



ANNEX 3

Charcoal Production in Yee San





The variety of mangrove Plantation use in Yee San is *Rhizophora apiculata*.

Plantation methods consists of 3 types.

1. **Extensive Practice:** no land preparation
2. **Medium Practice:** with land preparation
3. **Intensive Practice:** with land preparation and cultivation management



Rotation period is 10-15 years.

Green Sale is 10,000 Baht / Rai.



Production Process



- Wood with a diameter of 4-8 centimetre will be cut for charcoal production.
- A clear cutting method is used. One “Lha” or 1.30 metre is the optimal size of wood cutting.
- Wood shell is peeled and ready to transport by boat to the charcoal production plants.



- Wood will be placed orderly into the stove.



- Fire is lighted in front of the stove for 5-10 days.
- After 10 days, stove will be closed. There is still fire inside the stove and this step takes about 8-10 days.





- After the dark or gray smoke color becomes the light blue, it indicates that charcoal production process is almost finished.
- When the smoke is colorless, it indicates that wood is fully burned to be charcoal and it requires another 7 days until the fire is completely terminated.
- Total charcoal production period takes about 20-27 days or about 1 month.



Charcoal Production

- One rai of mangrove forest (with about 1,100 trees) at average age of 15 years can produce wood with the volume of 18.65 cubic metre.
- One cubic metre of cut wood can produce 370 kilogram of charcoal.
- One rai of mangrove forest can produce 6,900 kilogram of charcoal.

Charcoal Production Costs

Direct Cost

1. Investment Cost

1.1 Land preparation and weed clearing	500	Baht/Rai
1.2 Weed collection and burn	400	Baht/Rai
1.3 Root eradication	700	Baht/Rai
1.4 Mangrove seedling	600	Baht/Rai
1.5 Labor cost for cultivation	200	Baht/Rai

Total Investment Cost	2,400	Baht/Rai
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2. Operating and Maintenance Cost

2.1 Land tax	80	Baht/Rai
2.2 Replanting in year 2	216	Baht/Rai
2.3 maintenance cost in year 3	300	Baht/Rai
2.4 Wood cutting and peeling	7,986	Baht/Rai
2.5 Transportation cost	222	Baht/Rai
2.6 Labor cost of wood loading and taking in stove	350	Baht/Rai
2.7 Depreciation of building and stoves	266	Baht/Rai

2.8 Stove rent cost	1,165.63	Baht/Rai
2.9 Hired labor for burning	2,331.25	Baht/Rai
2.10 Labor cost of taking charcoal out from stove and packaging	350	Baht/Rai
2.11 Transportation of charcoal to shop	690	Baht/Rai

Total Operating and Maintenance Cost can be classified into 5 cases.

Total Operating and Maintenance Cost

<u>Case 1</u> Wood sale	596	Baht/Rai
<u>Case 2</u> Stove Rent	3,000.88	Baht/Rai
<u>Case 3</u> Own Stove	12,101.25	Baht/Rai
<u>Case 4</u> Stove Rent and transport to the shop	13,690.88	Baht/Rai
<u>Case 5</u> Own Stove and transport to the shop	12,791.25	Baht/Rai

Total Direct Cost

<u>Case 1</u>	Wood sale	2,996	Baht/Rai
<u>Case 2</u>	Stove rent	15,400.88	Baht/Rai
<u>Case 3</u>	Own stove	14,501.25	Baht/Rai
<u>Case 4</u>	Stove rent and transport to shop		
		16,090.88	Baht/Rai
<u>Case 5</u>	Own stove and transport to shop		
		15,191.25	Baht/Rai

Benefit

Direct Benefit

1. Wood Sale	10,000	Baht/Rai
2. Charcoal Sale at home	48,303.50	Baht/Rai
3. Charcoal Sale at shop	55,204	Baht/Rai
4. Subsidy received	3,000	Baht/Rai

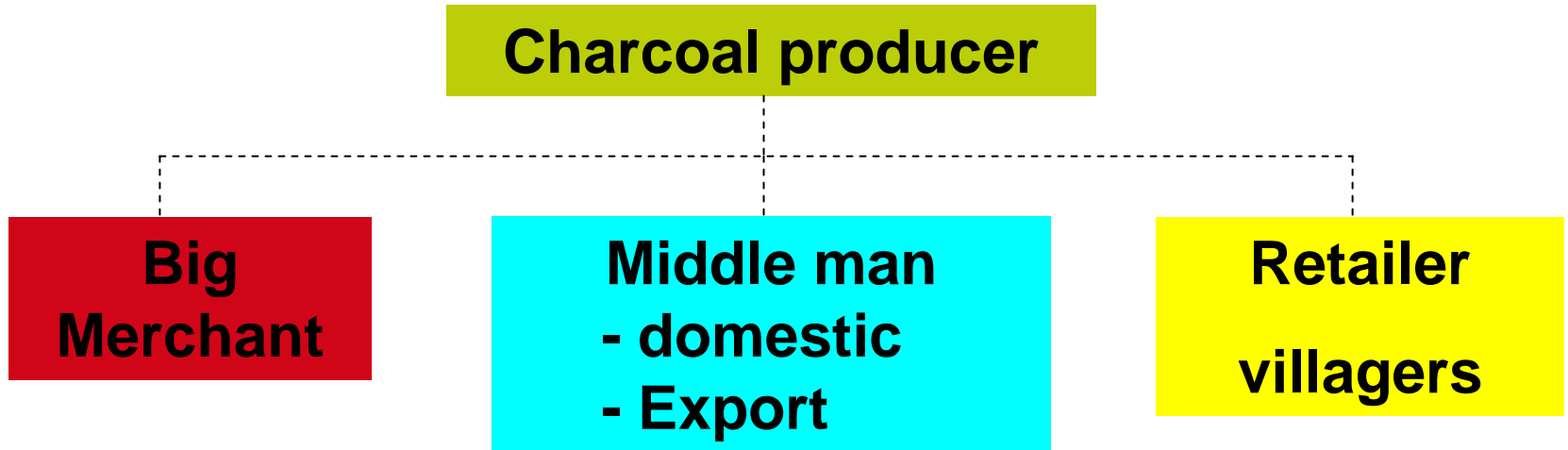
Market Channel

Charcoal producer

**Big
Merchant**

**Middle man
- domestic
- Export**

**Retailer
villagers**



Middle man

**Export
80 %**

**Domestic
20 %**

End User

**Restaurant
90%**

Household 5%

Funeral 5%