Non-dentritment finding on *Guaiacum sanctum* in Mexico

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**Guaiacum sanctum L. (Zygophyllaceae)**

- About 20 m tall and 60 cm DBH
- Shade tolerant species
- Long life cycle
- Low mortality, high reproductive values
- Tropical dry forest from Florida to Central America with heterogeneous distribution
- IUCN (ENC2a), NOM-ECOL (Pr); CITES App II.
- Main threats: habitat lost and harvesting

- Medicinal. Timber species used in the ship building industry
NDF’s procedure

- Based on two sources of information
- NDF completed by CONABIO (SA)

Parameters used
1. Biological criteria
   • Distribution and abundance

• Population
  i) Population structure
  ii) Number of commercial trees per ha
  iii) Seed production and recruitment
  iv) Growth (dbh and height)
  v) Population growth rate (λ)
Distribution

- Potential distribution (modelled with GARP)
Abundance

Rapid field assessments
NDF's procedure

Parameters used

2. - Management criteria
   i) Model of harvesting
   ii) Minimum diameter cutting
   iii) Cutting methods
   iv) Frequency of harvesting
   v) Skid trails (extract logs)
Harvesting matrix model

i) Harvesting commercial adult trees
ii) Damage to non-commercial adult trees
iii) Frequency of harvesting

Effects on:

a) Population growth rate ($\lambda$)
b) Number of commercial adult trees for harvesting

### Harvesting matrix model

<table>
<thead>
<tr>
<th>Stage at time $t+1$</th>
<th>Sd</th>
<th>J</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sd</td>
<td>0</td>
<td>0</td>
<td>F_{13}</td>
<td>F_{14}</td>
<td>F_{15}</td>
</tr>
<tr>
<td>J</td>
<td>G_{21}</td>
<td>S_{22}</td>
<td>S_{23}</td>
<td>S_{24}</td>
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<tr>
<td>A1</td>
<td>0</td>
<td>G_{32}</td>
<td>S_{33}</td>
<td>S_{34}</td>
<td>S_{35}</td>
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<tr>
<td>A2</td>
<td>0</td>
<td>G_{42}</td>
<td>G_{43}</td>
<td>S_{44}</td>
<td>S_{45}</td>
</tr>
<tr>
<td>A3</td>
<td>0</td>
<td>0</td>
<td>G_{53}</td>
<td>G_{54}</td>
<td>S_{55}</td>
</tr>
</tbody>
</table>

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\begin{pmatrix}
Sd \\
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A3
\end{pmatrix}
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Sd \\
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Sd \\
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Sd \\
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A1 \\
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\end{pmatrix} - \lambda - CT
\]

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Damage to non-commercial trees (1–25 cm dbh) might be more important than harvesting of commercial trees (>35 cm dbh)

Best scenario

a) DL ≤ 8%

b) Harvesting of commercial trees up to 100% (<50%)

c) At least frequencies > 16 y
Effects on the number of trees

Best Scenario
Damage ≤ 8%
Harvesting 50-75%
Frequency ≥16 yrs
Conclusions

Sustainable use for *G. sanctum* is achievable
- Recruitment of new individuals to population
- Population growth rate > 1
- Minimum diameter cutting 35 cm DBH
- Harvesting intensity ≤50%
- Damage level (non commercial trees) < 8%
- Frequency of harvesting ≥ 10 ys
- Previous and post-harvesting monitoring of managed populations
- Silvicultural treatments not required
Data quantity and quality

- The best available information in Mexico

- Four years data with a big range of information (geographic, ecologic, genetic)

- Information at national level, insights at regional level, very good info at population level
Problems, challenges or difficulties

- Demographics studies are time consuming but population structures might provide good information.

- Taxonomy of the genus still unclear.

- Impossible to distinguish timber from *G. sanctum* and *G. coulteri*. 
Acknowledgements

CONABIO

CITES

CIEco UNAM

Empresa Transforesta