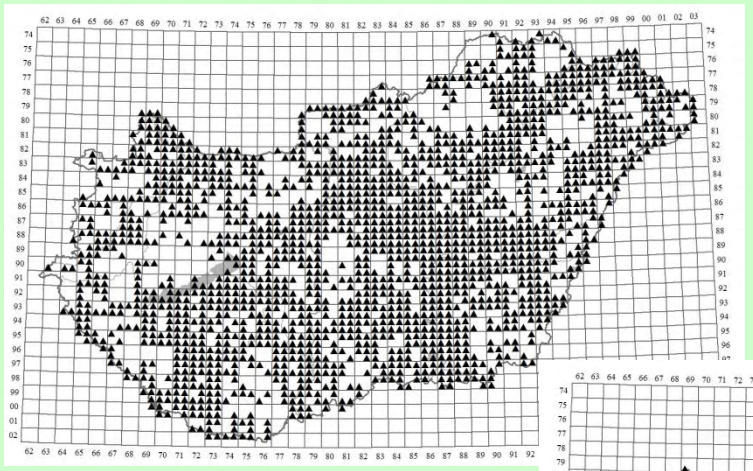
❖Cut stump treatment:
- all trunk diameter
- glyphosate herbicides
- 1 treatment: in vegetation period
- stump edges carefully treated

Box elder (*Acer negundo*) Green ash (*Fraxinus pennsylvanica*) Common hackberry (*Celtis occidentalis*)

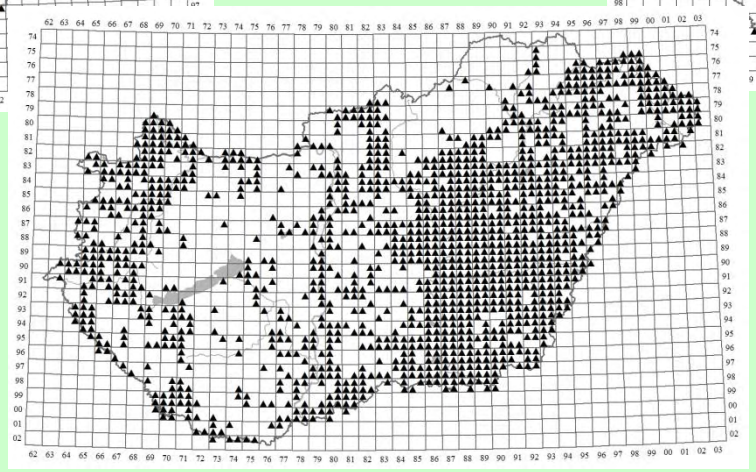
Invasion background

- 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

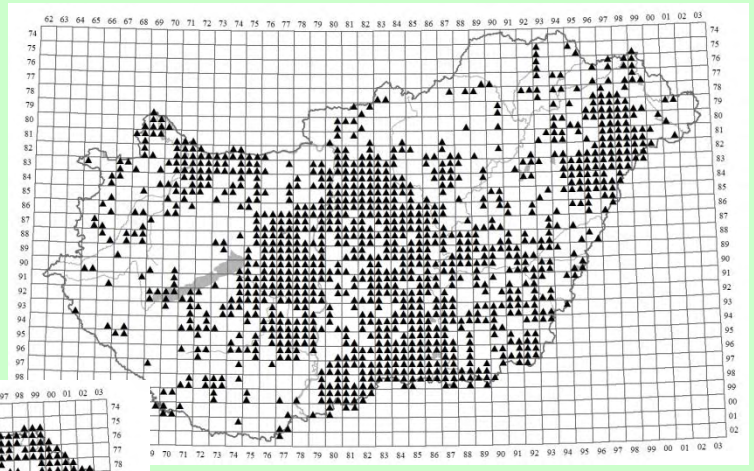
Box elder (*Acer negundo*)



Green ash (*Fraxinus pennsylvanica*)



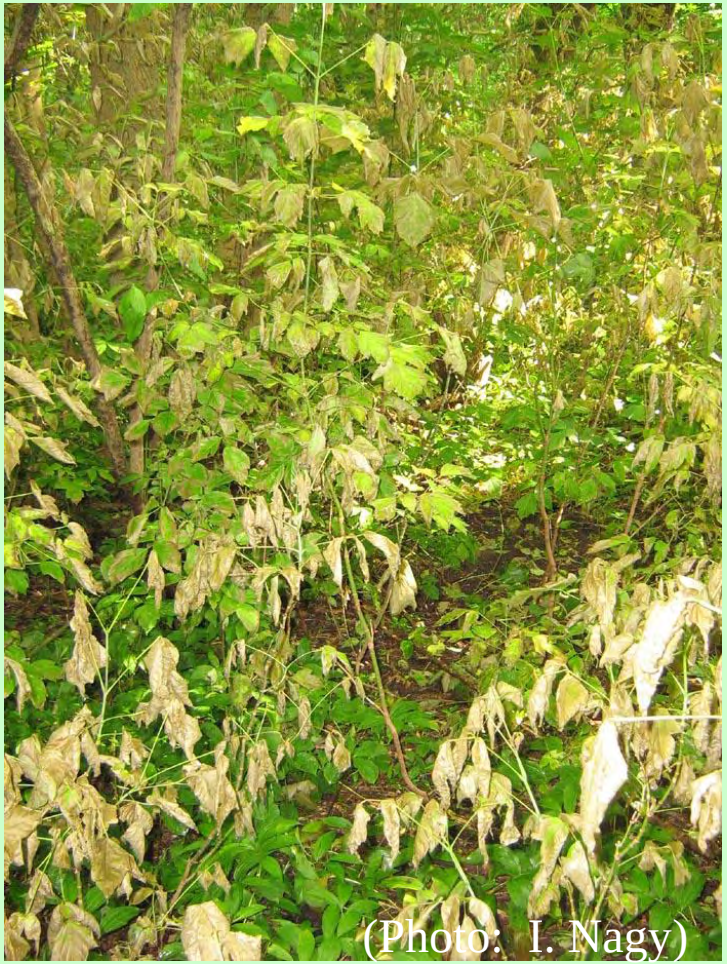
Common hackberry (*Celtis occidentalis*)



Invaded habitats

- Common hackberry:
  - especially in sandy areas but occurs in floodplain and gallery forests
- Green ash, box elder:
  - especially in floodplain and gallery forests

Box elder (*Acer negundo*) Green ash (*Fraxinus pennsylvanica*) Common hackberry (*Celtis occidentalis*)


(Photo: I. Nagy)

Control methods

–Non-chemical treatments:

- ❖Manual removal:
  - seedlings up to 1-1,5 m
- ❖Felling and sprout removal:
  - all trunk diameter
  - without chemical sprout control ineffective

– Chemical treatments:

- ❖Spraying:
  - sprouts
  - glyphosate herbicides
  - 1-2 treatments
  - in warm, sunny weather

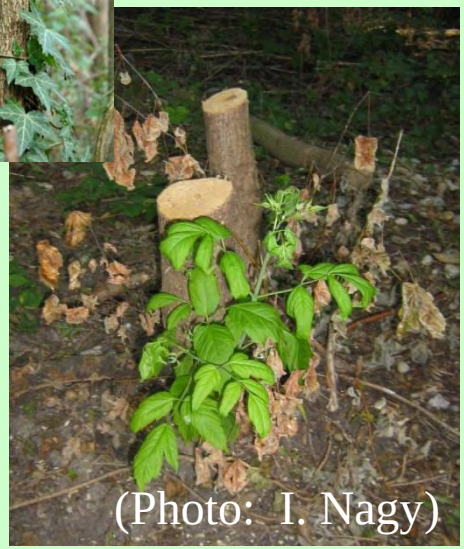
Box elder (*Acer negundo*) Green ash (*Fraxinus pennsylvanica*) Common hackberry (*Celtis occidentalis*)


(Photo: I. Nagy)

❖Partial bark stripping:
- trunk diameter < 8 cm
- glyphosate herbicides
- 1-2 treatments: August-October
- 100 % selective
- repeating rarely necessary

❖Bark treatment without cuts stripping:
- trunk diameter < 5 cm
- glyphosate herbicides
- 1-2 treatments: August-September

Box elder (*Acer negundo*) Green ash (*Fraxinus pennsylvanica*) Common hackberry (*Celtis occidentalis*)



(Photo: I. Nagy)

❖Trunk injection:
- trunk diameter >5 cm
- 1 drill hole / 5 cm of girth
- glyphosate herbicides
- 1-(2) treatments: August-October
- 100 % selective

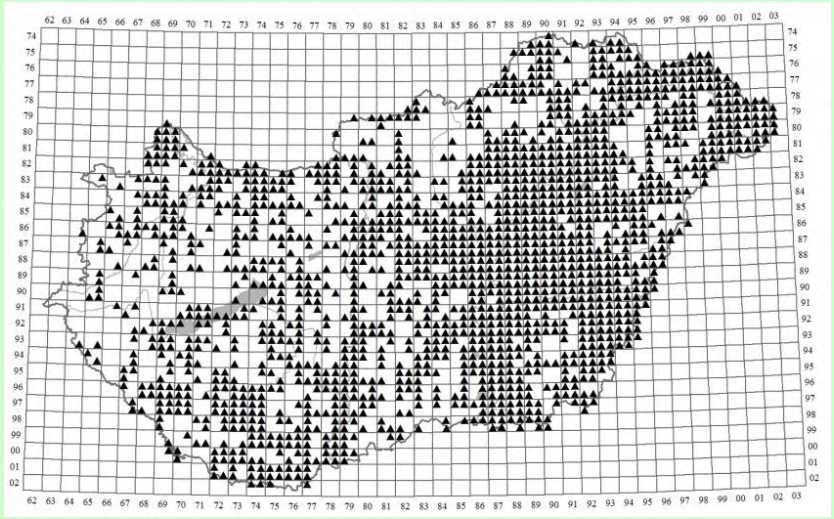
❖Cut stump treatment:
- all trunk diameter
- glyphosate, triklopir herbicides
- 1-(2) treatment: in vegetation period
- rapid herbicide treatment after cutting

False indigo (*Amorpha fruticosa*)

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

False indigo (*Amorpha fruticosa*)



Invaded habitats

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

Control methods

- Non-chemical treatments:
  - ❖ Manual removal:
  - autumn – winter (firewood)
  - regularly every year
  - ❖Grazing:
  - 1-2-year-old stands
  - by grey cattle
  - April -November
  - mowing at the end of grazing
  - after 2-3 years turn into grassland

False indigo (*Amorpha fruticosa*)

❖Flail mowing followed by grazing:
- dense, tall stands
- by grey cattle, goat, donkey, horse, Hungarian pied cow
- flail mowing twice: May-November
- grazing: 3-5 times
- after 4-5 years turn into grassland

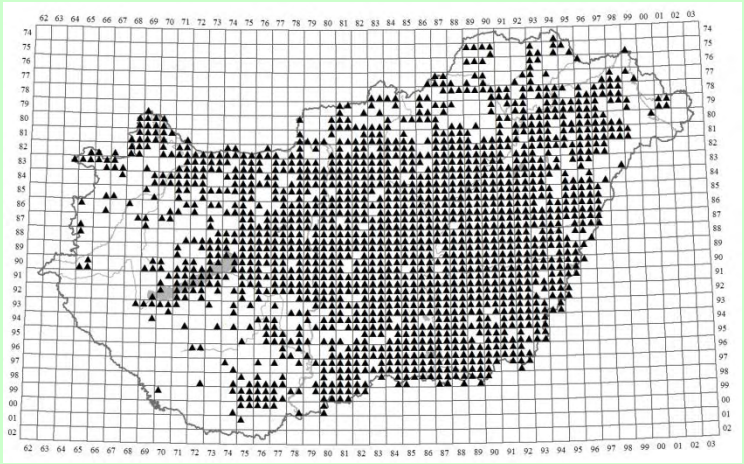
❖Habitat reconstruction:
- flail mowing + afforestation
- tree species change
- channel elimination + grassland management
- felling, bundling, cut stump treatment, root raking, afforestation

Russian olive (*Elaeagnus angustifolia*)

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

Russian olive (*Elaeagnus angustifolia*)



(Photo: Cs. Vadász)

Invaded habitats

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

Control methods

–Non-chemical treatments:

❖Uprooting:
  – all sized trunk
  – by loader or tractor with lifting fork
  – except nesting period
  – under good soil conditions

❖Felling and sprout removal:
  – all trunk diameter
  – without chemical sprout control ineffective

Russian olive (*Elaeagnus angustifolia*)


(Photo: Z. Bajor)

- Chemical treatments:
  - ❖Spraying:
    - trunk diameter <5 cm
    - glyphosate herbicides + fertilizer
    - 1-2 treatments in vegetation period
    - weather sensitive, high drift risk
  - ❖Partial bark stripping:
    - trunk diameter < 8 cm
    - glyphosate herbicides
    - 1-2 treatments: August-October
    - 100 % selective
    - repeating rarely necessary

❖Trunk injection:
- trunk diameter >8 cm
- 1 drill hole / 5 cm of girth
- glyphosate herbicides
- 1-(2) treatments: August-October
- 100 % selective
- grazing help accessing the trunk

❖Cut stump treatment:
- all trunk diameter
- glyphosate herbicides
- 1-(2) treatment: in vegetation period
- cost effective
- medium level of weather sensitivity and drift risk

Common milkweed (*Asclepias syriaca*)

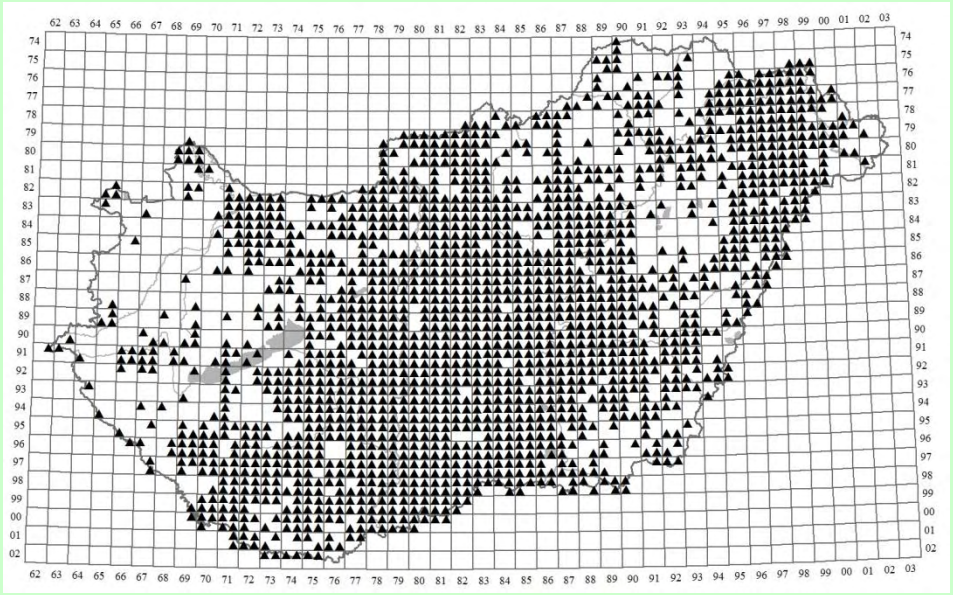
Invasion background

- Widespread cultivation:
  - silk-, (paper, syrup, wine, rubber, oil) honey production
- Spontaneous spread:
  - persistent seed bank
  - effective seed dispersal
  - root suckering ability
  - good vegetative regeneration
  - drought tolerance
  - low nutrient demand
  - rapid growth
  - competitive ability
  - allelopathy

Common milkweed (*Asclepias syriaca*)

Invaded habitats

- Mainly in flatlands:
  - especially in sandy areas, grasslands, forest plantations, wet areas, floodplain and gallery forests, agricultural lands



Common milkweed (*Asclepias syriaca*)

Control methods

–Non-chemical treatments:

- ❖Manual removal:
  - to inhibit seed dispersal: effective
  - to eradicate: ineffective
- ❖Mowing, flail mowing:
  - to inhibit seed dispersal: effective
  - to eradicate: ineffective
- ❖Grazing:
  - small patches
  - by goat and sheep
  - proved effective once but success was influenced by drought

Common milkweed (*Asclepias syriaca*)


(Photo: Cs. Vadász)


(Photo: J. Sallainé Kapocsi)

–Chemical treatments:

- ❖Spraying:
  - different sized patches
  - before flowering
  - different based herbicides
  - 1-2 treatments: 1.May, 2. August-September
  - cooler weather favourable
  - in the morning hours
  - necessary time: 3 years


(Photo: J. Sallainé Kapocsi)

Common milkweed (*Asclepias syriaca*)

❖Applying herbicide on leaves:
- sporadically occurring plants
- before flowering
- glyphosate herbicides
- 1-(2) treatments: 1.May, 2. August
- for high precipitation: 2-3 times
- high drift risk

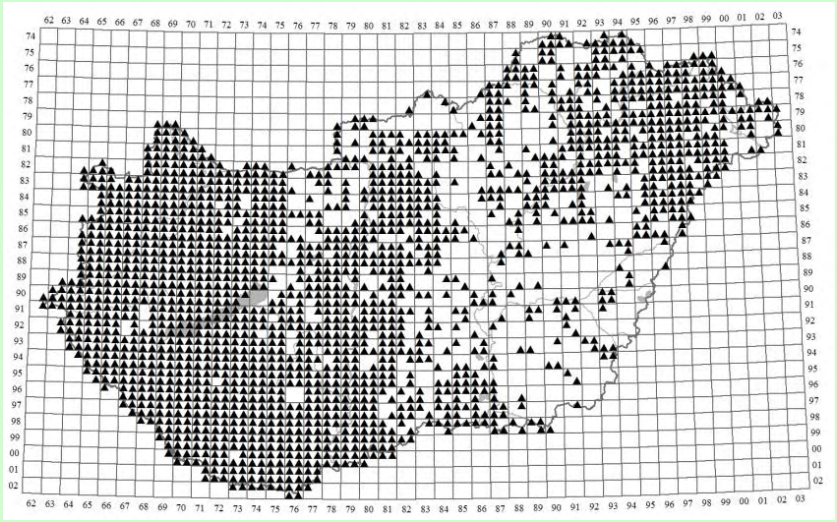
❖Mechanical application by quad:
- any type of stands
- before flowering
- glyphosate herbicides
- lot of additional damage

Giant and Canadian goldenrod (*Solidago gigantea*, *S. canadensis*)

Invasion background

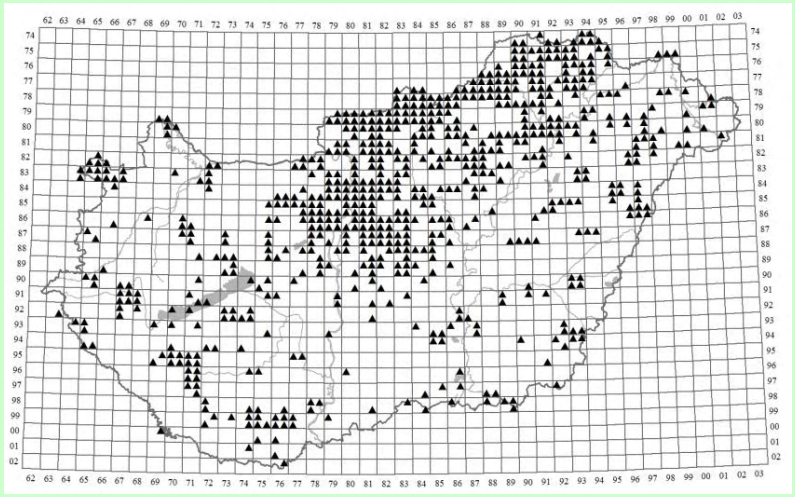
- Cultivation:
  - ornamental plants
- Spontaneous spread:
  - effective seed dispersal
  - good vegetative regeneration
  - rapid growth
  - low nutrient demand
  - competitive ability
  - allelopathy

Giant and Canadian goldenrod (*Solidago gigantea*, *S. canadensis*)



Invaded habitats

- Giant goldenrod:
  - mainly along rivers and streams, in moist soil, in semi natural habitats too
- Canadian goldenrod:
  - in mountains and in settlements, mainly in warmer, loose soils



Giant and Canadian goldenrod (*Solidago gigantea*, *S. canadensis*)

Control methods

- Non-chemical treatments:
  - ❖Flail mowing:
    - homogenous and mixed stands
    - 1-2-3 treatments: 1. May, 2. July, 3. September
    - moderately effective
    - for 2-3 years regularly
  - ❖Flail mowing followed by grazing:
    - homogenous stands
    - by grey cattle, buffalo
    - effective by regularly grazing
  - ❖Inundation:
    - homogenous stands
    - 20-60 cm deep water
    - effective habitat transformation

Giant and Canadian goldenrod (*Solidago gigantea*, *S. canadensis*)

–Chemical treatments:

- ❖Spraying:
  - different sized patches
  - before flowering
  - glyphosate herbicides
  - 1-2 treatments: 1.June, 2. October
  - altering weather sensitivity

–Combined treatments:

- ❖Mowing + spraying + grazing:
- –different stands
- –before flowering
- –glyphosate herbicides
- –1-2 treatments: May-November
- –Spaying: small patches




Further species and future tasks



Thank you for your attention!

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