

BREEDING AND BIOTECHNOLOGY RESEARCH PROGRAM OF INDONESIAN TROPICAL FRUIT RESEARCH INSTITUTE (ITFRI)

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OUTLINE

1

- INTRODUCTION

2

- MANAGEMENT OF FRUIT GENETIC RESOURCES

3

- BREEDING OF TROPICAL FRUIT :
 - BANANA, PAPAYA, ANANAS, SALACCA, DURIAN MANGO, MANGOSTEEN, AVOCADO

4

- CONSERVATION AND USE OF TROPICAL & WILD TROPICAL FRUIT

5

- SEED PRODUCTION AND DISTRIBUTION



INTRODUCTION

DEPARTEMEN OF AGRICULTURE REPUBLIC INDONESIA



AGENCY FOR AGRICULTURAL RESEARCH AND DEVELOPMENT



CENTER FOR HORTICULTURE RESEARCH AND DEVELOPMENT



1. **INDONESIAN VEGETABLE RESEARCH INSTITUTE (IVEGRI)**
Lembang – Bandung , Jawa Barat
2. **INDONESIAN TROPICAL FRUIT RESEARCH INSTITUTE (ITFRI)**
JL. Raya Solok – Arian, Km.8. Solok, West Sumatera.
3. **INDONESIAN ORNAMENTAL RESEARCH INSTITUTE (IORI)**
Pacet, Segunung – Cianjur , Jawa Barat`
1. **INDONESIAN CITRUS AND SUBTROPICAL FRUIT RESEARCH INSTITUTE (ICSFRI)** Tlekung - Malang



MANAGEMENT OF GENETIC RESOURCES

Collection of fruit genetic resources
at 6 experimental farm



More than 10.000 trees working collection



FRUIT GERM PLASM

No	Commodity	Variety/accessions	No	Commodity	Variety/accession
1	Mango	208 var	19	Guava	21
2	Mangosteen	2 variety/ 30 acc	20	Jambu bol	3
3	Banana	2 spec, 190 acc	21	Citrus	15
4	Durian	5 spec 30 var	22	Kecapi	2
5	Salacca	6 spec 600 progeny	23	Kedondong	2
6	Ananas	6 spec 150 progeny	24	Kepel	1
7	Papaya	12	25	Kesemek	2
8	Avocado	28	26	Langsat	2
9	Matoa	3	27	Leci	2
10	Star fruit	11	28	Lengkeng	9
11	Dragon fruit	7	29	Markisa	2
12	Buni	1	30	Garcinia sp	9
13	Cempedak	1	31	Namnam	2
14	Dewandaru	2	32	Nangka	10
15	Duku	4	33	Rambutan	37
16	Duwet	1	34	Sarikaya	3
17	Genitu	1	35	Sawo	7
18	Jambu Air	27	36	Sour Sop	14
			37	Bread Fruit	3



BANANA BREEDING



Collection: 190 varieties & accessions



BANANA BREEDING



Fusarium wilt
(*Fusarium oxysporum* f. sp. *cubense*)
Leaves: Yellow and brok start from old leaves

Blood disease (*Ralstonia solanacearum*)
Leaves : Yellow and broken in the middle
start from young leaves



Var. **Kepok Tanjung**

No male flowers

Production : 15-25 kg/bunch

TSS : 29-30° Brix

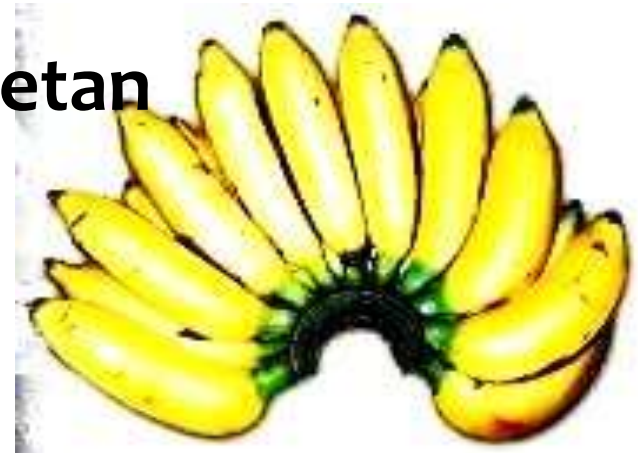
weight : 125-170 g/fruit

Taste : sweet, orange pulp

Tolerant to blood disease

Var. **Ketan**

Tolerant *Fusarium oxysporum* f.sp
cubense



NEW VARIETY

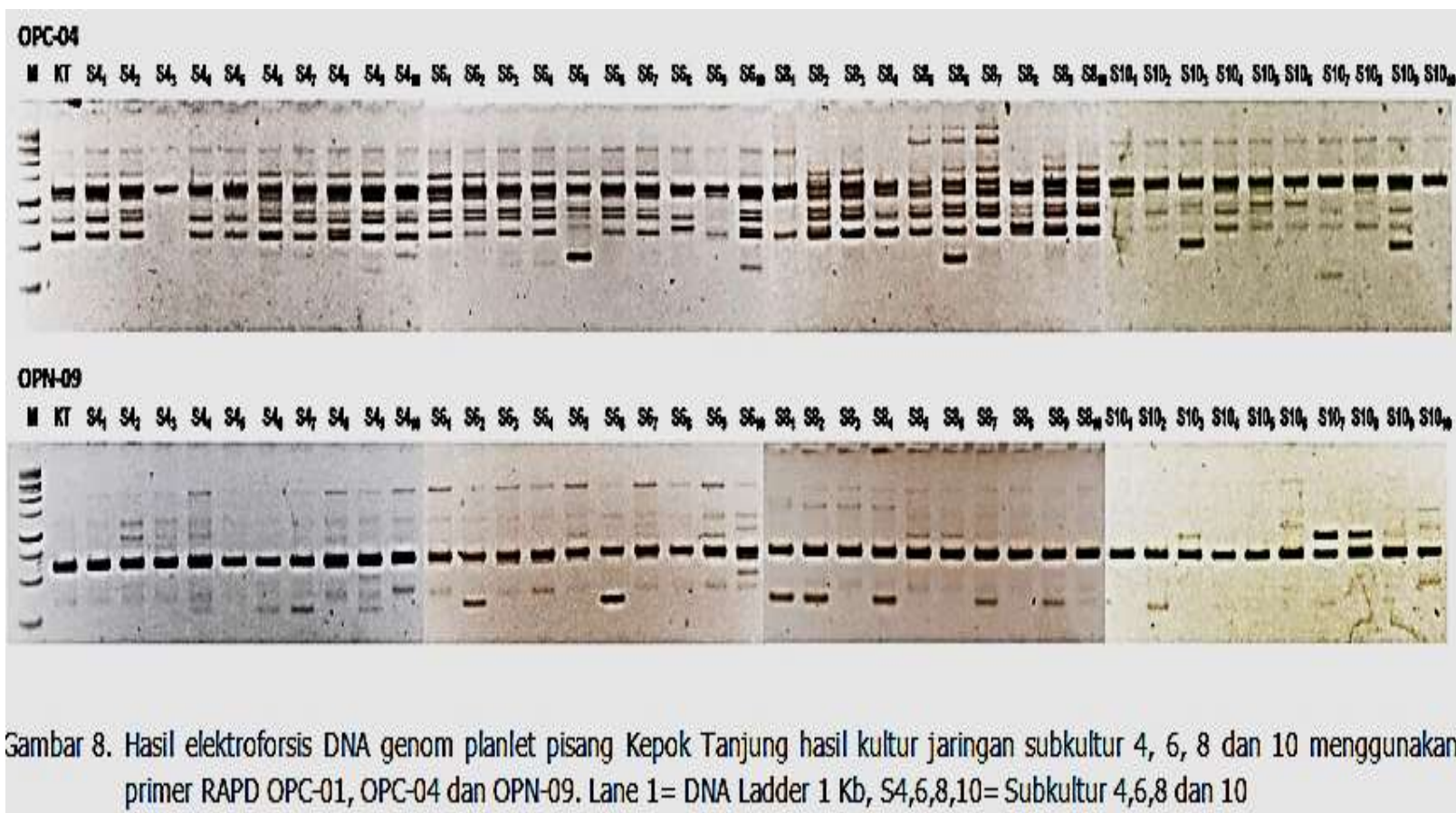
KETAN x CALCUTTA 4
(AA) (AA)

↓
INA03
(AAA)

RESISTANCE TO Foc



SOMACLONAL VARIATION IN BANANA CULTURE



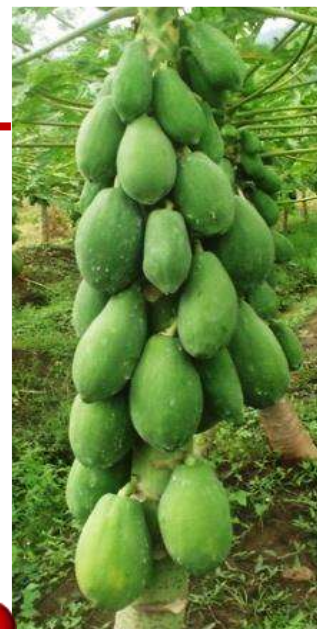
Gambar 8. Hasil elektroforisis DNA genom planlet pisang Kepok Tanjung hasil kultur jaringan subkultur 4, 6, 8 dan 10 menggunakan primer RAPD OPC-01, OPC-04 dan OPN-09. Lane 1= DNA Ladder 1 Kb, S4,6,8,10= Subkultur 4,6,8 dan 10

PAPAYA BREEDING



Hibridization :
100 hibrid F_1
(Sunyoto *et al.* 2012)





Selection (Budiyanti, *et al.*, 2014)



Sweet taste, pulp thickness, frmly, shelf live



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Kementan

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SUPERIOR VARIETY

Merah Delima



Agrisolinda



Carvita Agrihorti



SK .No 2275/Kpts/SR.120/5/2011

- ❖ Weight 700-900 g, TSS 11-14
- ❖ Pulp : Red-orange
- Production : 70 ton/ha/6 months
- ❖ First flowering at 3-4 month



Dapina



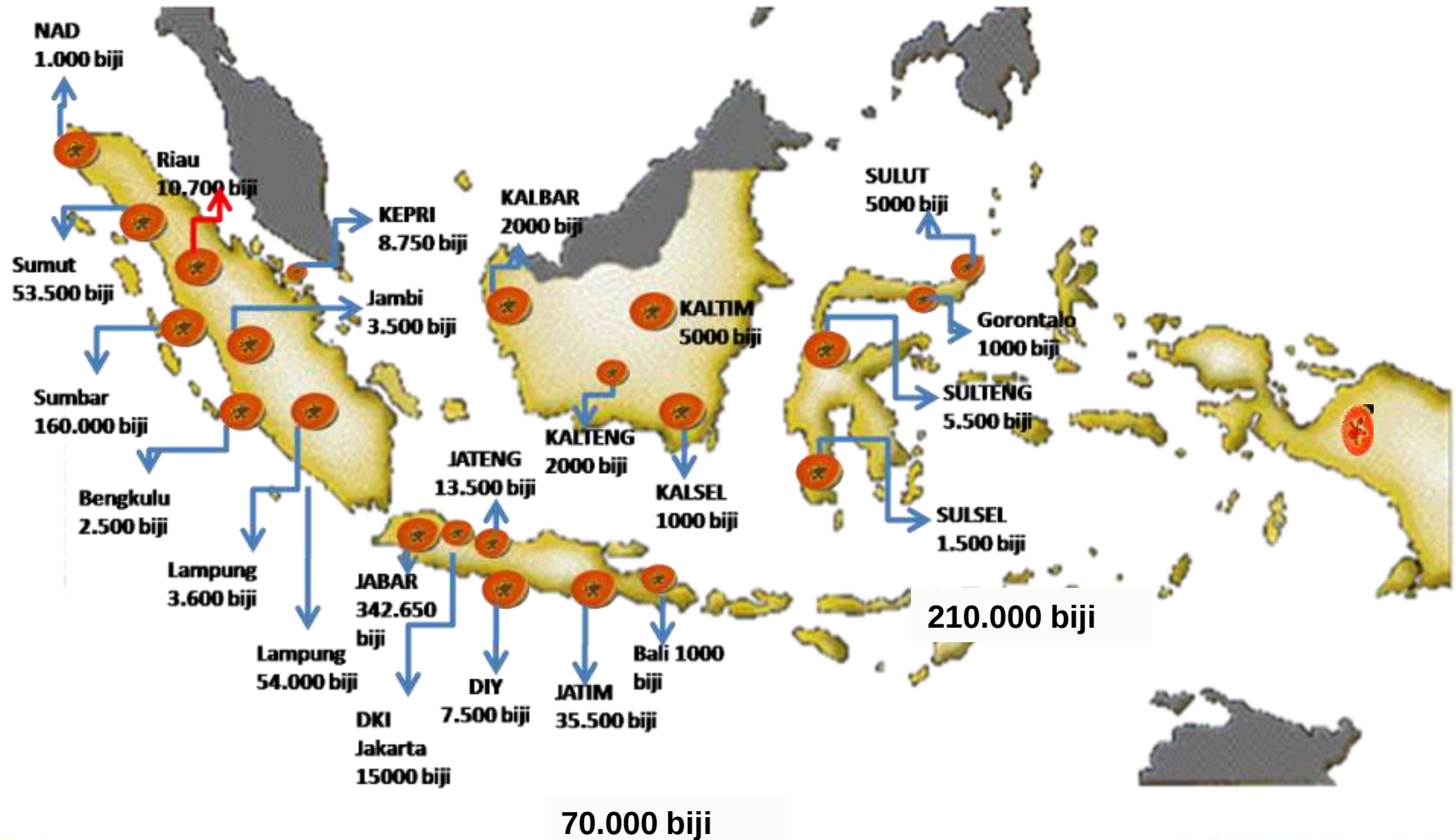
DEVELOPMENT OF PAPAYA MERAH DELIMA AT FARMERS FIELD PADANG PARIAMAN DISTRICT, WEST SUMATERA



COLLABORATION WITH PT PERKEBUNAN NUSANTARA VIII (WEST JAVA)



Development of Papaya var Merah Delima



ANANAS BREEDING

Ananas collection (6 spec + 150 hibrid progeny)



Queen



Cayenne



Green Spanish



Red Spanish
Berduri



Tanpa duri
N-32



Tanpa duri

Berduri



CANDIDATE SUPERIOR VARIETY

LOW OXALATE CONTENT (FROM HYBRIDISATION)

N-115.3



- Ca- Oxalate : 1150 mg/100g)
- TSS : 16.00 °Brix
- Vit C : 39.5 mg/100 g
- Fiber : 0.72%
- Weight : 750 gr
- Pulp Thickness :3.5 cm

N-101.5



- Ca-Oxalat 1250 mg/100g)
- TSS : 18.33 °Brix
- Vit C : 68.42 mg/100g
- Fiber : 1.24 %
- Weight : 1080 gr
- Pulp thickness : 4.66 cm

N-103.7



- Oxalate : 1210 mg/100g
- TSS : 15.13 °Brix
- Vit C : 68.05
- Fiber : 1.03 %
- Weight : 900 gr
- Pulpthickness : 4.3 cm

103.2



- Oxsalat :1250 mg/100g
- TSS : 15.73 °Brix
- Vit C : 36.83 mg/100g
- Fiber : 0.96 %
- Weight : 1330 gr
- Pulp thickness : 5 cm



CANDIDATE SUPERIOR VARIETY (SWEET TASTE)

N-158.2

N-158.2



- Weight : 500 g
- Pulp Thickness : 4.15 cm
- **TSS : 22.4° Brix**
- Vit C : 40.15 mg/100g
- Water content : 80%

N-158.3



- Weight : 600 g
- Pulp thickness : 4.36 cm
- TSS : 21.2° Brix
- Vit C : 39.72 mg/100g
- Water content : 77.20 %

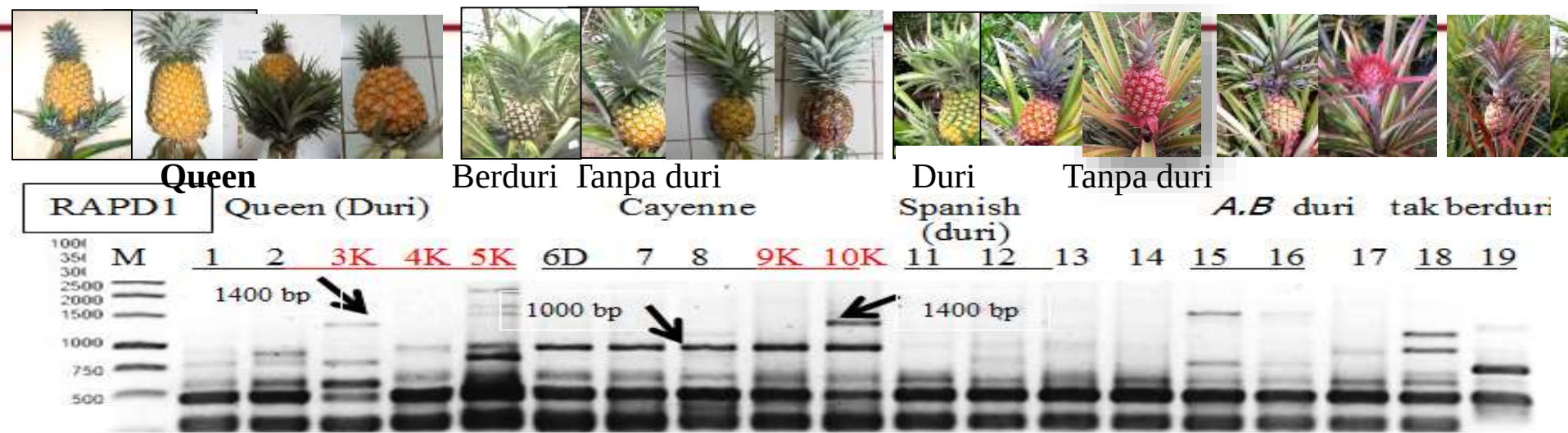
N-158.4



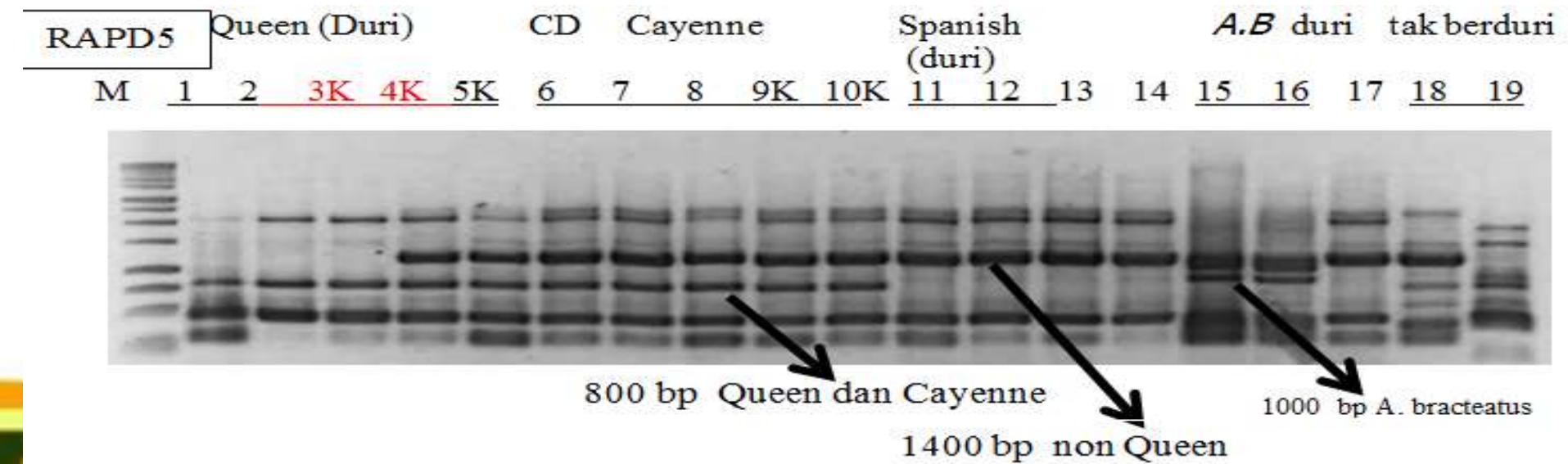
- Weight : 870 g
- Pulp thickness : 3.8 cm
- **TSS : 20.2° Brix**
- Vit C : 54.72 mg/100g
- Water content : 77.7 %



MOLECULAR MARKERS ON ANANAS COMUSUS



SPECIFIC MARKER FOR CAYENNE GROUP AND QUEEN GROUP

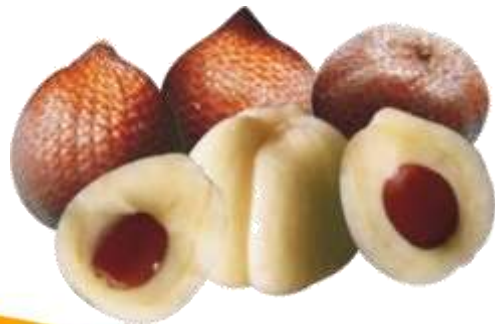


SALACCA BREEDING

6 species

600 progeny from crossing

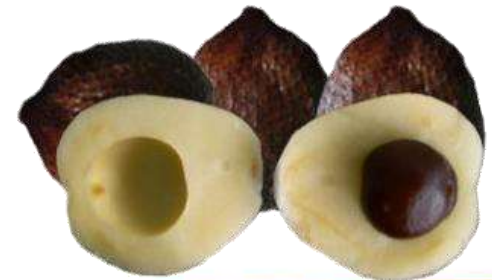
SARI INTAN 48



SARI INTAN 54I



SARI INTAN 295





SALACCA

Var. **Sari Intan 295**



Flesh thickness	: 1,8 cm
TSS	: 19-210 Brix
Vitamin C	: 21-35 mg/100g
Water content	: 77,3-79 %
Vitamin A	: 210 ug/g
Acidic content	: 0,51-1,23 %
Tannin content	: 0,20-0,21 %
Taste	: very sweet
Flesh texture	: slight crunchy



DEVELOPMENT SALACCA VAR. SARI INTAN



Kec. Teluk Sebung, & Kec. Toapaya, Bintan



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BF di Ko. Subang

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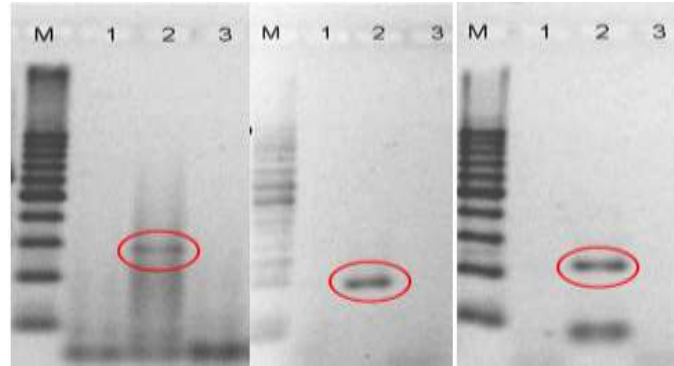
DURIAN BREEDING



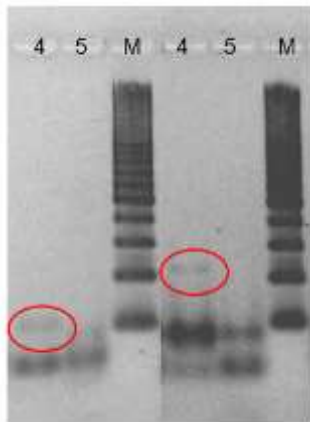
77 varieties



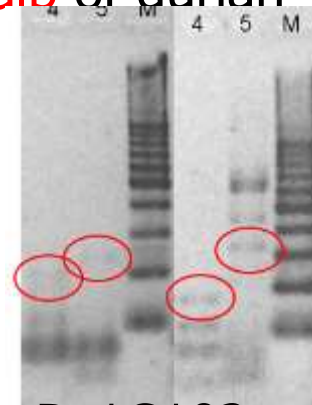
MOLECULAR MARKER FOR SELECTION YELLOW PULP AND SEEDLESS PROGENY ON DURIAN



locus mDz3G731, mDz2E9, and mDz6F06
Associated with **yellow pulp** of durian



Locus mDz1G3 and mDz03A312
associated with **big seed size**

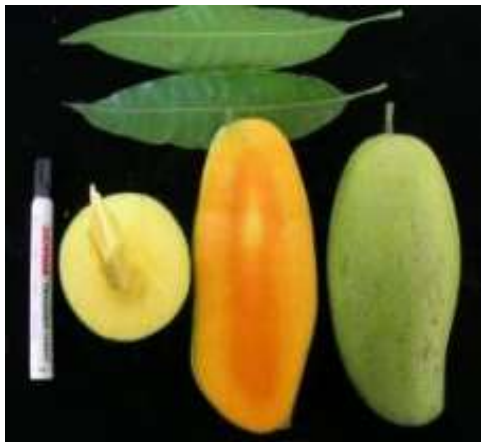


Locus mDz1G102 and mDz1C41
associated with **seedless character**



MANGO BREEDING

- Collection: 334 (3 species, 208 variety and accessions)
- Parent Stock



Golek



Manalagi



Arum manis

SUPERIOR VARIETIES

**GARIFTA
MERAH**



**GARIFTA
KUNING**



**GARIFTA
GADING**



**GARIFTA
ORANGE**



MANGGO

Var. **Agri Gardina 45**



MANGOSTEEN (30 accessions: Grafting)



SUPERIOR VARIETIES



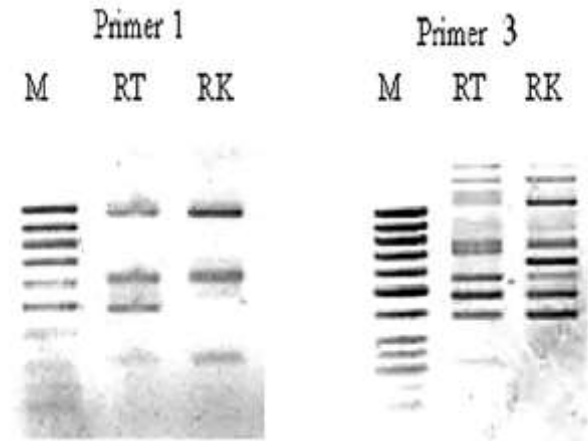
Ratu Tembilahan
Non Gamboge disorder



Ratu Kamang
Low gamboge disorder



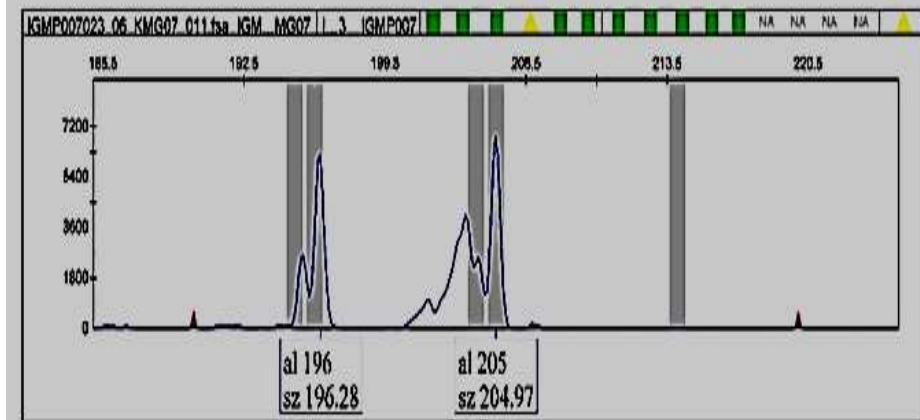
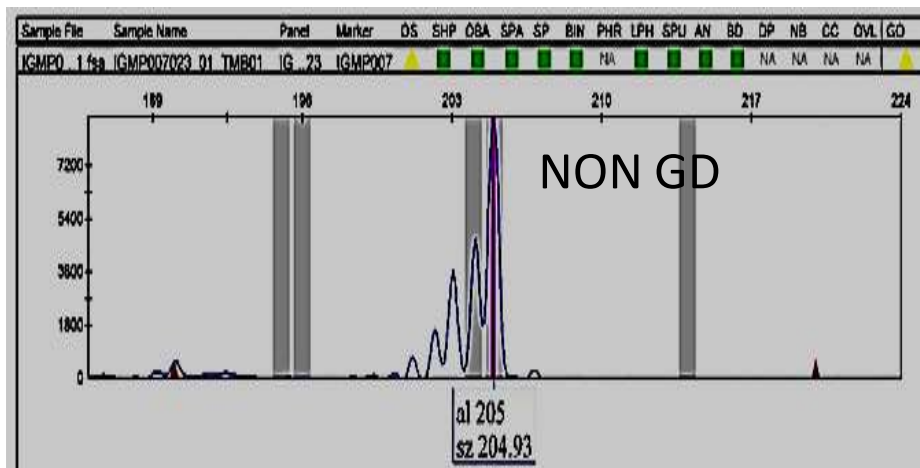
Variation in Gamboge Disorder percentation of different trees at same location



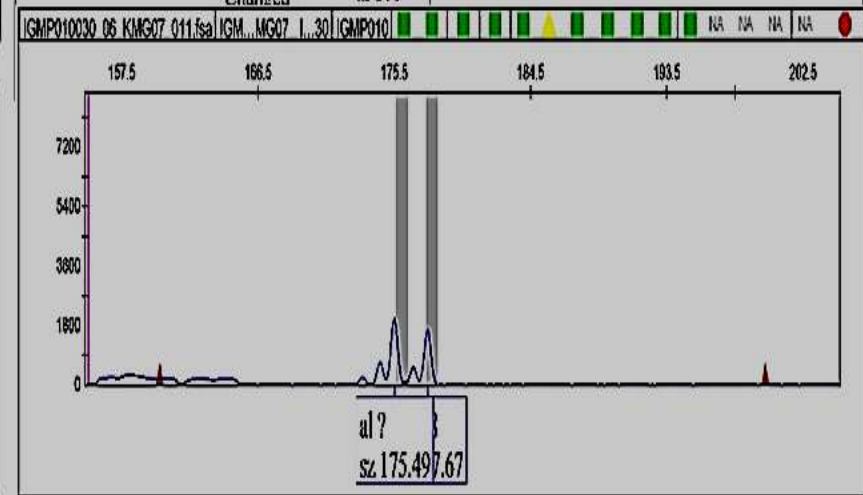
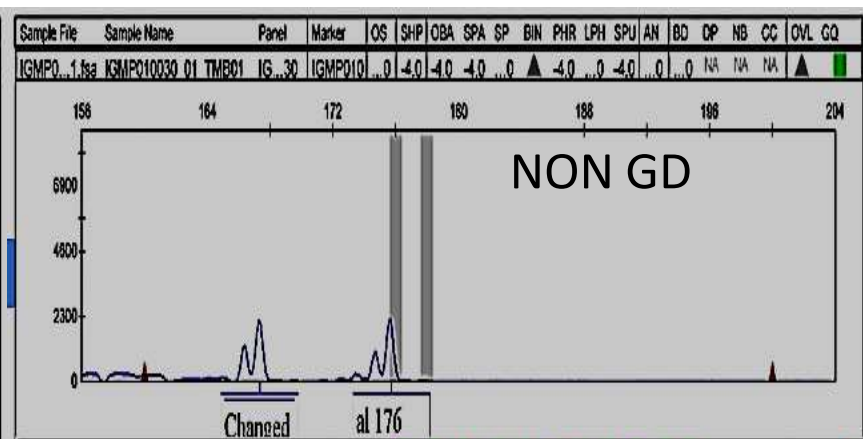
DNA banding patterns differences between free of GD mangosteen variety (RT) and the common variety (RK) by Primer 1 (GGTGCGGGAA) and Primer 3 (GTAGACCCGT). M= Marker



MICROSATELLITE ANALYSIS



IGMP 007



IGMP 010



AVOCADO BREEDING



Mega Murapi

- ❖ Creamy sweet taste, protein content 1,37 %, fat content 7,6%,
- ❖ Production: 350-450 fruit/tree (180-225 kg)/year



Mega Paninggahan

- ❖ Yellow flesh color,
- ❖ Creamy sweet taste, 7,95 %,
- ❖ Production 880-1.000 fruit/tree (300-350 kg)/year



Mega Gagauan

- ❖ Yellow flesh, slightly creamy sweet taste, fat content 6,41%,
- ❖ Production 220-230 fruit/tree (140-175 kg)/year delicious



Conservation and Sustainable Use of Garcinia species at Sijunjung District Based on CBM (Community Biodiversity Management)



FOCUS GROUP DISCUSSION

2. Identify local community-based organization (CBOs) at Sijunjung District of West Sumatera



CONDUCTING DIVERSITY FAIR



Promotion and
reintroduced local
genetic resources
to communities



Developing 2 community Nurseries for *Garcinia atroviridis*



Seedlings distribution and planting in diversity block



Processing *Garcinia atroviridis*

Garci-tea



SEED PRODUCTION AND DISTRIBUTION TO SUPPORT HORTICULTURAL YEAR 2018

Indonesian government released that the year 2018 as
Horticultural Year

This is an opportunity to overcome the problems in horticultural production, start with seed production

The Problems of fruit development in Indonesia :

1. Limited number of seedlings to be distribute
2. Caused by limited number of mother plants
3. The seed avallability depend on fruit season
4. Plant tissue culture technology is still limited.



SEED PRODUCTION TARGETS OF 7 TROPICAL FRUIT 2017

No	Commodity	Resources seed	Extension seed
1	Mango	230.000	140.000
2	Mangosteen	2.500	6000
3	Durian	25.000	80.000
4	Banana	1.000	11.000
5	Papaya	-	215.000
6	Salacca	5.000	25.000
7	Bread Fruit	10.000	50.000
	TOTAL	273.500	527.000

↓
For Seed
production
(BF)

↓
for distribute to
farmers

Objective : To accelerate development superior varieties of tropical fruit for domestic and international market



SEED PRODUCTION UNIT





8 months



4 months



2 months



BANANA SEED PRODUCTION



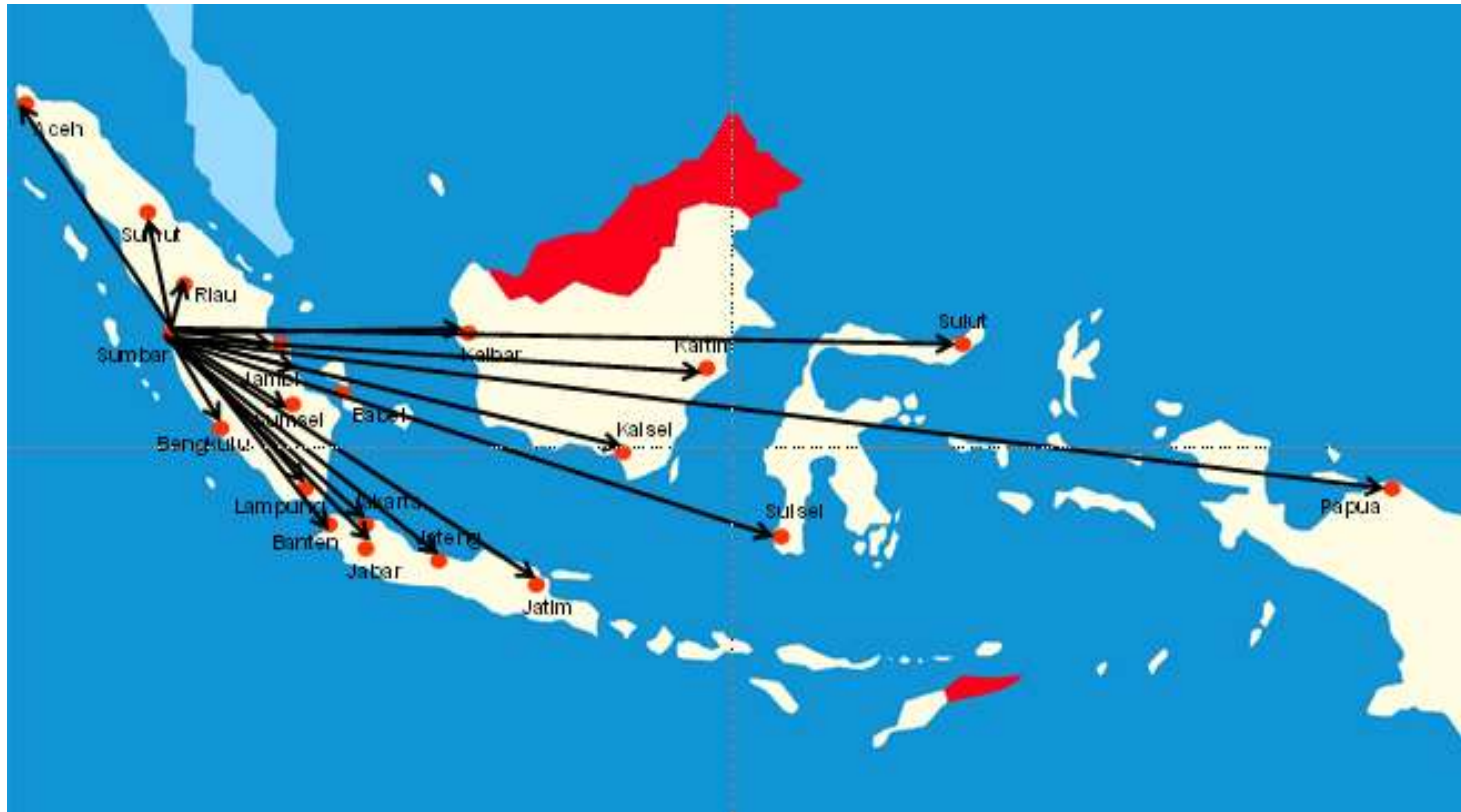
PAPAYA SEED PRODUCTION



SEED DISTRIBUTION



MAP OF SEED DISTRIBUTION



PLANT BREEDING AND BIOTECHNOLOGY TEAM OF ITFR :I

1. Dr. Ellina Mansyah
2. Dr. Agus Sutanto
3. Dr. Panca Jarot Santoso
4. Dr. Sukartini
5. Ir. Ni Luh Putu Indriyani
6. Ir. Sri Hadiati
7. Riry Prihatini SP MSc
8. Tribudiyanti SP MSi
9. Ir. Sunyoto
10. Ir. Sudjiji
11. Noflindawati SP MSI
12. Kuswandi SP MSi
13. Makful SP MSi



THANK YOU

