Effectiveness of community-based initiatives for mitigation of land degradation after wildfires.

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Summary

- Pontecaldelas 2017 Wildfire, Galicia
- Community-based initiatives
- Treatments assessment
Where is Pontecaldelas?
Loss of ground cover
Fauna
Soil erosion
Property damage
Human death

Al menos tres muertos en los incendios que azotan Galicia

Las llamas avanzan sin control y amenazan casas en Pontevedra, Ourense y Lugo

Asciende a 36 el número de muertos por los incendios en Portugal

Continúan activos 47 fuegos y muchas aldeas siguen cercadas por las llamas

El país vecino acumula este año 101 allecidos por el fuego y más de 120.000 hectáreas arrasadas
Wildfire causes?

Pyromans
Terrorism
Insufficient fire suppression services
Land abandonment
Eucalypt spreading
Global warming
Land abandonment

- Forestry
- Agriculture

Graph showing the trends in land use from 1900 to 2000.
Eucalypt spreading

Pine
Oak
Eucalypt
Pyrophytic sp.: likes the fire
Other pyrophytic exotic invasive species
Global warming
15 October 2017

2900 ha burned in Ponte Caldelas
Local communities organized themselves to take actions
1. Consultancy
2. Planning & Organization
3. Selection of critical areas
4. Material acquisition
5. Material distribution
6. Treatment application
7. Treatment effectiveness monitoring
18 October 2017: Consultancy about post-fire soil erosion risks and its mitigation
18 October 2017: Consultancy about post-fire soil erosion risks and its mitigation

What can we do? “Soil protection”

- Best mitigation treatment: Post-fire *mulching*
- Location of target areas
Community-based initiatives for burned areas:

**Short term**
- Post-fire mulch
  - Wheat straw
  - Corn straw
  - Wood chips
  - Forest residues (shredded)
- Post-fire acorn seeding

**Medium term**
- Tree planting
- Exotic invasive sp.

**Long term**
- “Custody of territory”
Custody of territory
1. Consultancy

2. Planning & Organization

3. Selection of critical areas

4. Material acquisition

5. Material distribution

6. Treatment application

7. Treatment effectiveness monitoring
Logistics of volunteers activities

• Volunteer coordinators traineeship
• Institutional support (Local governments)
• Insurance,
• Personal protection,
• Permissions
1. Consultancy
2. Planning & Organization
3. Selection of critical areas
4. Material acquisition
5. Material distribution
6. Treatment application
7. Treatment effectiveness monitoring
3. Selection of critical areas:

- High wildfire severity
  - Total crown combustion, no leaves in canopy
  - Soil cover totally consumed
  - White, red ash color
- Steep slopes, south exposed
- Human Values at risk
  - water supply structures
1. Consultancy
2. Planning & Organization
3. Selection of critical areas
4. Material acquisition
5. Material distribution
6. Treatment application
7. Treatment effectiveness monitoring
Donated mulch materials:

- Barley straw
- Wheat straw
- Shredded corn straw
- Shredded wood
- Wood chips
Corn and acorns
1. Consultancy
2. Planning & Organization
3. Selection of critical areas
4. Material acquisition
5. Material distribution
6. Treatment application
7. Treatment effectiveness monitoring
1. Consultancy
2. Planning & Organization
3. Selection of critical areas
4. Material acquisition
5. Material distribution
6. **Treatment application**
7. Treatment effectiveness monitoring
Post-fire mulch
Acorn seeding

30,000 *Quercus robur* acorns
1. Consultancy
2. Planning & Organization
3. Selection of critical areas
4. Material acquisition
5. Material distribution
6. Treatment application

7. Treatment effectiveness monitoring
Objetives:

Assess volunteer-applied treatments:

• Post-fire mulch (wheat, corn, corn strips) effect on soil losses

• Acorn seeding success (in untreated and mulched areas)
Treatment effectiveness monitoring

Unbounded Erosion plots

Bounded small plots

sediment weight, OMC
Study areas: Treatment, Mg ha\(^{-1}\), cover:

- Laforet: Wheat straw mulch, 2, >60%
- Parada: Corn straw mulch, 4, >60%
- Corn straw mulch strips, 1, <60%
• Laforet site: wheat straw mulch (6 plots)
• Parada site:
Corn mulch
(12 plots)
Acorn seeding

Untreated x512

Mulched x512
Erosion results

Laforet

Erosion (Mg ha\(^{-1}\)) Year2

- untreated straw mulch
- untreated corn mulch
- corn mulch strip

Parada

Erosion (Mg ha\(^{-1}\)) Year1

- untreated straw mulch
- untreated corn mulch
- corn mulch strip

- 85% reduction
- 92% reduction
- 72% reduction

Laforet Parada

1700mm
1300mm
1 straw truck = 25 soil trucks
Straw effectiveness seem to decrease…

![Graph showing effectiveness of different mulches over time.](image)
... but also soil loss decreases
Year 1: Low germination rate

Acorn incidences (%)

May 18  Jun 18  Aug 18

No germination
Rodent predation
Germination (8%)
Year 1: Low germination rate

Acorn incidences (%)

May 18 | Jun 18 | Aug 18
---|---|---
Dead herbivores (2%)
Alive damaged (3%)
Alive (2%)

5% untreated; 9% mulched

No germination

Rodent predation
Year 2: dead by drought

Low survival rate:
2% untreated;
5% mulched
Mulch helps acorn growing

![Graph showing the impact of mulch on acorn growth]

- **X-axis**: Months (May-18, Jun-18, Aug-18, Aug-19)
- **Y-axis**: Plant height (mm)
- **Legend**:
  - Red: Untreated
  - Green: Mulch

The graph indicates that mulch significantly enhances acorn growth, with plant height increasing notably in August 2018 and 2019 compared to the untreated control.
Conclusions
Conclusions

Community-based initiatives can be very effective when combining motivation, technical experience and scientific knowledge.

COLECTIVO
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Community-based initiatives for burned areas:

**Short term**
- Post-fire mulch
  - Wheat straw
  - Corn straw
  - Wood chips
  - Forest residues (shredded)
- Post-fire acorn seeding

>80% reduction in soil erosion

>2% acorn success

**Medium term**
- Tree planting
- Exotic invasive sp. suppression

**Long term**
- Custody of territory
More on post-fire soil erosion mitigation:

Prats et al. 2012 (Geoderma)
Prats et al. 2013 (Land Degradation & Development)
Prats et al. 2016 (Sci. Total Env.)
Malvar et al. 2017 (Forest Ecology and Management)
Prats et al. 2017 (Forest Ecolog. Manag.)
Prats et al. 2018 (Land Degradation & Development)
Keizer et al. 2018 (Catena)
Vieira et al. 2018 (Env. Research)
Prats et al. 2019 (Journal of Hydrology)

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Thank you for your attention!

Grazas!!