Improved Tapping of Philippine Canarium Trees for Manila Elemi

by

Arsenio B. Ella and Emmanuel P. Domingo
Scientist III and Research Assistant, respectively
Forest Products Research and Development Institute
Department of Science and Technology
College, Laguna 4031
## Distribution of *Canarium* Trees

<table>
<thead>
<tr>
<th>Region 3</th>
<th>Zambales (<em>Canarium asperum</em>)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region 4</td>
<td>Mindoro, Marinduque, Romblon (Sibuyan), Quezon Province</td>
</tr>
<tr>
<td>Region 5</td>
<td>Camarines Norte, Camarines Sur, Albay, Sorsogon, Catanduanes, Masbate (including Burias and Ticao Islands)</td>
</tr>
<tr>
<td>Region 8</td>
<td>Parts of Samar</td>
</tr>
</tbody>
</table>
Distribution of Productive Pilif trees (BAS 2005)

- 72% Bicol Region
- 18% Western and Eastern Visayas
- 9% Southern Tagalog
- 1% Southern Mindanao and Caraga Region
Around 2,126 farmers own at least 10 nut-bearing Pili trees.
Widely adapted to various agroclimatic conditions and wide range of soil types
Pili can be grown year-round, either alone or intercropped with other crops, such as Coconut and Banana.
Canarium species as an agroforestry crop.

Papaya

Pineapple
Canarium trees as source of Manila elemi resin
Sources of Manila elemi

- Pili (*Canarium ovatum* Engl.)
- Piling-liitan [*Canarium luzonicum* (Blume) Gray]
- Pagsahingin (*Canarium asperum* Benth.)
## Chemical Composition of Manila Elemi

<table>
<thead>
<tr>
<th>Compound</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limonene</td>
<td>56.0%</td>
</tr>
<tr>
<td>α - phellandrene</td>
<td>17.6%</td>
</tr>
<tr>
<td>Elemol</td>
<td>6.3%</td>
</tr>
<tr>
<td>Sabinene</td>
<td>5.7%</td>
</tr>
<tr>
<td>Terpinolene</td>
<td>2.8%</td>
</tr>
<tr>
<td>Elemicine</td>
<td>2.4%</td>
</tr>
<tr>
<td>β - phellandrene</td>
<td>3.3%</td>
</tr>
</tbody>
</table>
The Philippine Forestry Statistics reported that in 2006, 180,550 kg. of *Canarium* resin valued at USD 298,052 was exported to:

- France
- Germany
- India
- Japan
Production and Export of *Canarium* Resin, 1997-2006
(Quantity in thousand kilograms, value in thousand US$, FOB)

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>181</td>
<td>298</td>
</tr>
<tr>
<td>2005</td>
<td>165</td>
<td>237</td>
</tr>
<tr>
<td>2004</td>
<td>144</td>
<td>193</td>
</tr>
<tr>
<td>2003</td>
<td>361</td>
<td>528</td>
</tr>
<tr>
<td>2002</td>
<td>272</td>
<td>482</td>
</tr>
<tr>
<td>2001</td>
<td>246</td>
<td>528</td>
</tr>
<tr>
<td>2000</td>
<td>377</td>
<td>696</td>
</tr>
<tr>
<td>1999</td>
<td>245</td>
<td>464</td>
</tr>
<tr>
<td>1998</td>
<td>221</td>
<td>448</td>
</tr>
<tr>
<td>1997</td>
<td>162</td>
<td>436</td>
</tr>
</tbody>
</table>
Traditional Uses of Canarium Resin

In starting fires
Traditional Uses of Canarium Resin

Used for torches
As incense in religious ceremonies
Traditional Uses of Canarium Resin

Caulking material for boats
Industrial Uses of Canarium Resin

Components of oil and spirit varnishes and paints
Industrial Uses of Canarium Resin

Gives toughness and elasticity to pharmaceutical products such as plaster, lithographic works and perfumery.
Industrial Uses of Canarium Resin

In making patent leather and sealing wax
Used in the manufacture of soaps, plastics, printing ink, linoleum, shoe polish, floor wax, etc.
Basic structure of the stem relevant to tapping
Fig. 1. Diagram showing three (3) major subdivisions of the cross section of the stem.

- Bark
- Cambium
- Wood
Fig. 2. Diagram showing cross section of the stem with damaged cambium resulting in slower healing process of the cut or wound.
Fig. 3. Diagram showing cross section of the stem with undamaged cambium resulting to faster healing process of the cut or wound.
Factors Affecting Resin Production

- Vigor of the tree
- Location
- Inherent Capacity/Heredity
Deep tapping	Overtapping

Frequent rechipping
Tools and Accessories Required for Tapping

- Bolo and knife
- Cup
- Nails
- Bark hack
- File or whelting store
- Bottle (plastic, for application of acid)
- Polyethylene plastic sheets
- Roofing cement
- Bucket
- Funnel (to transfer resin from bucket to drum)
Tools and Accessories Required for Tapping

- Shaving tool
- Guttering
- Hammer
- Sulfuric acid
- Plastic bag as receptacle
- Drum barrel
- Jute sacks
- Protective clothing and accessories (for tapper, including visor or goggles, acid-proof gloves, plastic apron or other garments and gum tools)
• Tap only trees with at least 30 cm (DBH).
• Clean and scrape the portion to be tapped.
• Start the first tapping point not more than 60 cm from the ground.
• Make 2 cm wide and 15 cm long horizontal cut using a sharp knife or a bolo.
• Apply 2.5% ethylene to the cut. Use the “ethrel brand”.
• Tack plastic receptacle below the tapped area, wrap polyethylene sheet around the tapped trunk and seal with plastic roofing cement.
Proper Tapping Procedure

- Collect exudates after a week or when resin flow stops.
- When exudation stops, make a fresh cut (3 to 5 mm wide) immediately above the previous one.
- Tap vertically upward on the untapped portion of the trunk and use a ladder for convenience (tapping tools should be razor-sharp at all times to ensure clear cuts and care should be taken to obtain a clean product as much as possible).
A space of twice the width of the tapping should be maintained.

Subsequent chippings (3-5 mm wide) should proceed vertically straight.

Initial tapping cut should be 15 cm wide along the circumference and 1 to 2 cm wide along the height of the tree.
Untapped portion between tapping twice the length of the tapping
SWOT Analysis of Tapping *Canarium* Trees

**Strengths**

- Supply of resin expected to be plenty as evidenced by the big number of *Canarium* trees growing in the areas.
- Manila elemi contains large amount of limonene.
- Manila elemi can be subjected to value-added processing like simple steam distillation.
SWOT Analysis of Tapping *Canarium* Trees

**Strengths**

- Manila elemi commands much higher price than Almaciga resin.
- Manila elemi has varied economic uses.
- Potential of *Canarium* trees to thrive because of Bicol’s ideal climate.
Weaknesses

• Irregular amount of resin yield
• No regular market
• Absence of knowledge on Manila elemi production and marketing
• No previous experience in Manila resin tapping among farmers
Weaknesses

- No formal group or association among the farmers
- Poor infrastructure like poor roads, limited communication facilities and lack of electricity supply that may hinder linkages with the Manila elemi market
Opportunities

• There is an opportunity to start varnish production in the region.
• An opportunity also exists to open the region as the center for Manila elemi production.
• Improved tapping technique for Manila elemi resin has already been developed by FPRDI.
Over tapping may lead to destruction of Canarium trees.

The possibility of constructing of trails and dirt roads leading to the Canarium tree plantations may open the areas to unscrupulous middlemen.
Threats

- Competition with synthetic resin and presence of other substitutes
- Demand-driven not supply-driven market
- Occurrence of drastic weather conditions
## Cost and Return Analysis

Information on *Canarium* Resin tapping in Quezon Province

<table>
<thead>
<tr>
<th>Items</th>
<th>Alabat</th>
<th>Bondoc Peninsula</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of trees tapped/day</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>No. of cuts made/tree</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Harvest Cycle</td>
<td>15 days</td>
<td>15 days</td>
</tr>
<tr>
<td>Cutting Cycle</td>
<td>Daily</td>
<td>Daily</td>
</tr>
<tr>
<td>Yield/tree/harvest</td>
<td>5 kg</td>
<td>3 kg</td>
</tr>
<tr>
<td>Harvest/month</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer</td>
<td>40 kg</td>
<td>35 kg</td>
</tr>
<tr>
<td>Average resin</td>
<td>P32.00/kg</td>
<td>P31.00/kg</td>
</tr>
<tr>
<td>Sale of resin per month</td>
<td>P1,120.00</td>
<td>P1,085.00</td>
</tr>
</tbody>
</table>
Conclusion

Tapping Philippine resins is a veritable economic activity among farmers. Applying the proper or scientific tapping techniques offer the following advantages:

- prolongs life of the tree
- increases production of quality resin
- increases income of tappers and government
- is environment friendly and helps in the conservation program of the government
Conclusion

- Preventing the premature death of *Canarium* trees can help alleviate global climate change brought about by the increasing level of carbon dioxide (CO₂) in the atmosphere.
- Trees sequester (CO₂) from the atmosphere and the longer the *Canarium* stands are preserved in the forest, the better they can contribute in the global effort to remedy climate change.
Thank you!