



# MALAYSIAN OIL PALM BIOMASS

**Wan Asma I, Mahanim S., Zulkafli H., Othman  
S & Y. Mori**

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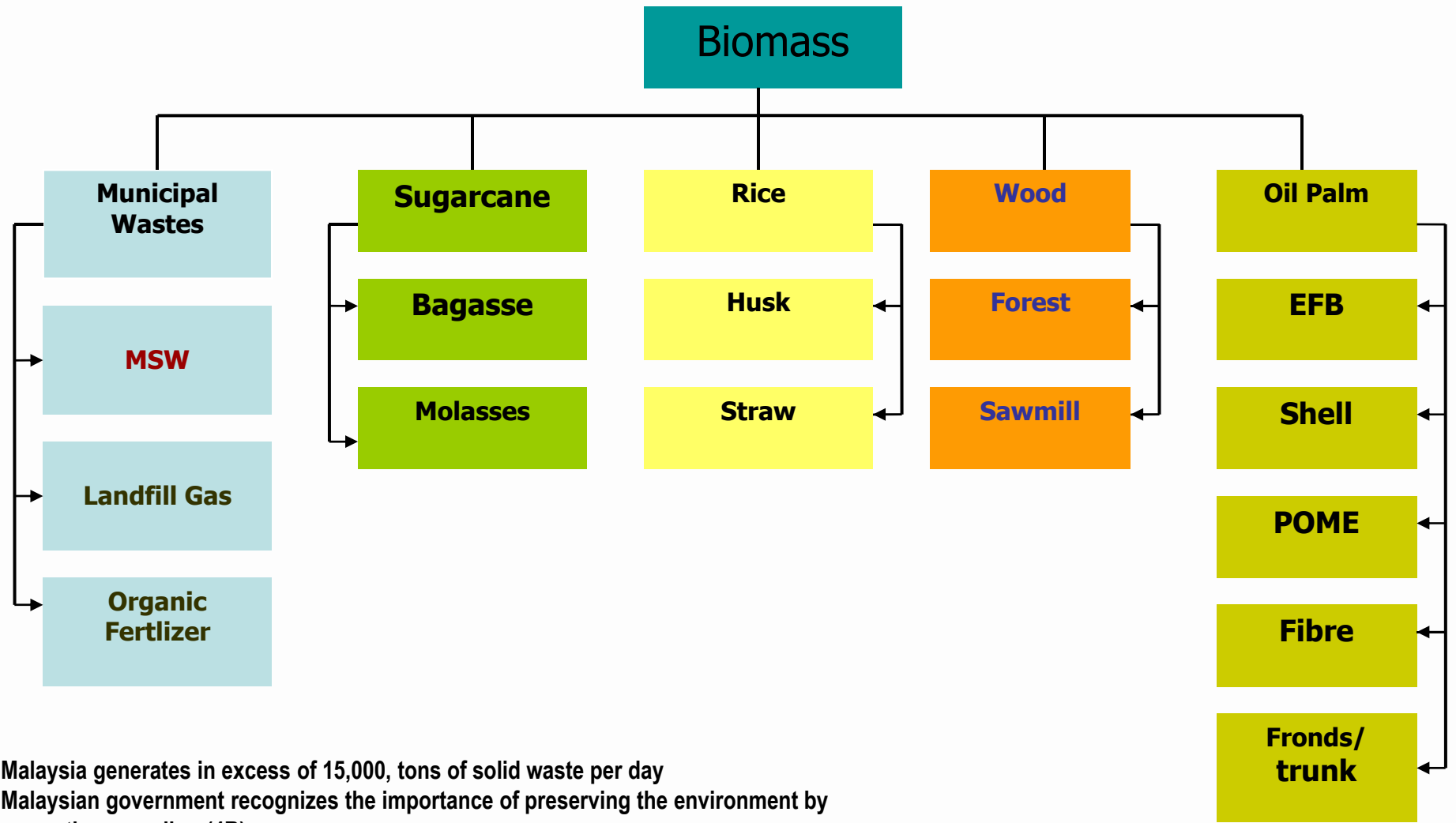
# Presentation Outline

- Introduction
- Malaysian Palm Oil Industry
- Biomass residues from palm oil industry & current uses
- Availability of Oil Palm Trunks
- Sap derived from OPT for bioethanol conversion
- Way forward

# Introduction

- Biomass – organic matter available on a renewable basis, including forest and mill residues, wood wastes, agricultural crops and wastes, animal wastes and Municipal waste
- Abundant in Malaysia : >15 million tonnes collected / year
- Production of biomass throughout the year – high sunlight intensity/time and high rainfall

# Types of Biomass in Malaysia



Malaysia generates in excess of 15,000, tons of solid waste per day  
 Malaysian government recognizes the importance of preserving the environment by promoting recycling (4R)

# Malaysian Palm Oil Industry

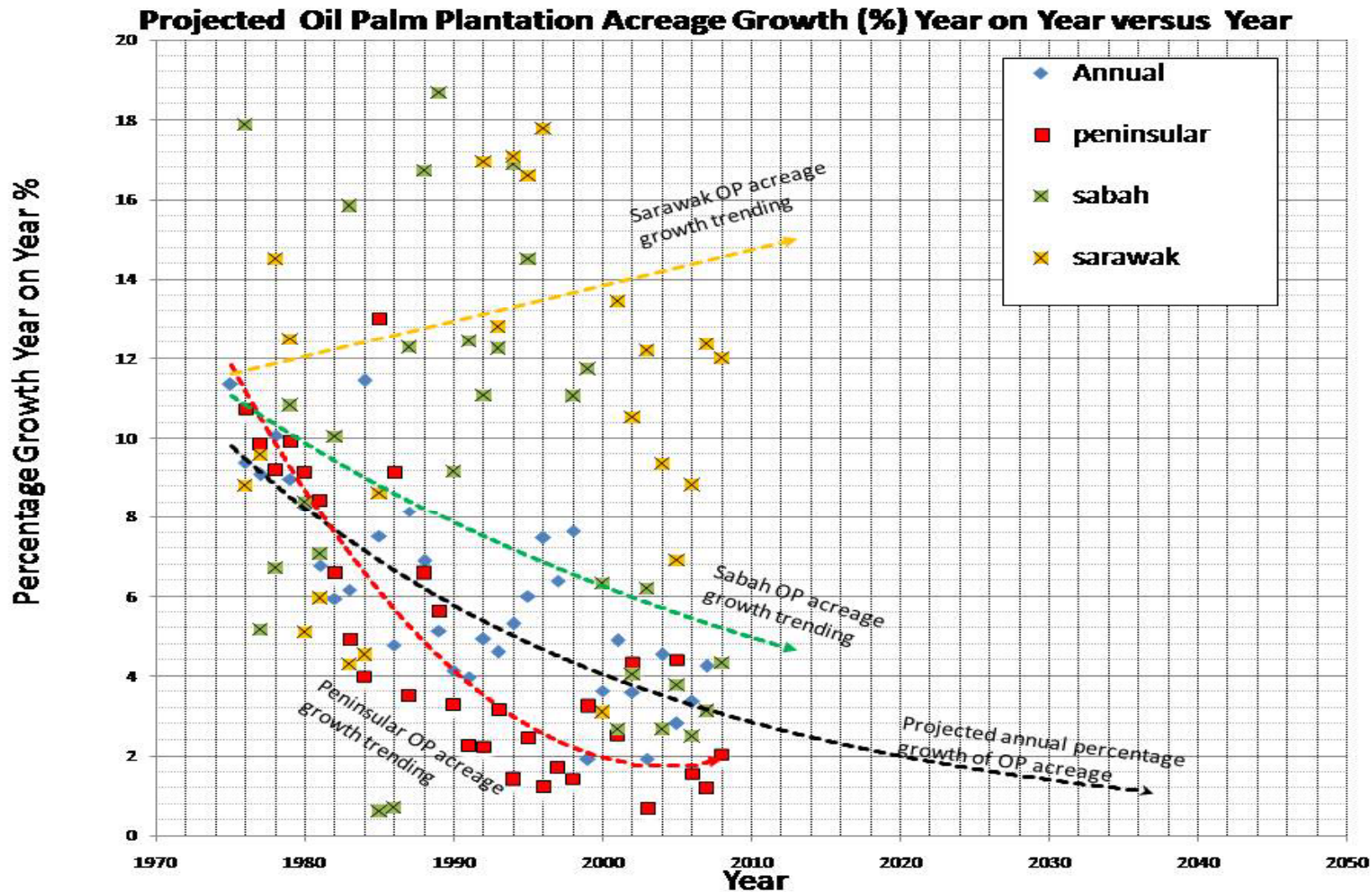
- 51% of world palm oil production
- Valued at USD6.14 billion (RM23.3 billion)
- Export to China, India, Netherlands & Pakistan
- Third contributor to GNP after oil and electronics

# Oil Palm Plantation

- Covers about 4.3 million ha
- 135-145 trees per ha
- 500,000 people engaged in this sector
- Covers about 67% agricultural of land

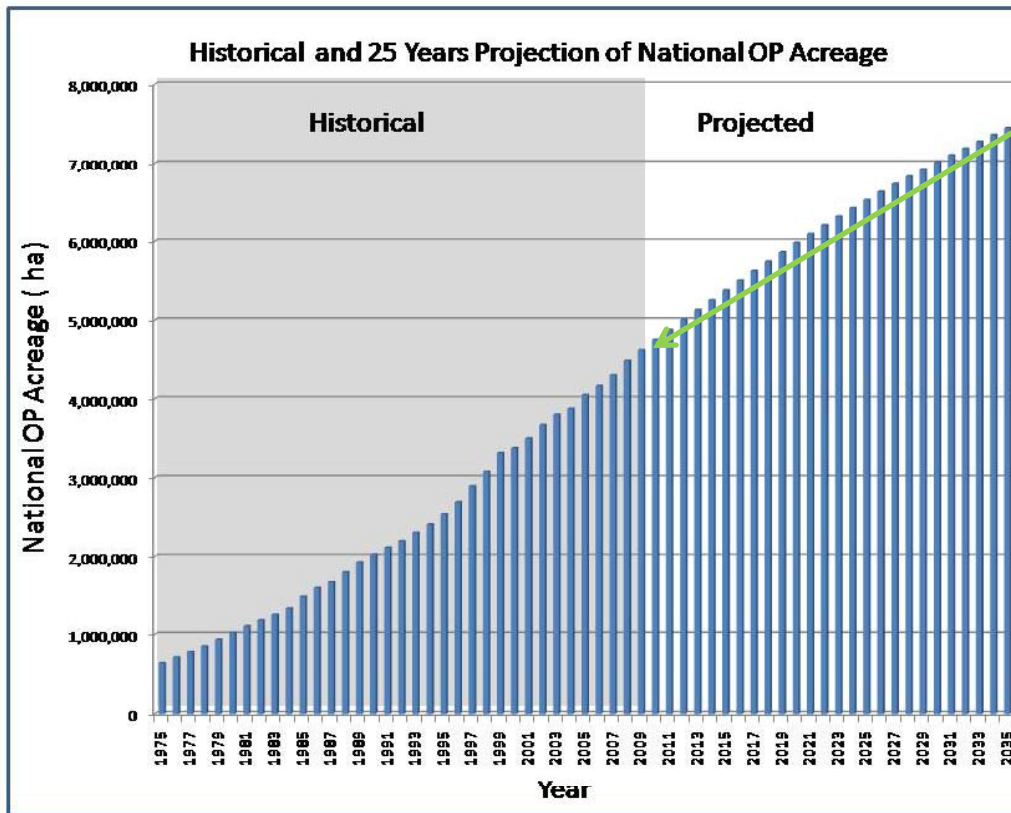


# Oil Palm Plantation Growth Trends



# Oil Palm Acreage Growth

The forecasted annual OP acreage growth rates were utilised to simulate the projected OP acreage for the next 25 years until 2035 as seen on the figure x below.



Year	Projected Year on Year Acreage Growth Rate based on Exponential Fit (%)	National OP Simulated Acreage (Ha)
2008	4.25	4,487,957
2009	3	4,622,596
2010	2.8	4,752,028
2011	2.7	4,880,333
2012	2.6	5,007,222
2013	2.5	5,132,402
2014	2.4	5,255,580
2015	2.4	5,381,714
2016	2.3	5,505,493
2017	2.2	5,626,614
2018	2.1	5,744,773
2019	2.1	5,865,413
2020	2	5,982,722
2021	1.9	6,096,393
2022	1.8	6,206,128
2023	1.8	6,317,839
2024	1.7	6,425,242
2025	1.6	6,528,046
2026	1.6	6,632,495
2027	1.5	6,731,982
2028	1.4	6,826,230
2029	1.4	6,921,797
2030	1.3	7,011,780
2031	1.3	7,102,933
2032	1.2	7,188,169
2033	1.2	7,274,427
2034	1.2	7,361,720
2035	1.2	7,450,060



# Old Trees to be Felled for Replanting





# After felling

OPT's are

- Shredded and left to biodegrade in the fields as mulch (nutrient recycling)
- Sold to interested parties (cost RM8-18 per trunk)
- Emerging industries
  - Plywood
  - Palm flooring (floor ply)
  - Furniture (laminated lumber)



# Plywood from oil palm trunk



MS ISO 9001:2000

# Current industrial uses of OPT

- Plywood manufacture



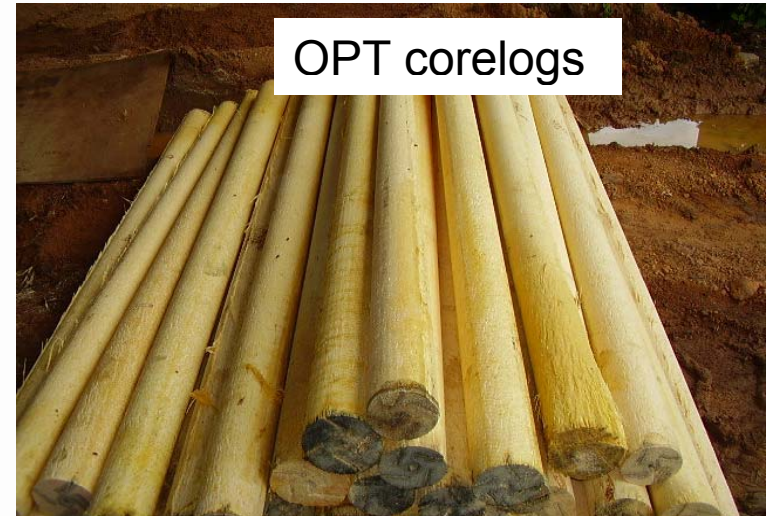
# OPT Plywood mill residues



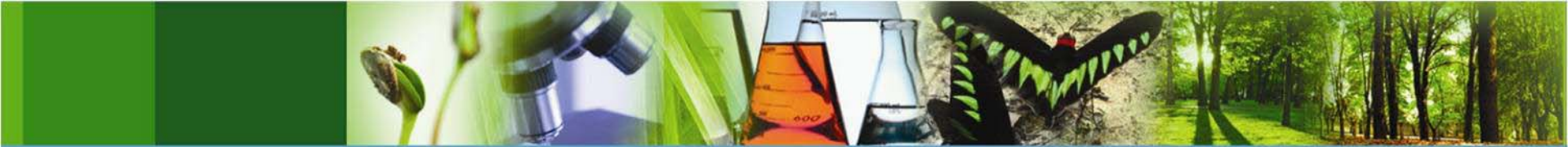
Veneer waste



OPT end cuts



OPT corelogs



# Oil Palm Trunks



Generated every >25 years cycle during replanting

Cannot be used as timber as is.

Current utilization- plywood manufacture which uses only 40%

Highly susceptible to degradation agents

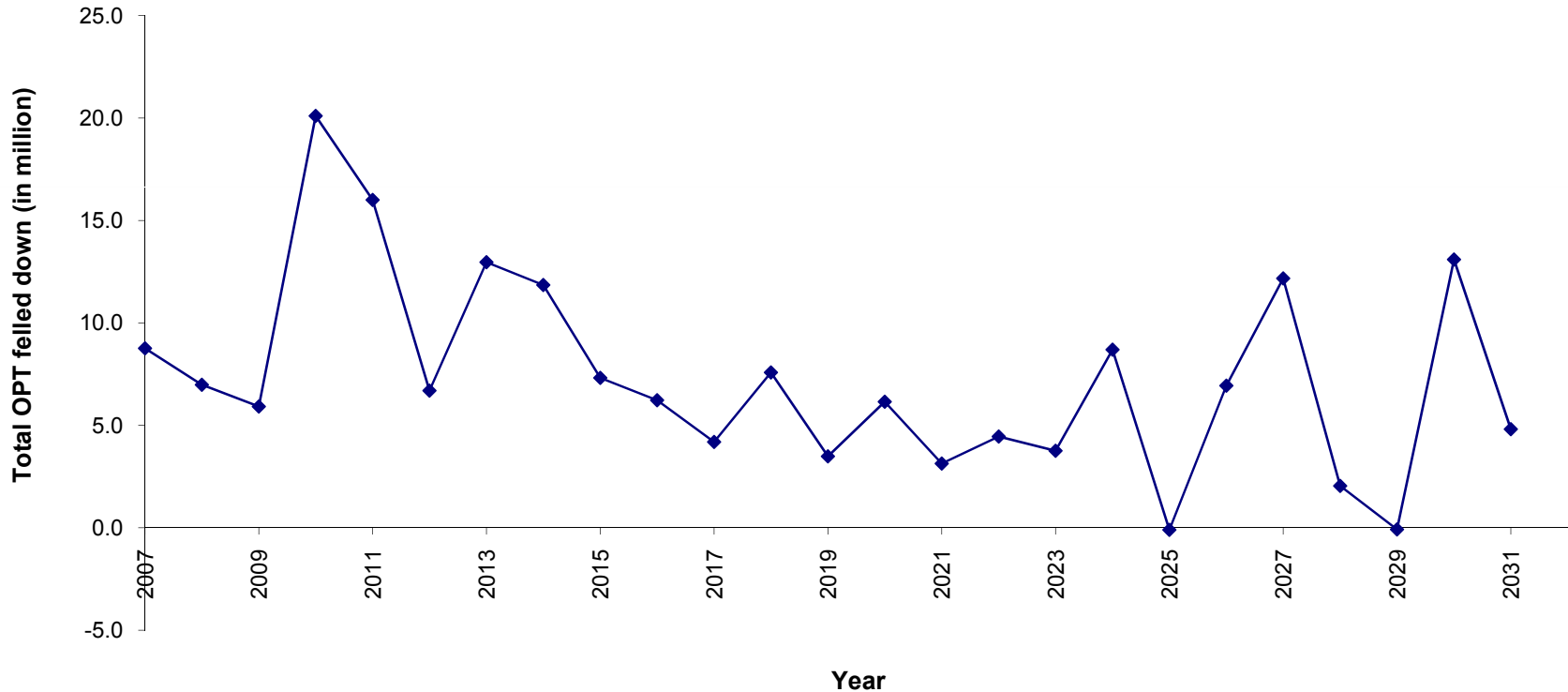
High moisture content

**BIOFUEL POTENTIAL**

**Contains sap that can be converted into bioethanol**

# No of trees available for felling based on secondary data (2006)

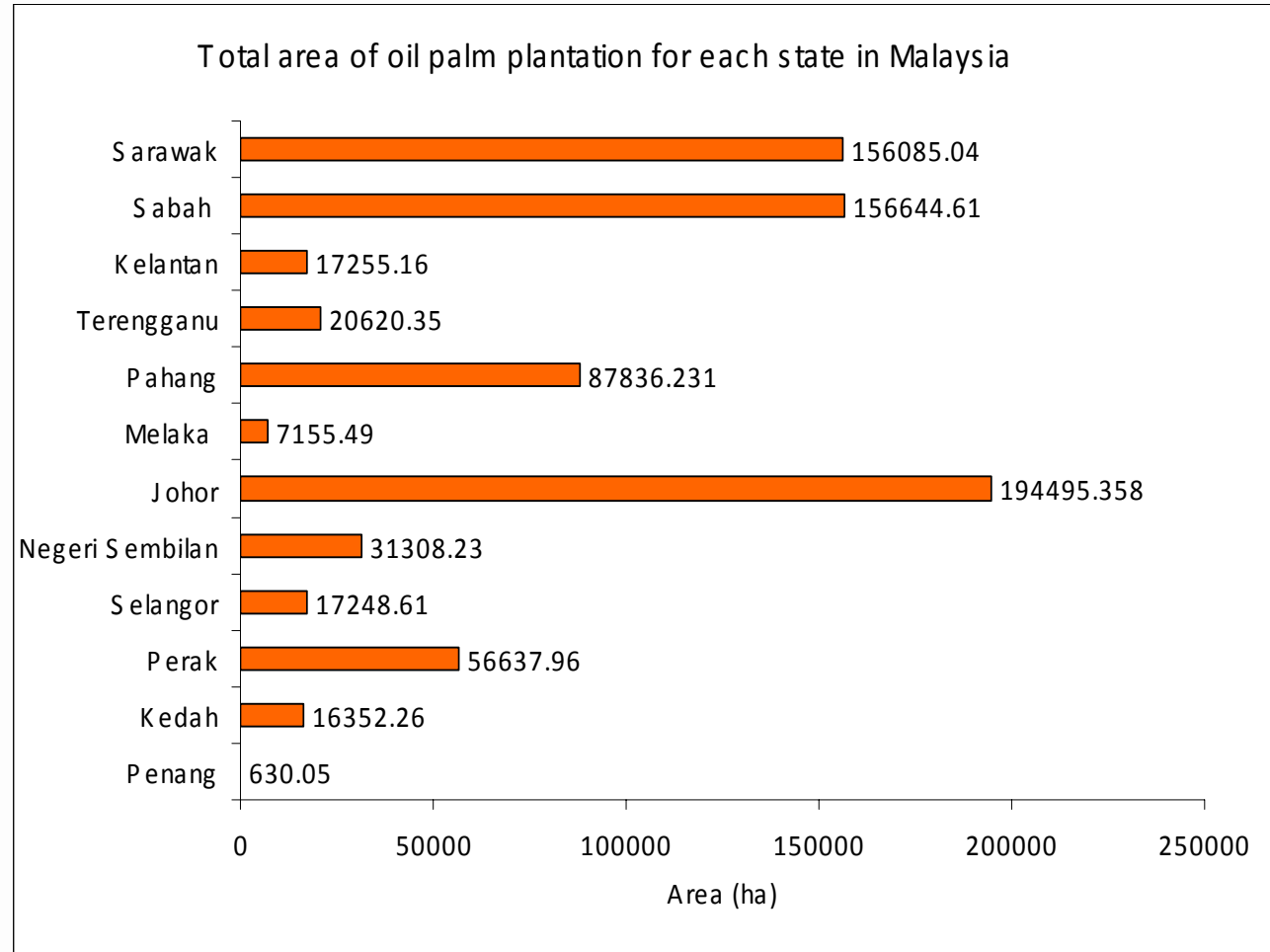
Outlook OPT felled down in Peninsular Malaysia for 25 years



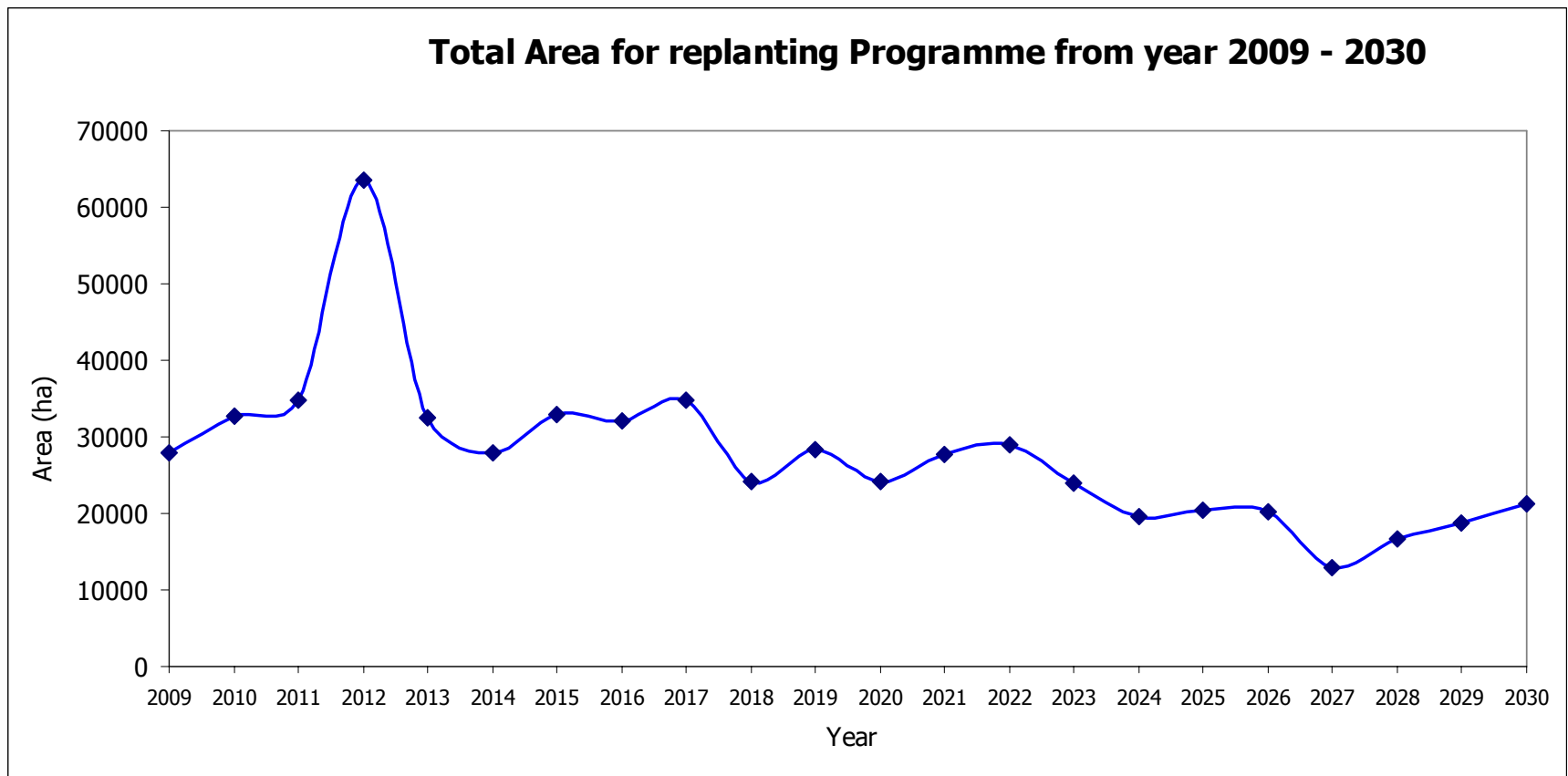


# Availability of OPT (based on survey)

- Survey and outlook of the amount of oil palm trunks felled down by major plantation companies.
- 925 questionnaires forms have been mailed out based on 50% sampling of the total number of oil palm plantations in Malaysia. (MPOA database)
- 32% (293) feedbacks have been received.
- Total area surveyed 762,269.35 ha



# Outlook for actual replanting

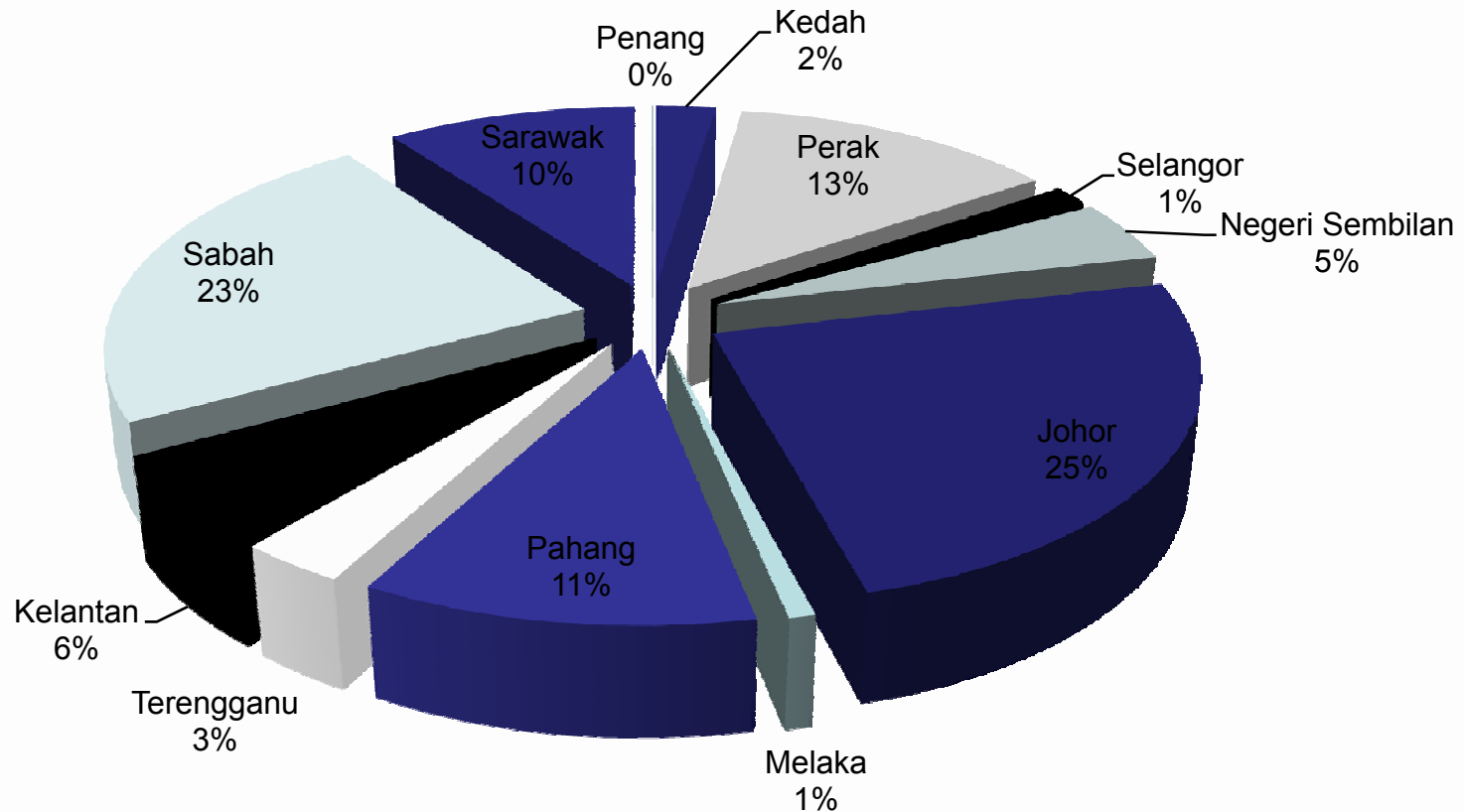


Year 2012 63,473.36 ha x 136 trees/ha = 8,632,376 OPTs available

Annual average = 27,554.8 ha = 3,747,452.8 OPTs available next 21 years (15.8 million OPTs based on secondary data)

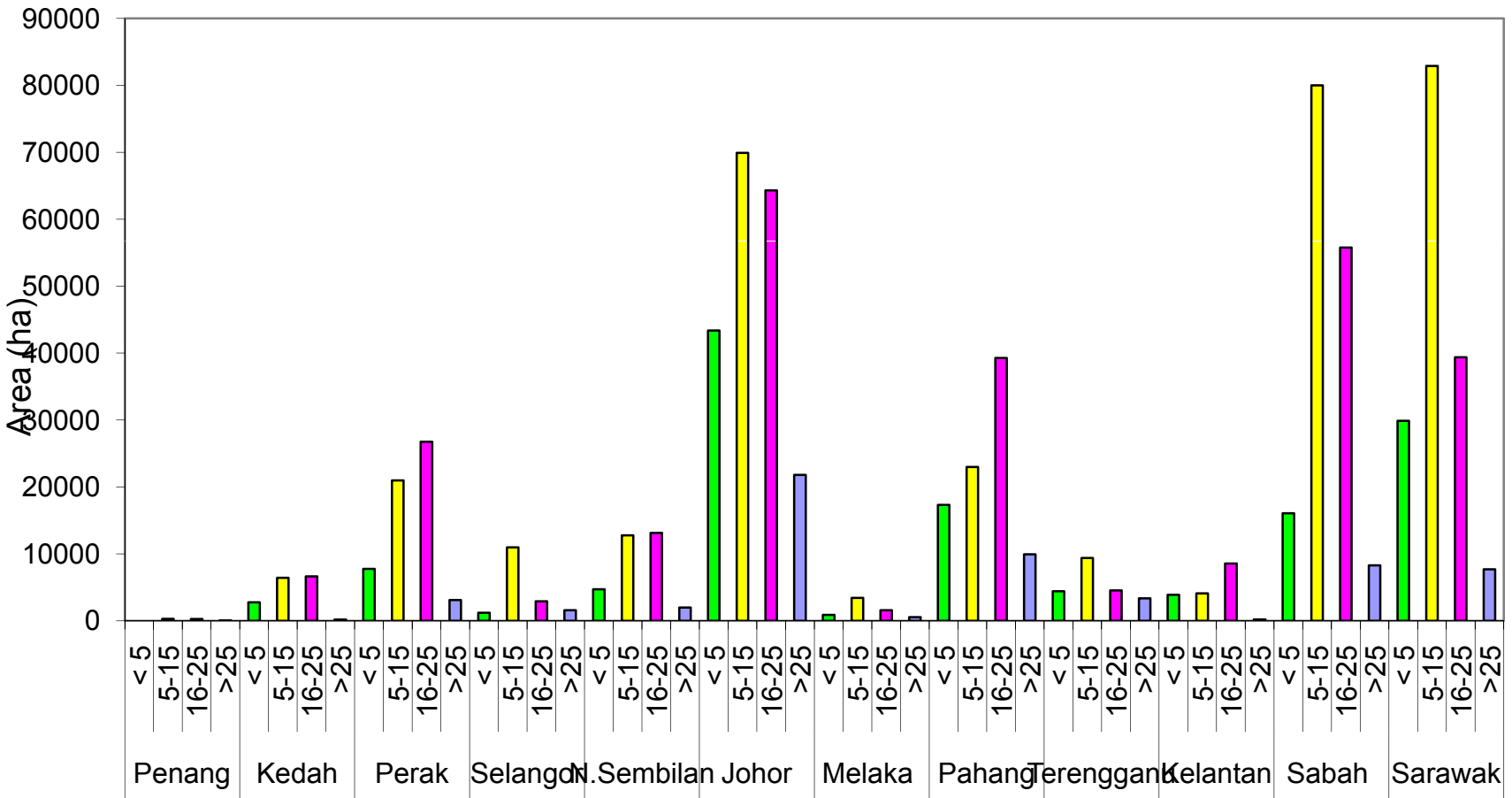
# Replanting area by states

Total area of replanting programme for each state in Malaysia



# Age of palm trees standing by states

Average no. of palm tree area planted (ha) for each state



# Process technologies



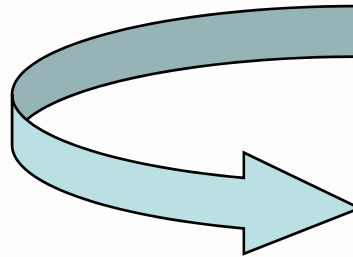
OPT & OPT core



Peeling, Shredding, squeezing



Sap

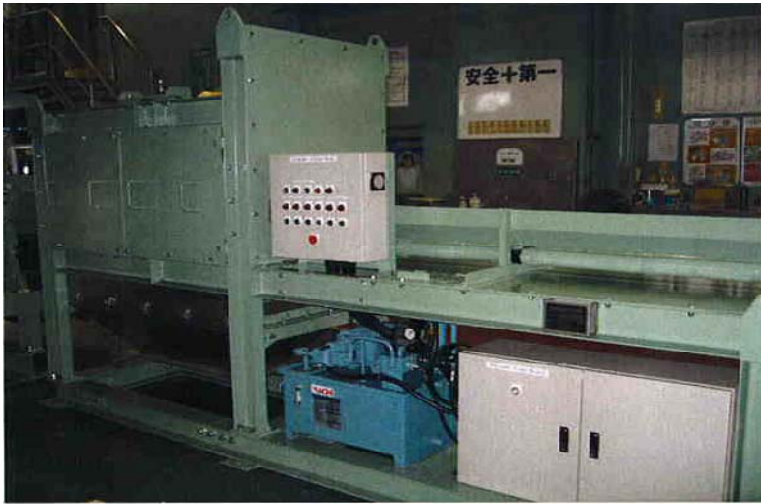


Fermentation

Bioethanol



# Prototype Shredding machine

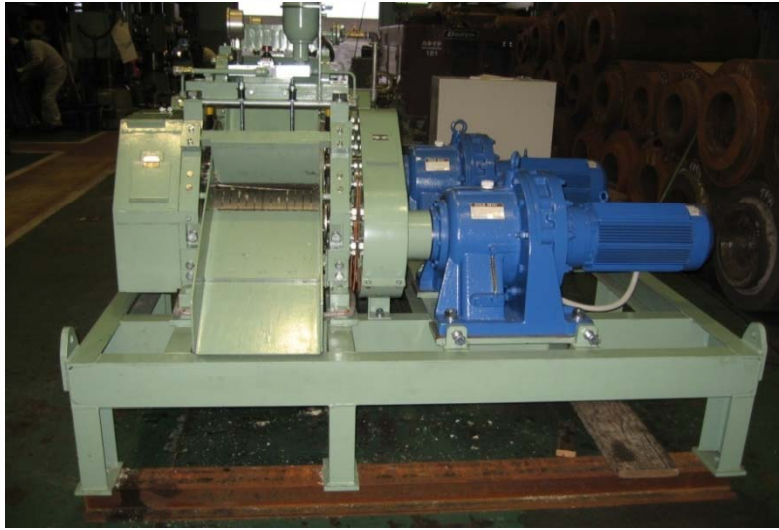


Capacity; 550 kg/h



Shredded oil palm trunk

# Prototype Squeezer



Specs:

3 roller hydraulic press

Size of roller:  $\phi$ 240mm, 340 w

Capacity: 500kg/h

7.5kw x 2 (AC415Vx50Hz)

8RPM variable

2450 x 2030W x 1800H



MS ISO 9001:2000

# Bioethanol

- One trunk produces about 200-250 L sap
- Sugar content 8% (18% with proper aging)
- Sugar can be further fermented into ethanol





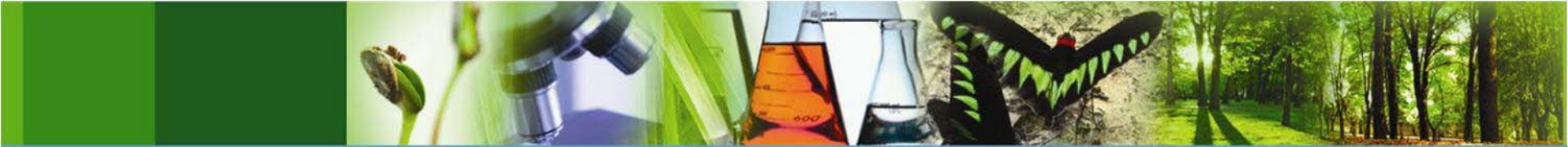


# WAY FORWARD

- OPT as potential feedstock for second generation biofuels

## Hurdles:

- Financing
- Scale of production
- Logistics - Collection & Processing & Plant location



# THANK YOU



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