Wood Tracking Project in Indonesia: *Diospyros celebica* in Sulawesi

Presented by:
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Progress of PHPL (Management of Sustainable Production Forest) and SLK (Certification of Timber Legality) certification, as of December 2017 (DJPHPL-MoEF, 2018)
Introduction

Timber Legality System - SVLK

Source: Maryudi (2016)
Introduction

Timber trade of Ebenaceae

23 commercial species

6 luxury woods species

1 endemic species

Diospyros celebica (Ebony)

Djarwanto et al. 2017
Introduction

• Endemic to Sulawesi Island (South Sulawesi, West Sulawesi, Central Sulawesi and North Sulawesi)
• Slow growing species
• Vulnerable species (IUCN 2019)
• Timber for carving, inlay, furniture and musical instruments
• Problem: **Illegal logging**
Research Questions

How to prevent the Illegal logging?

What can be done?
Solution: Wood Tracking

Questions
- Where are the sample collection sites?
- How to get a samples?
Objectives

- **Main objective:** To setting up a reference data building pipeline for DNA of commercial timber species, *Diospyros celebica* Bakh. (Ebony)

- **Specific objectives:** To collect physical timber reference material and extract its associated DNA for the species *Diospyros celebica* Bakh. (Ebony).
Activity#1: Wood Collection (Concentrated Species: *Diospyros celebica*) in Sulawesi
Objective

To prepare the necessary permits and update the current distribution of *Diospyros celebica* in Sulawesi
### D. celebica Wood Sampling Sites

<table>
<thead>
<tr>
<th>No</th>
<th>Province</th>
<th>Regency</th>
<th>Sub-district</th>
<th>Sampling Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>South Sulawesi</td>
<td>Maros</td>
<td></td>
<td>Batimurung Bulusaraung National Park</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hasanuddin University Teaching Forest</td>
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<tr>
<td></td>
<td></td>
<td>Barru</td>
<td>Barru</td>
<td>Coppo Village</td>
</tr>
<tr>
<td></td>
<td>Sidenreng Rappang (Sidrap)</td>
<td>Pituriase</td>
<td></td>
<td>Tana Toro Protection Forest</td>
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<tr>
<td></td>
<td>Gowa</td>
<td>Parangleo</td>
<td>Bellabori</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Luwu Timur</td>
<td>Mangkutana</td>
<td>Ponda-Ponda</td>
<td>Nature Reserve</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mangkutana</td>
<td>Kalaena</td>
<td>Nature Reserve</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mangkutana</td>
<td>Mango Lembo</td>
<td>Village</td>
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<tr>
<td></td>
<td></td>
<td>Mangkutana</td>
<td>Pegunungan</td>
<td>Faruhumpeni Nature Reserve</td>
</tr>
<tr>
<td></td>
<td>Luwu</td>
<td>Larompong</td>
<td>Temboe</td>
<td>Education Forest and Tourism</td>
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<tr>
<td></td>
<td>Bone</td>
<td>Ulaweng</td>
<td>Cani Sirenreng Nature Park</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>West Sulawesi</td>
<td>Mamuju</td>
<td>Papalang</td>
<td>Batu Papang Village</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Papalang</td>
<td>Palado</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Central Sulawesi</td>
<td>Marowali</td>
<td>Lembo</td>
<td>Wawopada Village</td>
</tr>
<tr>
<td></td>
<td>Parigi Moutong</td>
<td>Sausu</td>
<td>Sausu Village</td>
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<td></td>
<td>Poso</td>
<td>Poso Pesisir</td>
<td>Peawa Oli</td>
<td>Montane Forest</td>
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<td></td>
<td>Donggala</td>
<td></td>
<td></td>
<td>Gunung SojoI Nature Reserve</td>
</tr>
</tbody>
</table>

16 Sites  
20 Individual/site  
Total sample n= 320
Research & Collection Permits
Field Work: GPS, Tree Measurement
Field Works: Herbarium Collection
Field Works: Core Wood Collection
Field Works: Leaf Collection
Lab Work: Wood Anatomical Structure Analysis

Xylarium Bogoriense
Activity#2:
DNA Extraction from Ebony (*Diospyros celebica* Bakh.) Dry Wood Samples Collected Using Pickering Punch
Objective

To develop the most efficient method of obtaining DNA from tissues of dry ebony wood, which collected using Pickering Punch tool.
Materials & Methods

1. Core Wood Extraction from Tree Stand Using Pickering Punch (Agroisolab, UK)

Figure 1. The workflow of ebony wood core extraction using Pickering Punch.
Core Wood Sample Collection
Materials & Methods

2. Genomics DNA Extraction from Dry Wood Using CTAB Method

Figure 2. The workflow of ebony dry wood DNA extraction.
Results & Discussion

Table 1 Presents concentrations and quality of the obtained DNA using two different homogenization methods.

<table>
<thead>
<tr>
<th>Tree No.</th>
<th>Homogenization Method</th>
<th>DNA Conc. (ng/µl)</th>
<th>Purity (A₂₆₀/₂₈₀)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dremel</td>
<td>215.25</td>
<td>2.532</td>
</tr>
<tr>
<td></td>
<td>Dremel+manual grinding</td>
<td>335.60</td>
<td>2.011</td>
</tr>
<tr>
<td>2</td>
<td>Dremel</td>
<td>166.50</td>
<td>2.595</td>
</tr>
<tr>
<td></td>
<td>Dremel+manual grinding</td>
<td>242.75</td>
<td>2.104</td>
</tr>
</tbody>
</table>
Closing Remarks

- The **first collection** of samples has just been carried out in Sulawesi comprising herbarium, leaves and core wood.
- Modification of combined the use of “**dremel + manual grinding**” for sample homogenization proved to be reliable and it can be recommended as a good alternative when extracting DNA from dry wood.
Thank you

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