How policies constrain native seed supply for restoration in Brazil

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Large scale restoration

Native seeds

International commitments
350 Mha by 2030

Shortage of supply
Low genetic diversity and poor quality

certification or accreditation
Seed programs in tropical countries have transformed local smallholders or communities into seed producers through national agencies that have established regulations. This has led to a large amount of informal production.
Emerging forest seed supply in the mid-1960s

The Brazilian Forest Code
Law N° 4,771/1965

Tax incentives for forestry sector
Law N° 5,106/1966

Research funds for genetic improvement programs

Highly productive wood industry based on exotic *Eucalyptus* and *Pinus* species
Policies for native seeds

Crop and exotic tree seed supply

Ensuring quality for the emerging market

Seed quality applicable to agricultural crops
Restoration projects

Seed collectors and producers

Pioneer native seed suppliers: Atlantic Coast

1990s: international conservation agenda

Shortage of native seed production in Brazil
Associations
Cooperatives
Enterprises

Mobilize resources
Enhance local capacity
Knowledge

Decentralisation
Native seed supply
2000’s: 1st governmental funding
Ministry of the Environment

decentralisation strategy intended devolution of control over the forest resources
Seed Networks

- eight seed networks
- different Brazilian Biomes
- funded: US$ 3.7 million

Brazilian States with Seeds Networks created by Ministry of the Environment:
National Seeds and Seedlings System

Law nº 10,711/2003 & Decree nº 5,153/2004

Regulations for forest seed production

MAPA + Advisory commission

More detailed processes for forest and native seed

Normative Instruction nº 56/2011 substituted by nº 17-19/2017
FOREST SEEDS COMMERCIAL TERM

Identification of the seed producer

Producer's name: ...
Number of National Registry of Seed and Seedlings: ...
Commercial contacts: ...
Location: ...

I ensure the seed lots listed below were produced according to the norms and standards established by the Ministry of Agriculture, Livestock and Supply (MAPA) which I assume responsibility for identity and quality:

<table>
<thead>
<tr>
<th>Specie name</th>
<th>Common name</th>
<th>Source Class</th>
<th>Selection criterion</th>
<th>Isolation</th>
<th>Collection site</th>
<th>Seed lot number</th>
<th>Number of mother trees</th>
<th>Total weight (kg)</th>
<th>Number of Quality analysis batches</th>
<th>Purity (%)</th>
<th>Germination (%)</th>
<th>Best before</th>
</tr>
</thead>
<tbody>
<tr>
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* are not applied for Source identified cases

Producer’s Name

<table>
<thead>
<tr>
<th>Number of National business registration</th>
<th>Number of National Registry of Seed and Seedlings</th>
</tr>
</thead>
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</tbody>
</table>

Species name: ...
Common name: ...
Source category: Identified
Lot n: ...
Collection Date: ...
Collection site: ...
Net weight (kg): ...
Number of seeds/kg: ...

Seed Quality testing
Best before: ___/___/___

Germination (%): ...
Purity (%): ...

Technical responsible name: ...
Number of National Registry of Seed and Seedlings for the technical responsible: ...
Professional registration number for the technical responsible: ...
Technical responsible location and contacts: ...

Producer’s location and contacts

...
Knowledge

- 51 forest species with validated seed testing
- 300 forest species with seed testing instructions

Structure

- 16 labs operate with native and forest seed quality testing
- the south and southeast regions of Brazil

Management

- excessive technical procedure
- administrative process
- high costs
Native seed production is essentially a community-based activity.
Structure
• seed testing in non-accredited laboratories to be permitted until 2020

Technical
• exemption from mandatory quality testing for recalcitrant seed;
  • technical assistance beyond forest engineers and agronomists

Commercial
• Trade mixed native seeds for direct seeding
Developing countries → Restrictive seeds laws → Informal channels

Collectors and producers are ‘invisible’

<table>
<thead>
<tr>
<th>Biome</th>
<th>Formal collectors (n)</th>
<th>States (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amazon</td>
<td>63</td>
<td>4</td>
</tr>
<tr>
<td>Atlantic Coast</td>
<td>129</td>
<td>7</td>
</tr>
<tr>
<td>Caatinga</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Cerrado</td>
<td>71</td>
<td>5</td>
</tr>
<tr>
<td>Pantanal</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pampa</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>264</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>
Fragmentation change in the national environmental law: 50 to 12 Mha

Unstable regional restoration markets

Restrictive regulations for seed trade

Informal operations

Objected commercial practices

Expertise related to seed technology and training:

- creating technical parameters
- on-line system of information: 10,000 mother trees
- training stakeholders: 2,500 people
- diagnosing seed marketing

Seed Networks
Rio-São Paulo Seed Network

Native seeds supply (kg)

- Native seed supply
- Producers

Seed producer (n)

Years: 2004 to 2014

Seed supply and producers over the years.
Emergent community-based organisations

Commercial seed supply

Native Vegetation Protection Policy

international agreements on climate change

Brazilian restoration target of 12 Mha by 2030
Institutions
- general agreements
- local arrangements

Trust

Order
- ecological restoration
- sale
- management office
- order
- delivery
- seed collector
<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Collectors</th>
<th>Gender</th>
<th>Age (years)</th>
<th>Experience in seed collection (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Male %</td>
<td>Female%</td>
<td>m</td>
</tr>
<tr>
<td>Ikpeng</td>
<td>67</td>
<td>6.0</td>
<td>94.0</td>
<td>36.1</td>
</tr>
<tr>
<td>Kawaiwete</td>
<td>54</td>
<td>37.0</td>
<td>63.0</td>
<td>34.3</td>
</tr>
<tr>
<td>Panará</td>
<td>6</td>
<td>-</td>
<td>100</td>
<td>24.8</td>
</tr>
<tr>
<td>Wauja</td>
<td>40</td>
<td>32.5</td>
<td>67.5</td>
<td>38.3</td>
</tr>
<tr>
<td>Xavante</td>
<td>56</td>
<td>3.6</td>
<td>96.4</td>
<td>40.7</td>
</tr>
<tr>
<td>Yudja</td>
<td>9</td>
<td>66.7</td>
<td>33.3</td>
<td>20.0</td>
</tr>
<tr>
<td>Total for indigenous group</td>
<td>232</td>
<td>19.4</td>
<td>80.6</td>
<td>35.5</td>
</tr>
<tr>
<td>Total for Network</td>
<td>385</td>
<td>34.3</td>
<td>65.7</td>
<td>41.16</td>
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Household cash income (thousand US$):
### Early Seed Networks

<table>
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<tr>
<th>Main stakeholders</th>
<th>Governmental agencies</th>
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<td>Public universities</td>
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| Funding           | Specific governmental announcement |

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<tr>
<th>Main actions</th>
<th>Seed technology research</th>
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<tr>
<td></td>
<td>Forest seeds commissions</td>
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<td>Training courses</td>
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<thead>
<tr>
<th>Outcomes</th>
<th>Technical protocols</th>
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<tr>
<td></td>
<td>Quality control tests</td>
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<td>Seed regulations</td>
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Workshop on Seeds for large-scale restoration

- 69 participants (42.3% women)
- 11 countries (72.46% from Brazil)

Shortage of seed supplies for restoration

Highly technical native seed production

Increasing participation and strength of local institutions

Up-scaling native seeds supply for restoration

Full-devolution for native seed production
Seed origin and identity

Seed collection areas:
georeferencing

Seed orchards: species that are less available in the seed market

RNC must update constantly the species' scientific names
<table>
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<tr>
<th>Registration of laboratories without the current standard requirements</th>
<th>Universities and research institutes: key role for seed quality testing</th>
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<td>Purity test and identity</td>
<td>Alternative seed testing: faster, cheaper and easier procedures</td>
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Relaxation of the laboratory accreditation process
Research to provide technological innovation
Foster markets for native seeds for restoration

- legal restoration requirements
- inspections for demanding restoration
- governmental plan: purchase seed to support small farmers and local communities

Support local, diverse and small businesses

- strategic business planning
- access to funding support and investments
- commercial arrangements with partnerships

Legal improvement should also consider specific conditions for small producers (<500 kg seed yearly)
Implications for practice

- **regulations**: native seed for restoration x improved plant material for the forestry industry

- The **identity and origin** of native seed = genetic variability in restoration programs;

- **accredited laboratories** prevents formal recognition of local native seed suppliers

- Multiple stakeholder **participation** in policy decision-making processes

- **Governmental support** for structuring market and technological innovation.