Bumitama Gunajaya Agro

PROPOSAL

OPEN INNOVATION

TAHUN 2025

OPEN INNOVATION 2025

- **RUANG LINGKUP**

Dosen/Peneliti:

1. Peningkatan Oil Content: rekayasa metabolit untuk meningkatkan biosintesis minyak sawit, serangga pollinator & artificial pollination, aplikasi booster atau beneficial untuk meningtkan oil to dry mesocarp

Maksimal 300 juta per Proposal

Mahasiswa :

1. Ekologi Polination
2. Breeding Elaeidobius K
3. Dinamika Reproduksi Serangga Polinator
4. Artificial Pollination
5. Aplikasi Beneficial Microbes atau booster untuk meningkatkan oil content

Maksimal 10 juta per Proposal

- **KRITERIA PENILAIAN SELEKSI**

Kriteria penilaian hasil Open Innovation akan meliputi:

1. Impact Terhadap Penyelesaian Masalah Di BGA (50%)
2. Tingkat Technology Readiness Level (TRL) (25%)
3. Kelayakan Anggaran dengan Program yang Diusulkan (15%)
4. Kelayakan Aplikasi dan Scalability (10%)

1. Impact Terhadap Penyelesaian Permasalahan di BGA (50%)
2. Metodologi riset (25%)
3. Luaran hasil riset (25%)

- **RANGKAIAN KEGIATAN**

1. Inovator upload proposal ke https://dashboard.bumitama.co.id/inovasi/
2. Seleksi proposal administrasi dan presentasi
3. Pengumuman peserta lolos seleksi
4. Kick off Open Innovation
5. Pelaksanaan Riset Project
6. Evaluasi Project
7. Laporan Akhir

Format proposal maksimal 12 Halaman menggunakan PPT. Submit proposal dalam bentuk file pdf.

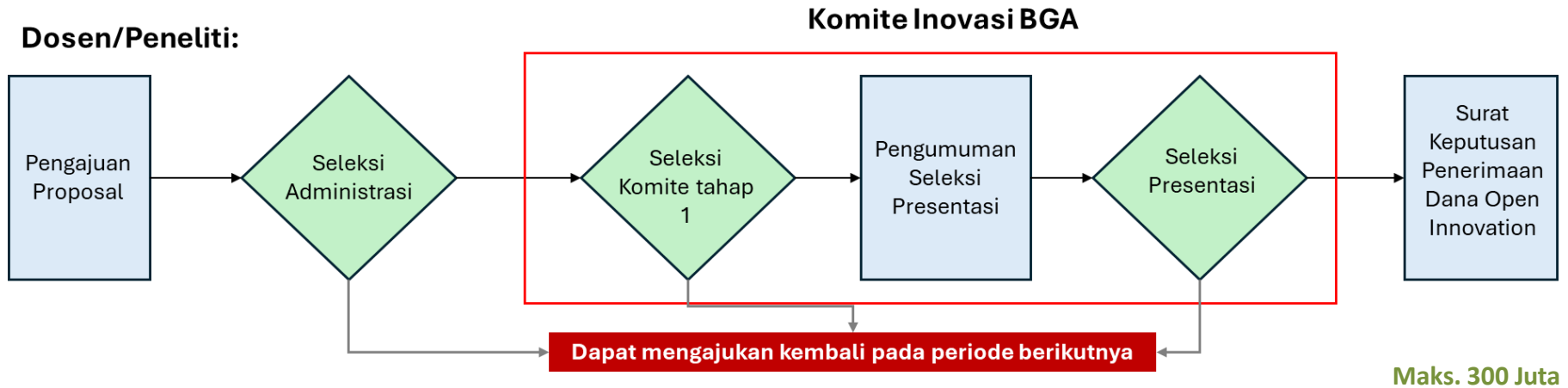
1	Justifikasi & Tujuan penelitian	2 halaman
2	Metodologi penelitian	2 halaman
3	Rincian Kebutuhan Biaya	2 halaman
4	Ganchart Detail Kegiatan Penelitian dan Target Output	2 halaman
5	Analisis Cost & Benefit (Impact Hasil Penelitian)	2 halaman

MEKANISME PENGAJUAN PROPOSAL

Skema OI Dosen:

Fokus Open Innovation Dosen/Peneliti:

1. Peningkatan Oil Content: rekayasa metabolit untuk meningkatkan biosintesis minyak sawit, serangga pollinator & artificial pollination, aplikasi booster atau beneficial untuk meningtkan oil to dry mesocarp



Maks. 300 Juta /Proposal

Skema OI Mahasiswa:

Fokus Open Innovation Mahasiswa :

1. Ekologi Polination
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4. Artificial Pollination
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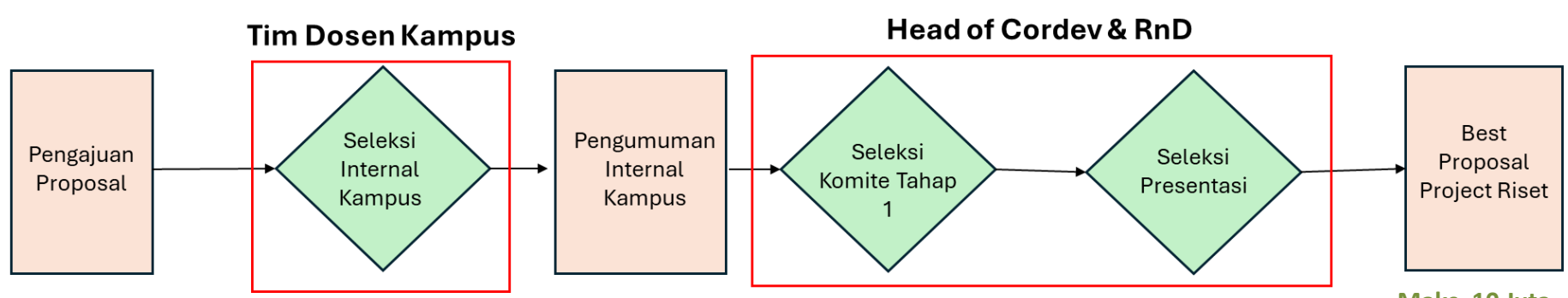
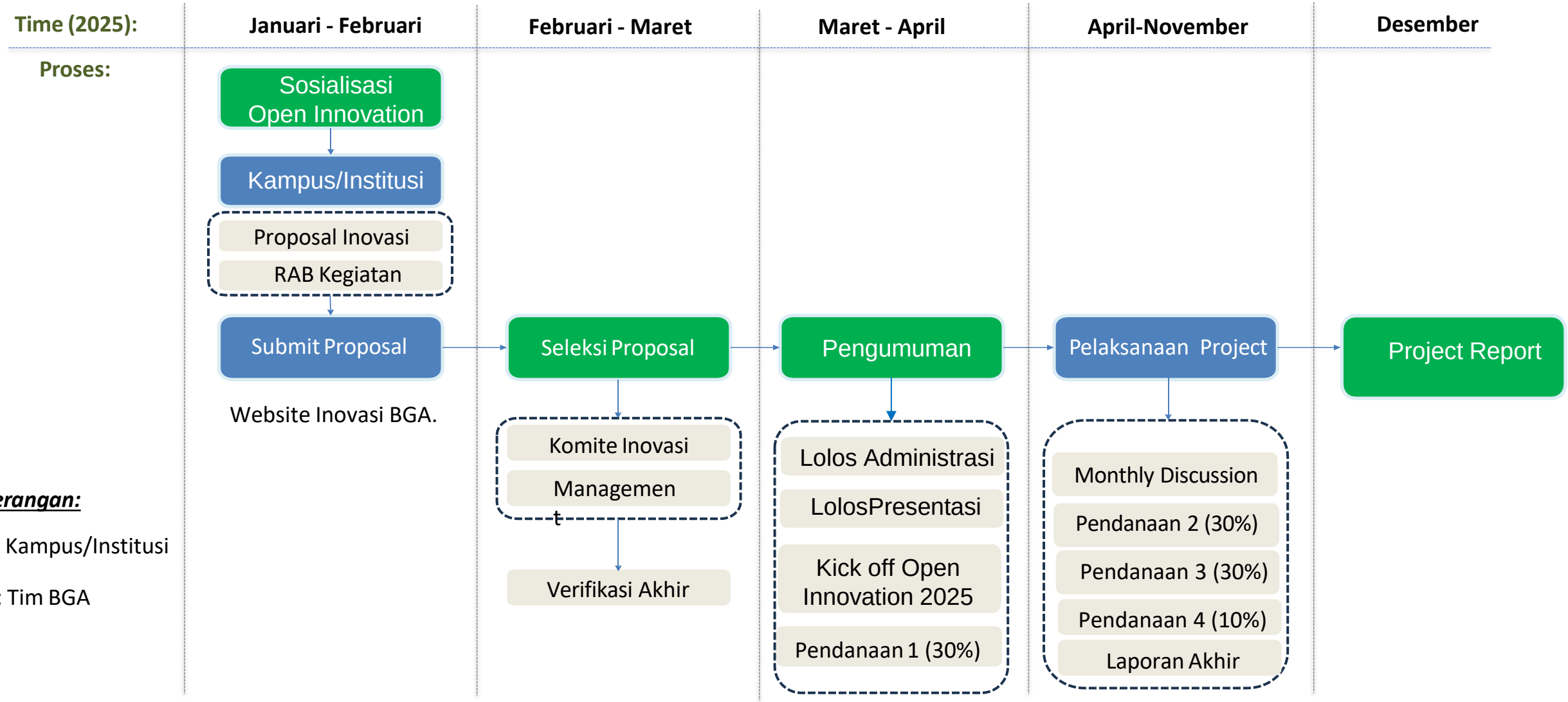


Maks. 10 Juta /Proposal

OPEN INNOVATION 2025



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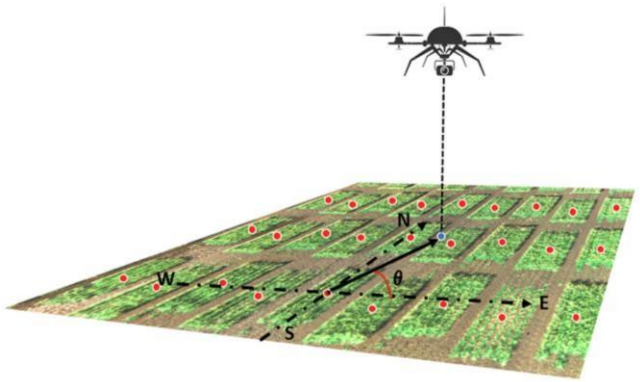
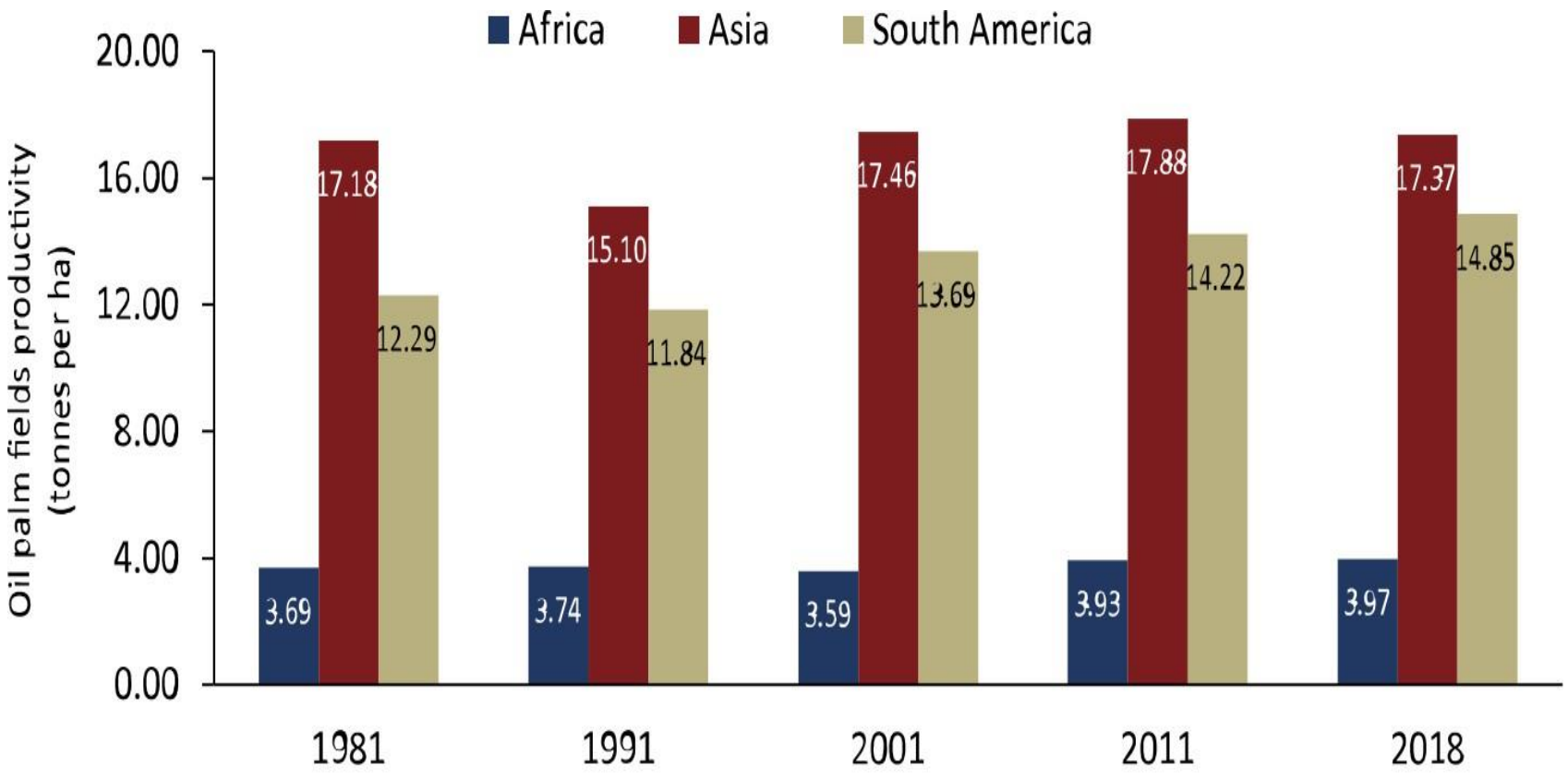


INOVASI TERINTEGRASI UNTUK MEMAJUKAN INDUSTRI SAWIT INDONESIA

PT. BUMITAMA GUNAJAYA AGRO (BGA)

KEUNGGULAN KOMPARATIF DAN KOMPETITIF INDONESIA & TANAMAN SAWIT



A comparative look at how Africa's oil palm productivity is in relation to other continents

WORLD POPULATION GROWTH

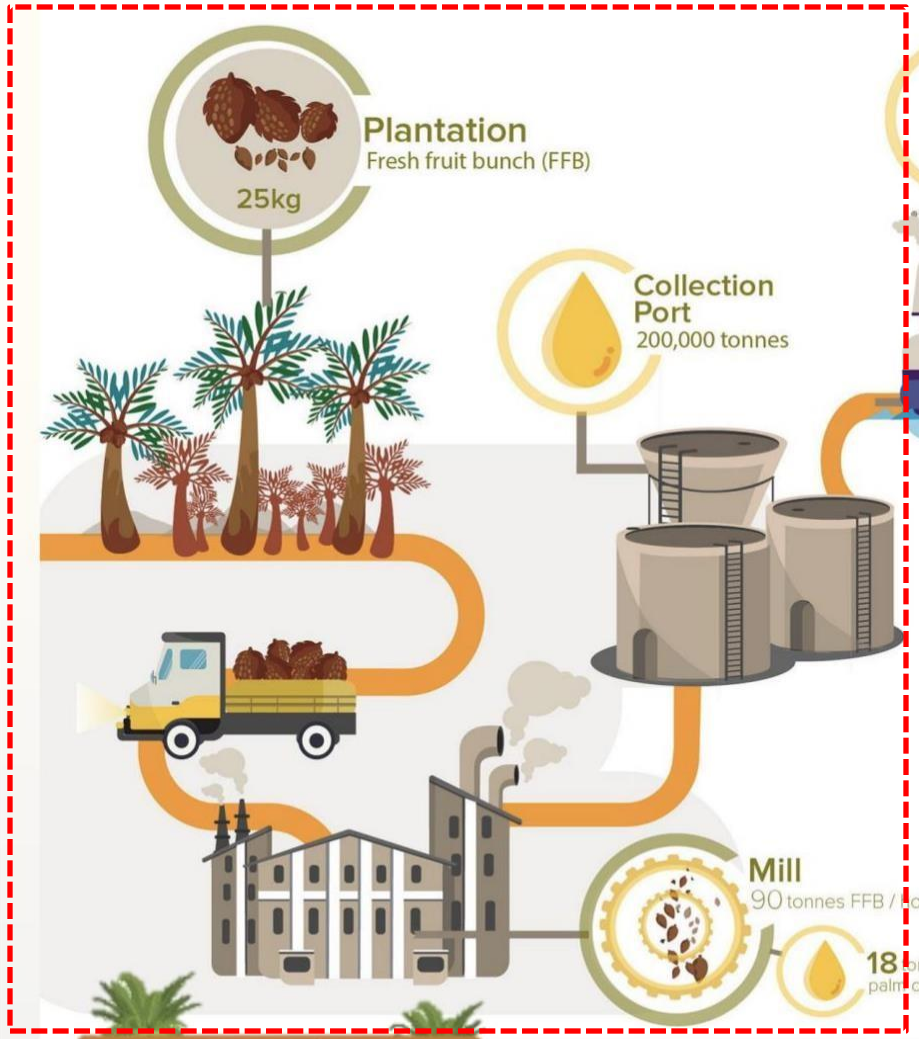
Population	Year
9,2 Milyar	2050
8 Milyar	2025
7,3 Milyar	2015
6,7 Milyar	2007
6 Milyar	2000
5 Milyar	1987
4 Milyar	1975
3 Milyar	1960
2,5 Milyar	1950
2 Milyar	1930
1 Milyar	1800

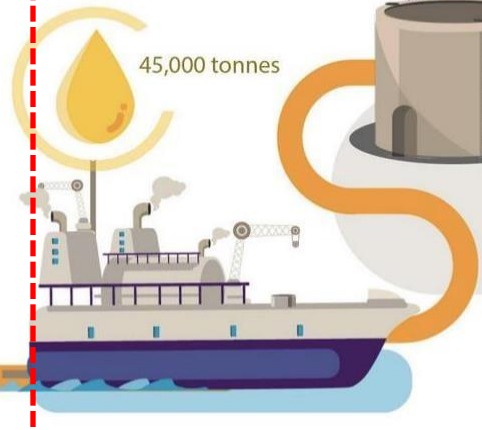
Dib *et al* 2018

Bumitama Gunajaya Agro

Palm Oil Supply Chain

NOTE : Volumes in this infographic are averages.
There is a lot of variation in processing, transport capacity and ingredient use





Sumber : Oil World 2018. Monthly no. 11, vol 61

BUMITAMA GUNAJAYA AGRO (BUMITAMA AGRI)

Planted Area

Planted Area : 186,628 Ha
Nucleus : 131,099 Ha (70%)
Plasma : 55,529 Ha (30%)

Estate & Mill

Estates : 68 Estates
Mills : 17 Unit
Total Capacity : 1,065 Tph

Workforces

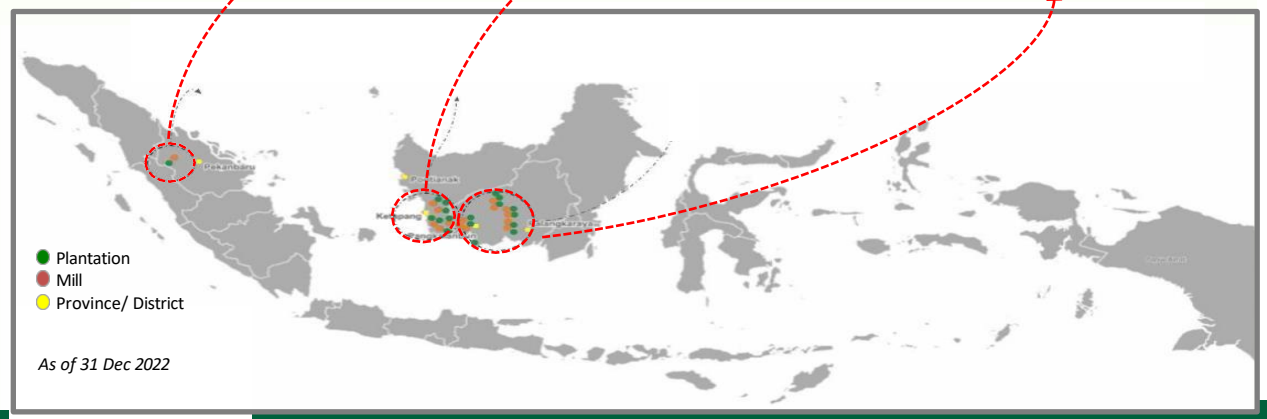
Staff : 1,500
Worker (eff) : 26,000

Location

Riau:
- 2K ha Planted Area
- 1 Mill (90 tph capa)

West Kalimantan:
- 81K ha Planted Area
- 5 Mills (300 tph capa)

Central Kalimantan:
- 105K ha Planted Area
- 9 Mills (675 tph capa)



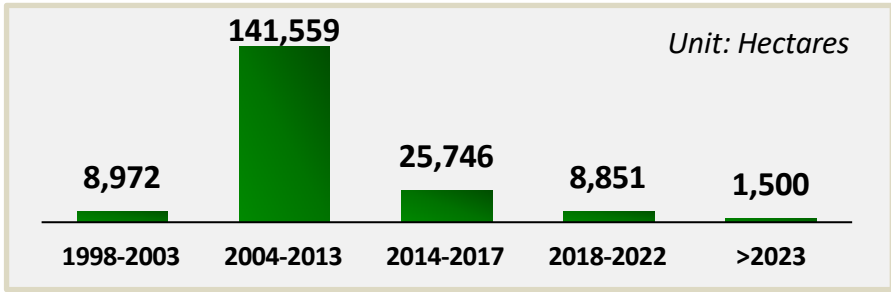
Plasma

No. of Cooperatives : 56 Units
No. of Families : 35,599

Development Supports

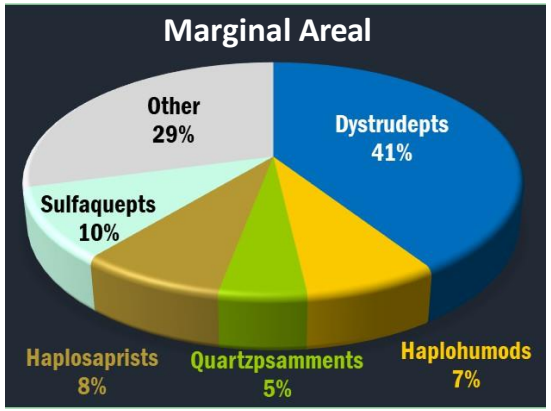
- **Bumitama Corporate University (BCU) - Learning & Development : 2 Unit**
- **Central Workshop : 2 unit**
- **Research Center & Innovation : 4 Unit**

Planted Period

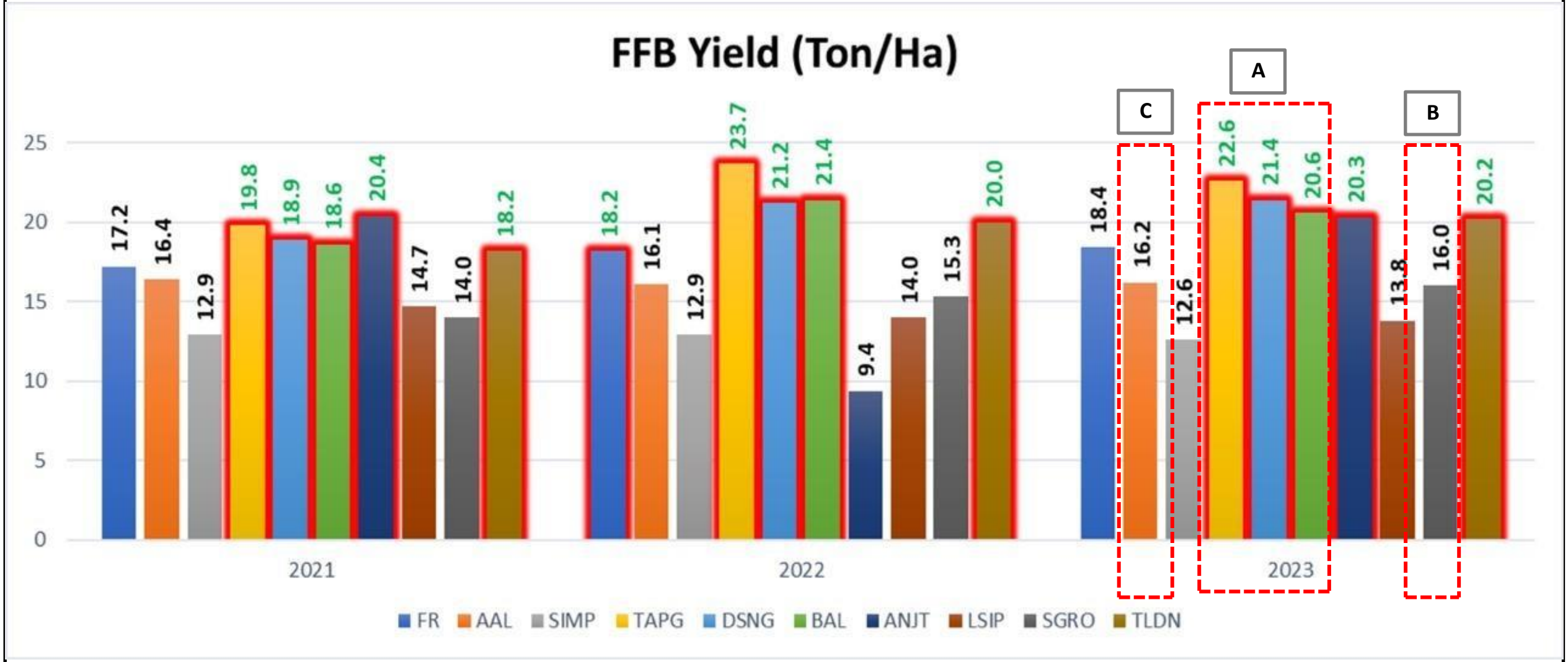


Soil Type

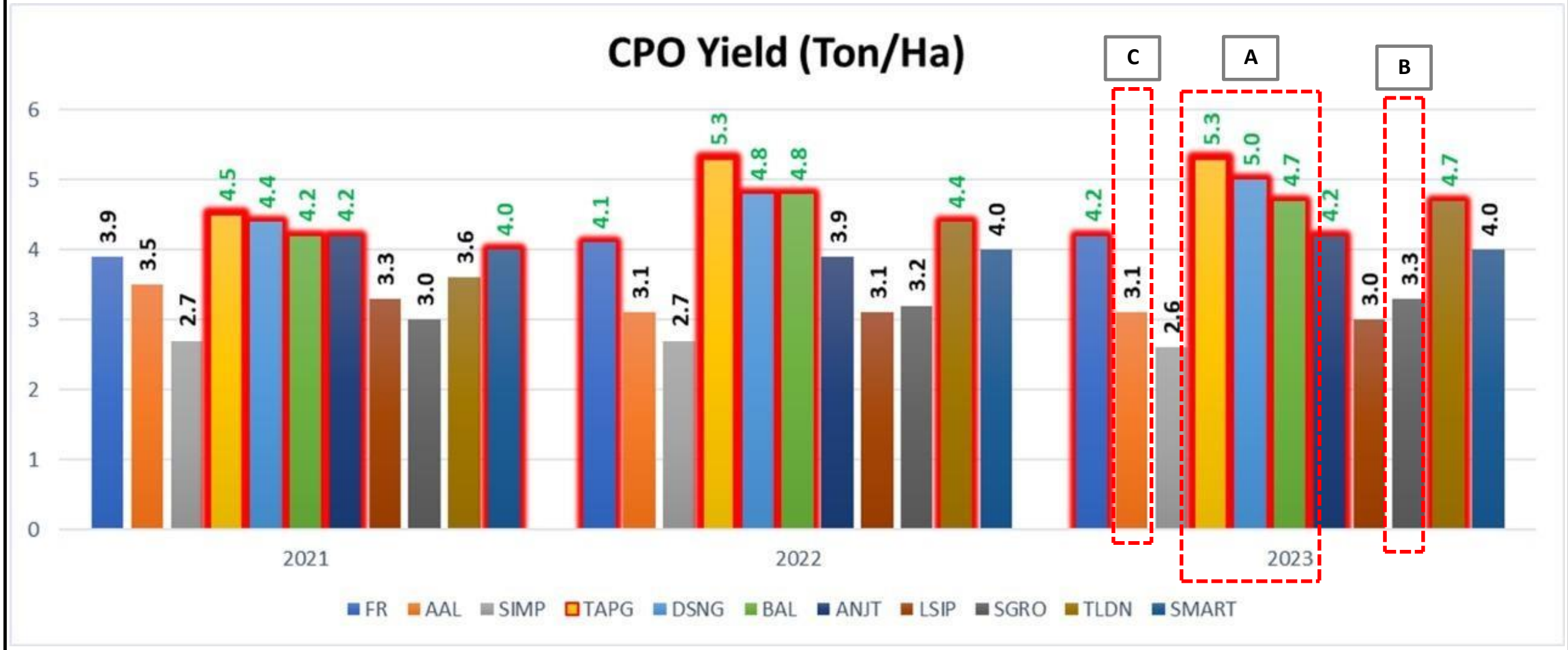
Mineral : 55,880 Ha (30%)
Marginal : 130.748 Ha (70%)



PRODUKTIVITAS BEBERAPA KEBUN DI INDONESIA



KOMPARASI CPO YIELD (Ton/Ha)



TANTANGAN INDUSTRI KELAPA SAWIT

Bumitama Gunajaya Agro

KEBUN

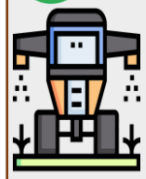
1 TANAMAN BERPRODUKTIVITAS TINGGI BERKELANJUTAN

1. PERUBAHAN IKLIM GLOBAL
2. JUMLAH BUNGA JANTAN YANG KURANG
3. FENOLOGI TANAMAN BERUBAH
4. STATUS KESEHATAN TANAMAN
5. GANODERMA

2 KESEHATAN TANAH DAN KESUBURAN LAHAN YANG BERKELANJUTAN

1. PENURUNAN KESEHATAN TANAH
2. BANJIR DAN KEKERINGAN
3. DEGRADASI KESUBURAN LAHAN
4. PENGGUNAAN PESTISIDA KIMIA BERLEBIHAN
5. SERAPAN HARA

3 EFISIENSI BIAYA PRODUKSI



1. SISTEM PERKEBUNAN PRESISI
2. MEKANISASI DAN DIGITALISASI
3. FLEET MANAGEMENT SYSTEM
4. GEO-AI FOR DAILY WEATHER MONITORING
5. PENINGKATAN KETRAMPILAN KARYAWAN

MILL

4 PROSES EKSTRAKSI CPO YANG EFEKTIF

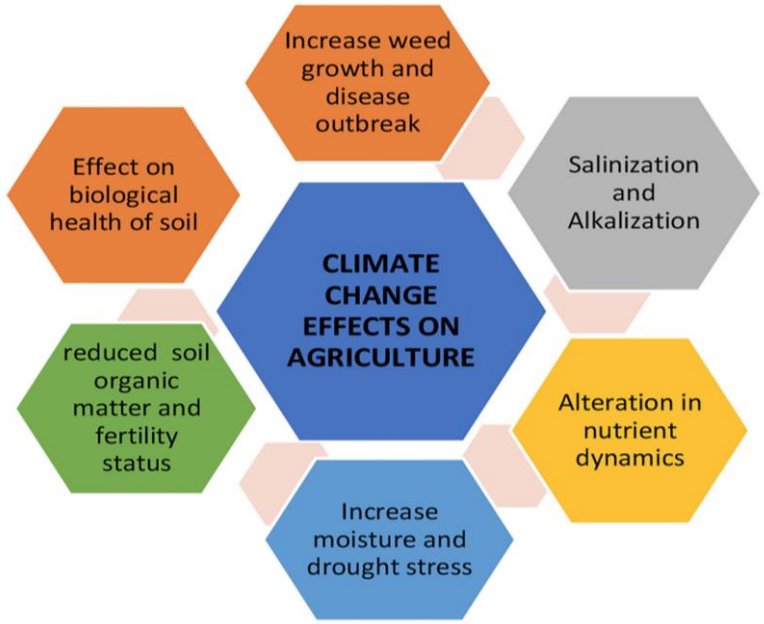
1. GRADING KEMASAKAN TANDAN
2. EFEKTIVITAS MESIN EKSTRAKTOR
3. IMPLEMENTASI ENZIM UNTUK MENINGKATKAN OER
4. OIL LOSSES
5. POME

5 CPO STORAGE

1. MUTU CPO

SISTEM PRODUKSI YANG BERKELANJUTAN YANG MENJAMIN PRODUKTIVITAS TINGGI YANG DIMULAI DARI KEBUN SAMPAI PABRIK CPO

CPO PRODUCT



1. SDM
2. TEKNOLOGI
2. KULTUR / ALAM

PENINGKATAN TBS & CPO MERUPAKAN URGENSI SAAT INI

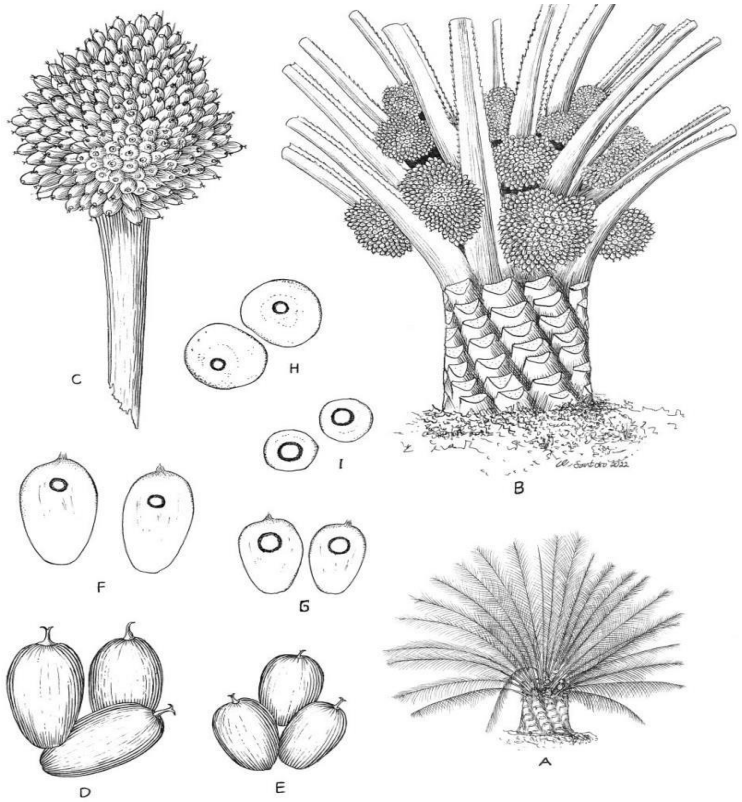
I	II	III	IV	V	VI
Pembentukan Bunga Betina	Penyerbukan	Perkembangan Buah	Prosesing Grading TBS	Proses Ekstraksi	Eksplorasi New Product / Diversifikasi Produk
> 7 Bulan	1 Bulan	5-6 Bulan	Harian	Harian	
Menentukan BJR dan Jumlah Janjang			Menentukan OER & Oil Yield		Menentutkan Total Revenue

KEY DETERMINANT FACTORS

1 Σ Tanaman Defisiensi 2 Σ Tanaman abnormal (metabolisme) 3 Kualitas Bio-organofertilizer	1 Σ Polinator 2 Σ Hari Hujan	1 Σ Hari Hujan 2 Ketersediaan Air 3 Status Hara Daun	1 Monitoring Sistem	1 Efektivitas Ekstraksi 2 Balancing Check	1 Σ Produk / Trial

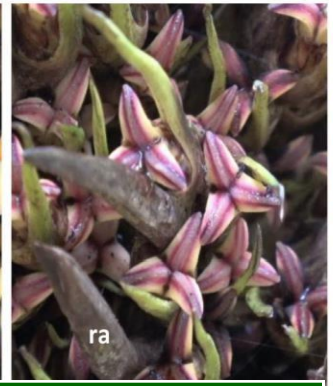
INOVASI

1 Enriched Bio-Organofertizer 2 Sistem Deteksi Dini 3 Repellent System Program	1 Teknologi Drone 2 Pollinator Militan	1 Digitlasiasi Monitoring System	1 Teknologi Enzyme	1 Teknologi Biokenversi TKKS + POME



7 HARI

7 HARI



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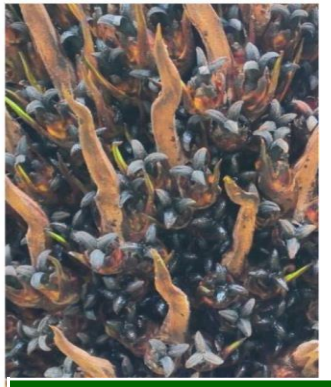
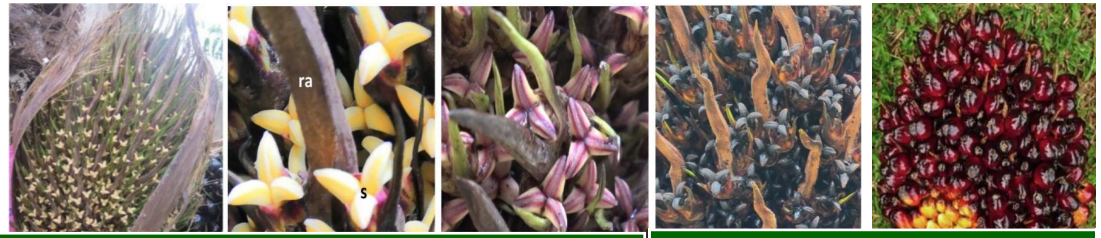


150 HARI

PENINGKATAN TBS & CPO MERUPAKAN URGENSI SAAT INI

FOKUS INOVASI : BAGAIMANA MENINGKATKAN OIL CONTENT?

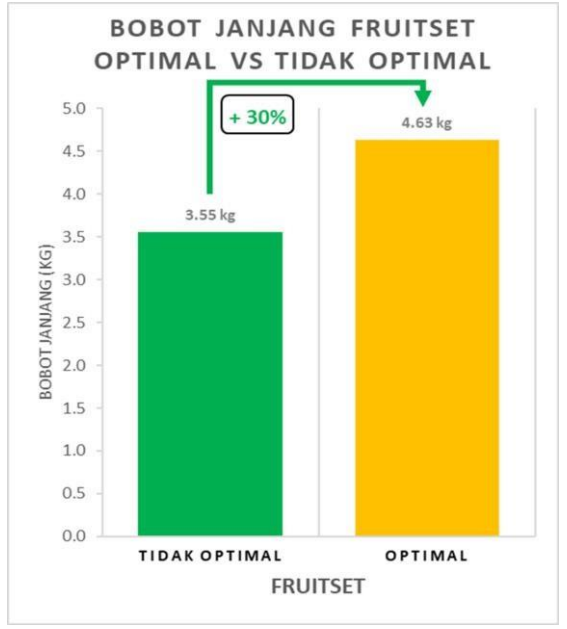
1. Meningkatkan jumlah bunga betina yang terbentuk
2. Meningkatkan kuantitas pollen pada inflorescens bunga jantan
3. Meningkatkan populasi serangga pollinator dan agresivitasnya untuk berkunjung ke bunga betina
4. Memastikan penyerbukan terjadi
5. Meningkatkan Fruit to Bunch (Fruitset & Modifikasi bentuk buah)
6. Meningkatkan Oil to Dry Mesocarp
7. Meningkatkan Rasio Mesocarp to Fruit
8. Meningkatkan ekspresi gen-gen yang terkait dalam biosintesis minyak



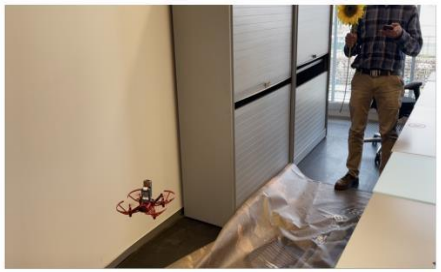
2 HARI | 150 HARI

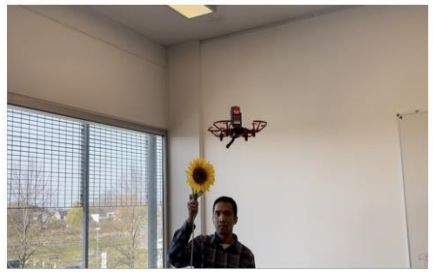
Luas dan Populasi Kelapa sawit BGA

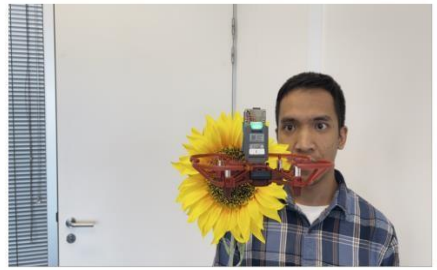
Region	Luas	Populasi
Mentaya	30,566	3,828,131
Pundu	44,608	5,680,816
Kotawaringin	29,810	4,005,409
Kendawangan	20,930	2,835,198
Sei Rasau	24,127	3,308,801
Nanga Tayap	23,906	3,021,393
Rokan Hulu	2,299	314,098
Sei Melayu	11,174	1,471,007
TOTAL	**187,420**	**24,464,853**



Autonomus Pollination Drone for the future Agriculture

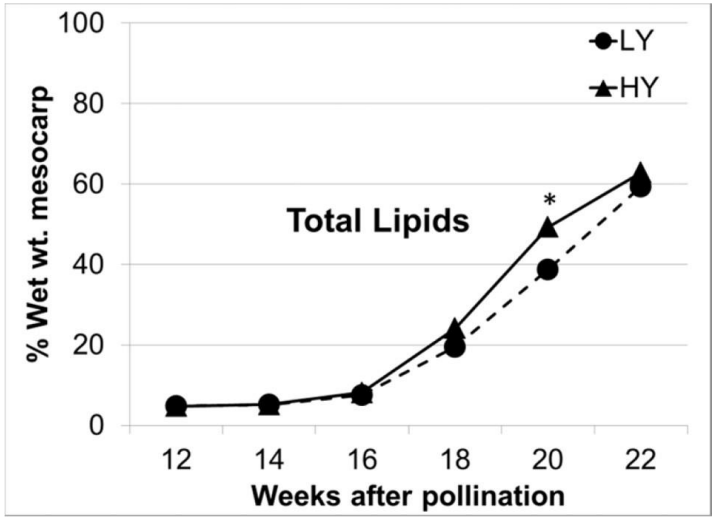


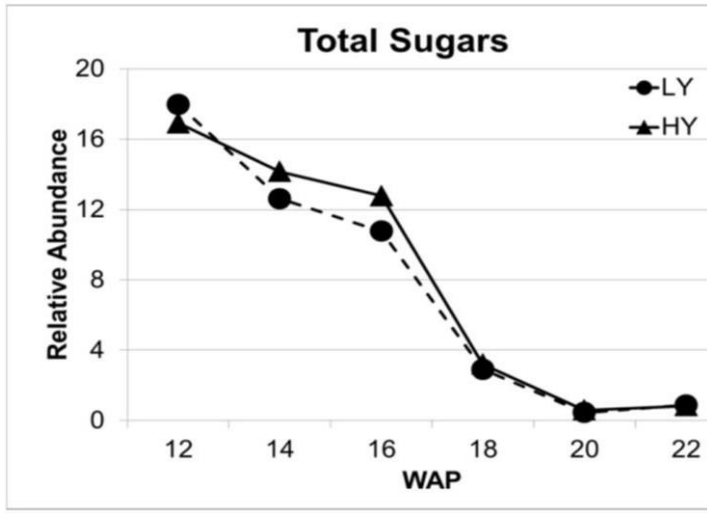




Differential Metabolite Profiles during Fruit Development in High-Yielding Oil Palm Mesocarp

Huey Fang Teh[1]*, Bee Keat Neoh[1], May Ping Li Hong[1], Jaime Yoke Sum Low[1], Theresa Lee Mei Ng[1], Nalisha Ithnin[1], Yin Mee Thang[1], Mohaimi Mohamed[2], Fook Tim Chew[3], Hirzun Mohd. Yusof[1], Harikrishna Kulaveerasingam[1], David R. Appleton[1]





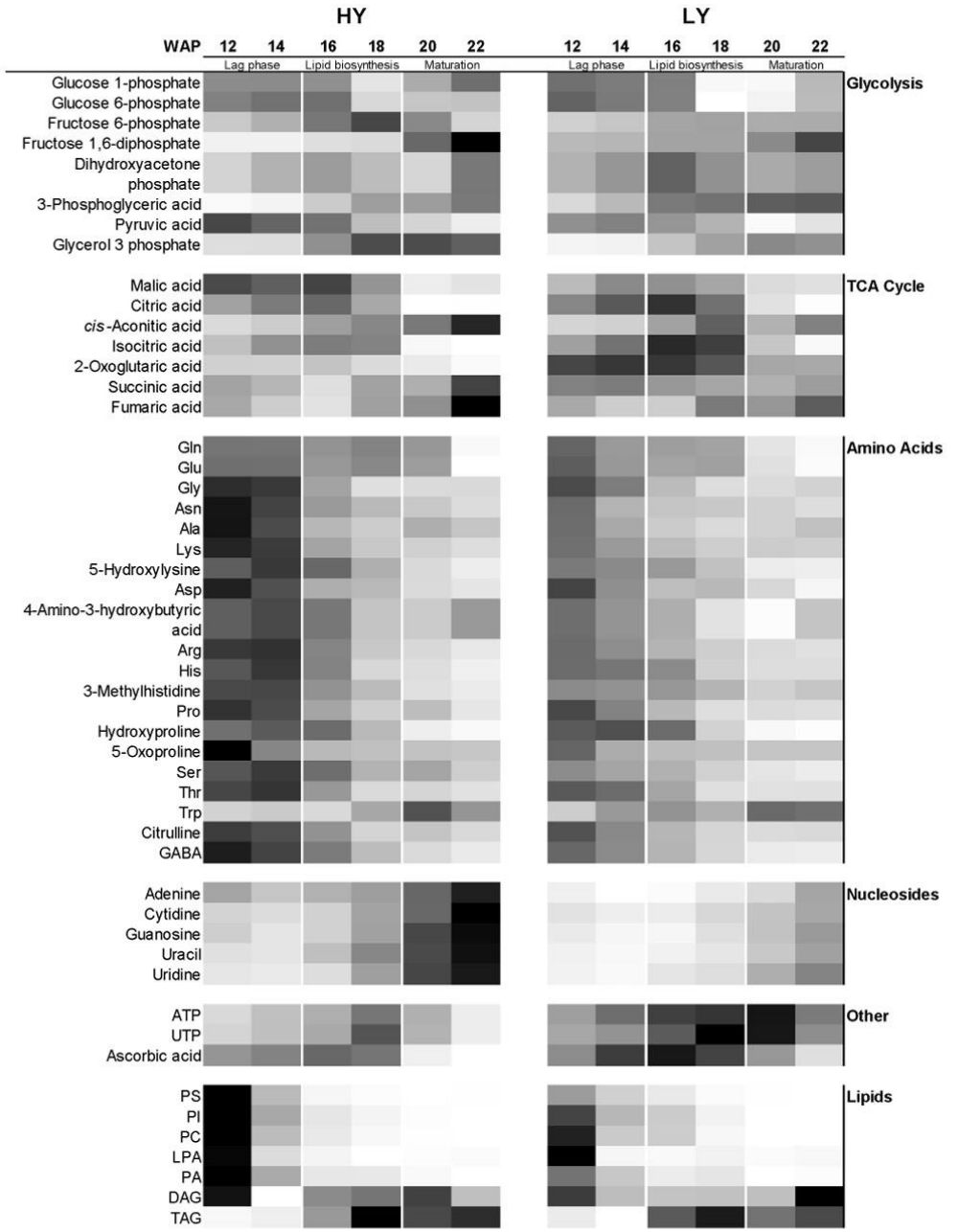
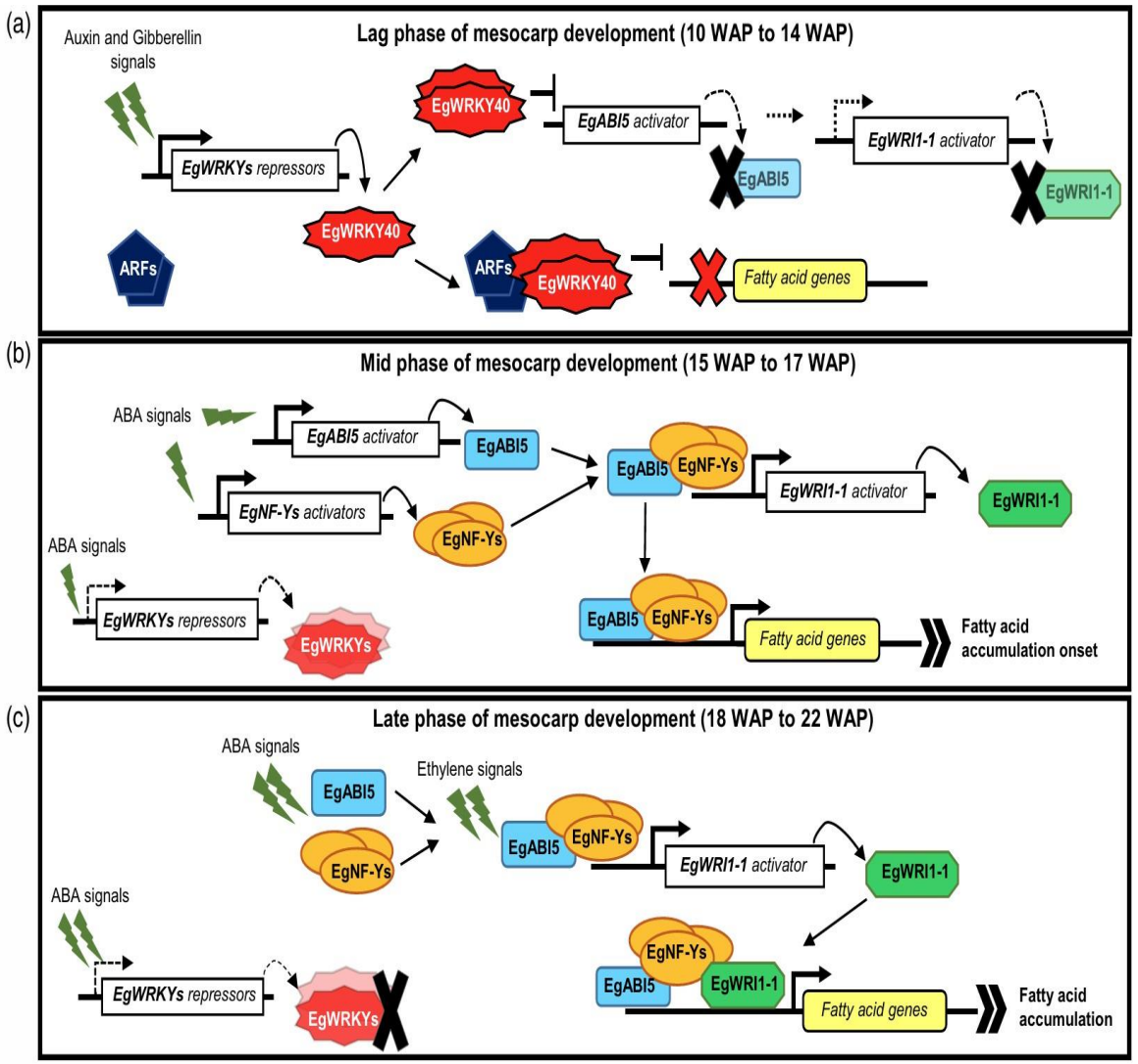


Figure 3. Heatmap of important primary metabolite concentrations during HY and LY palm mesocarp development. Heatmap of averaged and normalized mesocarp metabolite concentrations in key biosynthetic and cellular pathways of HY and LY oil palm groups at 12-22 WAP (n = 8). Scale from white (lowest concentration) to black (highest concentration) within each metabolite class.
doi:10.1371/journal.pone.0061344.g003

WRI1-1, ABI5, NF-YA3 and NF-YC2 increase oil biosynthesis in coordination with hormonal signaling during fruit development in oil palm



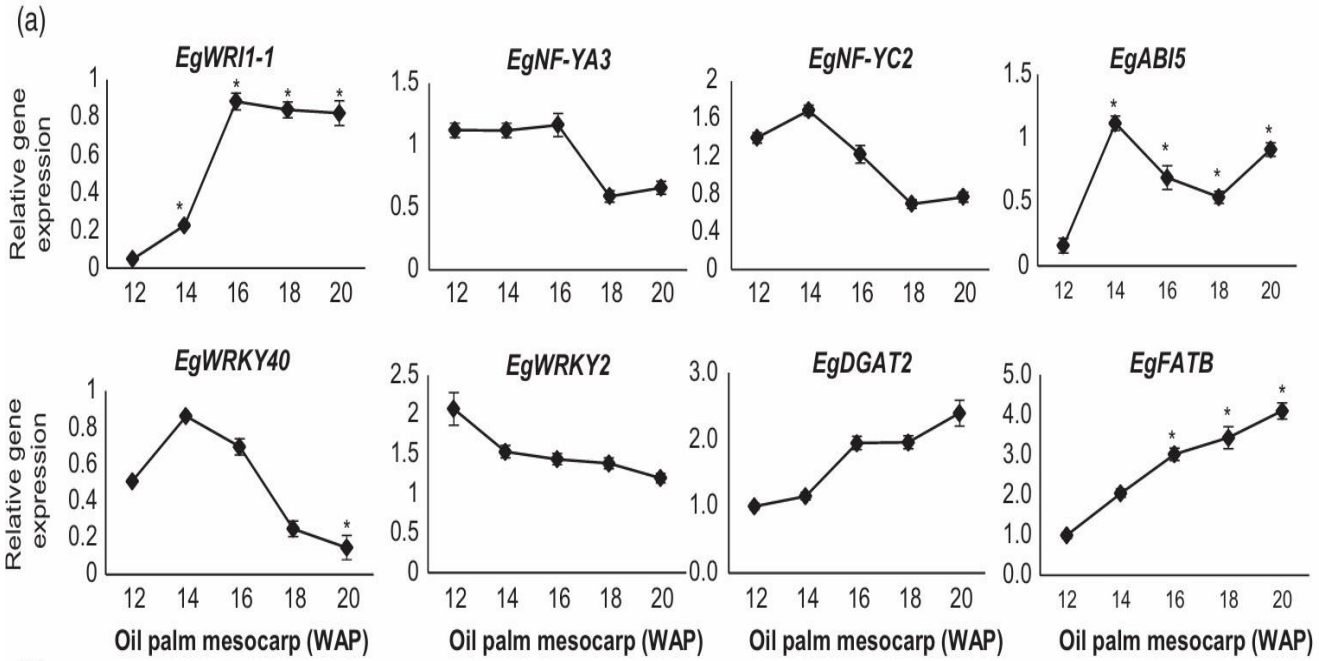


Figure 7. Regulatory model for oil biosynthesis in oil palm mesocarp.
(a) EgWRKY2 and EgWRKY40 interact with EgABI5 to repress its DNA-binding activity to *EgWRI1-1* at the lag phase of mesocarp development. Auxin signals trigger *EgWRKYs* expression that interacts with ARFs to repress transcription of fatty acid biosynthesis genes.
(b) Elevation of ABA signals during mid-phase of mesocarp development inhibits transcription of *EgWRKYs* repressors and trigger transcription activation of *EgABI5* and *EgNF-Ys* activators. The activators form a complex to activate transcription of *EgWRI1-1* and their downstream oil biosynthesis genes.
(c) High ABA and ethylene signaling levels trigger *EgWRI1-1* transcription. The EgWRI1-1 is recruited into activation complexes containing EgABI5 and EgNF-Ys, to activate the expression of oil biosynthesis genes, which consequently promotes oil accumulation in oil palm mesocarp. [Colour figure can be viewed at wileyonlinelibrary.com].

Regulatory mechanisms underlying oil palm mesocarp maturation and functional specialization in lipid and carotenoid metabolism

Stéphane Dussert, Timothy Tranbarger, Thierry Joët, Fabienne Morcillo
IRD, UMR Diade, Montpellier, France

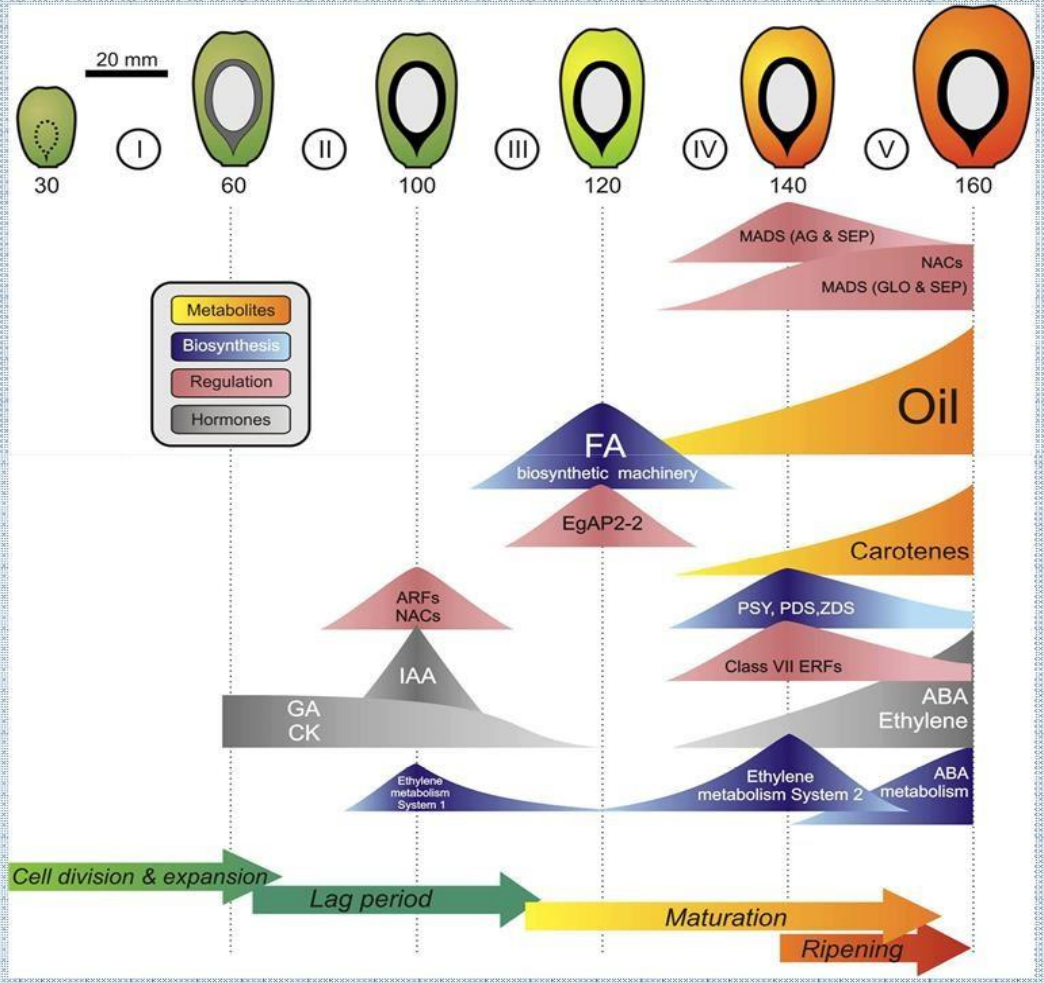


Figure 1. Scheme representing the major events that occur during the phases of mesocarp development.

Fruit development

- Morphological, histological, and biochemical (hormones, lipids) analyses were used to define phases of oil palm fruit development, maturation, and ripening (Fig. 1)
- Phase IV, between 120 and 140 DAP, is characterized by the onset of lipid and carotenoid accumulation
- Very low amounts of all hormones examined, including auxin, GA and cytokinin, ABA, and ethylene, were detected during phase IV
- Oil accumulates within subcellular spherical organelles (10–15 µm in diameter, six to 12 per mesocarp cell) that occupy the whole volume of the cells (Fig. 2)
- Mesocarp cells also contain distinct regions, presumably chromoplasts, with high carotenoid concentrations (Fig. 2)
- This detailed morphological, histological and biochemical description of fruit development enabled to chose the stages for transcriptome 454 pyrosequencing

Regulatory mechanisms underlying oil palm mesocarp maturation and functional specialization in lipid and carotenoid metabolism

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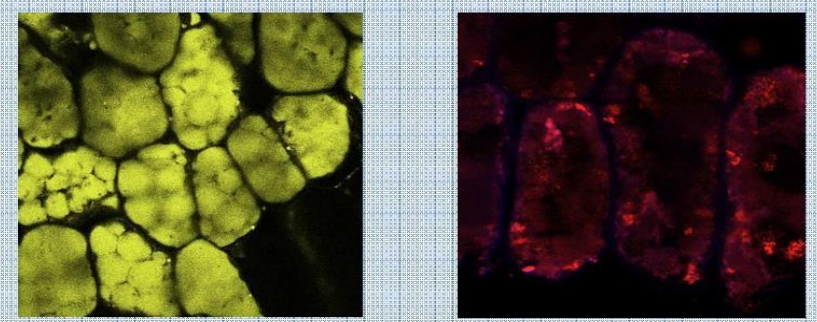

Figure 2. Confocal microscopy of mesocarp oil (left) and β-carotene (right)

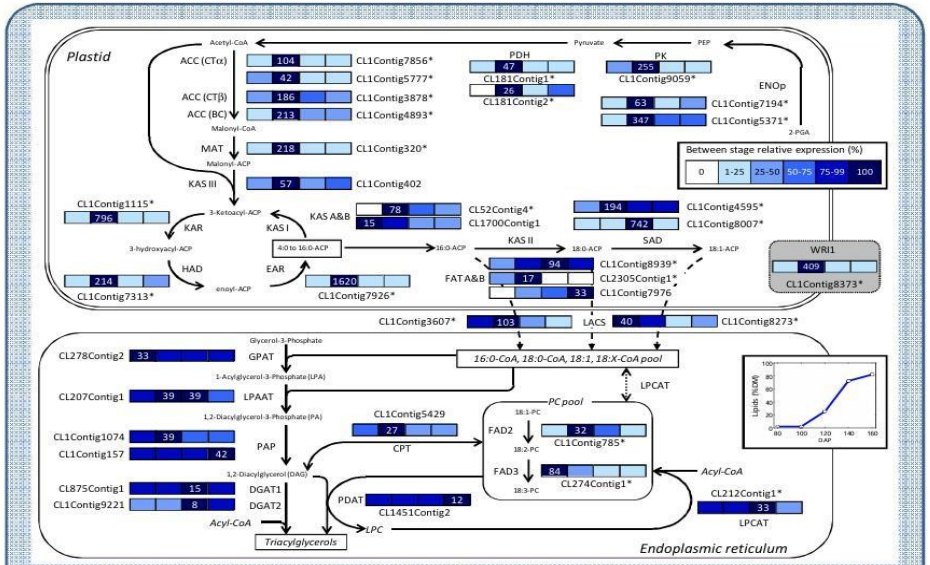

Figure 3. FA synthesis and TAG assembly in the oil palm mesocarp as reconstructed from the 454 pyrosequencing transcriptome. Gene expression levels at 100, 120, 140, 160 DAP are indicated with colored bars. *=significant differential expression

Oil biosynthesis

- The core FA synthetic machinery of the oil palm mesocarp is remarkably coordinated at the transcriptional level (Fig. 3)
- The transcription peak of FA biosynthetic genes coincided with the onset of oil accumulation
- A transcript encoding a transcription factor similar to WRINKLED1 Is highly expressed in the mesocarp during FA biosynthesis
- Canonical AW elements were found in several transcripts encoding enzymes involved in glycolysis and FA synthesis
- FA synthesis in the plastid and TAG assembly in the ER seem to be governed by two different transcriptional programs
- The last acylating step of TAG assembly may involve several complementary routes

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Abid Zulfikar

Corporate Planning &
Continuous Improvement

abid.zulfikar@bumitama.com

THANK YOU

Bumitama Gunajaya Agro

TOGETHER
WE CAN