# Eradication of invasive alien plants under operating and experimental conditions in the sandy grasslands near Győr

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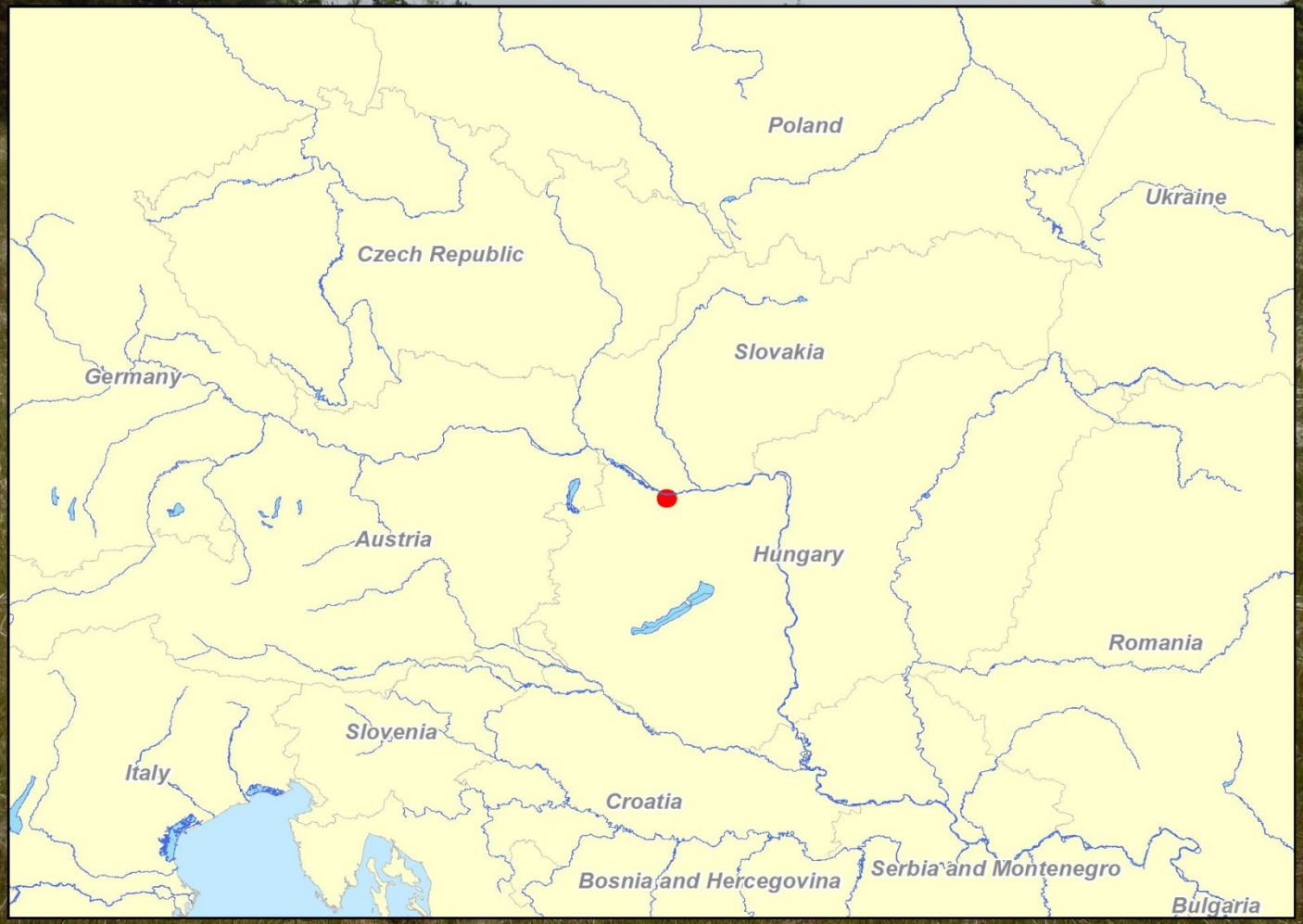
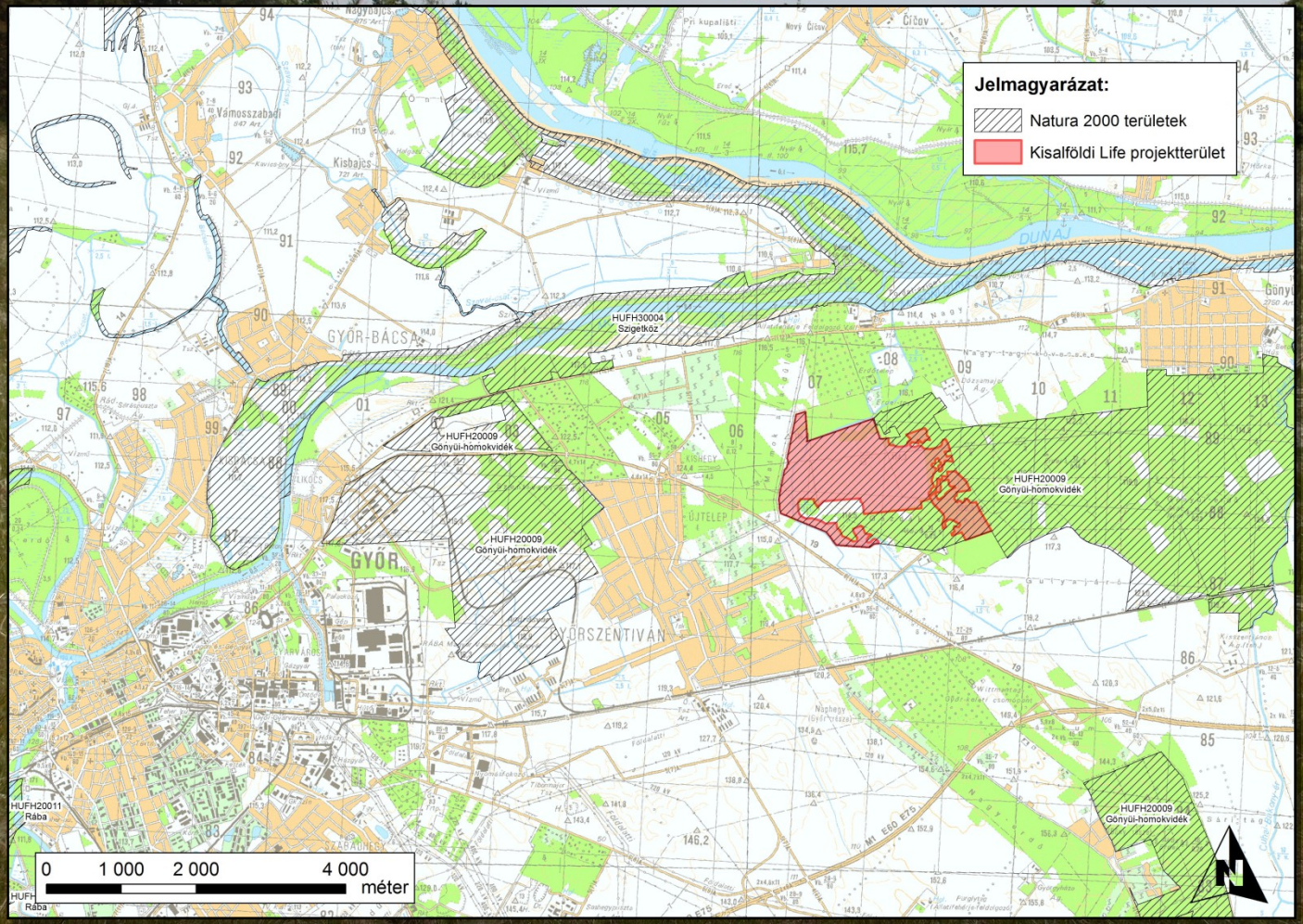
Hungarian Little Plain LIFE08NAT/H/000289

# Where are we now?



# Where are we now?



# Background

- Hungarian Little Plain – LIFE08NAT/H/000289
- Use/Used as Military Training Area (Soviet and Hungarian army)
- Main actions:
  - Removal of invasive species from the project area (Action C.1)
  - Removal of accumulated dead organic matter from grasslands (Action C.2)
  - Reconstruction of natural landforms, rehabilitation of grasslands (Action C.4) and removal of debris and illegal waste from the project area (Action C.5)

# Natural values


Iris arenaria


Pulsatilla nigricans


Anacamptis morio


Zodorion zorba


Cerambyx cerdo


Carabus hungaricus

# Elimination of Invasive Plant Species

- We used combined mechanical and chemical methods
- Under operating conditions, with methods accepted in forestry and nature conservation
- Experimental methods:
  - In ideal cases, experiments are carried out before operational use.
  - Development of new methods to elimination invasive plant species

# Main expectation using chemical control methods

- To kill the entire root-system of target plant ideally with one treatment
- Not to be harmful for the environment / neighbouring plants (selective ingredients or application technics with minimal drift and no or moderate soil-effect after leaching)
- Not to be toxic to workman
- To be cheaper than other methods
- To be controllable application technics (for instance visible) whilst applied
- To be decomposable after treatment

# Experimental conditions

- The following variables were examined for specific species:
  - method of application;
  - treatment period;
  - combination of reagents;
  - amount of herbicide used;
  - time requirements of the treatment;
  - ratio of surviving, damaged and destroyed plants;
  - damage caused to the surrounding vegetation;
  - diameter of treated plants (in the case of arboreal
  - species).

# Application techniques tested

- Spot spraying
- Overall spraying
- Leaf painting
- Bark painting
- Bark ringing and painting
- Cut stem painting
- Leaf wiping by hand
- Leaf wiping by light tractor
- Tree – Injection

# Application at trees

Black locust

| Application method | Time needed for treatment | Amount of chemical used | Time needed for treatment (for treated circumference unit) | Amount of herbicide needed for treatment (for treated circumference unit) |
|---|---|---|---|---|
| Injection | 26 minutes (min. 14 minutes, max. 45 minutes) | 171.25 ml (min. 100 ml, max. 220 ml | 2.31 minutes | 15.43 ml |
| Partial bark stripping method | 18.5 minutes (min. 14 minutes,max. 23 minutes) | 241.87 ml (min. 130 ml, max. 320 ml | 1.94 minutes | 24.47 ml |
| Cut stump method | 34.7 minutes (min. 22 minutes,max. 55 minutes) | 390.6 ml (min. 120 ml, max. 850 ml | 3.28 minutes | 31.87 ml |

Tree of heaven

| Application method | Time required for treatment | Amount of chemical used | Time required for treatment (for treated circumference unit) | Amount of herbicide reuired for treatment (for treated circumference unit) |
|---|---|---|---|---|
| Injection | 33.9 minutes (min. 17 minutes, max. 60 minutes) | 411 ml (min. 200 ml, max. 1000 ml | 2.24 minutes | 25.58 ml |
| Partial bark stripping method | 20.2 minutes (min. 8 minutes, max. 30 minutes) | 275 ml (min. 70 ml, max. 460 ml | 1.67 minutes | 18.72 ml |
| Cut stump method | 65 minutes (min. 37 minutes, max. 80 minutes) | 390 ml (min. 270 ml, max.500 ml | 4.49 minutes | 27.87 ml |

# Endotherapic treatments - trunk injection

- Efficiency of chemical intake is 10 times higher that painting/spraying/cut steam painting method
- At >5 cm diameter
- High inverstment cost – high labour cost – low chemical usage
- Applicable: Ailanthus, Robinia, *Prunus, Celtis, Acer, Fraxinus*

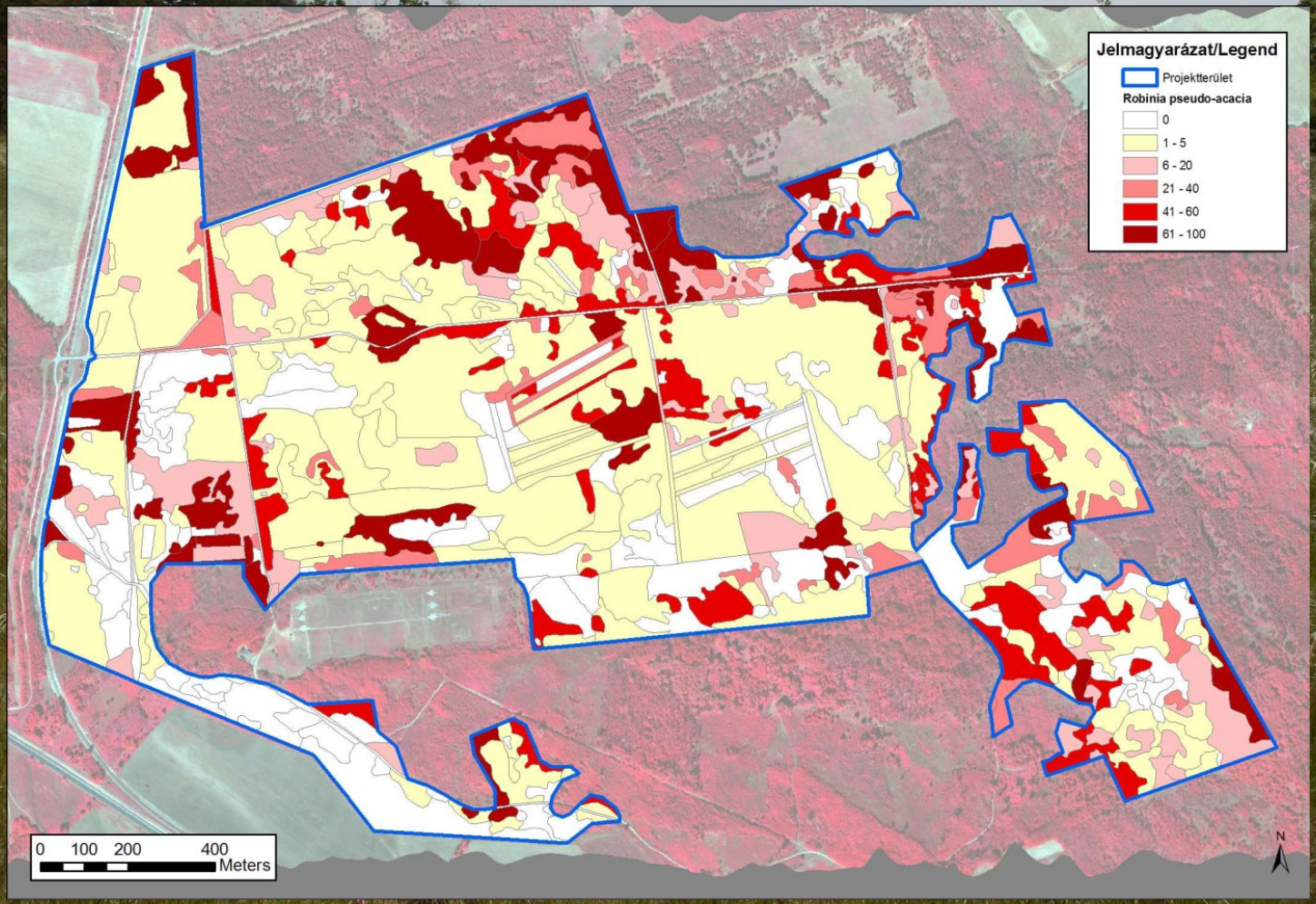
# Painting onto bark

- Chemical intake medium – drift minimal
- Low investment cost – low labour cost comparing to tree-injection or bark removal – high herbicide usage – relatively high performance
- Quality is excellent (coloured liquid)
- Applicable: Robinia, Ailanthus, *Prunus, Amorpha, Celtis* <5 cm diameter without resprouting. In case of larger diamater resprouting from the root.

# Cut stump treatment, sprout spraying

- Low cost at first treatment
- 2-3 comeback to sprout spraying
- High chemical usage
- High drifting at spout spraying - damage to natural vegetation
- Potential to error (if the stump painting

# Black locust



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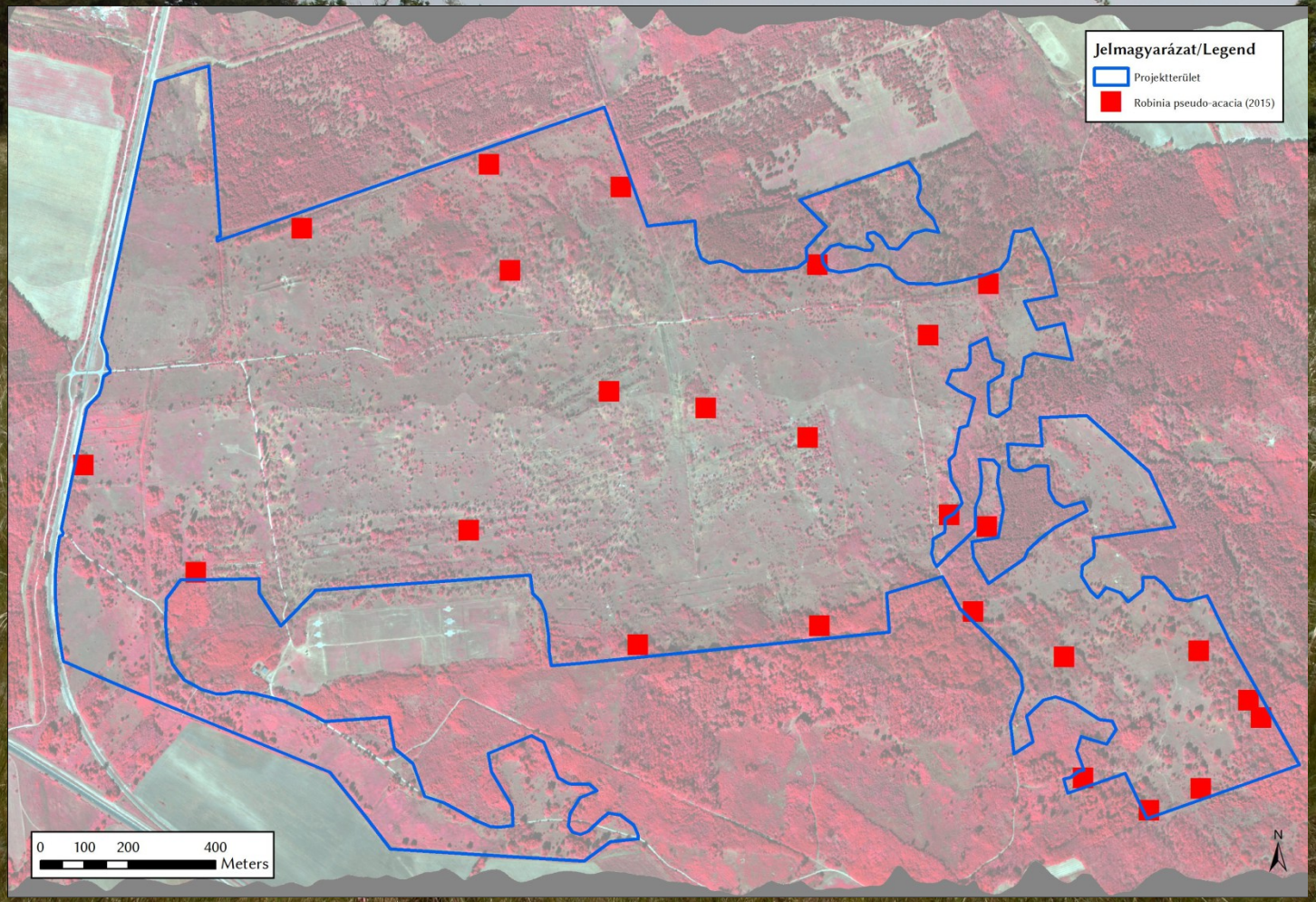


# Black locust

- 40 treatment versior
- Glyfozat (Medallon P
- Treatment period:
  - May – October
- Application method:
  - injection
  - partial bark stripping treatment
  - cut stump treatment, sprout spraying

| Code | Composition of the mixture used (in 1 litre) | | Concen-tration (%) | Application | Time period | Treated circumfer-ence (cm) |
|---|---|---|---|---|---|---|
| MAY 1 | 750 ml Medallon Premium + 15 g fertiliser | | 75 | injection | May | 1824.34 |
| MAY 2 | 500 ml Medallon Premium + 15 g fertiliser | | 50 | injection | May | 1161.80 |
| MAY 3 | 750 ml Medallon Premium + 0.5 ml Nonit + 15 g fertiliser | | 75 | partial bark stripping treatment | May | 822.68 |
| MAY 4 | 500 ml Medallon Premium + 3.5 ml Nonit + 15 g fertiliser | | 50 | partial bark stripping treatment | May | |
| MAY 5 | 750 ml Medallon Premium + 3.5 ml Silwet Star + 15 g fertiliser | | 75 | partial bark stripping treatment | May | 1070.74 |
| MAY 6 | 500 ml Medallon Premium + 3.5 ml Silwet Star + 15 g fertiliser | | 50 | partial bark stripping treatment | May | 1221.46 |
| JUNE 1 | 1. treatment: + 330 ml Taifun + 3.5 ml Nonit + 15 g fertiliser | 2. treatment: + 35 ml Taifun + 3.5 ml Nonit + 15 g fertiliser | 33 | cut stump treatment, spraying of sprouts | June | 1786.66 |
| JUNE 2 | 1. treatment: + 500 ml Taifun + 3.5 ml Nonit + 15 g fertiliser | 2. treatment: + 35 ml Taifun + 3.5 ml Nonit + 15 g fertiliser | 50 | cut stump treatment, sprout spraying | June | 1862.02 |
| JUNE 3 | 1. treatment: + 330 ml Medallon Premi- um + 3.5 ml Nonit + 15 g fertiliser | 2. treatment: + 35 ml Medallon Premi- um + 3.5 ml Nonit + 15 g fertiliser | 33 | cut stump treatment, spraying of sprouts | June | 1500.92 |
| JUNE 4 | 1. treatment: + 500 ml Medallon Pre- mium + 3.5ml Nonit + 15g fertiliser | 2. treatment: + 35 ml Medallon Premi- um + 3.5 ml Nonit + 15g fertiliser | 50 | cut stump treatment, spraying of sprouts | June | 2012.74 |

# Black locust


injection

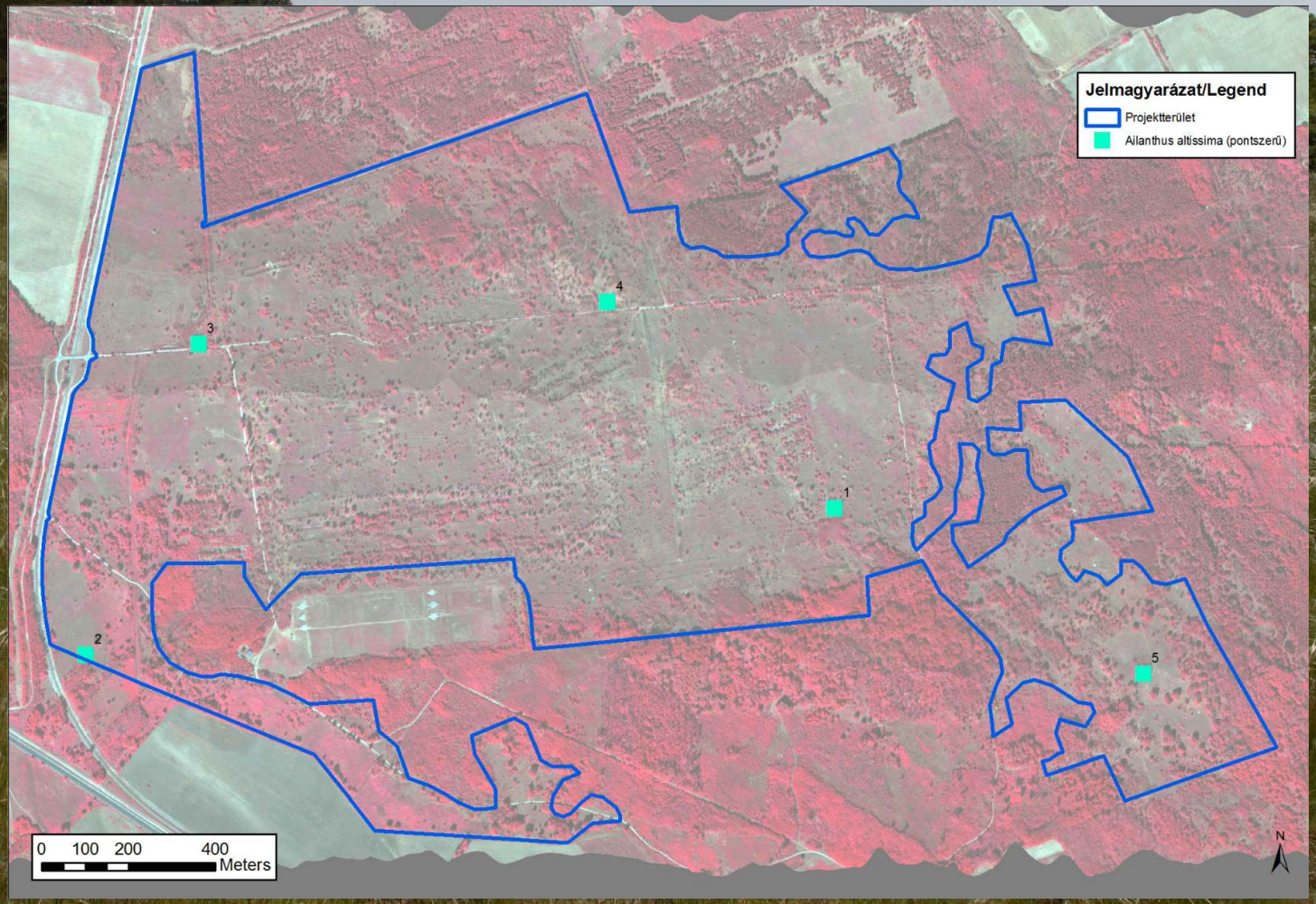

partial bark stripping treatment

# Black locust (JUN6)

# Black locust

- Smaller patches of black locust in grasslands, or isolated trees (with diameters > 5 cm)
  - Injection (glyphozat 50% + fertiliser)
- Thin stemmed trees on grasslands (with diameters < 5 cm)
  - Partial stripping of the plants' bark (or on bark) followed by wiping with a glyphozat 50% (+ cohesion enhancer 3.5 ml/l + fertiliser 15 g/l) solution, performed in the autumn
- Closed stands of black locust (without natural values to be protected)
  - Autumn (September–October) cutting followed by stump wiping within 10–20 mins (Medallon Premium or Taifun 360 33% + cohesion enhancer 3.5 ml/l + fertiliser 15 g/l), followed by a treatment of the suckers by spot spraying (Medallon Premium or Taifun 360 3.5%)

# Tree of heaven



# Tree of heaven

- 34 treatment version
- Medallon Pr., Taifun, Titus Pluss, Mezzo, Banvel)
- Treatment period:
  - May – October
- Application method:
  - injection
  - partial bark stripping treatment
  - cut stump treatment, sprout spraying

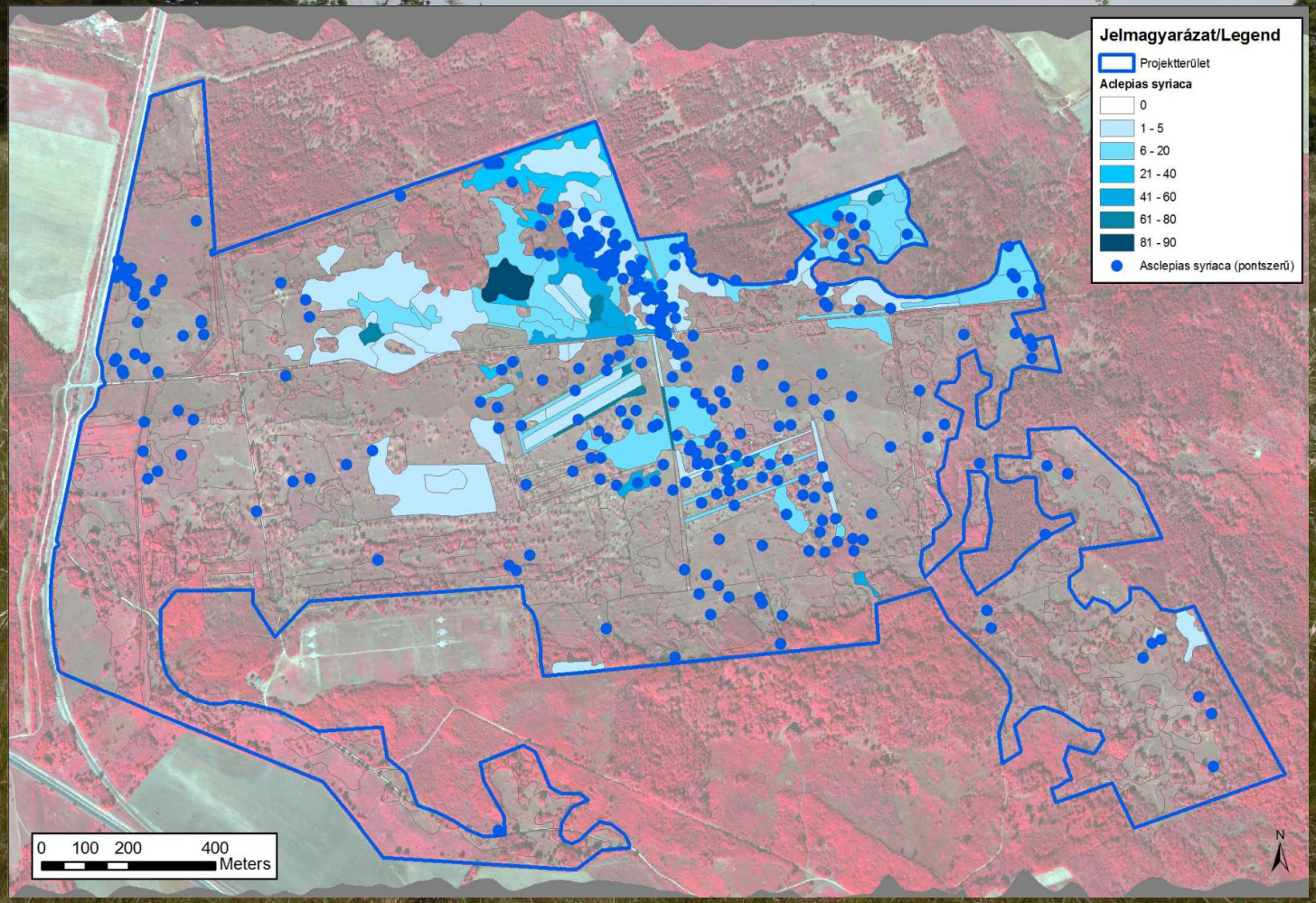
| Code | Composition of the mixture used (in 1 litre) | Application | Treatment period | Number of plants | Circumference treated (cm) |
|---|---|---|---|---|---|
| MAY 7 | 750 ml Taifun + 3.5 ml Silwet Star + 15 g fertiliser | injection | May | 118 | 2471.18 |
| MAY 8 | 750 ml Medallon + 3.5 ml Silwet Star + 15 g fertiliser | injection | May | 197 | 3011.26 |
| MAY 9 | 750 ml Medallon + 4 g Mezzo + 3.5 ml Silwet + 15 g fertiliser | injection | May | 156 | 3582.74 |
| MAY 10 | 8 g Titus Plus + 3.5 ml Silwet Star + 15 g fertiliser | injection | May | 202 | 2948.46 |
| MAY 11 | 750 ml Medallon + 3.5 ml Silwet Star + 15 g fertiliser | partial bark stripping method | May. | 110 | 1887.14 |
| MAY 12 | 500 ml Medallon + 3.5 ml Silwet Star + 15 g fertiliser | partial bark stripping method | May | 119 | 2176.02 |
| MAY 13 | 8 g Titus Plus + 3.5 ml Silwet Star + 15 g fertiliser | partial bark stripping method | May. | 157 | 2292.20 |
| MAY 14 | 6 g Titus Plus + 3.5 ml Silwet Star + 15 g fertiliser | partial bark stripping method | May | 158 | 2345.58 |
| JUNE 15 | 1. treatment: + 500 ml Taifun + 15 g fertiliser; 2. treatment: + 35 ml Taifun + 15g fertiliser | cut stump method, spraying of sprouts with 2 x 3.5% Taifun | June | 99 | 1714.44 |
| JUNE 16 | 1. treatment: + 6 g Titus Plus + 15 g fertiliser; 2. treatment: + 35 ml Banvel 480 S + 15g fertiliser | cut stump method, spraying of sprouts with 2 x 3.5% Principal Plus/Titus Plus/Banvel 480 S | June | 98 | 1723.86 |
| JUNE 17 | 750 ml Taifun + 3.5 ml Silwet Star + 15 g fertiliser | injection | June | 100 | 1391.02 |
| JUNE 18 | 750 ml Medallon + 3.5 ml Silwet Star + 15 g fertiliser | injection | June | 119 | 1808.64 |
| JUNE 19 | 750 ml Medallon + 4 g Mezzo + 3.5 ml Silwet + 15 g fertiliser | injection | June | 115 | 1692.46 |

# Tree of heaven

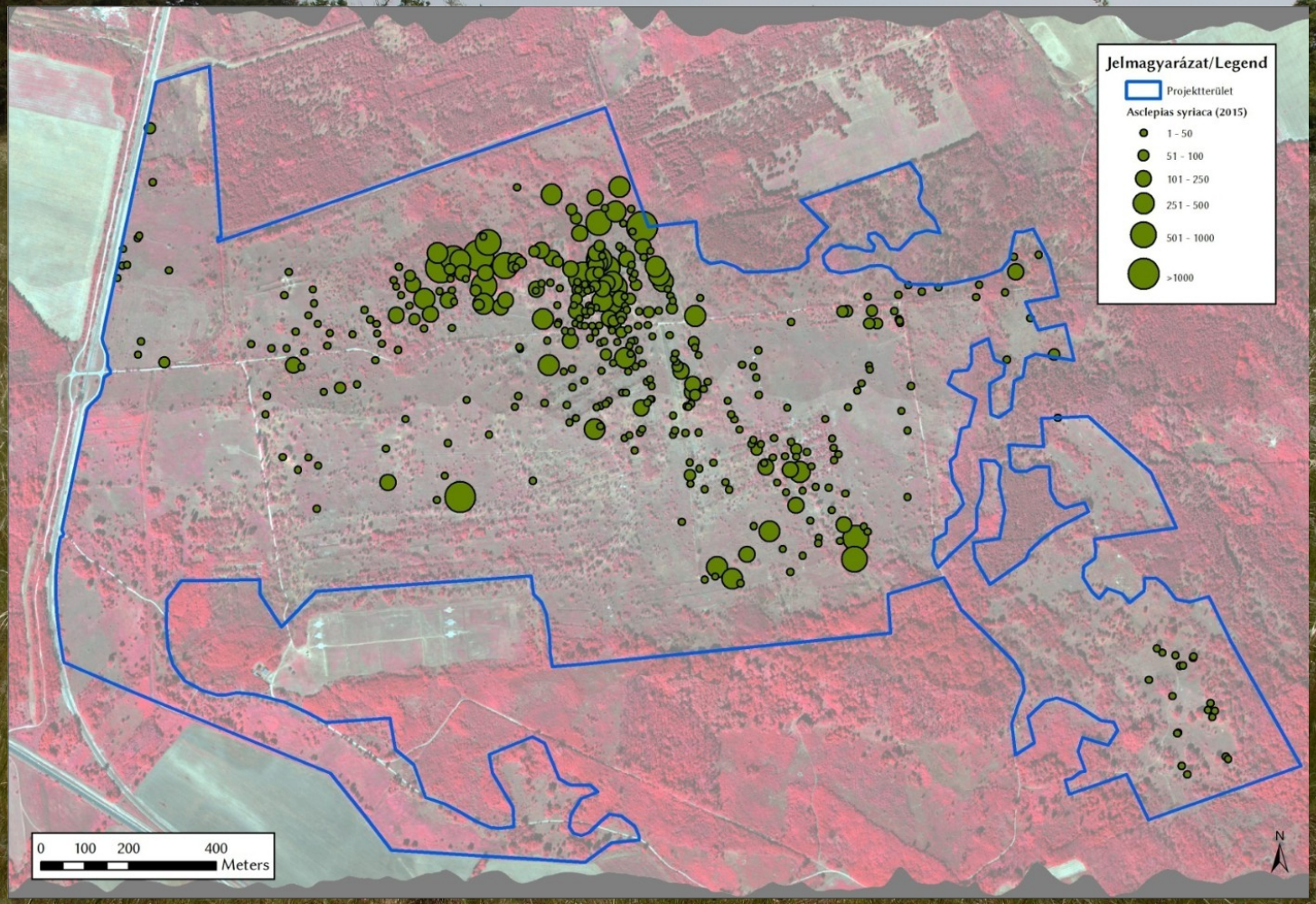
# Tree of heaven

- Older plants (diameter larger than 5 cm):
  - Injection at any time within vegetation period (Medallon Premium 75% + Mezzo (4 g/l) + cohesion enhancer 3.5ml/l + fertiliser 15 g/l, min. 5-6 mm diameter drill bit, in a 45 degree angle with 1-2 cm reagent per hole injected with the help of a veterinary mass vaccination syringe. The hole must be sealed (plasticine, silicone sealing, ointment). Should be repeated the following year if necessary.
- Young plants (with diameters smaller than 5 cm):
  - Following partial bark stripping (around ⅓ of the circumference in the length of 40-50 cm) apply 50% Medallon Premium of Taifun 360 (or BFA+) solution. The treatment must be repeated the following year if necessary.
- Snags can be cut the third winter following the first treatment

# Common milkweed



# Common milkweed



# Common milkweed

- 30 treatment version in May
- 6 chemicals (exp: Medallon Premium, Granstar, Tomigan 250EC, Mezzo, Titus Plus, Casper)
- 3-3 dose/chemicals
- Application methods:
  - Spot spraying
  - Leaf painting
  - Leaf wiping by hand

Microwipe – It was not work

# Common milkweed

| Code | Composition of the mixture used (in 1 litre) | Concentration (% or dose) | Application | Period |
|---|---|---|---|---|
| MAY 15 | 100 ml Medallon + 3.5 ml Silwet Star+ 15 g fertiliser | 10 | wiping | May |
| MAY 16 | 330 ml Medallon + 3.5 ml Silwet Star + 15 g fertiliser | 33 | wiping | May |
| MAY 17 | 500 ml Medallon + 3.5 ml Silwet Star + 15 g fertiliser | 50 | wiping | May |
| MAY 18 | 100 ml Medallon + 3.5 ml Silwet Star + 15 g fertiliser | 10 | semi-mechanical wiping | May |
| MAY 19 | 330 ml Medallon + 3.5 ml Silwet Star + 15 g fertiliser | 33 | semi-mechanical wiping | May |
| MAY 20 | 500 ml Medallon + 3.5 ml Silwet Star + 15 g fertiliser | 50 | semi-mechanical wiping | May |
| MAY 21 | 100 ml Medallon + 3.5 ml Silwet Star + 15 g fertiliser | 10 | mechanical wiping | May |
| MAY 22 | 200 ml Medallon + 3.5 ml Silwet Star + 15 g fertiliser | 33 | mechanical wiping | May |
| MAY 23 | 330 ml Medallon + 3.5 ml Silwet Star + 15 g fertiliser | 50 | mechanical wiping | May |
| MAY 24 | 0.2 g Granstar + 3.5 ml Silwet Star + 15 g fertiliser | 1st dose | spot spraying | May |
| MAY 25 | 0.4 g Granstar + 3.5 ml Silwet Star + 15 g fertiliser | 2nd dose | spot spraying | May |
| MAY 26 | 0.8 g Granstar + 3.5 ml Silwet Star + 15 g fertiliser | 3rd dose | spot spraying | May |
| MAY 27 | 0.3 g Mezzo + 3.5 ml Silwet Star + 15 g fertiliser | 1st dose | spot spraying | May |
| MAY 28 | 0.6 g Mezzo + 3.5 ml Silwet Star + 15 g fertiliser | 2nd dose | spot spraying | May |
| MAY 29 | 1.2 g Mezzo + 3.5 ml Silwet Star + 15 g fertiliser | 3rd dose | spot spraying | May |
| MAY 30 | 0.3 g Titus Plus + 3.5 ml Silwet Star + 15 g fertiliser | 1st dose | spot spraying | May |
| MAY 31 | 0.6 g Titus Plus + 3.5 ml Silwet Star + 15 g fertiliser | 2nd dose | spot spraying | May |
| MAY 32 | 1.2 g Titus Plus + 3.5 ml Silwet Star + 15 g fertiliser | 3rd dose | spot spraying | May |
| MAY 33 | 0.2 g Granstar + 3.33 ml Tomigan 250 EC + 3.5 ml Silwet Star + 15 g fertiliser | 1st dose | spot spraying | May |

# Common milkweed (MAY16-17)



## Leaf painting with Medallon Premium

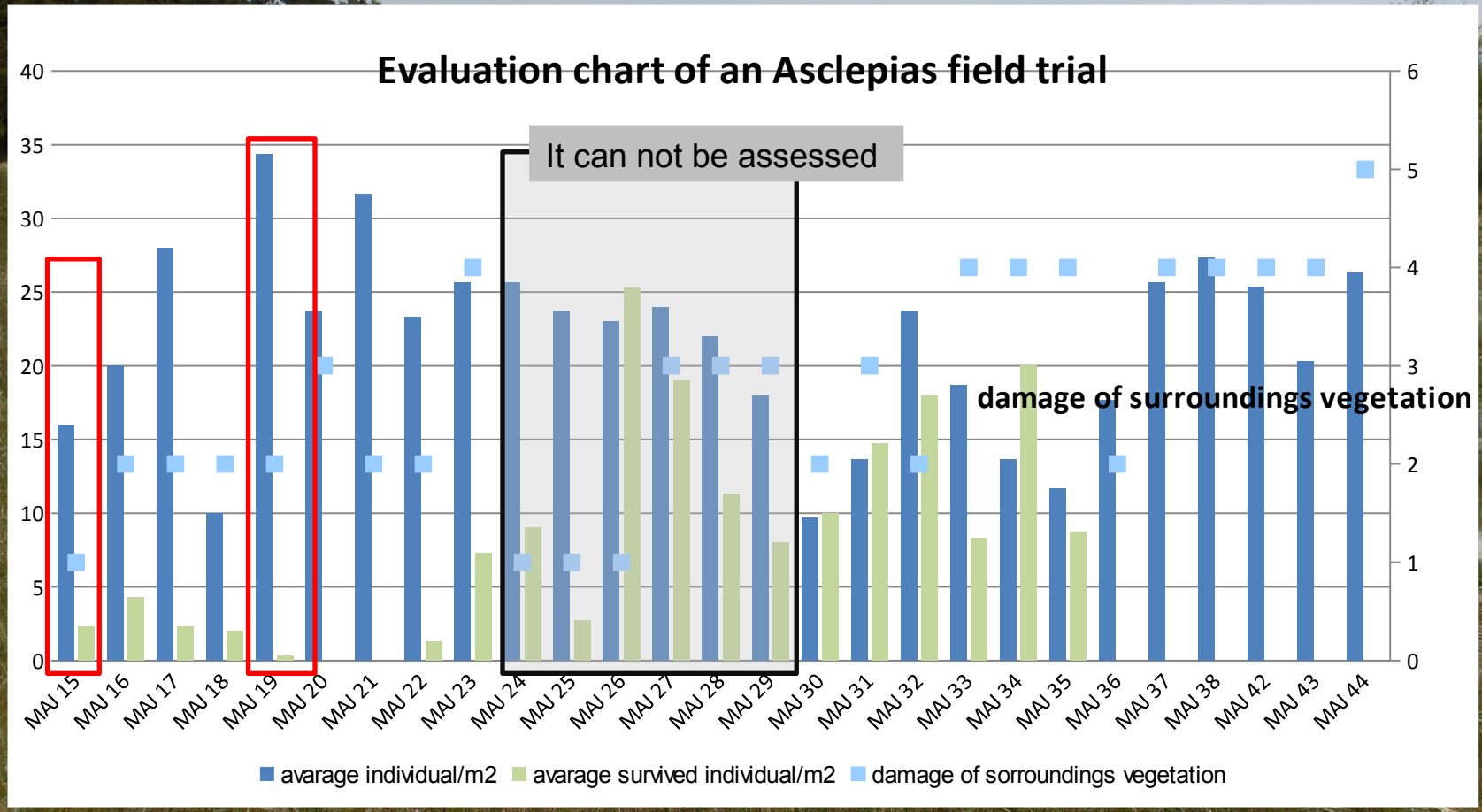
| Concentration | The number of treated plants in the microquadrants (piece) | Plants alive a year later (piece) | Offshoot ratio (%) | Damage to surrounding vegetation* |
|---|---|---|---|---|
| 10% | 48 | 7 | 14.5 | 1 |
| 33% | 60 | 13 | 21.6 | 2–3 |
| 50% | 84 | 7 | 8.33 | 2–3 |

# Common milkweed (MAY21-23)

Spot sprying with Medallon Premium

| Concentration | The number of treated plants in the micro- quad-rants (piece) | Plants alive a year later (piece) | Offshoot ratio (%) | Damage in the surrounding vegetation* |
|---|---|---|---|---|
| 10% | 30 | 6 | 20 | 2 |
| 33% | 103 | 1 | 0.9 | 1 |
| 50% | 71 | 0 | 0 | 2 |

# Common milkweed



# Common milkweed

- Min. 3 years needed
- Closed, continuous stands as well as patches in degraded grasslands:
  - Spraying with a 33% solution of Medallon Premium (+ cohesion enhancer 3,5 ml/l + fertiliser 15 g/l) at the end of May or beginning of June. Repeated a month later if needed.
- Stands of sporadic plants in grasslands in good condition:
  - Wiping with a 10% solution of Medallon Premium (+ cohesion enhancer 3.5 ml/l + fertiliser 15 g/l) at the end of May or beginning of June.

# Results

- Chemical control is the only way to eradicate effectively some of the aggressively resprouting species
- Tree injection is the most effective method – herbicide utilization 10 times higher (estimated) than any other method (spraying or painting) therefore environmental strain is less
- For thin bark arboreal and non-arboreal species leaf painting <1m, bark painting >1m had the best results

# Results

- In general glyphosate-ammonium (Medallon) and metsulfuron-methil (Mezzo, Savvy) combination produced the highest translocation into root systems
- The ideal timing is necessary
- After eradication (moderate) effort is needed to prevent the new colonization of emerging seedlings


Thank you for your attention !
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