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

Mariana P. Fernandes, Paula Matono, Carla Pinto-Cruz, Anabela D.F. Belo

Stakeholder Meeting Control In Road
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Study Area

South of Portugal

High concentration of roads, ecotrails and powerlines
Principal aims

Test, evaluate and disseminate mitigation measures

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

Promote the creation of a demonstrative Green Infrastructure

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

**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
In Portugal:

Distribution: Mainland Portugal, Azores and Madeira archipelagos

Status in Portugal: Invasive species - annex I of Decreto-Lei nº 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

**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
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

**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
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

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

- Acacia dealbata
- Acacia melanoxylon
- Ailanthus altissima
- Arundo donax
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**

**Sprouts** **Young adults** **Adults**

<table>
<thead>
<tr>
<th>Season</th>
<th>Sprouts</th>
<th>Young adults</th>
<th>Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2018</td>
<td>[Bar Graph]</td>
<td>[Bar Graph]</td>
<td>[Bar Graph]</td>
</tr>
<tr>
<td>Spring 2019</td>
<td>[Bar Graph]</td>
<td>[Bar Graph]</td>
<td>[Bar Graph]</td>
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<tr>
<td>Autumn 2019</td>
<td>[Bar Graph]</td>
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</tr>
</tbody>
</table>

*Intervention*
**Acacia melanoxylon**

Spring 2019

Autumn 2019

Adults cut + stump paint with herbicide
Main results – Acacia species

Drill + herbicide injection

Spring 2018 | Spring 2019 | Autumn 2019
--- | --- | ---
Cover % | Cover % | Cover %

Ring-barking

Intervention

Spring 2018 | Spring 2019 | Autumn 2019
--- | --- | ---
Cover % | Cover % | Cover %

Intervention
Acacia melanoxylon

Spring 2019

Autumn 2019

Ring-barking
Control methods

*Ailanthus altissima*

**Adults**
- Cut + stump paint with herbicide
- Drill + herbicide injection

**Sprouts**
- Hand pull
Main results – Ailanthus altissima

Sprouts  Young adults  Adults  Adults drill

Drill + herbicide injection

Intervention

Spring 2018  Spring 2019  Autumn 2019

Cut + stump paint with herbicide

Drill + herbicide injection

Intervention

Spring 2018  Spring 2019  Autumn 2019
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

Spring 2018 | Spring 2019 | Autumn 2019

Intervention

Cover %

Rhizome removal and hand pull

Spring 2017 | Spring 2018 | Spring 2019 | Autumn 2019

Cover %

Small Green Giant | Large Green Giant
Arundo donax control plots

Spring 2017

Rhizome removal and hand pull

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

Adjacent populations in private property

Population awareness

Drill + injection

Ring-barking
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 active control of sprouts

Maintain continued monitoring
Thanks for listening!