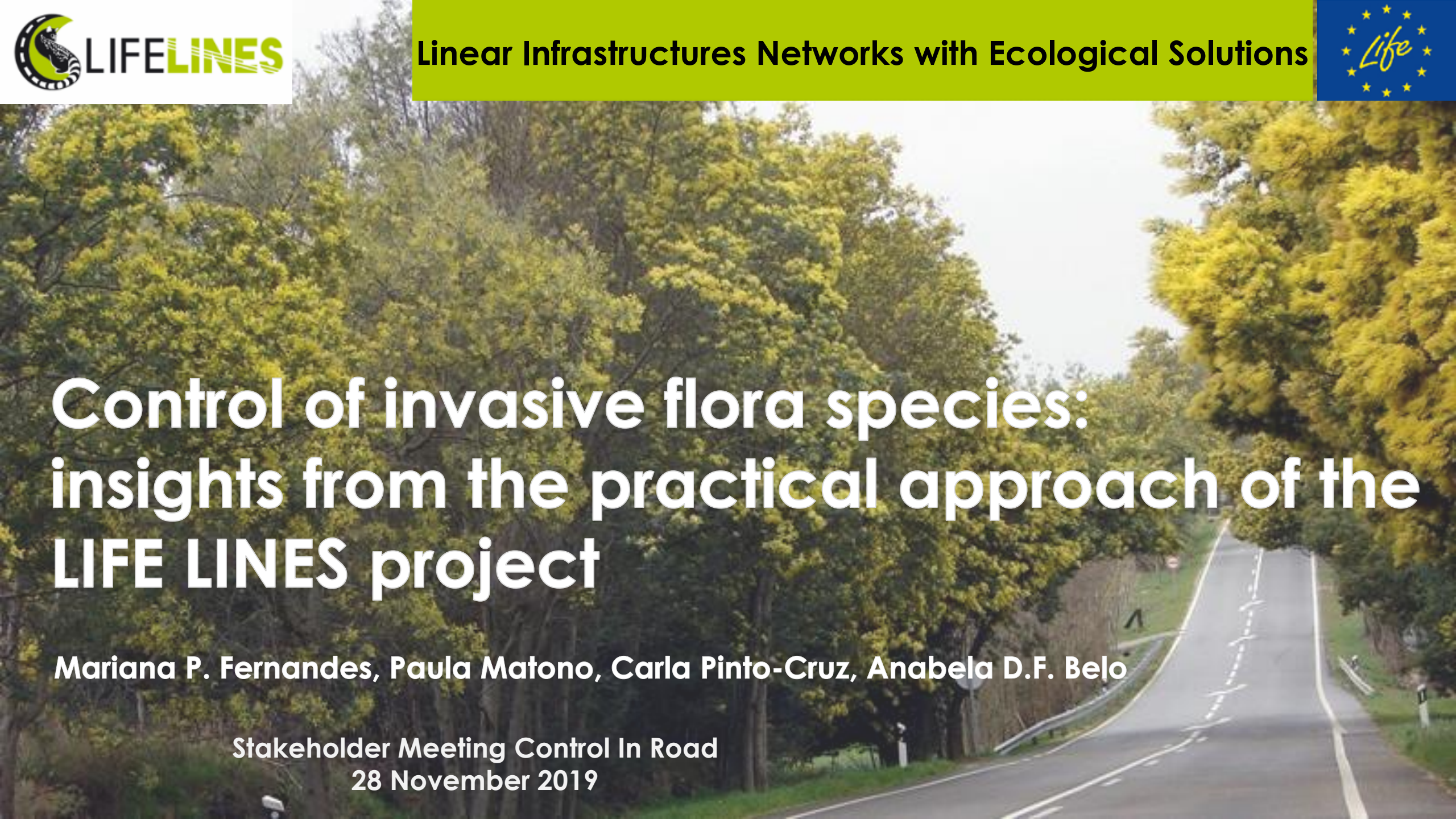
LIFELINES

Linear Infrastructures Networks with Ecological Solutions



Control of invasive flora species: insights from the practical approach of the LIFE LINES project

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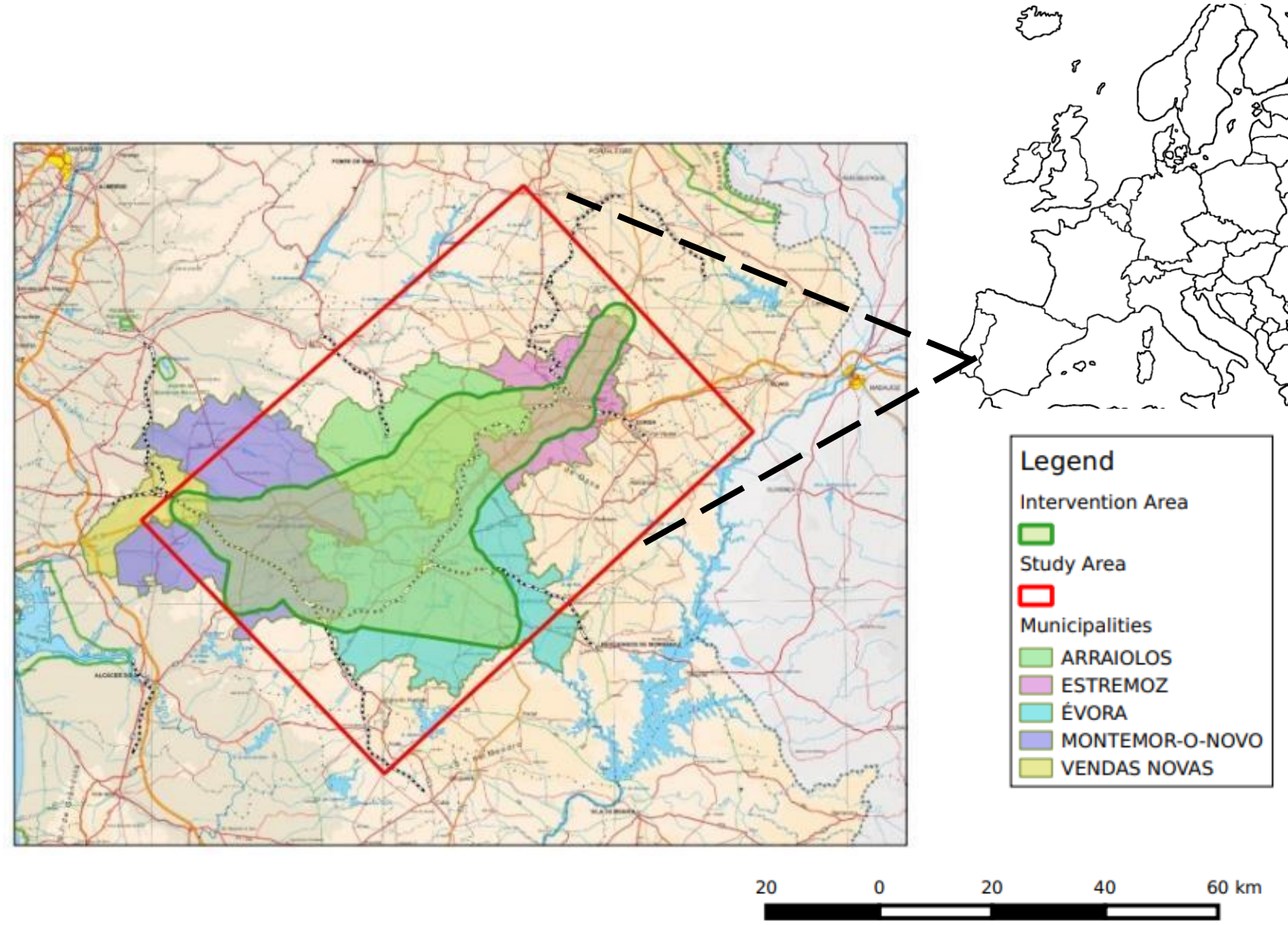
Stakeholder Meeting Control In Road
28 November 2019

Study Area

South of Portugal

High concentration of roads, ecotrails and powerlines



Principal aims

Test, evaluate and disseminate mitigation measures

Promote the creation of a demonstrative Green Infrastructure

To mitigate negative effects of linear infrastructures and improve the local biodiversity

Invasive exotic flora management

Target species

Acacia dealbata

Acacia melanoxylon

Ailanthus altissima

Arundo donax

Acacia dealbata Link.

Family: Fabaceae
Common name:

- Silver wattle, mimosa, blue wattle

Short description:

- Evergreen tree
- Grey-green bipinnate leaves and bright yellow spherical flower heads

Native distribution area:

- Southeast Australia

Characteristics that aid invasion:

- Vegetative propagation
- Many seeds with a long viability
- Seeds easy to disperse
- Abundant seed bank
- Germinates aggressively after fires

Acacia dealbata Link.

In Portugal:

Distribution: Mainland Portugal, and Madeira archipelago

Status in Portugal: Invasive species - annex I of Decreto-Lei n° 565/99, 21 December

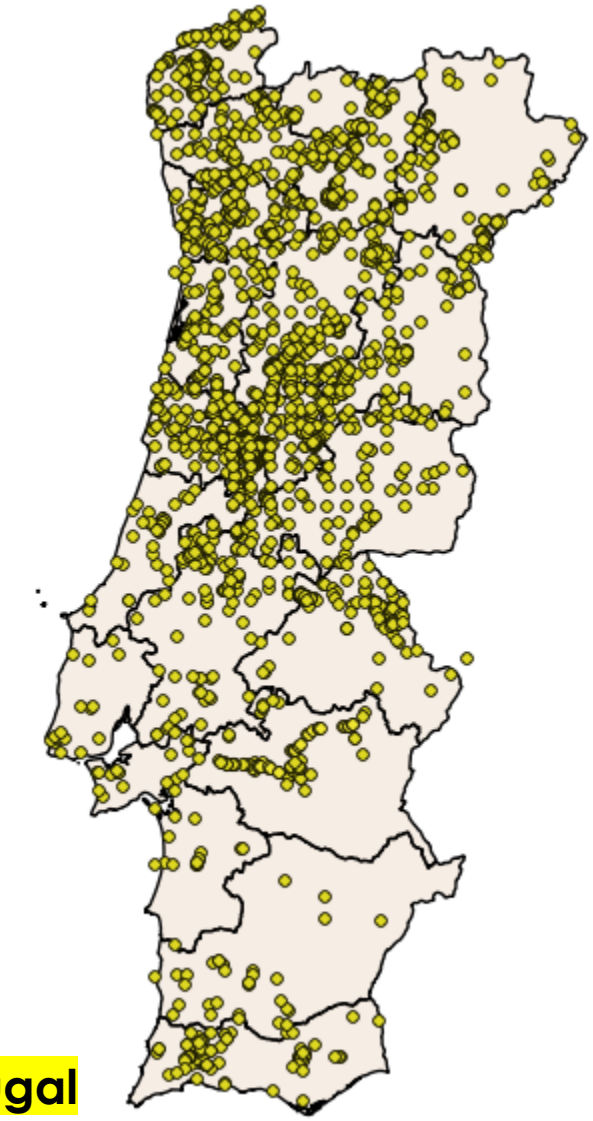
Risk Assessment score in Portugal: 31*

Introduction reasons:

- ✓ Ornamental purposes
- ✓ Soil improvement
- ✓ Forestry species

Invasion environments:

- ✓ Fresh terrains of the valleys
- ✓ Mountainous areas
- ✓ Banks of watercourses
- ✓ Roadsides



One of the worst invasive species of terrestrial ecosystems in mainland Portugal

*Pheloung, P.C., Williams, P.A., Halloy, S.R., 1999. A weed risk assessment model for use as a biosecurity tool evaluating plant introductions. Journal of Environmental Management. 57: 239-251.

Acacia melanoxylon R.Br

Family: Fabaceae
Common name:

- Australian blackwood, blackwood, acacia blackwood

Short description:

- Evergreen tree
- Leaves slightly shaped like a scythe and pale-yellow spherical flower heads

Native distribution area:

- Southeast Australia and Tasmania

Characteristics that aid invasion:

- Vegetative propagation
- Many seeds with a long viability (>50 years)
- Seeds easy to disperse
- Numerous seed bank
- Great germination when a space open or after fire

Acacia melanoxylon R.Br

In Portugal:

Distribution: Mainland Portugal, Azores and Madeira archipelagos

Status in Portugal: Invasive species - annex I of Decreto-Lei n° 565/99, 21 December

Risk Assessment score in Portugal: 28*

Introduction reasons:

- ✓ Ornamental purposes
- ✓ Shade tree
- ✓ Wood production
- ✓ Soil improvement

Invasion environments:

- ✓ Roadsides
- ✓ Watercourses banks
- ✓ Forest areas or open spaces
- ✓ It prefers granite terrains, avoiding calcareous ones

*Pheloung, P.C., Williams, P.A., Halloy, S.R., 1999. A weed risk assessment model for use as a biosecurity tool evaluating plant introductions. Journal of Environmental Management. 57: 239-251.

Ailanthus altissima (Mill.) Swingle

Family: Simaroubaceae

Common name:

- Tree-of-heaven, Chinese sumac

Short description:

- Deciduous tree
- Large bipinnate leaves
- Young leaves with reddish extremities
- Fetid smell when cut

Native distribution area:

- Temperate Asia (China)

Characteristics that aid invasion:

- Very rapid growth (3cm/day)
- Many seeds (± 350 000/year/average tree)
- Seeds easy to disperse
- Vegetative propagation

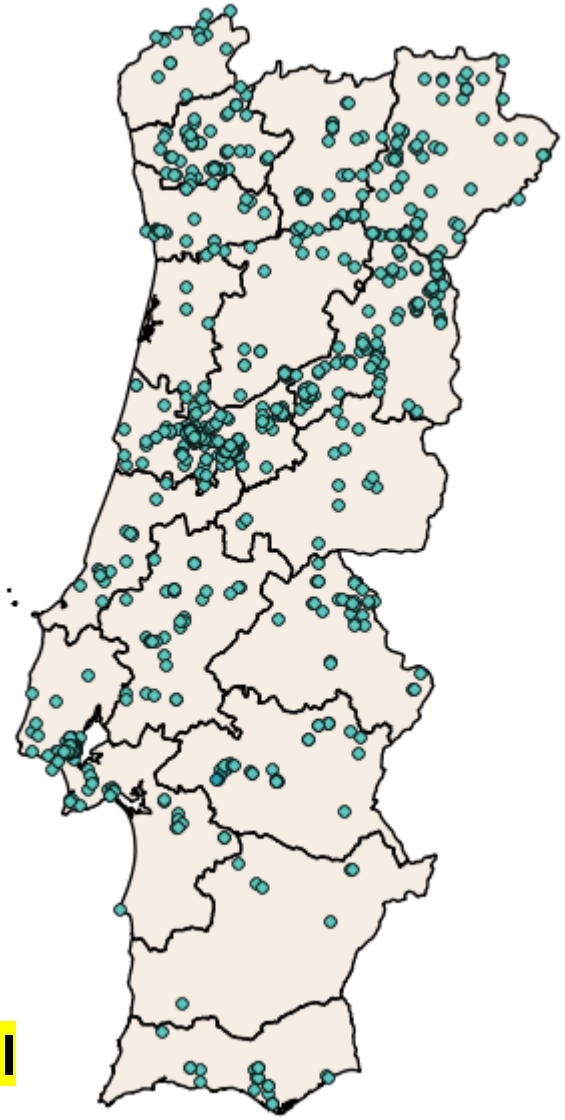
Ailanthus altissima (Mill.) Swingle

In Portugal:

Distribution: Mainland Portugal, Azores and Madeira archipelagos

Status in Portugal: Invasive species - annex I of Decreto-Lei n° 565/99, 21 December

Risk Assessment score in Portugal: 20*



Introduction reasons:

- ✓ Ornamental purposes in urban areas and roadsides.

Invasion environments:

- ✓ Disturbed areas: riparian areas, roadsides, fences, abandoned agricultural areas and urban spaces
- ✓ All types of soils
- ✓ Sunny places

One of the most aggressive invasive species in mainland Portugal

*Pheloung, P.C., Williams, P.A., Halloy, S.R., 1999. A weed risk assessment model for use as a biosecurity tool evaluating plant introductions. Journal of Environmental Management. 57: 239-251.

Arundo donax L.

Family: Poaceae
Common name:
- Giant reed, giant cane

Short description:
- Large perennial grass
- Up to 6m
- Rhizomatous
- Stems: long, robust, cylindrical and hollow

Native distribution area:
- Eastern Europe
- Temperate and tropical Asia

Characteristics that aid invasion:
- Vegetative propagation – Rhizome
- Rhizomes regenerate after cutting
- Highly flammable – regenerate after fire

Arundo donax L.

In Portugal:

Distribution: Mainland Portugal, Azores and Madeira archipelagos

Status in Portugal: Invasive species - annex I of Decreto-Lei n° 565/99, 21 December

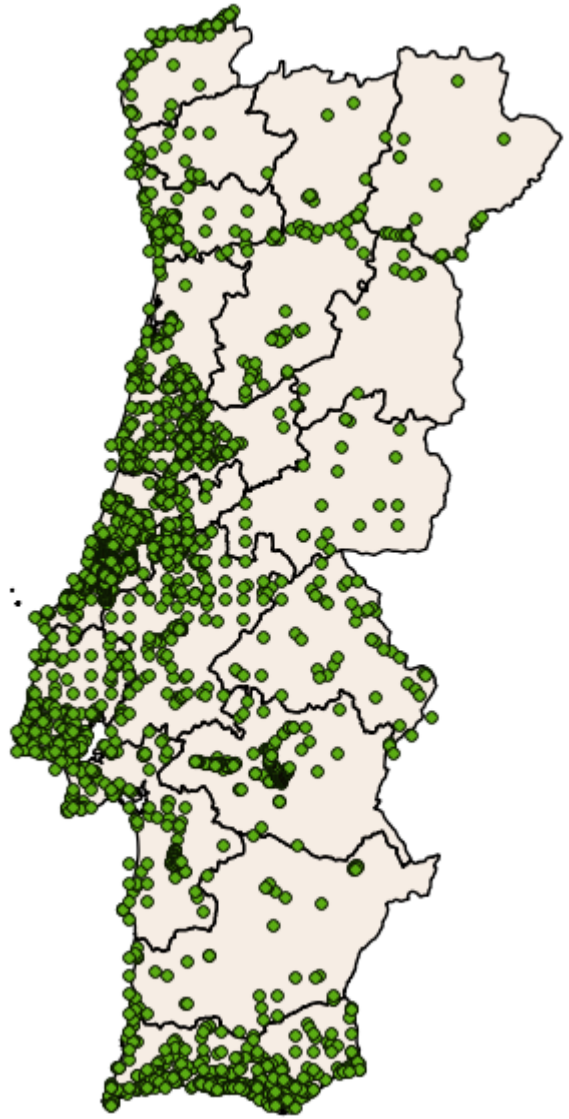
Risk Assessment score in Portugal: 14*

Introduction reasons:

- ✓ Agriculture
- ✓ Hedges
- ✓ Stabilize slopes

Invasion environments:

- ✓ Close to watercourses, dykes, humid areas, wetlands and coastal swampy areas
- ✓ Roadsides and crop areas
- ✓ Cultivated throughout the country, except in high altitudes



*Pheloung, P.C., Williams, P.A., Halloy, S.R., 1999. A weed risk assessment model for use as a biosecurity tool evaluating plant introductions. Journal of Environmental Management. 57: 239-251.

Global Impacts

Ecological impacts:

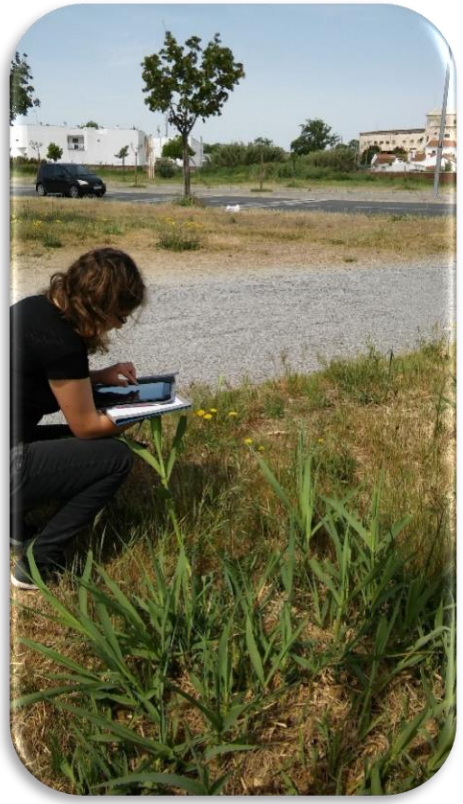
- ✓ **Inhibition** of the development of **native vegetation**
- ✓ **Allelopathic effects** - inhibiting the development of other species
- ✓ Increase of **nitrogen** in the soil- promoting change in soil
- ✓ Interference with the water flow
- ✓ **Impacts in Natura 2000 network habitats**. E.g.: *Quercus suber* forests (9330)

Other impacts:

- ✓ Reduction of productivity
- ✓ Expensive control methodologies
- ✓ Allergies
- ✓ Accentuates the probability of fire occurrence

Invasive flora control

Cartography

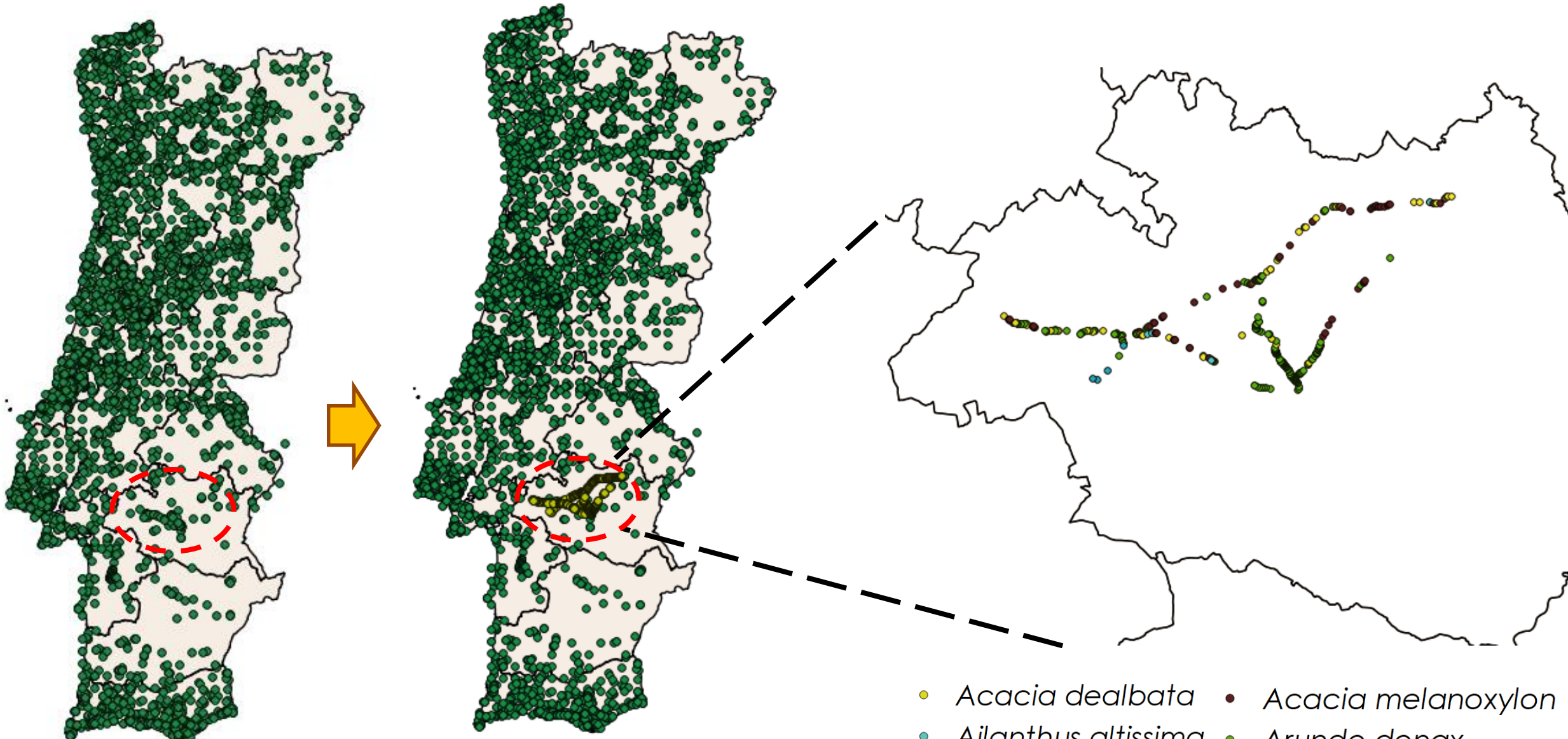


Selection and application of control methods

Promotion of native flora

Monitoring

Cartography



Control methods

Acacia species

Adults

Cut + stump paint with herbicide

Drill + herbicide injection

Adults, Young adults and Big sprouts

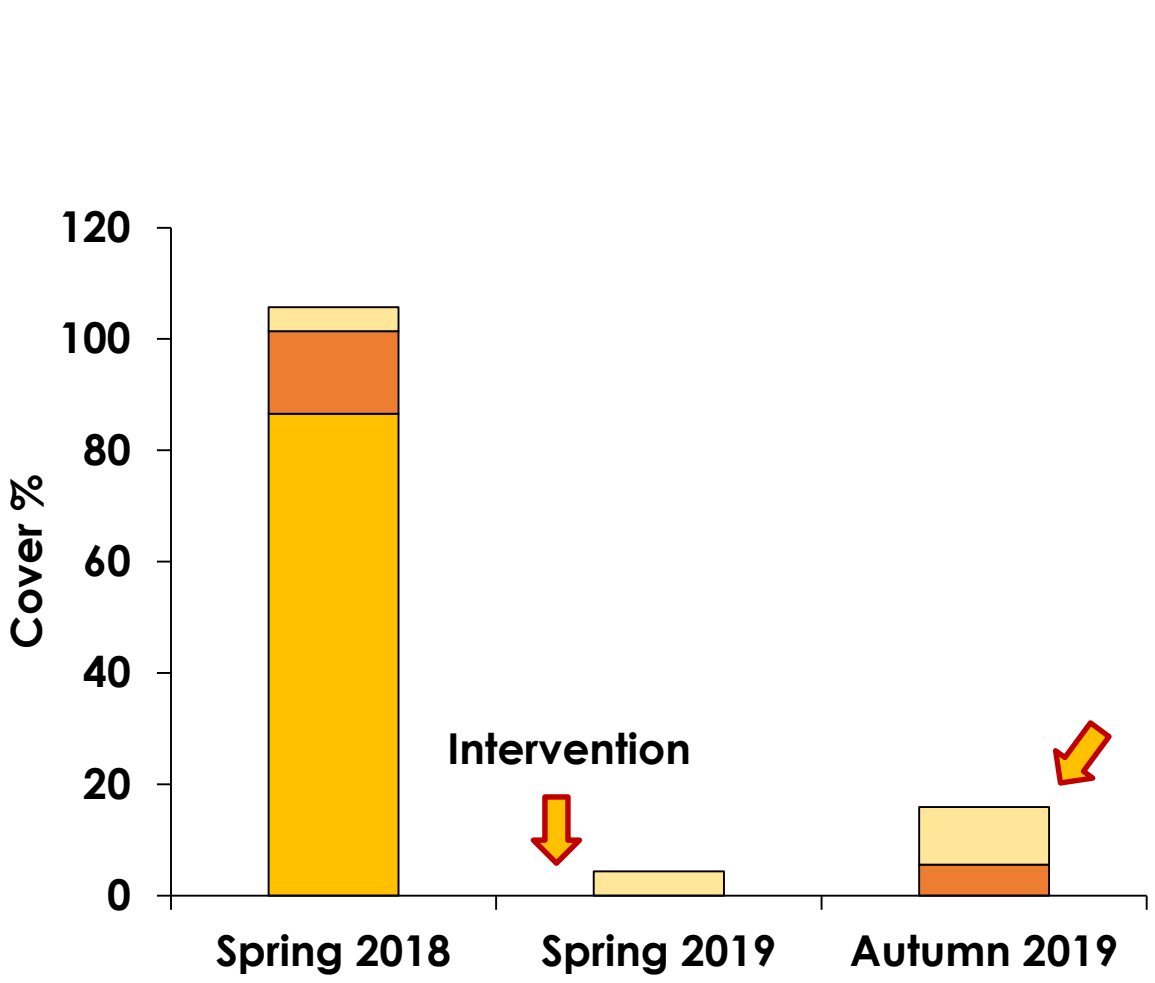
Ring-barking or Girdling

Selective cut

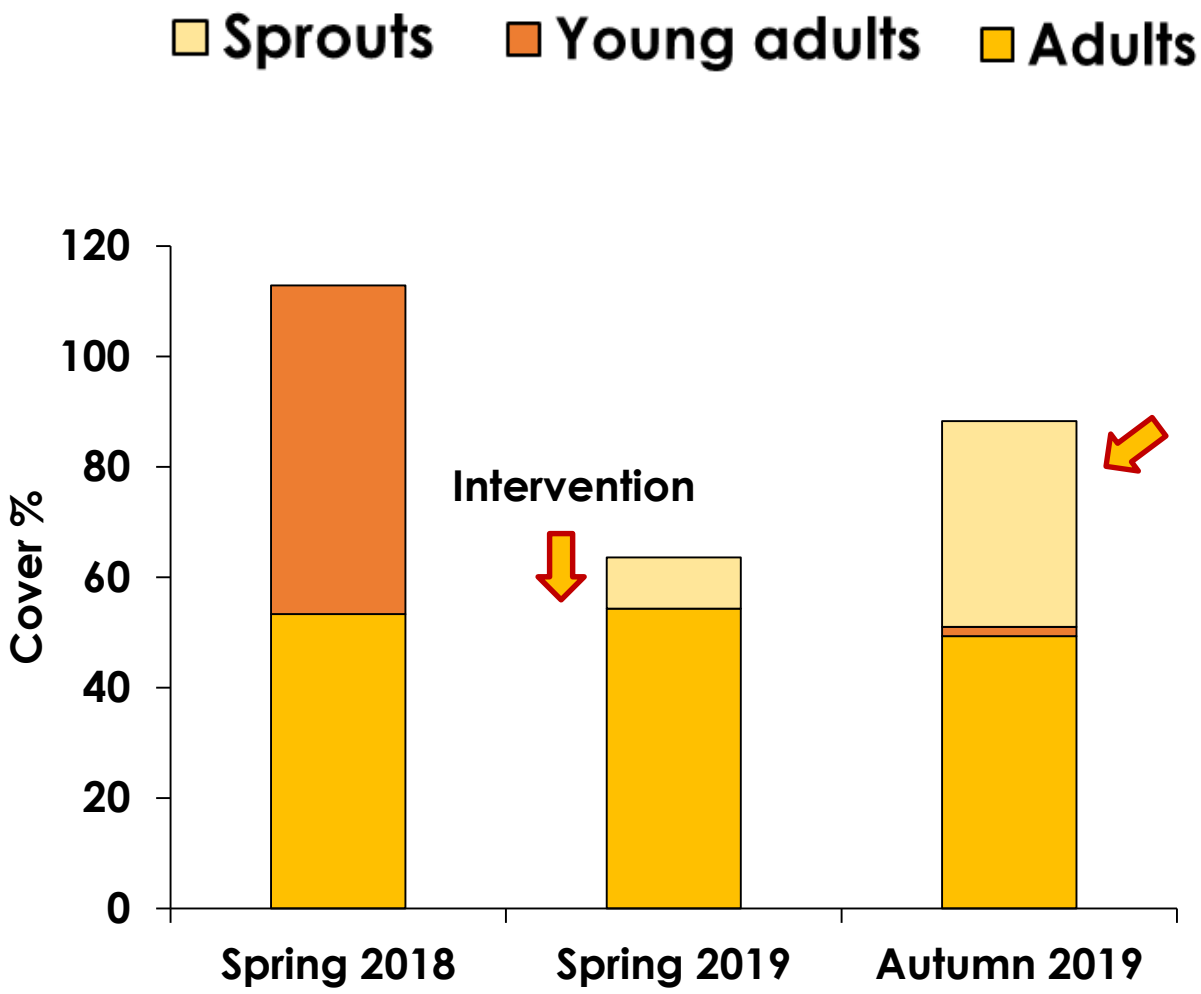
Sprouts

Hand pull

Main results – *Acacia* species



Cut + stump paint with herbicide



Selective cut

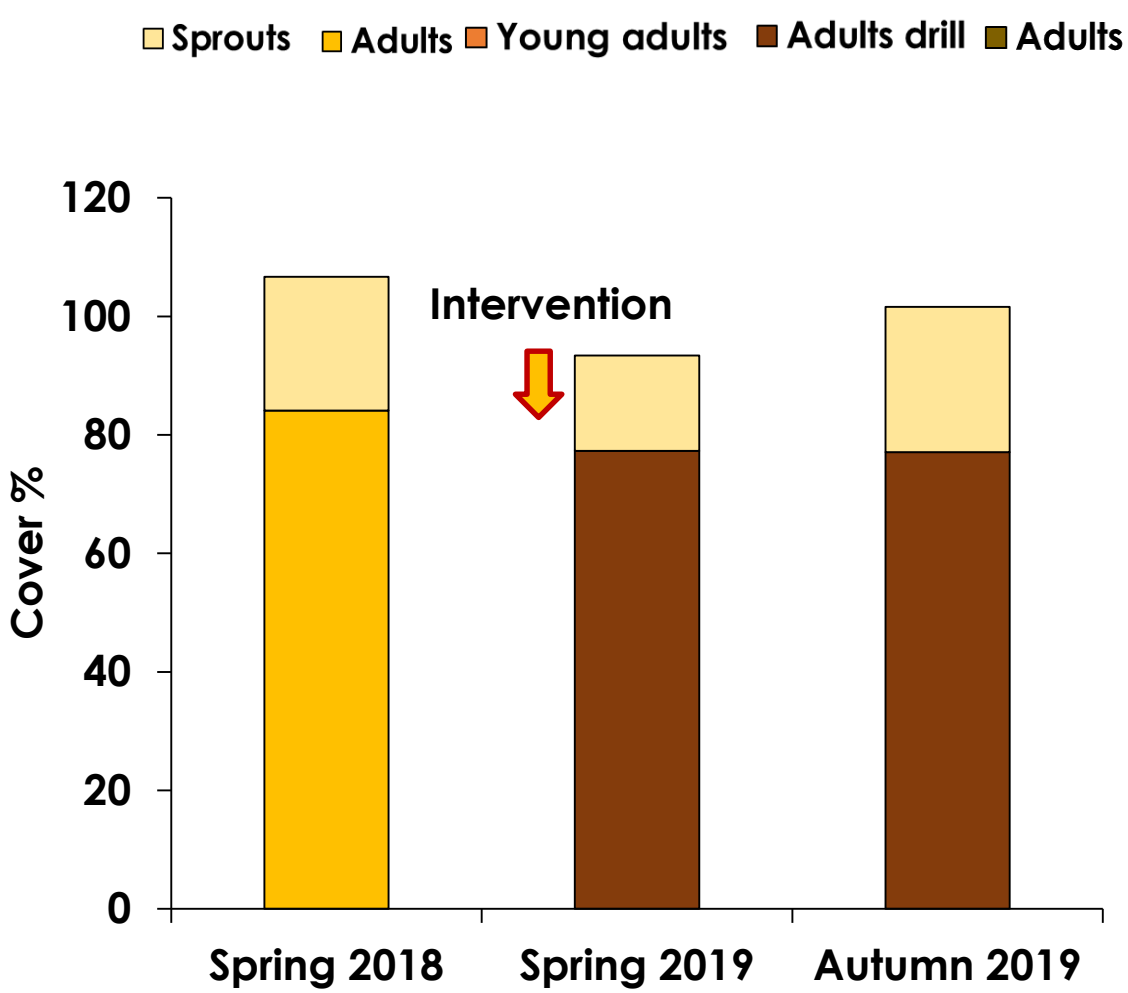
Adults cut + stump paint with herbicide

Acacia melanoxylon

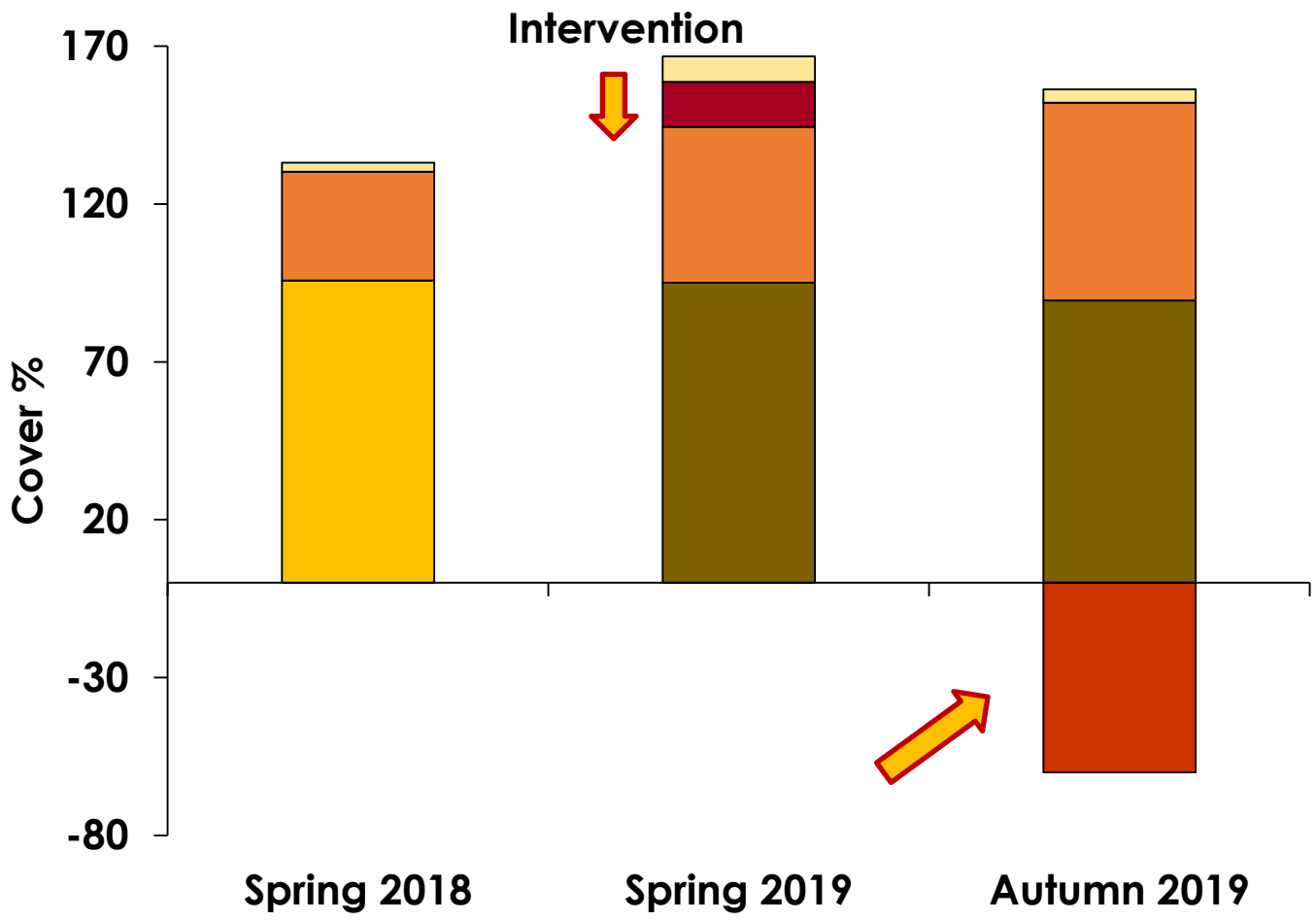
Spring 2019

Autumn 2019

Main results – *Acacia* species



Drill + herbicide injection



Ring-barking

Ring-barking

Acacia melanoxylon

Spring 2019

Autumn 2019

Control methods

Ailanthus altissima

Adults

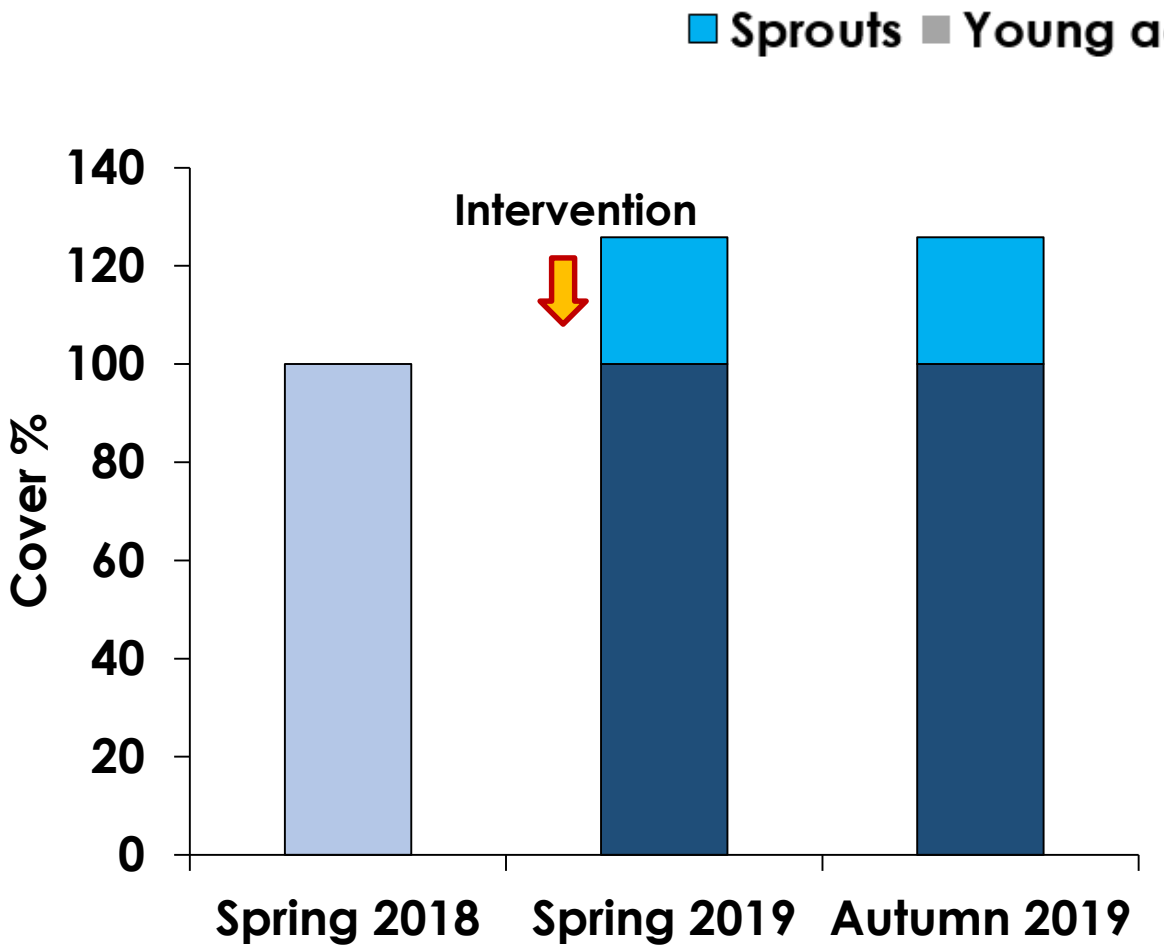
Cut + stump paint with herbicide

Drill + herbicide injection

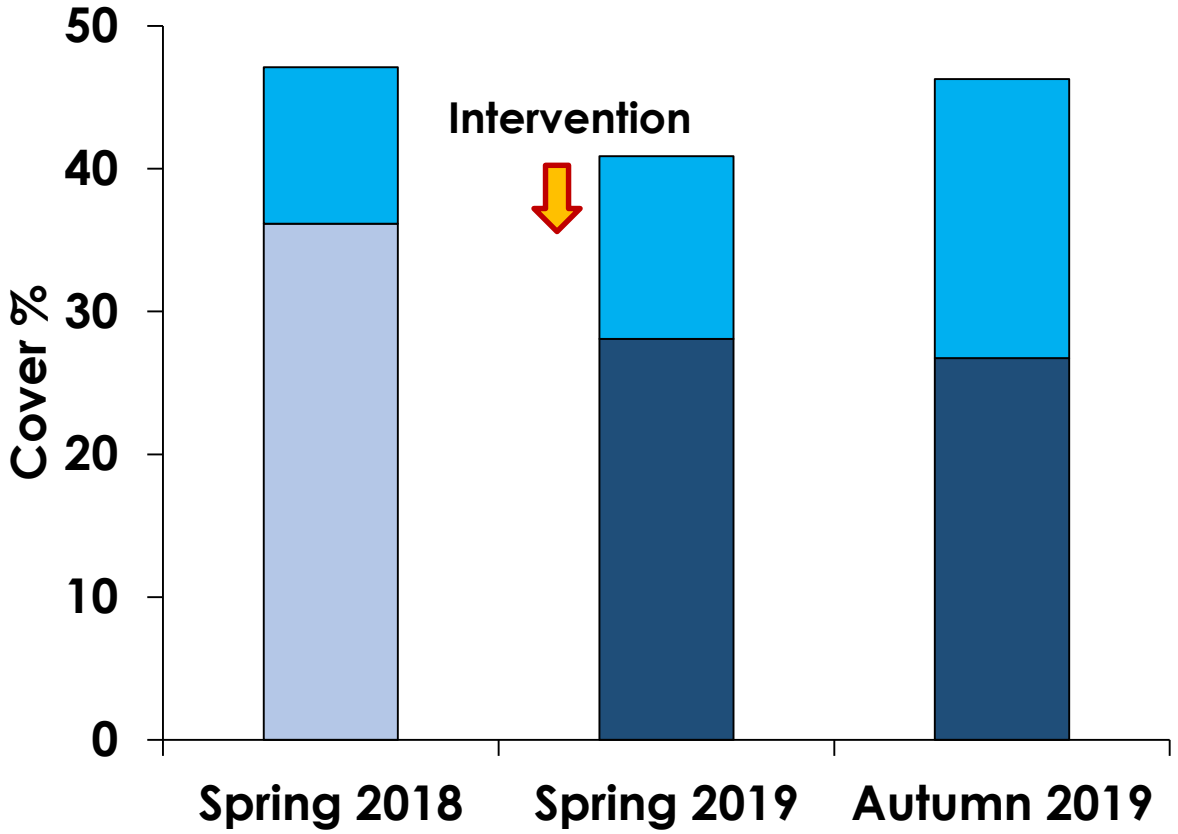
Sprouts

Hand pull

Main results – *Ailanthus altissima*



Drill + herbicide injection



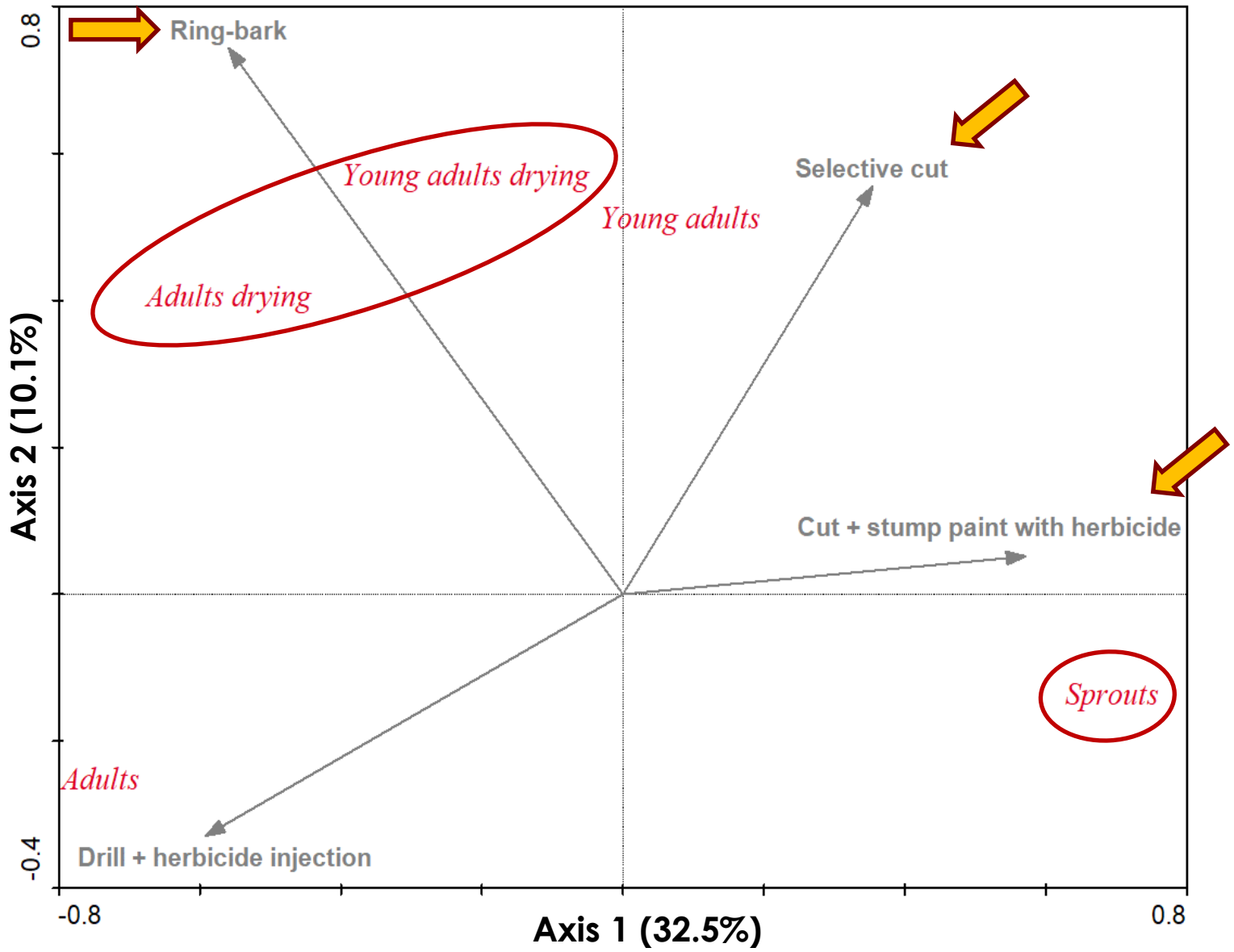
Drill + herbicide injection

AND

Cut + stump paint with herbicide

Overall Results - Redundancy Analysis

***Acacia* species**
AND
Ailanthus altissima



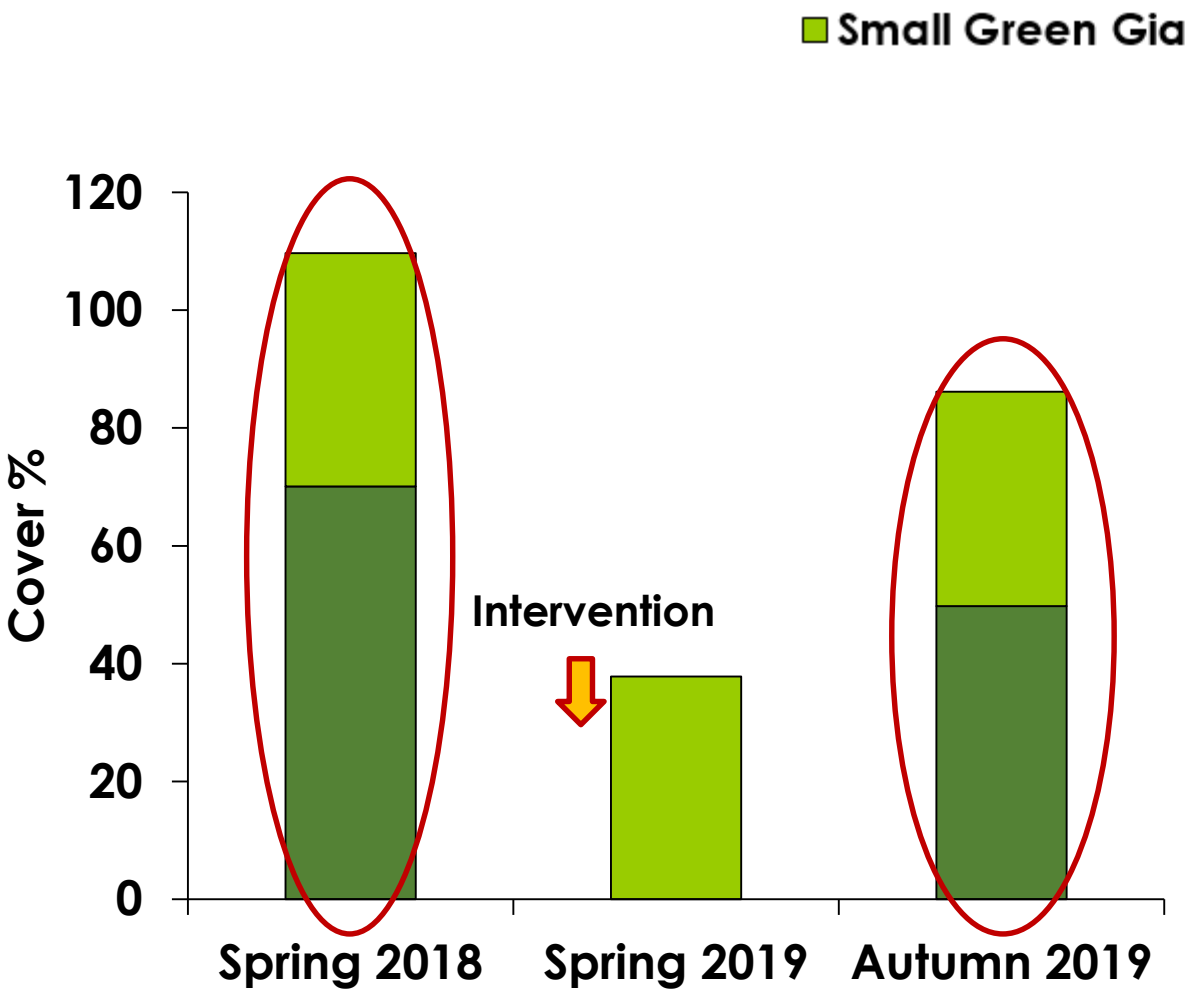
Control methods

Arundo donax

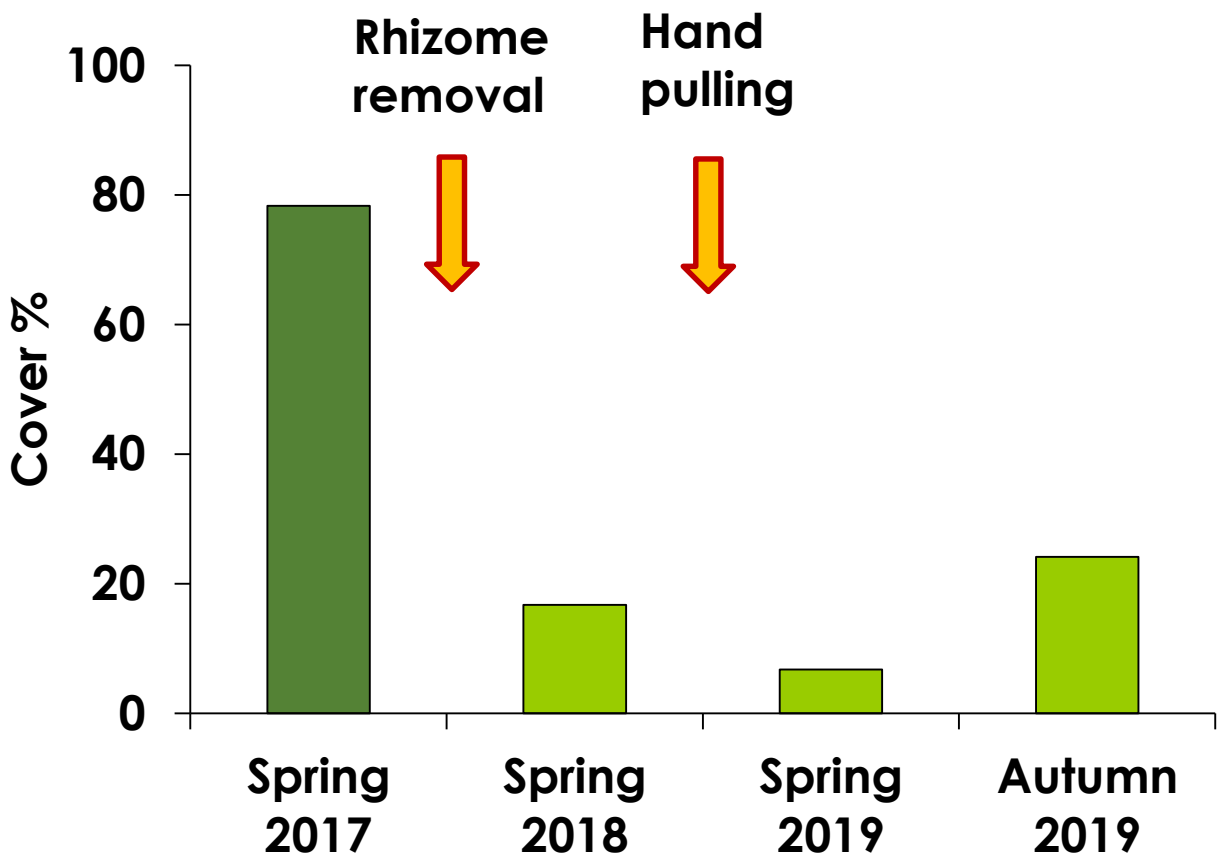
Consecutive cuts
- **Spring: 1 cut**
- **Autumn: 1 cut**

Manual control:
- **Spring: Rhizome removal**
- **Autumn: Hand pull**

Main results – *Arundo donax*



Consecutive cuts



Rhizome removal and hand pull

Rhizome removal and hand pull

Arundo donax control plots

Spring 2017

Autumn 2018

Spring 2019

Spring 2019

Main constraints

Time between intervention and **monitoring** → **False results** → Need for **extended monitoring**

Financial limits

→ Application of **less efficient** but **cheaper methods** → **Cutt**

→ More **effective methods** require **specialized staff**

→ **Drill + injection**

→ **Ring-barking**

Adjacent populations in private property

Population awareness

Taking home ideas

Acacia species and *Ailanthus altissima*

Adults cut

- Diminish immediately the invasive flora cover
- Sprouts emerge very fast

Both methods: **drill** or **ring-barking**

- Diminishing of invasive flora cover is slower
  - Ring-barking seems to take effect faster
- Sprouts emerge slowly

Arundo donax

Rhizome removal is an **efficient method**

- Decreased the cane cover
- Sprouts reappear slower
- Favors the emergence of native herbs

Taking home ideas

Regardless of the method, but especially with cut methods

Maintain continued monitoring

Maintain active control of sprouts

LIFELINES Linear Infrastructures Networks with Ecological Solutions

LIFE LINES
Linear Infrastructure Networks with Ecological Solutions

LIFE-LINES (LIFE14 NAT/PT/001081)
Linear Infrastructure Networks with Ecological Solutions
60% co-financed project by the LIFE - Nature and Biodiversity Program of the European Commission

Thanks for listening!

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Quercus

Pictures source: LIFE LINES project; Invasive Plants in Portugal (http://invasoras.pt/en); Flora-On: Flora de Portugal Interactiva (www.flora-on.pt)