



# Mass Propagation of *Jatropha curcas* L. using *Ex Vitro* Culture

Teuku Tajuddin, Minaldi, Linda Novita,  
Yenni Bakhtiar and Nadirman Haska

BIOTECHNOLOGY CENTER, BPPT  
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## INTRODUCTION

- ◆ A total area of the marginal, critical and degraded land in Indonesia is around 22 million hectares. Concerning the environmental issues, conservation program is very important for the purpose of land remediation.
- ◆ Government has suggested that the possible planting area of *Jatropha* trees is 3 millions Ha.
- ◆ It's equivalent to: 7.5 billion seedling.



# OBSTACLES

- ◆ Superior mother plants are rare
- ◆ Propagation of seedling in large amount – difficult
- ◆ Micro-propagation using tissue culture method - expensive
- ◆ Transportation of seedling - expensive
- ◆ Plant needs some periods of time for adaptation in new environment
- ◆ Low productivity of soil

- ◆ *Jatropha curcas* can be propagated in two ways, generatively and vegetatively.
- ◆ Generative propagation is normally performed sexually by seeds, while vegetative method by asexual propagation using cuttings, grafting, and *in vitro* culture.
- ◆ The plants propagated by seeds are highly heterozygous. Thus, variations in genetic characters are to be expected.
- ◆ In vegetative propagation, unlike generative method, superior traits or characters of mother plants with respect to yield, oil quality and disease resistances are conserved in their progenies.

# PROBLEM SOLVING

- ◆ Propagation method for seedling production has to be fast, inexpensive, easy and high capacity
- ◆ Ideally seedling production on or near plantation / planting area – no transportation needed
- ◆ Mother plants are selected from the area where the plantation take place – no adaptation process with their environment
- ◆ Bio-remediation on critical lands by application of biotechnology products

◆ Biotech Center BPPT has developed another method of vegetative propagation on some woody plant, including *Jatropha curcas*, which is known as an *ex vitro* culture.

◆ This method is adopted from the *in vitro* micro-propagation system, which is done outside the glass vessels.



## METHODOLOGY

- ◆ In *ex vitro* method, rooting was induced directly from the apical shoots of plants, after some treatments, and then producing new plantlets.
- ◆ The plantlet derived from this method can directly be acclimatized into the green house.



- ◆ The *ex vitro* propagation is a relatively low-cost and simple method to propagate the plant with the same quality as the plantlet produced from *in vitro* micro-propagation.
- ◆ The environmental conditions are optimized with regards to physical as well as nutritional and hormonal factors.



◆ It can be produce in a large amount of progenies, relatively uniform growth and development as their mother plant.

◆ Stimulating agents formulated by the scientists in Biotech Center, BPPT, special for *Jatropha curcas*

- **Jatropex:** induction solution for apical shoots production on mother plants
- **Jatrosin:** sterilant
- **Jatrodix:** root induction agent
- **Jatrofert:** stimulating growth



## Purposes:

1. Reclamation of the ex-mining, critical or marginal land by planting oil- producing plants

2. Bio-remediation on critical land by application of soil-borne fungus *Mikoriza arbuskular*

3. Technology transfer on *ex vitro* propagation of oil- producing plants that resistance to low fertilized soil



## APPLICATION BIOTECHNOLOGY PRODUCTS



Land productivity was reduced significantly on critical and degraded land, particularly on ex-mining land, with low level of free Phosphorus content in the soil (available  $P^+$  for plant) and low pH (acid). One of the alternatives to deal with such problem is bio-remediation on those lands by application of fungus *Mikoriza arbuskular*.

Application of mikoriza into *Jatropha* seedling increasing the vegetative growth of plant, as well as increasing root capacity in absorbing phosphorus, nitrogen and micronutrients such as: Zn, Mo, Fe, Cu.

Reduce the application of chemical fertilizer and Increasing resistance to drought.



## Application on Corn (*Zea mays*) in NTT



## Results on Technofert Application

No	Plants	Increasing in				
		Height	Diameter	Dry Weight	Seed/Fruit Weight	No Polong
1	Acacia	70%				
2	Cacao	203%				
3	Cane	43.30%	20.65%			
4	Corn	25%			50-150%	
5	Oil Palm	70.56%				
6	Sengon	251%				
7	Soybean				359%	327%
8	Sungkai	37.30%	77.80%	35.90%		
9	Strawberry				436%	
10	Teak	25.88%				

# Application on Critical Land in Nusa Penida Island, BALI

Before  
application



After  
application



- ❖ *Ex vitro* propagation
- ❖ 2 months old plantlets of *Jatropha* ready for planting in the field



Flowers and fruits in seedling, conserved the characteristic of mother plants



## Biotech Center, BPPT:

- ◆ Training and technology transfer for *ex vitro* propagation of Jatropha, as well as bio-fertilizer application



# *Jatropha* Plantation



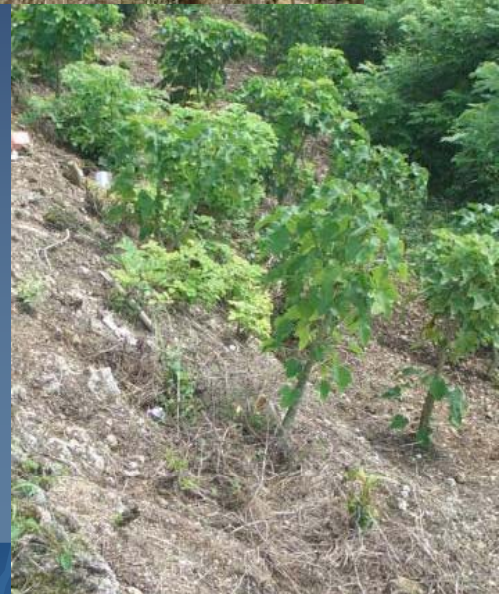
**Pabuaran, Cirebon,  
West Java, 15 Ha**



**Bandung,  
West Java,  
3 Ha**



**Nusa Penida Island,  
Bali, 5 Ha**



# Pantar Island, Alor, NTT, 400 Ha



# Kab. Berau, Kalimantan Timur, 5 Ha





**THANK YOU**