Local perceptions and endogenous technologies of *Carapa procera* oil production in Mali

Urbain DEMBELE\textsuperscript{1,2}, Aïssata A. DIALLO\textsuperscript{1} & Yénizié KONE\textsuperscript{1}, Bino TEME\textsuperscript{1}, Anne Mette LYKKE\textsuperscript{3}, Amadou Malé KOUYATE\textsuperscript{1}

\textsuperscript{1}Institut d’Economie Rurale (IER), Bamako, Mali.  
\textsuperscript{2}Institut Supérieur de Formation et de Recherche Appliquée (ISFRA), Bamako, Mali.  
\textsuperscript{3}Aarhus University, Department of Bioscience, Silkeborg, Denmark.
Outline of presentation

I. INTRODUCTION

II. OBJECTIVES

III. MATERIALS AND METHODS

IV. RESULTS

V. CONCLUSION AND RECOMMENDATIONS
INTRODUCTION

- Role of wild tree species in the socio-economic life of rural populations: food, therapeutic, energy needs, etc.

- Oil tree species: potential value to increase and diversify the livelihoods

- *Carapa procera*: forest fruit species with high income in southern Mali (FAO, 1996) and multi-use values

- Oil extracted from seeds of *Carapa procera* is highly sought and used:
  - therapeutic,
  - cosmetic,
  - veterinary,
  - Insecticide and repellent properties
STUDY OBJECTIVES

- Contribute to the understanding of local knowledge of *Carapa procera* oil production and related local perceptions
  
  - Identify traditional technologies of *Carapa procera* oil production
  
  - Document the socio-cultural perceptions on the exploitation of *Carapa procera*. 
## MATERIALS AND METHODS

### Study sites

<table>
<thead>
<tr>
<th>Region</th>
<th>Agro-ecological zone</th>
<th>Village</th>
<th>Majority ethnic group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sikasso</strong></td>
<td>South soudanian</td>
<td>Kountjila</td>
<td>Fulani</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mourasso</td>
<td>Senufo</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ziékorodougou</td>
<td>Senufo</td>
</tr>
<tr>
<td><strong>Koulikoro</strong></td>
<td>North soudanian</td>
<td>Koumabougou</td>
<td>Fulani</td>
</tr>
</tbody>
</table>
MATERIALS AND METHODS

❖ Qualitative and quantitative approaches

❖ Socio-economic surveys
  • Semi-structured questionnaire
  • Individual interviews
  • 30 operators / site

❖ Tests of oil production
  • 2-3 processors / site
  • Monitoring of activities and participant observations

❖ Processing and data analysis
  • Qualitative analysis
  • Descriptive statistics through SPSS.18 and Excel
  • Yield of extraction, \( R_{ex} = \frac{Q_{Hex}}{Q_{Atr}} \times 100 \), \((Q_{Hex}: \text{quantity of oil obtained}; Q_{Atr}: \text{quantity of almonds transformed})\)
# RESULTS

## Characteristic of actors

<table>
<thead>
<tr>
<th>Characteristic of actors</th>
<th>Study sites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Koumabougou</td>
</tr>
<tr>
<td><strong>Sex (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>100</td>
</tr>
<tr>
<td><strong>Education (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>67</td>
</tr>
<tr>
<td>Primary school</td>
<td>10</td>
</tr>
<tr>
<td>Coranic/arabic school</td>
<td>10</td>
</tr>
<tr>
<td>Literacy rate</td>
<td>13</td>
</tr>
<tr>
<td><strong>Marital status (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>77</td>
</tr>
<tr>
<td>Widow</td>
<td>23</td>
</tr>
<tr>
<td><strong>Age (in years)</strong></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>48±2</td>
</tr>
<tr>
<td>Min.</td>
<td>28</td>
</tr>
<tr>
<td>Max.</td>
<td>80</td>
</tr>
<tr>
<td><strong>Experience of <em>Carapa procera</em> (in years)</strong></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>25±2</td>
</tr>
</tbody>
</table>
Average of quantity of nuts collected per day: 9,3±0,7 kg (in Kountjila)
**Constraints in collecting nuts**

- Decrease populations of *Carapa procera* and remoteness of collection sites
  - Hence, increasingly large distances to be covered for collecting nuts
- Increased number of women operators
- Some collection sites are hardly accessible (leafy vegetation, thorny shrubs, reptiles, etc.)
- A certain quantity of nuts are washed away.
Method of extracting oil by dry process

Pretreatment of nuts

- Boiling nuts
- Conservation in holes/pits
- Digging up nuts

Conservation of nuts

- Manual crushing
- Manual pounding or grinding almonds on wheel
- Drying the obtained paste

Almonds process

- Roasting, malaxing and baking
- Adding water or boiled extract of plants
- Removal oil

Oil extraction
Method of extracting oil by wet process

1. **Pretreatment of nuts**
   - Drying/smoking nuts
   - Destocking nuts
   - Put into bag and conservation in shelters

2. **Conservation of nuts**
   - Manual crushing
   - Pounding/grinding almonds in mill

3. **Almonds of nuts**
   - Malaxing and churning paste
   - Oily phase and addition of cold water
   - Cooking fatty matter
   - Removal oil

4. **Oil extraction**
Yield of oil extraction

<table>
<thead>
<tr>
<th>Study sites</th>
<th>Yield of extraction (%)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>Min.</td>
<td>Max.</td>
</tr>
<tr>
<td>Koumabougou</td>
<td>21.1 ± 1.0</td>
<td>19.8</td>
<td>23.3</td>
</tr>
<tr>
<td>Kountjila</td>
<td>25.2 ± 0.8</td>
<td>24.4</td>
<td>26.1</td>
</tr>
<tr>
<td>Mourasso</td>
<td>24.7 ± 0.9</td>
<td>23.8</td>
<td>25.7</td>
</tr>
<tr>
<td>Ziékodorodougou</td>
<td>22.4 ± 1.5</td>
<td>19.6</td>
<td>26.0</td>
</tr>
<tr>
<td><strong>Overall average</strong></td>
<td><strong>23.01 ± 1.0</strong></td>
<td><strong>19.6</strong></td>
<td><strong>26.1</strong></td>
</tr>
</tbody>
</table>

Processors has explained the yield of extraction through some parameters as:

- maturity of nuts
- storage conditions
- extraction method
- know-how of the processor related to sociocultural aspects.
## Oil production and sales in 2012

### Oil produced/processor, 2012, (litre)

<table>
<thead>
<tr>
<th>Study sites</th>
<th>Oil produced/processor, 2012, (litre)</th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Min.</td>
<td>Max.</td>
</tr>
<tr>
<td>Koumabougou</td>
<td>5</td>
<td>1.5</td>
<td>11</td>
</tr>
<tr>
<td>Kountjila</td>
<td>12</td>
<td>3</td>
<td>40</td>
</tr>
<tr>
<td>Mourasso</td>
<td>4</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Ziékorodougou</td>
<td>16</td>
<td>4</td>
<td>30</td>
</tr>
</tbody>
</table>

### Sale price of oil, (FCFA/litre)

<table>
<thead>
<tr>
<th>Study sites</th>
<th>Sale price of oil, (FCFA/litre)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Min.</td>
</tr>
<tr>
<td>Koumabougou</td>
<td>1 733</td>
<td>1 500</td>
</tr>
<tr>
<td>Kountjila</td>
<td>1 500</td>
<td>1 500</td>
</tr>
<tr>
<td>Mourasso</td>
<td>2 438</td>
<td>1 500</td>
</tr>
<tr>
<td>Ziékorodougou</td>
<td>1 750</td>
<td>1 250</td>
</tr>
</tbody>
</table>

An overall average of 37% sales and 63% home consumption transformed into soap.
**Constraints of transformation**

- Traditional processing methods: duration and arduous process
- Manuel crushing
- Lack of appropriate equipment
- Problem of product quality.

**Constraints of marketing**

- Lack of organization in marketing
- Lack of adequate market
- Lack of product promotion
Sociocultural perceptions related to *Carapa procera*

The exploitation of *Carapa procera* nuts has certain sociocultural considerations related to magico-mystical specificities:

- Do not steal or cheat during collection otherwise the nuts do not produce oil
- Preserve nuts away from the urines
- Avoid the collection and processing during periods of menstruation for women
Sociocultural perceptions related to *Carapa procera*

- Do not be angry and exempt from criticism and reproaches when you want to begin the transformation
- The failure to obtain oil during the processing is often perceived as a sign of bad omens related to the operator or those around him (illness, accident, death, tragic events, etc.).
CONCLUSION

✓ *Carapa procera* oil: opportunity for diversification and income generation for women

✓ 2 traditional processing methods identified

✓ Low yields of extraction

✓ Poor sales of a large part of the production transformed into soap

✓ Sociocultural considerations.
RECOMMENDATIONS

- Improve traditional processing technologies following the example of shea butter presses to enhance the yield of oil extraction and the quality.
- Develop strategies for financing the activities of value chain actors and product promotion.
- Improve market organization and linking actors.
- Promote strategies for domestication of *Carapa procera* species to increase production.
ACKNOWLEDGEMENT

- DANIDA for funding “Qualitree” project
- CTA for sponsoring my participation to this conference
- and the local communities.

THANK

www.qualitree.neri.dk