



# Citrus Variety Improvement Program in Indonesia : Varieties, Production and Distribution Viruses free of Citrus Nursery Stocks



**INDONESIA**



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AGENCY FOR AGRICULTURAL RESEARCH AND DEVELOPMENT**



## Comodities mandate of Balitjestro





# INTRODUCTION

## The Indonesian Citrus Industry before 2000

- In 1980 – 1990, most of citrus plantation were infected by HLB, productivity  $< 10$  ton/ha;
- Citrus growers still being eagerly to plant citrus trees although with low productivity;
- In 1995, citrus viruses - free stocks ( certification programme ) were delivered to certain area ( north Bali ) followed by HLB control technology

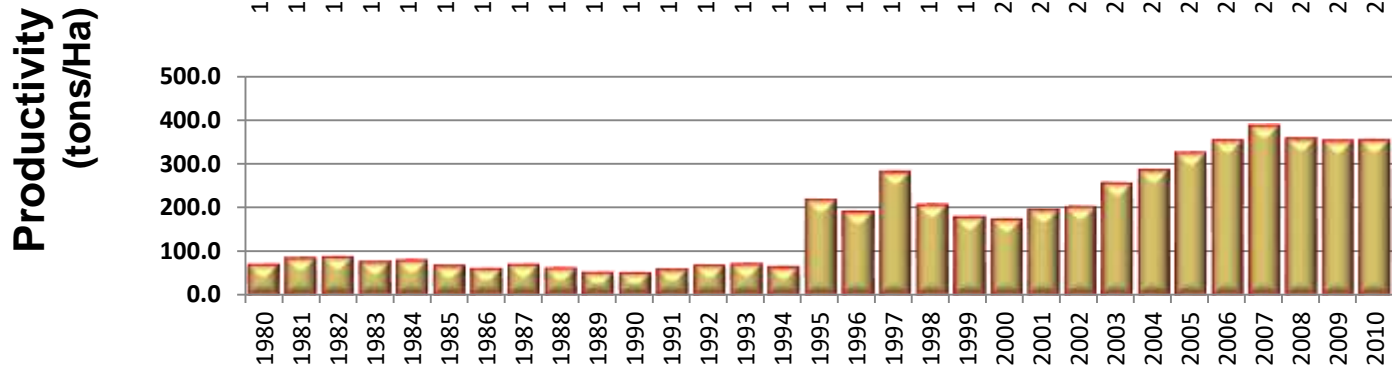
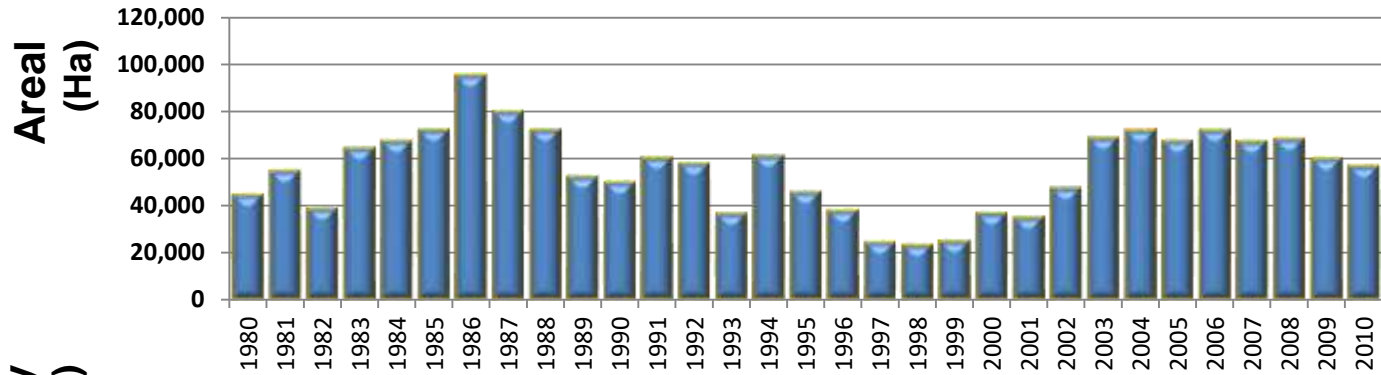
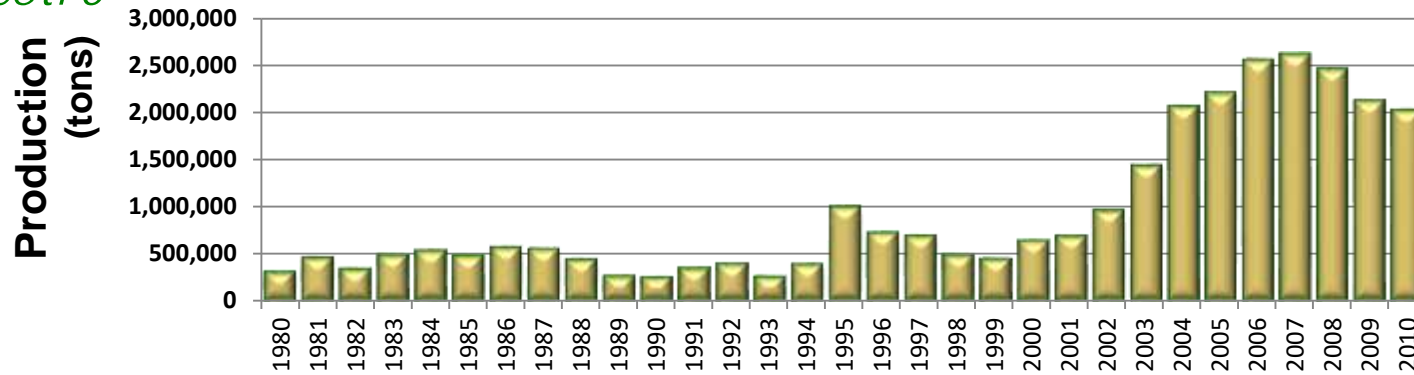




## The Indonesian Citrus Industry after 2000

- 29 provinces of 34 provinces have been produced viruses-free of citrus stocks ( from the multiplication blocks ) - 2017
- *The production of certified nursery stocks are not enough to meet the demands*
- The performance of citrus plantations were, again fluctuated due to the recommended technology was not implemented properly.





## Development of citrus plantation 1980- 2010





## **The Indonesian Citrus Industry 2016**

- Indonesia getting position of 11<sup>th</sup> citrus production in the world
- Areal : 68.000 ha and production 1.478.000 ton, harvesting time : January-April : 19 %; May-August : 56 % and September-December : 25%
- Import : 150.000 ton







## Traditional and modern citrus post harvest handling in Sambas- West Kalimantan





*Citrus*  
**VA****RI****E**Tie**S**  
In **INDONESIA**







## VARIETIES

- Indonesia have a lot of “local” citrus varieties and citrus relatives.
- In general, citrus in Indonesia grows well in the different altitude depend on varieties
  - Tangerine : mostly for lowland area including swamp area : gren-yellow
  - Mandarin : for highland area with yellow-deep orange color
  - Pummelo : lowland – medium area
  - Lime : lowland – medium area
  - Lemon : lowland and highland area
- Almost 75-80 % citrus plantation in Indonesia dominated by tangerine-Siam; mandarin 10-15%; pamelo 10 % and others 5 % : lime, lemon and others

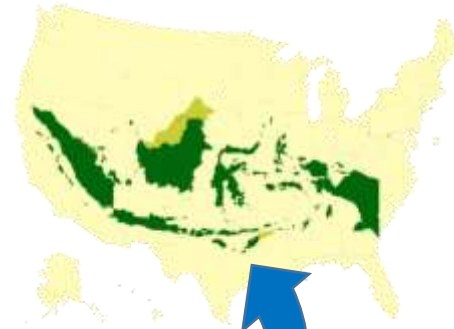




Commercially Citrus varieties in Indonesia



# KEPROK SoE



the best mandarin in this country



**SoEIndo**  
keprok SoE seedless







## MODERN vs CITRUS TRADITIONAL MARKET IN SoE, WEST TIMOR - NTT







Keprak *Gayo*







# DEKOPON





**Borneo Red Pummelo**





**PAMINDO – PAMELO INDONESIA**  
produced by gamma ray irradiation





## *Borneo lime*

Round, seedless, pleasant scent and juicy





# Production of **VIRUSES FREE** citrus mother trees



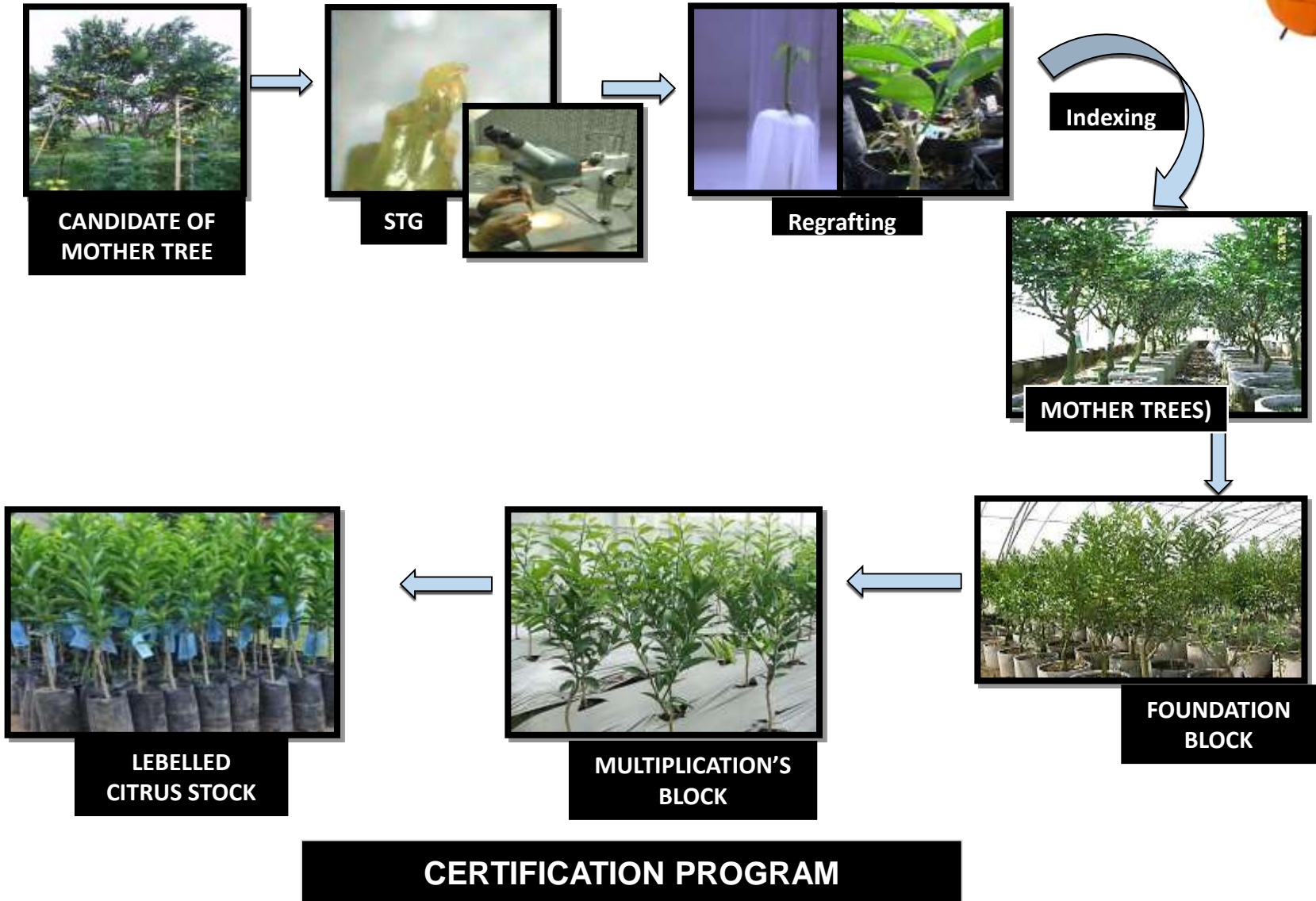


# Shoot-tip Grafting

- Once a single selected citrus tree in certain area was chosen as the candidate of new prior citrus variety. then the tree send to **Balitjestro** laboratory being freed from citrus viruses expeccialy for HLB, CTV and CVEV
- Using the Shoot-tip Grafting followed by indexing
- Planting in pots followed by an optimum maintenance in the insect-proof screen house with double door
- Indexing periodically
- Source of bud sticks for Foundation Block









# SHOOT-Tip GRAFTING AND INDEXING

- **Shoot-tip Grafting** : % succesful graft = 40-60%  
Pumello is more difficult to be shoot-tip grafted because of their trichrome on apical dome
- **Regrafting** : % succesful graft : 60-90 %
- **Indexing** : % positive HLB = 0.0 – 3.0 %  
% positive CTV = 0,0 – 10.0%
- **Duration** : Shoot-tip grafting to indexing activities need 15-18 months





# DISTRIBUTION



## Citrus material propagation and nursery stocks





## DISTRIBUTION OF PROPAGATION MATERIAL

- Foundation Blocks – Multiplication Blocks – Citrus Nursery Blocks – Citrus Growers
- **Foundation Block** : planted in pot, under insect proof screenhouse indexing periodically
- **Multiplication Blocks** : planted on the field with high density, under insect proof screehouse, it can be harvest for 3 – 5 years
- **Citrus Nursery Blocks** : produced on field and or in the polybags, follow regulation of certification program
- **Citrus growers** : need premium quality of labelled citrus stocks







Foundation Block



Multiplicaion Block's

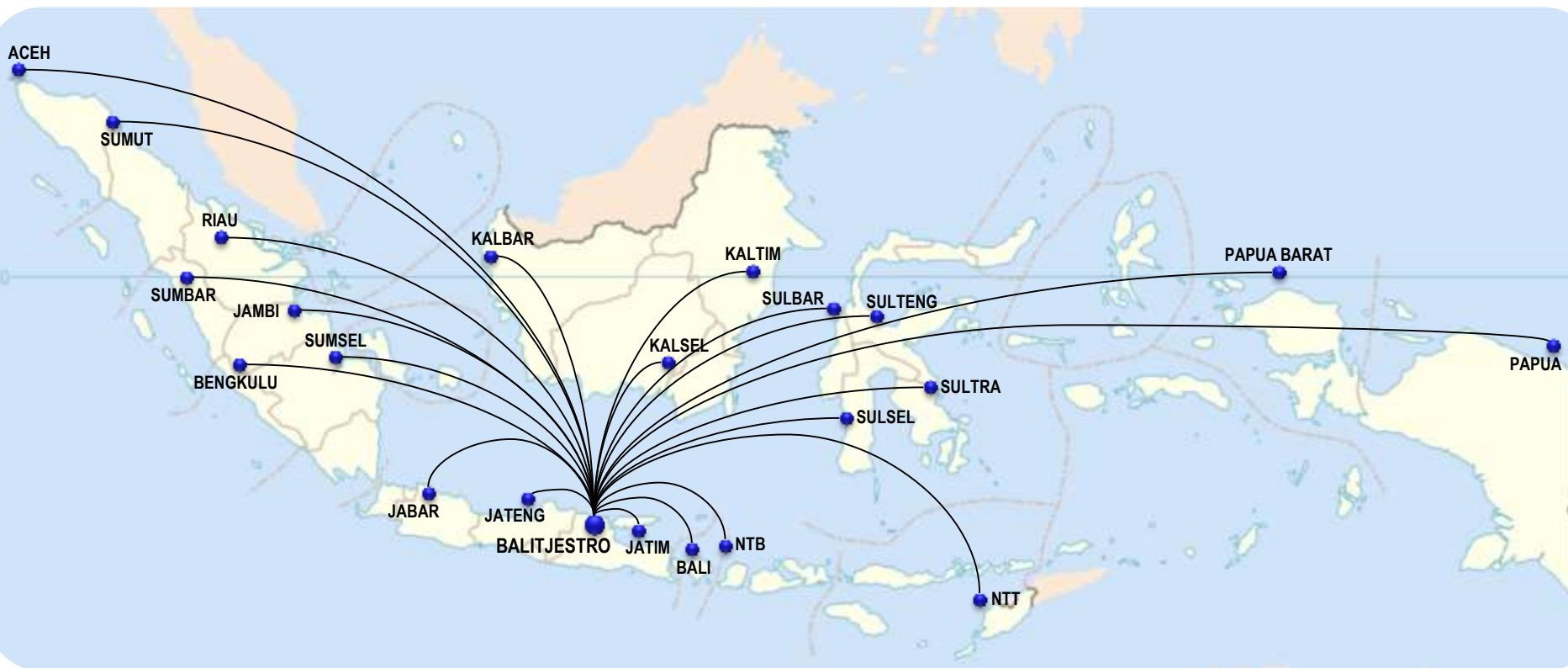


Citrus Nurseries



New plantation 01/11/2009





## DISTRIBUSI BENIH SUMBER BPMT DI 29 PROVINSI INDONESIA








## Distribution of citrus viruses free of planting material for Foundation Block and Multiplication Blocks in Indonesia

<b>NO</b>	<b>Keterangan</b>	<b>Foundation Block</b>	<b>Multiplication Block</b>
<b>1.</b>	<b>Number of provinces</b>	<b>19</b>	<b>29</b>
<b>2.</b>	<b>Number of plantation</b>	<b>786</b>	<b>43.713</b>
<b>3.</b>	<b>Number of varieties</b>		
	<i><b>Mandarin</b></i>	<b>12</b>	<b>21</b>
	<i><b>Tangerine/Siam</b></i>	<b>4</b>	<b>6</b>
	<i><b>Pummelo</b></i>	<b>1</b>	<b>5</b>
	<i><b>Others</b></i>	<b>2</b>	<b>5</b>





**Production of**  
**LABELLED CITRUS**  
**NURSERY STOCKS**





## **Citrus nursery stocks production**

- Two methods producing citrus nursery stocks : on the field and in polybag
- Produced by private company or mostly under Association of citrus nurserymen at the citrus nursery production area
- Using rootstock of Japasnche Citroen (mostly) and Rough Lemon
- Using several varieties of scions depend on citrus grower needs and it can be different each provinces.





## Technology recommended

- Producing citrus budded trees in one year
- Using polybag diameter x height : 10cm x 30cm with sand as big portion of mixed media
- Selection of nuselar seedling
- Height of budding at 20 cm
- An optimum maintenance
- Synchronized bud sticks harvesting time from Multiplication Blocks to the budding time where rootstock seedling are ready for budding.





## Seed germination



## transplanting



## Nuselar seedling selection



## Seed germination



## Ready to be planted





## PROBLEMS

- Multiplication Blocks not always be maintained properly make the available of bud sticks are not enough during the budding period;
- Enforcement of regulation implementation to citrus nurseries
- Still we can find easily unlabeled citrus nursery stocks
- Some of citrus orchard belong to growers are not freed from HLB infected







## **Integrated Management for Citrus Healthy Orchard (IMCHO) – technology package to keep the planted citrus stocks free from HLB reinfection**

- Using viruses-free stocks
- Vector control
- Eradication infected trees
- An optimum maintenances
- Consolidation of orchards management (citrus grower groups based)





## CONCLUSION

- Fifteen years after the Citrus improvement program in Indonesia started, more than 10 million of viruses free citrus stocks have been produced and delivered to the citrus growers
- Improvement for better management of Foundation blocks, multiplication blocks and enforcement or citrus certification program will be conducted as well as the establishment of National citrus nursery information system





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