

# Integrated Study of *Moringa oleifera* as High Potential Commodity in Small Island Case Study : Poteran Island, Sumenep

Student Research and Development Team (SR & DT) Program

Poteran Team

Sustainable Island Development Initiatives



# POTERAN TEAM PROFILE

SR & DT Poteran Team	:	1. Arida Wahyu Barselia
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		2. M. Yasir
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		3. Elvian Haning P.
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		4. Yunita Permanasari
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		5. Hanum Laila R.
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		6. Ni Luh Putu Sukma Dewi
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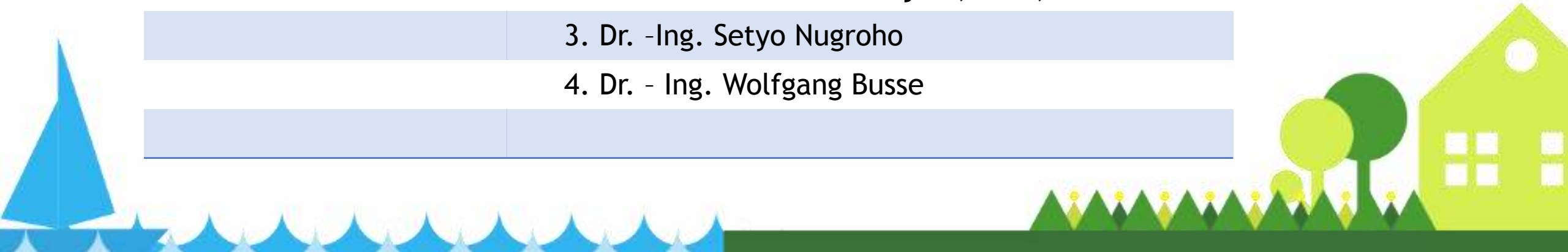
		7. Dewi R. Sinaga
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Supervisor	:	1. Dr. techn. Endry Nugroho Prasetyo, M.Eng
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		2. Maharani Pertiwi Koentjoro, S.Si., M.Biotech
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		3. Dr. -Ing. Setyo Nugroho
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		4. Dr. - Ing. Wolfgang Busse
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# POTERAN ISLAND

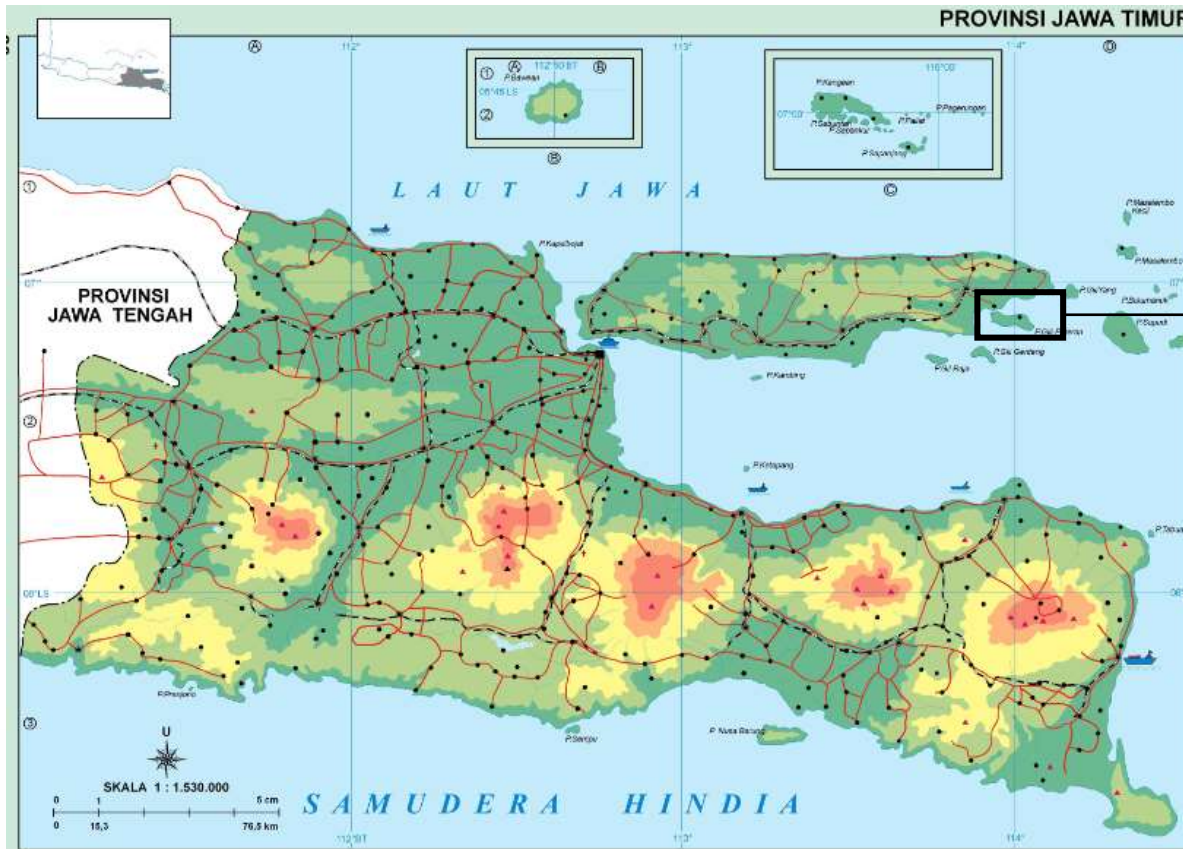


Fig : Poteran Island  
(RZWP,2011)

Location:  
Sumenep Regency, East Java  
East of Madura Island, about 100 km east of Surabaya

# POTERAN ISLAND



## Accessibility:

- By car from Surabaya to Sumenep (5 hours)
- Ferry boat (car and passenger) Sumenep to Talango (20 minutes)
- (RZWP, 2011)



# POTERAN ISLAND



- Sumenep area includes 126 scattered island, 48 of them inhabited
- Economy is dominated by agriculture
- Industry (mainly small industry and handicraft) with low employment potential
- (Primer Survey,2014).



# *Moringa oleifera*



- Species: *Moringa oleifera*
- Family : Moringaceae
- Range : Native to the Indian sub-continent and naturalized in tropical areas around the world
- (Bey,2010).



# *Moringa oleifera* Characteristic

- Deciduous tree or shrub
- Fast growing
- Drought resistant
- Average height of 12 meters of maturity (Bey, 2010).



# Why Moringa?



*Moringa oleifera* :

Delivering such powerful nutrition, these leaves could prevent the of malnutrition and related diseases.

Moringa is a fast-growing, drought-resistant tree that grows even in marginal soils

(Mathur, 2014)





# Moringa Nutritions



## Fresh Leaves

Gram for gram, fresh leaves contain about:

**4** times the Vitamin A of Carrots

**7** times the Vitamin C of Oranges

**4** times the Calcium of Milk

**3** times the Potassium of Bananas

**$\frac{3}{4}$**  the Iron of Spinach

**2** times the Protein of Yogurt



## Dried Leaves

Gram for gram, dried leaves contain about:

**10** times the Vitamin A of Carrots

**$\frac{1}{2}$**  the Vitamin C of Oranges

**17** times the Calcium of Milk

**15** times the Potassium of Bananas

**25** times the Iron of Spinach

**9** times the Protein of Yogurt

(Bey, 2010)



# Moringa function



Nutritional, plant growth hormone, nutritional



Nutritional, medicinal, honey



Nutritional, medicinal



Medicinal

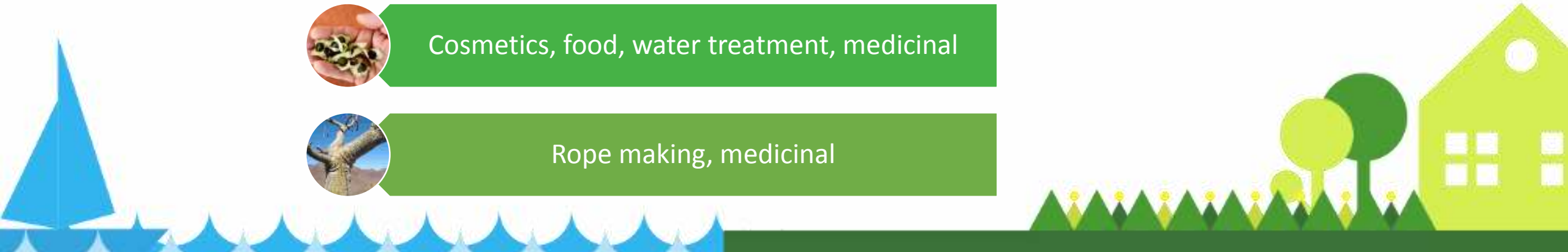


Cosmetics, food, water treatment, medicinal

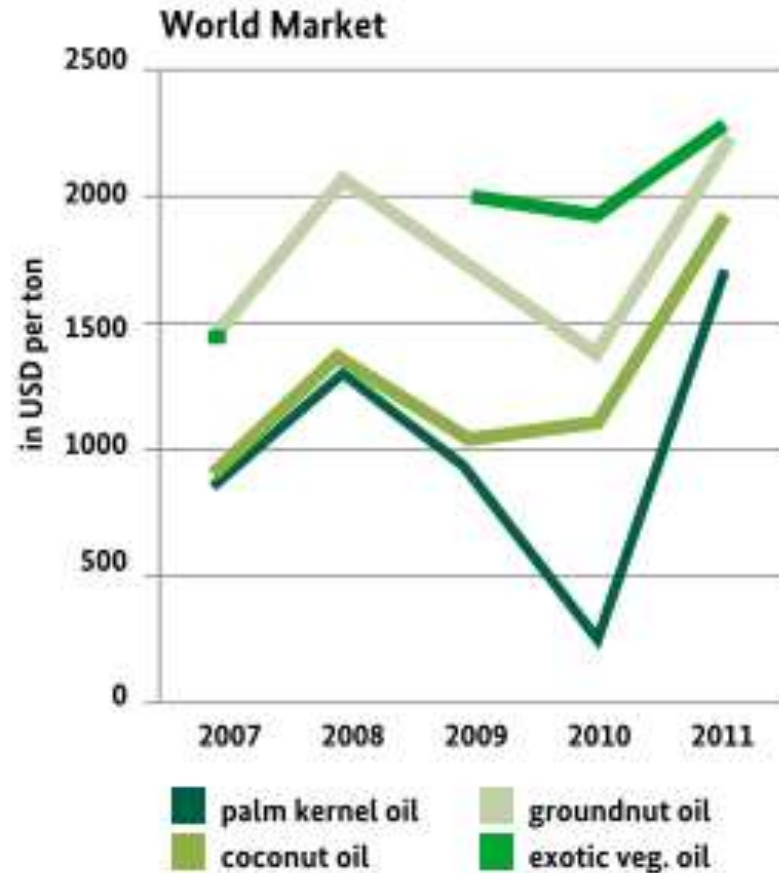


Rope making, medicinal

Moringa's potential



# Moringa World Market



- The price for vegetable oils is considerably higher and has proven more stable than others.
- The world market price for Moringa vegetable oils has grown from around USD 1,450 per ton in 2007 to almost USD 2,300 per ton in 2011

# Moringa in Poteran



- Moringa in Poteran can be grown easily
- It's use for support *Pipper retrofractum* grow
- Mostly local people use moringa for barrier plantation in farm field



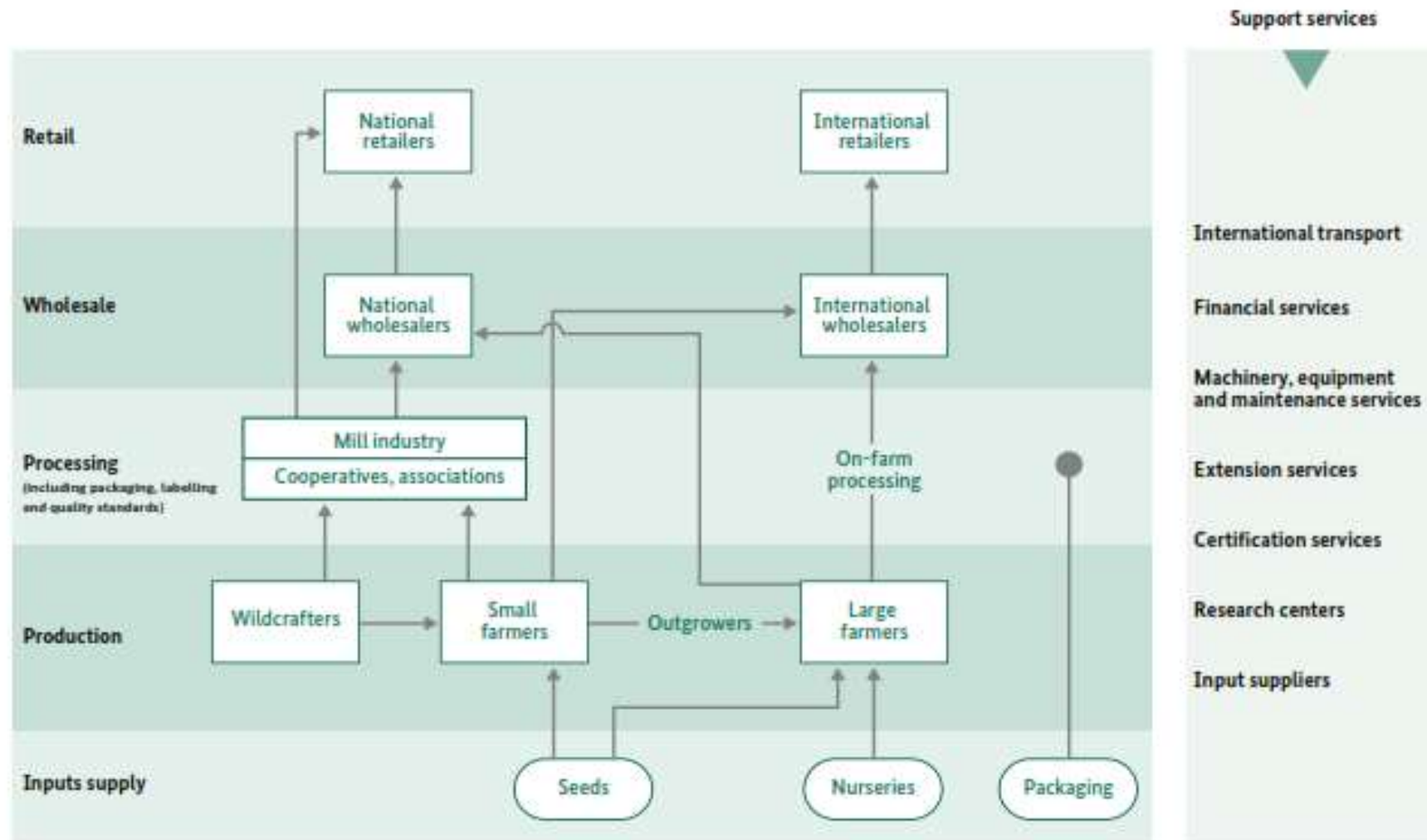


# Value Chain of Moringa

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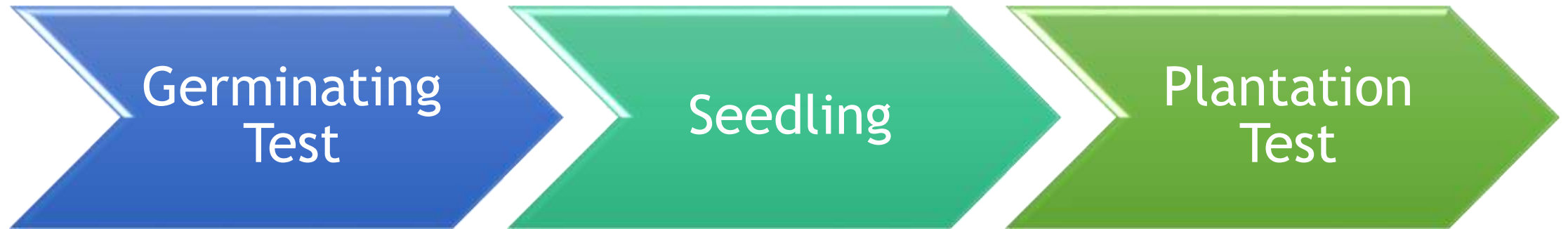


# Value chain of Moringa

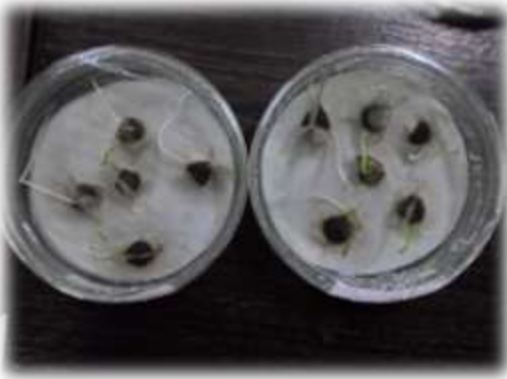


# How to Cultivation?

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# Germinating Test



Indian Moringa

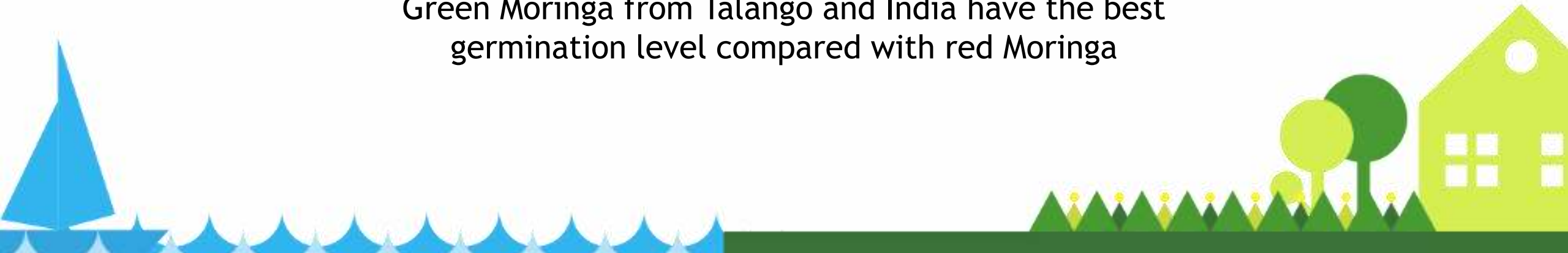


Green Moringa



Red Moringa

Green Moringa from Talango and India have the best germination level compared with red Moringa





# Seedling



Moringa from India



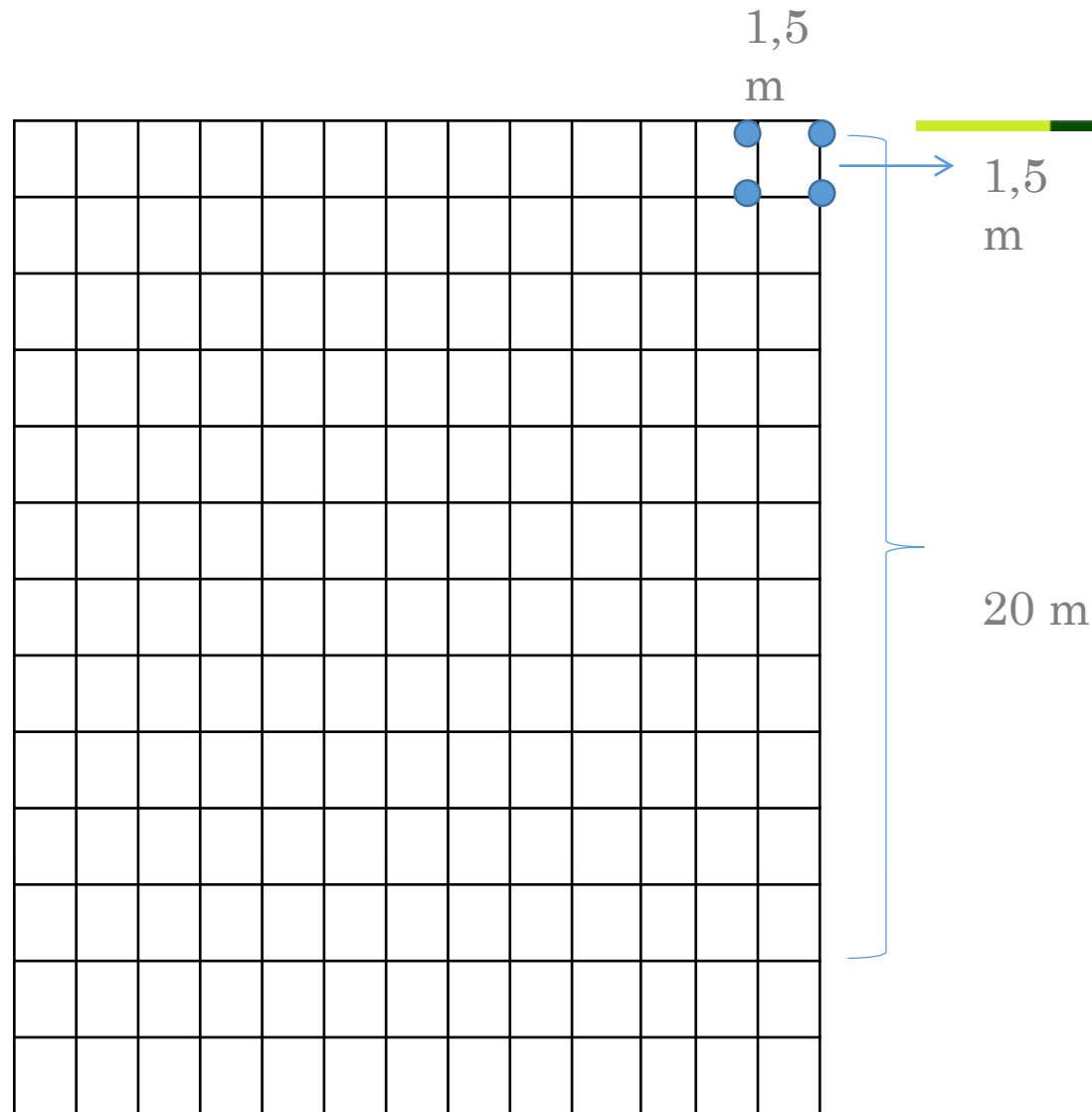
Green Moringa



Red Moringa

- a. There were three types of Moringa had been selected for seedling
- b. Green Moringa was selected as the best germination level and more fast growing
- c. The Indian seed was more resistant to the diseases

# Plantation Test



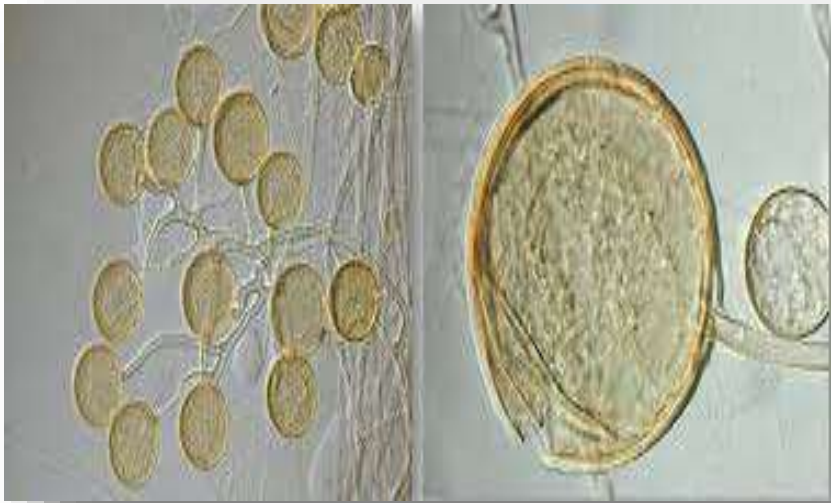
**169 Seeds could be applied**

At a planting distance of 1,5 m x 1,5 m, 169 seedlings will be needed as planting materials for 400 m<sup>2</sup>

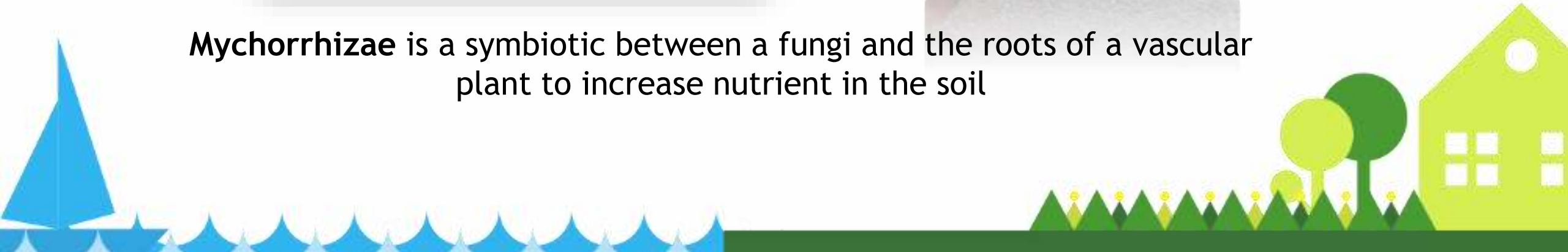
It's using Tissue Culture Method to select the best Moringa seed



# Mychorrhizae Fertilizer



**Mychorrhizae** is a symbiotic between a fungi and the roots of a vascular plant to increase nutrient in the soil



# Biopesticide



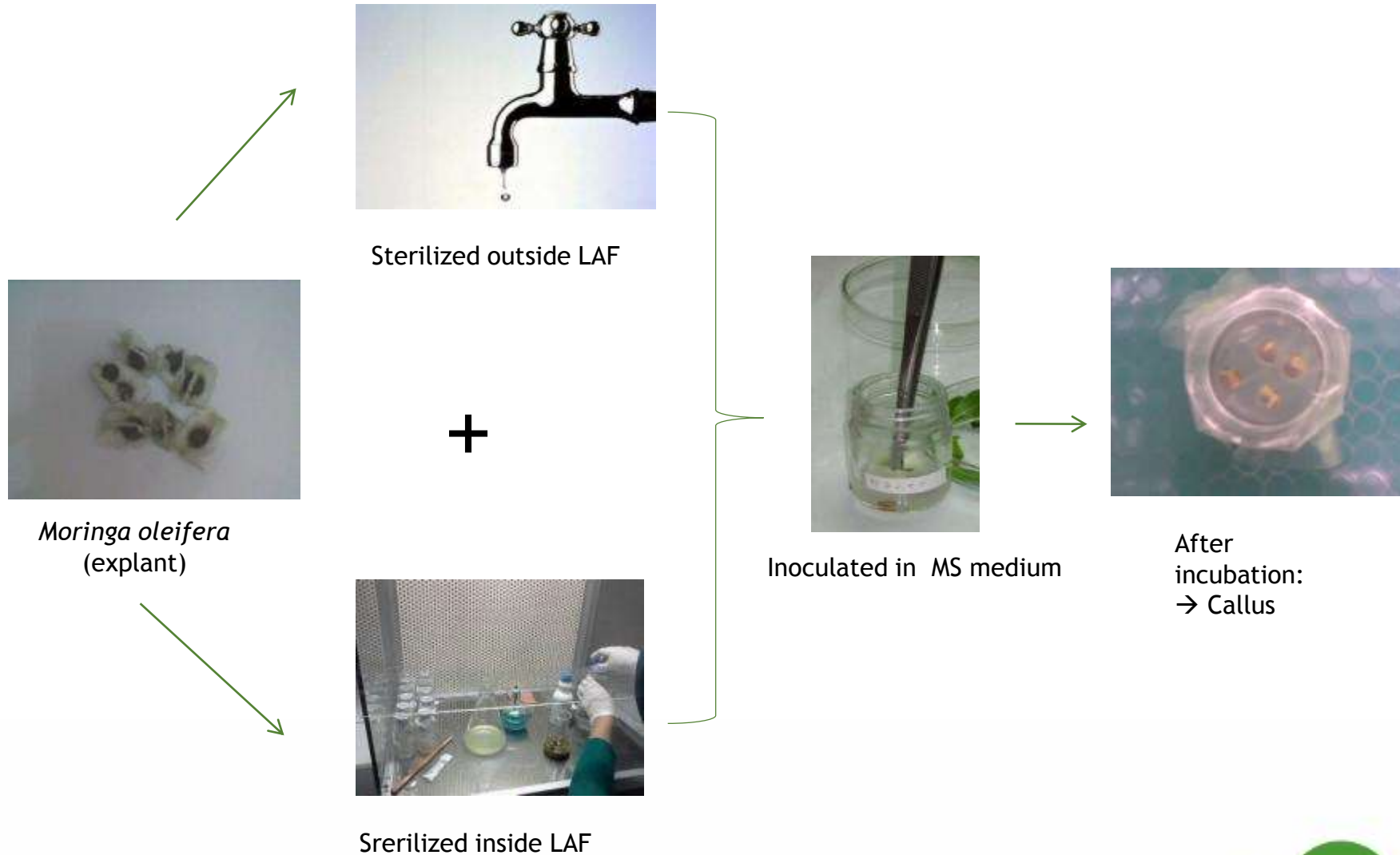
Figure: Moringa Infection Disease

- It is relatively cheap and easily available in Poteran
  - Biodegradable
- Active compound: azadirachtin against nearly 550 insect species (Debashri and Tamal, 2012).





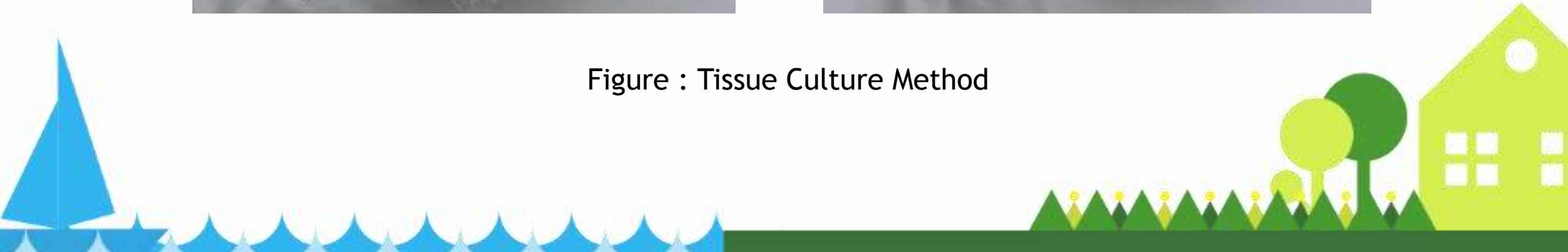
# Tissue Culture Method



# Tissue Culture Method



Figure : Tissue Culture Method



# How to Harvest?



- Harvesting times mostly is about 4 months
- To make the tree growing laterally, the shoot apical meristem should be cut every month
- We can pick up the leaves from the tree

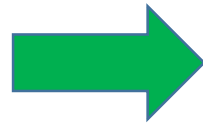




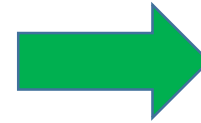
# How to Process?



Harvesting



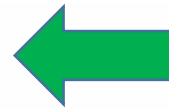
Washing



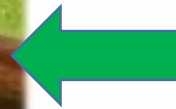
Sorting



Drying



Drying in 35 - 40°  
C in 3 days



Flouring





# Existing Moringa Product



Moringa Tea



Moringa Leaf Powder

CV Pustaka Madura  
Produce Moringa tea  
and Moringa leaf  
powder and sell it to  
the local market



# Innovation of Moringa Powder



Moringa Cookies

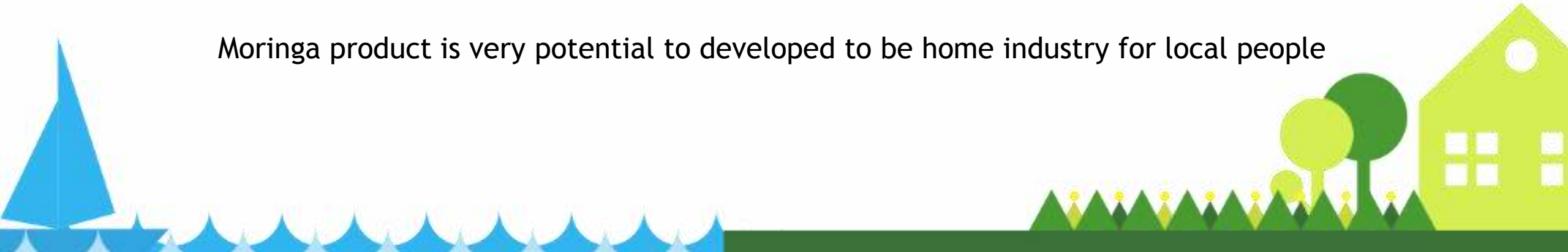


Moringa Steak



Moringa Jelly

Moringa product is very potential to developed to be home industry for local people



# How to Make Moringa Cookies?

## Ingredients:



30 grams Moringa powder

110 gram sugar powder

235 gram butter

225 gram flour

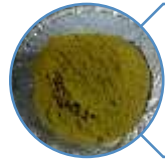
110 gram almond powder

3 eggs

$\frac{1}{4}$  teaspoon of Vanilla extract



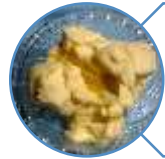
# How to Make Moringa Stick?



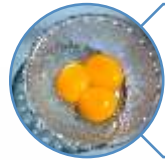
Moringa Powder



Flour



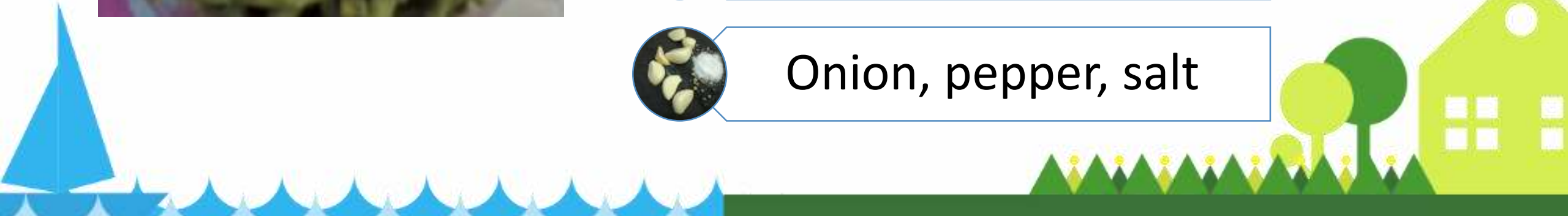
Butter



Egg



Onion, pepper, salt





# How About Nutrition?

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The derivative of *Moringa oleifera* product increase nutrient than without Moringa powder.

The nutrition increasing was approximately 20% consist of:

1. Calcium
2. Protein
3. fibre
4. vitamin C
5. magnesium,
6. Flaovonoid
7. vitamin B
8. phosporus



# How to Transport?

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Production Scale

Inland Transport

Transportation to  
another market



# Production Scale



Poteran has **3,836** hectare  
fertile land

Assumed that  
Moringa will  
cultivated in  
**15%** total  
fertile land



Total fertile land for Moringa  
Plantation is approximately **575**  
hectare

# Production Scale

Ratio of Moringa Powder Production:



8 Fresh leaves



4 Dry leaves



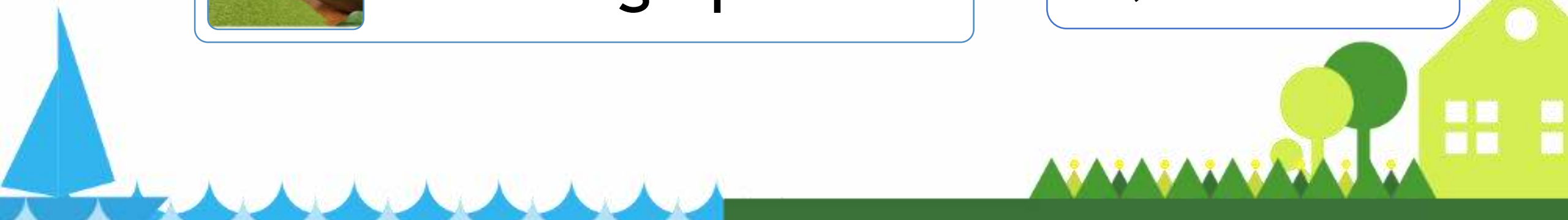
1 Moringa powder

Production in Poteran :

9,206 ton/harvest

4,603 ton/harvest

1,158 ton/harvest





# Production Scale

Commercial  
production of fresh  
*Moringa oleifera*  
leaves approximately  
4 kilograms/tree/  
harvest

*Source by Specialty Crop for Pacific Island Agroforestry*



# Production Scale



Harvesting Period is 4 months

Moringa Powder Production

**1,158** ton/harvest

or

**288** ton/month

Existing Packaging in Sumenep



288 ton Moringa powder / month



Was packaged in aluminium foil with 250 gram weight



Was packaged in carton  
(1 carton = 100 pcks)

**11,520** carton/month

# Container Required



20 ft  
Max. volume : 33,08 m<sup>3</sup>  
374 carton  
31 unit  
container/month

40 ft  
Max. volume : 67,49 m<sup>3</sup>  
762 carton  
16 unit  
container/month

# How to distribute harvesting result to the production center?



## Harvesting

- Pick up the leaves from the trees
- We can pick up the leaves manually

## Carrying

- Carrying the leaves to production center with truck
- This method to prevent sunlight directly and the leaves will stay fresh

## Processing

- Processing activities will be done in the production center





# Production Center Planning



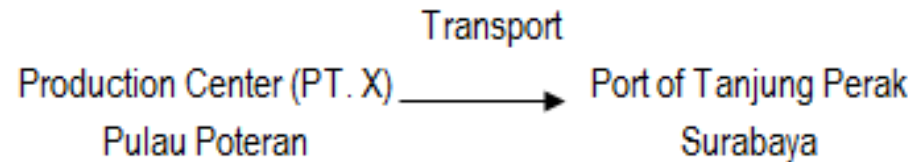
Logistic and Processing Center will be build in Talango village

Aspect for determining the location:

- Access easily
- Water suply
- Socio-economy
- Transportation

# How to Transport Moringa Powder to Another Place?

## TRANSPORTATION PLANNING



### Transportation Scenario Planning

1st Scenario:



2nd Scenario:



Notes:



Urban Transportation (truck)

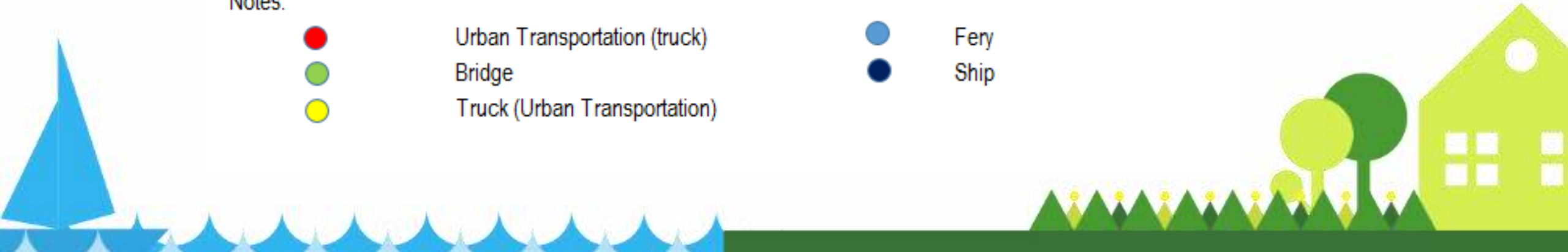
Bridge

Truck (Urban Transportation)



Ferry

Ship



# The Other Prospective of Moringa Product

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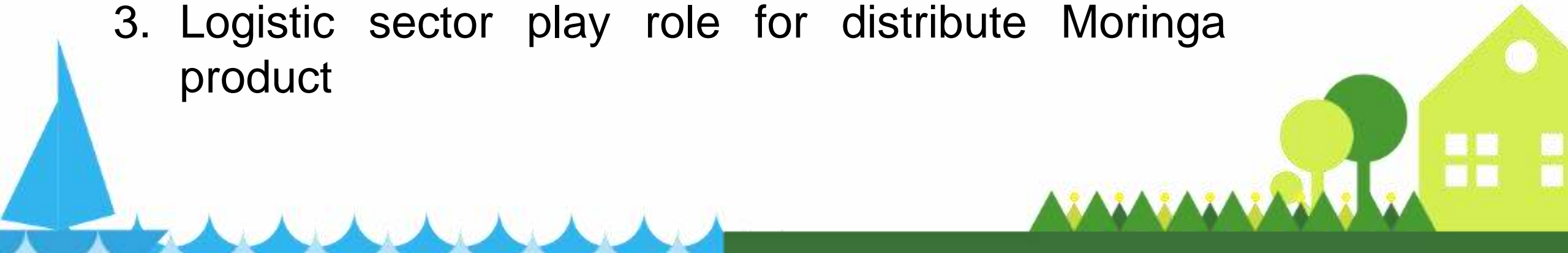
1. Compound Extraction of Flavonoid and Vegetable Oil
2. It will produced for pharmaceutical substance
3. It will be the main ingredients for cosmetics



# CONCLUSION

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1. The integrated study for Poteran Island involve *Moringa oleifera* plantation for selecting seed
2. Selected seed will be developed for Moringa leaves as derivation product such as, powder, cookies, stick, yogurt, etc.
3. Logistic sector play role for distribute Moringa product

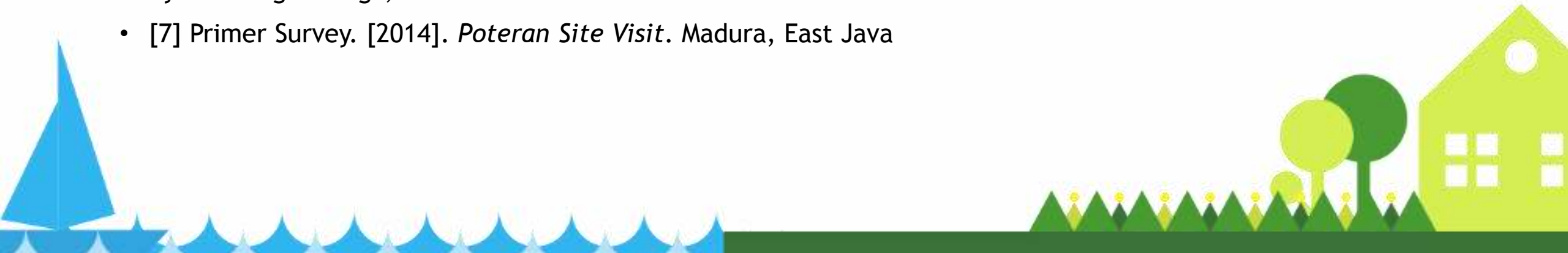




# References

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- [2] Bey, H. (2010). *All Things Moringa Article The Story of an Amazing Tree of Life*. <http://www.allthingsmoringa.com> retrieved 6 September 2014.
- [3] Fahey, W.J. (2005). *Moringa oleifera: review of the Medical Evidence for its Nutritional, Therapeutic, and Prophylactic Properties*. Part 1. *Trees for Life Journal*.
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- [5] Mathur, Balbir. *The Tree of Life. USA Article*. Diakses pada [www.thetreeoflife.org](http://www.thetreeoflife.org) pada tanggal 1 September 2014 pukul 10.00 WIB
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- [7] Primer Survey. [2014]. *Poteran Site Visit*. Madura, East Java



# Thank You..





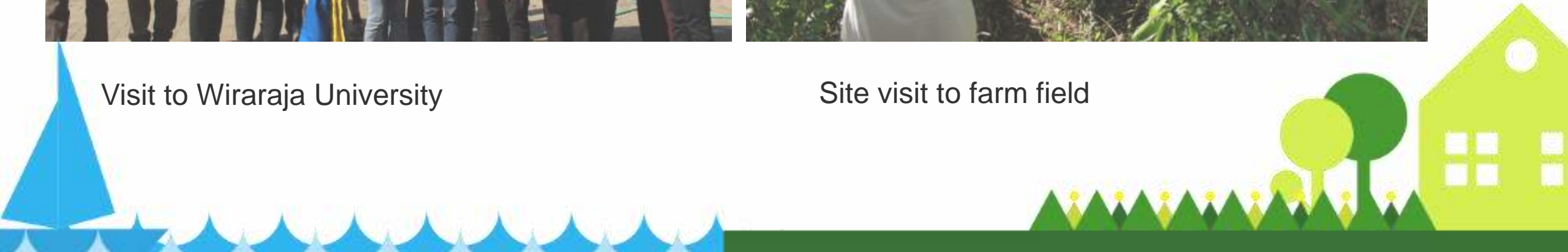
# Documentation in Poteran Island



Visit to Wiraraja University



Site visit to farm field







Site visit to farm field (*Moringa oleifera*)



Site visit to people





# Transportation Condition



Port condition



Sea transportation