Comparison of plant species richness between hedgerows and a bamboo field in Ireland

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Master thesis

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   --> specialisation: forest and nature

--> 'Evaluation of the potential of hedgerow networks for forest biodiversity restoration in an Irish rural landscape'
What?

- 204 hedgerows
- 6 big and several smaller properties
- 129 herbs, 25 shrubs en 32 trees
- Per hedgerow:
  - Flora
  - Length, width, height (+ variation)
  - Presence tree layer and/or shrub layer
  - Percentage gaps
  - Presence hill
  - Presence ditch, depth and waterlevel
  - Adjacent landuse
  - Height above sealevel
  - Soil type
  - Age
Bamboo plantation

Figure 1: Picture of the property in Ireland (marked in red) and of the bamboo plantation on that property (marked in yellow). Adapted from Google Maps.
Bamboo plantation

- 5 temperate species:
  - *Phyllostachys humilis*
  - *P. decora*
  - *P. bissetii*
  - *P. aurea*
  - *P. aureosulcata ‘Alata’*

- Origin: China

- 2005
- 2007
Bamboo plantation

- Produced via in-vitro techniques by Oprins Plant NV., Rijkevorsel, Belgium

- 1th year: semozine to suppress upcoming weeds
- 2nd year: spot-treatment for emerging weeds
Need - Solution

- Need for sustainable resources
- Several sources of energy investigated
- Biomass also able to replace fossil fuels as a major resource for other industries as well

=> bamboo as one of the candidates
But...

- Spreading of bamboo by rhizomes
- Growth reserves kept underground

--> Failure to contain bamboo plants to the plantation area

- Dense canopy
- Capacity to drain water from a given area

=> Bamboo might therefore be an invasive plant with a devastating potential for endemic flora and fauna
IT IS OF PARAMOUNT IMPORTANCE THAT WE DO NOT COMBAT ONE RISK WITH ANOTHER !!!
Dataset

- 41 hedgerows
- 101 plant species

Table 1: Summary of the data collected on hedgerows.

<table>
<thead>
<tr>
<th></th>
<th>number of species</th>
<th>area (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>average</td>
<td>23</td>
<td>440</td>
</tr>
<tr>
<td>minimum</td>
<td>9</td>
<td>70</td>
</tr>
<tr>
<td>maximum</td>
<td>39</td>
<td>1470</td>
</tr>
</tbody>
</table>

- Bamboo plantation:
  - Number of species: 39
  - Area: 1400 m² (5m edge)
Used techniques

- **Species - area relation**
  - \( S = cA^z \)

- **TWINSPAN - analysis**
  - Classifies the samples according to the principal indicator species

- **Sörensen similarity index**
  - To tell the extent to which the flora around the bamboo field resembled the community in the hedges nearby
  - \( QS = \frac{2C}{A + B} \) with \( A \) and \( B \) number of species in samples \( A \) (a hedge) and \( B \) (bamboo plantation) and \( C \) number of common species
Species - area relation

Figure 2: Species - area relation for the 41 hedgerows and the bamboo plantation (encircled in black)
Figure 3: Classification of the samples in groups using Twinspan. Number 1 till 41 (in black) are the different hedgerows and number 42 (in red) is the bamboo plantation.
Is bamboo a threat?

- Clustering fails to demonstrate great differences in species composition
- Species richness is not affected

=> No negative influence of bamboo on the indigenous plant species for this property in Ireland

=> Hypothesis: bamboo biomass plantations need not have negative influence on the rural flora
Is bamboo a threat?

- Seed dispersal as a possible way of becoming invasive
  --> not for bamboo because of infrequent mass flowering

- Longer periods between harvests
  --> biomass plantation as refuge and seed bank

=> small plots, mixed into common types of landuse and attention for elements that allow migration
Thank you for your attention! Are there any questions?