

# Tropical Horticulture: Lecture 24

## Lecture 24 Tropical Oil Palms

Palm family = Palmae =  
Areaceae  
Over 4000 species



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Oil palm, *Elaeis guineensis*  
Originates to west and  
central Africa

### Tree

An unbranched monoecious  
palm; 40–50 leaves  
(24/year), 10–11m at 25 to  
35 years.

### Fruit

A drupe with fleshy  
mesocarp and hard  
endocarp which surround  
1, usually 2, and  
occasionally 3 seeds.



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The oil of the mesocarp is orange red = palm oil. This is  
the most important product.

The oil of the seed is colorless = palm kernel oil.

Ratio of palm oil to palm kernel oil is about 10:1,  
90% of all palm oil is used for food.

Palm kernel oil, similar to coconut oil is fractionated or  
hydrogenated for use in confectionery.

Also used for industrial purposes either as an  
alternative to coconut oil in the manufacture of high-  
quality soaps or as a source of short chain and  
medium chain fatty acids.

These are used as intermediates in the manufacture of  
fatty alcohols, esters, amines, amides, and more  
sophisticated chemicals which have a multitude of  
end-uses.

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In Brazil palm oil is known as dende and is slightly red; imparts a special flavor to cooking.

Fruit bunches contain 500–4000 fruits (up to 30 g/fruit). Fruits take 5–6 months to mature. Palm oil is 70–75% oil, source of glycerin. Residue is used for cattle feed. The shell is used as fuels for the mill.

From 1968 to 1978 production increased 10% per year, 94% came from Malaysia and Indonesia.

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20-year-old oil palm harvested with sickle attached to aluminum pole.



Staminate inflorescence at anthesis.



Receptive pistillate inflorescence.



Four year old palm harvested with a chisel.

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**Fatty Acid Composition of Palm Oils**

Fatty acid	No. of carbons	Composition (%)	
		Palm oil	Kernel oil
caprylic	8		3
capric	10		6
lauric	12		50
myristic	14	1	16
palmitic	16	50	6
stearic	18	3	1
oleic	18:1	40	17
linoleic	18:2	6	1

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**Oil Palm Production (2001)**

Continent	1000 tonnes		Chief countries (palm oil)
	Palm Kernel	Palm Oil	
World	4,353	118,794	
Africa	723	15,080	Nigeria (8,000), Ivory Coast (1,771), Ghana (1,050)
North America	52	1,854	Costa Rica (650), Honduras (620), Guatemala (295)
South America	356	5,159	Columbia (2,550), Ecuador (1,540), Brazil (388)
Asia	3,149	95,543	Malaysia (56,600), Indonesia (34,750), Thailand (3,343)
Oceania	72	1,158	Papua New Guinea (1,030), Solomon (128)

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**Ecology**

Requires 24–28°C; lowland equatorial, to 500 m.

Moisture must be sufficient to insure the absence of stress.

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**Propagation**

Seed propagation—nut is enclosed in polyethylene and exposed to 38–40°C; Modern plantations use hybrid seed.

Tissue culture—asexual embryos form from roots and allows clonal propagation but there have been problems with somaclonal variation.

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**Fruit Types**

A particular feature of the oil palm with considerable economic consequences is the occurrence of three natural fruit types under monogenic control, which form also the basis for the classification of oil palm.

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**Dura**

Homozygous (*Sh Sh*) for a relatively thick endocarp (shell 2–8 mm), 25–55% of fruit

Mesocarp = 35–65%

Kernel = 7–20%



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**Tenera**

Heterozygous (*Sh sh*) with a relatively thin endocarp (0.5–4 mm), 1–32%

Mesocarp = 60–95%

Kernel = 3–15%



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**Pisifera**

Homozygous (*sh sh*) for the absence of an endocarp; is sterile.



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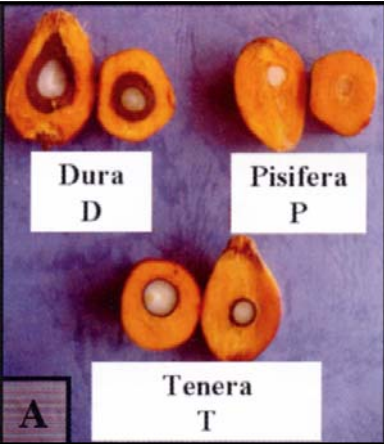
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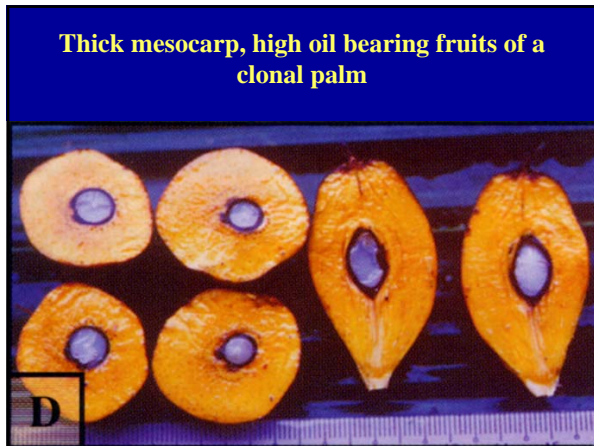
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Thick shelled dura as seed parent  $\times$  shell-less pisifera as pollen parent produces thin shelled tenera

$Sh Sh \times sh sh \rightarrow Sh sh$

Oil yields can be very high, up to 4.5 t/ha (2 tons/acre)  
—now 4.8–7.0 t/ha oil

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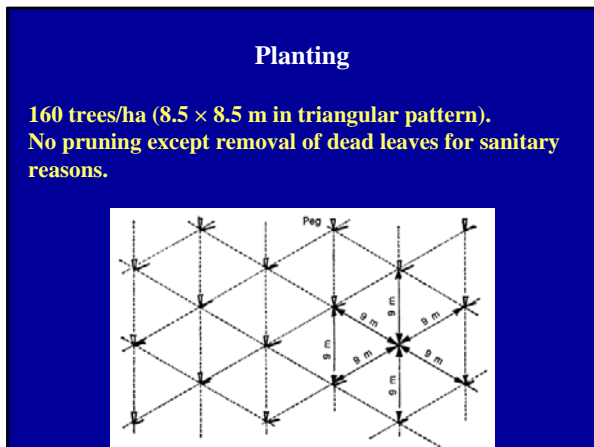
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## Harvest

Throughout the year after the 3rd year.  
Cut by hand.  
Production is usually 30 t/ha of bunches.



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## Uses

The mesocarp produces one product, palm oil.  
The palm kernel produces both oil and high protein cake (used as feed stock).  
The future is bright for palm oil because it is the highest yielding oil crop.  
Potential energy crop if oil yields of 12 t/ha/year can be achieved.  
The only problem at present is that high saturation of palm oil makes it “unhealthy” compared to such alternatives as canola oil produced in temperate areas.  
However palm oil is much cheaper and is still widely used.

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Oil palm, Brazil

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Tropical Horticulture: Lecture 24



African oil palm

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African oil palm

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Precocious high yielding clonal palm or ramet

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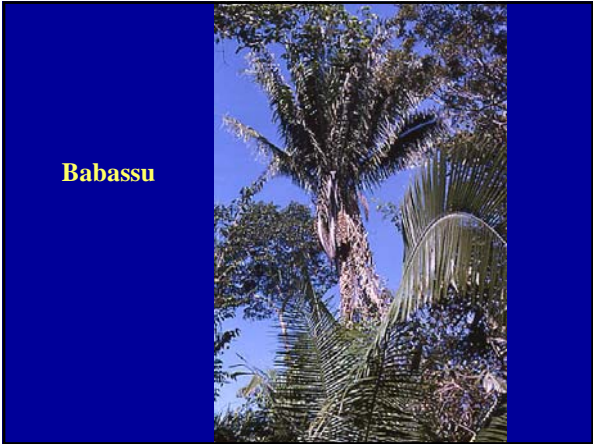
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