Mangrove based Food Products Processing

Dyah Ilminingtyas WH
&
Faculty of Fisheries and Marine Science
Diponegoro University
2013

PREFACE

In Indonesia, Mangrove forest has various benefits. Directly benefit of mangrove are firewood/ fuel-wood, construction material, paper material, medicine, textile, manure, fisheries, food and drinks. Indirectly, mangrove has benefits to protect coastal area from abrasion /erosion. Waves and storm, shoreline protection, prevent salt water intrusion, riverbank protection, feeding, spawning and nursery ground, bio-filter pollutant; traditionally, mangrove has been already utilized for food.

Practical clue of mangrove benefits as material food has purpose to use as one of knowlegments for individu or group of fisheries processing or others Small Entreprize. This guideline was writen in the framework of activity " The benefit Optimum of unproductive fish pond and Dissemination of Mangrove Conservation" by Team of Faculty of Fisheries and Marine Sciences, Diponegoro University, Semarang which funded from Mangrove for the Future (MFF) through Proyek Small Grants Facility (SGF).

Contact : retnohartati.undip@yahoo.com

Semarang, 2013

Dyah Ilminingtyas WH & FACULTY OF FISHERIES AND MARINE SIENCE
DIPONEGORO UNIVERSITY

INTRODUCTION

Indonesia is the country island has ± 17.508 islands and coastal line as long as ± 81.000 km, has huge natural resources which consist of renewable natural resources (fisheries, coral reef and mangrove) and unrenewable natural resources (gas oil, and mineral).

In Indonesia, Mangrove forest has area 860 millions Ha, 72 % mangrove forest in Asia, 27 % mangrove forest in the world. There are 89 spesies of mangrove in the world. Since 1990, 50% of mangrove condition has been damage, fish-pond (to increase export of shrimp), residences, industries, tourisme, street, etc. Devastation of mangrove because of abrasion, seawater intrusion, huge wave from sea, organic and anorganic pollutants.

Mangrove rehabilitation was conducted to reach ecological value, to effort of mangrove conservation should be involved community (bottom up), to support of rehabilitation successful such as socialization of directly and un-directly economical mangrove benefit. Directly mangrove benefit such as fuel-wood, construction material, paper, medicine, textile, manure, feeding ground for fish, food and drinks. Un-directly mangrove benefit such as, to protect coastal area from waves and storms, to protect from abrasion/erosion, prevent salt water intrusion, riverbank protection, spawning ground, nursery ground, feeding ground for many marine organisms and pollutant bio-filter.

MANGROVE as FOOD MATERIAL

Traditionally, mangrove has been used for food, study from food crisis in Lembata Island NTT. This can change old theory that paddy is not only for basic food, the exploration new local food resources, natural resources potency through ecosystem and to support food resiliency program which become national problem.
Benefit mangrove food in traditional manner

- *Bruguiera gymnorrhiza* (lindur): can make cake, mixed by rice, eating directly with coconut;
- *Avicenia alba* (api-api), eating directly with coconut; cracker
- *Soneratia alba* (pedada) for syrup and drinks
- *Rhizopora mucronata, Acrosticum aerum* (kerakas); for vegetables

Bruguiera gymnorrhiza (lindur) can improve as food potency because of:

- Carbohidrate content is high. Fruit of this tree has protein and lipid
- All of part of fruit can be eaten except skin of fruit.
- This fruit has relatively big size

Figure 1. *Avicenia alba* (api-api/brayo)

Figure 2. *Bruguiera gymnorrhiza* (lindur)

There are some indicators for security of food material such as physically hazard. biological hazard and chemical hazard (some of this fruit contain HCN, anti nutrient (tannin). Therefore, needed to special preparation before application this fruit material as food).

Procedure of lindur benefit become food is substitution in form of porridge of fruit and making into flour become more preserved, more easily be aplicated into various of food processing without any inhibited by high water content.

Procedure of preparation api-api/brayo (fruit from Avicenia)

- This fruit has as potential as lindur
- Most of the people from the coastal of north part of Center Java has been already using this fruit in their food.
- Traditional utility, people eat directly with coconut
- No idea for continuing processing.

Procedure of preparation of Avicenia sp/api-api processing

- To peel
- To separate fruit with bud
- The first boiling is 45 minute
- The second boiling is 45 minutes mixing with ash from paddy
- Cleaned
- Soaking with water 2 days (every six hours should be changed with new water).
- Make into four

Figure 3. Peel

Figure 4. Separated fruit with bud and skin

Figure 5. The first boiling is 45 minutes

Figure 6. The second boiling is 45 minutes mixing with ash from paddy

Figure 7. Cleaned

Figure 8. Soaking with water 2 days (every six hours should be changed with new water).

Figure 9. Making into flour

Procedure for processing of lindur fruit

- Boiling during 15 minute
- To peel
- Soaking during 48 hours (2 days), the water should be changed every 6 hours
- The process of grating of lindur fruit
- Already to be used
- Making flour

The content of nutrition value of lindur flour.

- Water : 11- 12 %
- Lipid : 3,0- 3,2 %
- Protein : 1,4-1,8 %
- Ash : 1,4-2,7 %
- Carbohydrate : 80,4-81,9 %
- Fiber : 0,73-0,76 %
- Amilum : 16,9-17,3 %

Physical Characteristic of lindur flour

- Ability to absorb water are 132,67 – 139,33%
- Characteristic flour white L=69,52-72,14; a = 6,62-7.68; b = 11,42- 13,64

Boiling

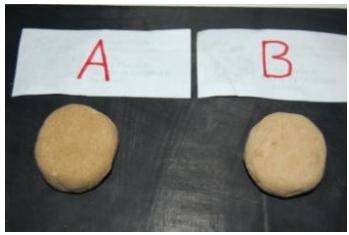
Soaking

Grating

Already to substitution

Making flour

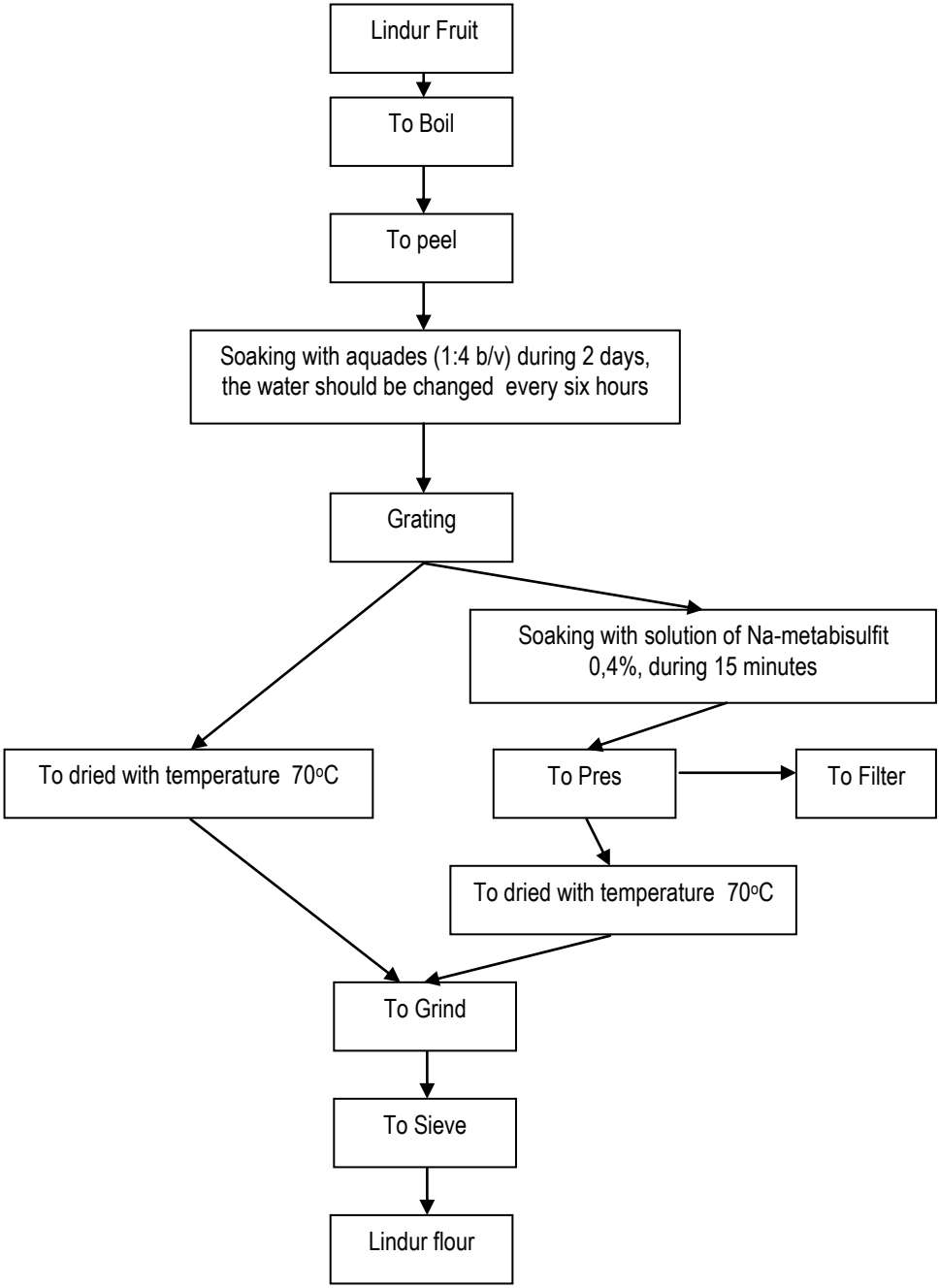
Lindur Flour



Ability to make row material of cake/ bread

Figure 10. Procedure of processing of lindur fruit

Flowchart of Processing of lindur flour lindur



Example Processing of Mangrove Fruit

Stik Lindur

- Material : Lindur already use, Wheat flour with high protein, yolk egg, bumbu instant flavor, cooking oil.
- Equipment : Wok, Grinder, washbasin

Lindur flour

Wheat Flour

Egg

Figure 11. Material of Lindur Stik

- Procedure of lindur stik :

Lindur flour

Wheat flour

The compound of material is not sticky

Figure 12. Mixing all of the materials become one and the material is not sticky

Figure13. Grating of material become slice and then cutting carefully and then fried become yellow till gold yellow, already to eat.

Lindur cake | Steam Lindur Brownies | Pedada's jelly drink (on the bottom)

Lindur cracker | lindur Cracker | Pedada's jelly drink (floating)

Mini cake | Pukis | Cookies

Figure 14. Some of product from mangrove material

Nutritive value and active senyawa aktif (%b/b):
Avicenia alba (brayo) : water 61.95 **%**, Carbohydrate 21.43 **%**, Protein 10.85 **%**, Lipid 0.04 **%,** Fiber 4.09 **%,** Ash 1.27 **%,** Fe(mg/kg) 30.11**%,** Mg 76.22 **%,** K 5689.13 **%,** Ca 383.63 **%,** Na 173.07 **%,** Phyto-Chamical (alkaloid, saponin,fenolik, flavonoid, glukosinolat), Vit B 3.74 mg/100g dan Vit C 22.24 mg/100g

Direction of Improvement PRODUCT OF BASIC MATERIAL OF MANGROVE

1. Functional
   - Phyto-chemical content (antioksidatif, anticancer, anti biotic, etc)
   - Mineral content (anti hypertension)
   - Vitamin (antioksidatif, to easy metabolism)
   - Content of carbohydrate(pre biotic)

2. Improved for modify four industry. As a food with high carbohydrate content, has potential to improve as food of modify flour (flour has been modified through chemical reaction such as hydrolysis, oxidation) until produced flour with specific characteristic and then the flour easily to apply into food.
3. Improving to direct industry. If rehabilitation and conservation success, so row material for mangrove processing industry will be enough available, possible for standing mangrove processing industry because recently, there are many industry which process and get benefit but there are not continuing of processing.

Improvement Short Period

- Diversification mangrove food production, especially which has long durable.
- To create specific snack with row material from mangrove.
- To support improving tourism
- To improve economical mangrove value and income of coastal community.

Advice

- In mangrove forest rehabilitation, it is needed to plant various diversity mangrove which have high potential to improve as food material.

Figure 15. Lindur Fruit

Figure 16. Bryo (api-api)