

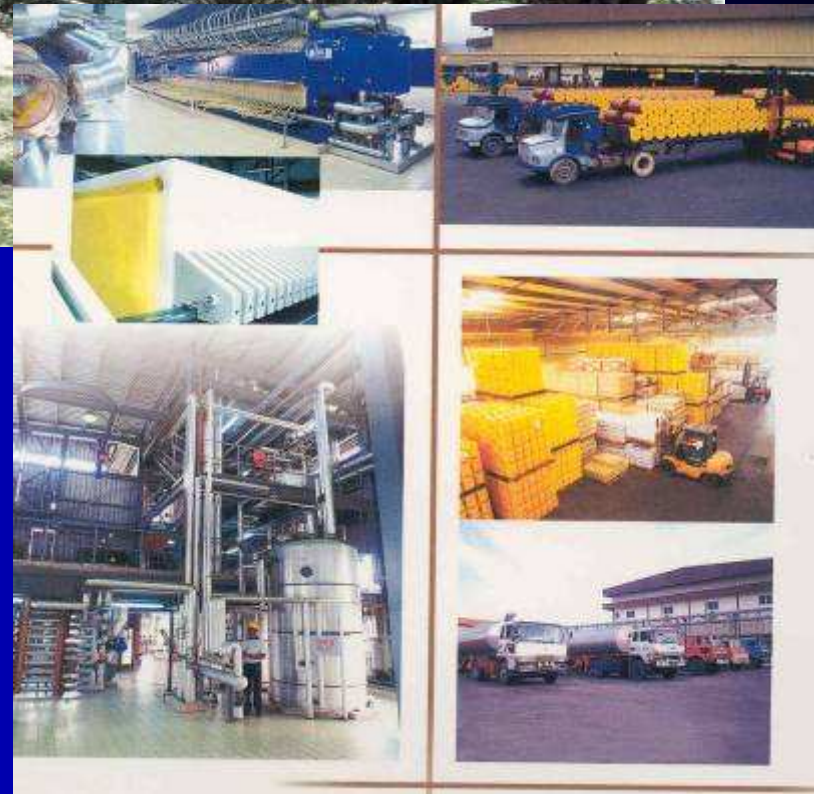
Palm oil and fractions

WAI-LIN, SIEW
and JOHARI MINAL
MPOB

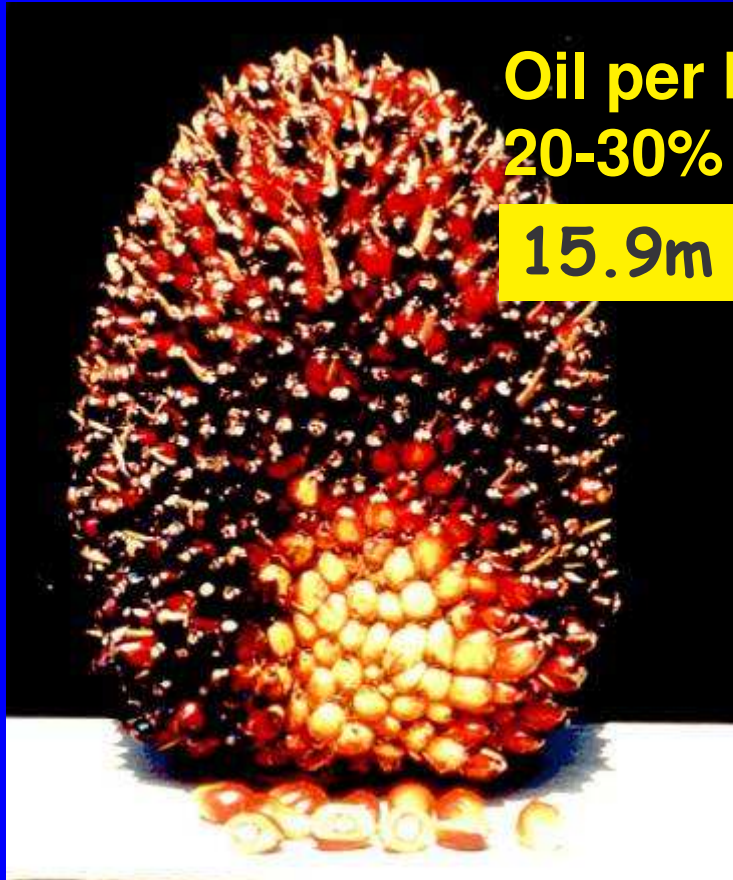


OFI Middle East 2007

**PALM OIL INDUSTRY-RM31.8b,
PLANTED AREA OF 4.17m hectares,
production of 15.9 m tonnes oil.**



Oil Palm Bunch



Oil per bunch
20-30%

15.9m tonne CPO

Bunch weight 20-30 kg



Fruit spiklets

1.95m tonne PKO



Kernels

The PALM OIL option

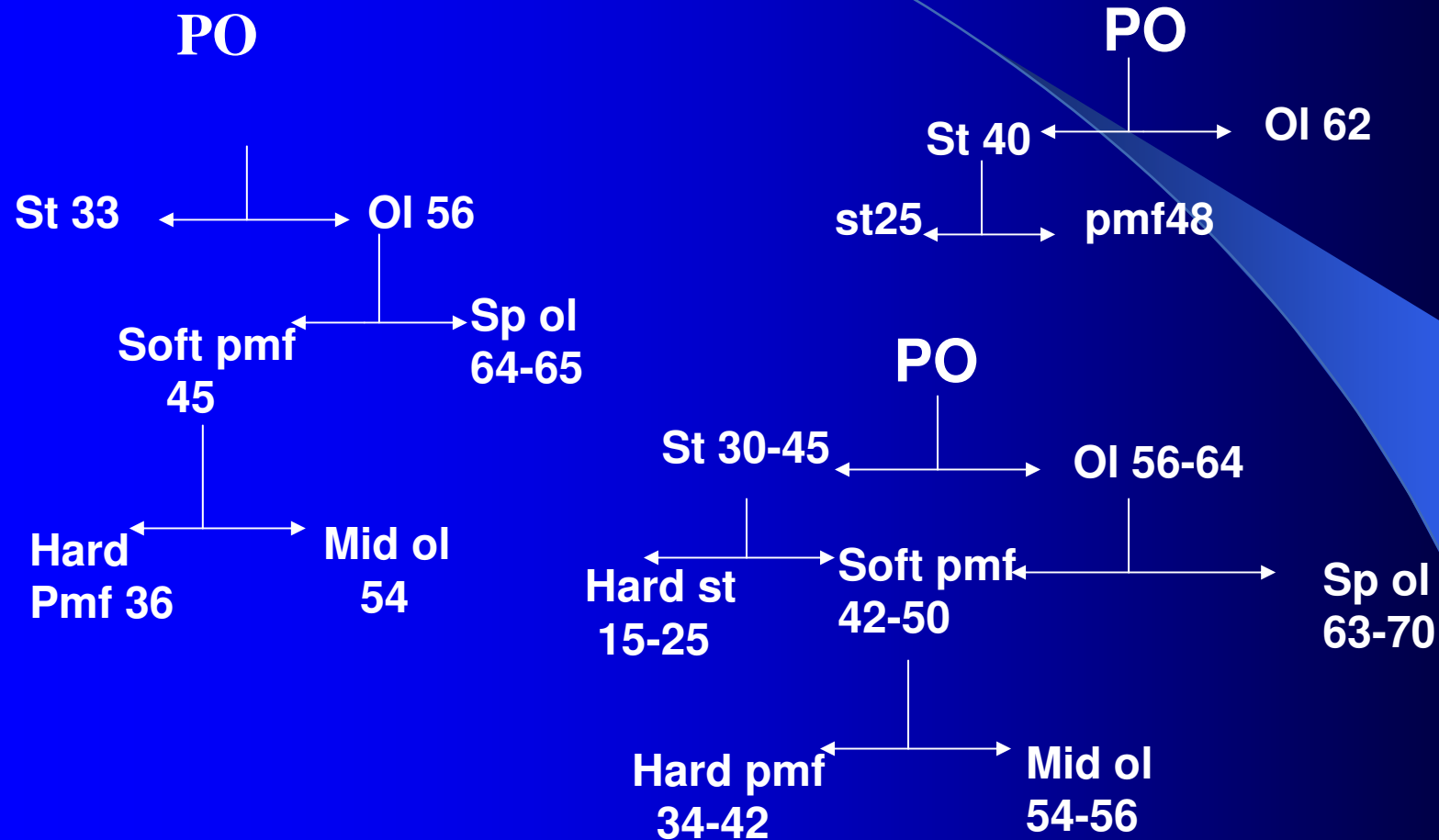
- Versatility
- Cost effectiveness
- Wide range of products
- 20% solids at 20C-suited for formulation of plastic fat products
- Nutritive value

PALM OIL- A BALANCED OIL

- 50% UNSATURATED
- 50% SATURATED



Fractionation of palm oil



Source:Kellen, M,

FATTY ACID COMPOSITION OF PALM OIL PRODUCTS

Fame	Palm Oil	Palm Olein	Super Olein	Palm Stearin
C12:0	0.2	0.2	0.3	0.1-0.3
C14:0	1.1	1.1	1.0	1.1-1.7
C16:0	44.0	40.9	35.4	49.8-68.1
C18:0	4.5	4.2	3.8	3.9-5.6
C18:1	39.2	41.5	45.1	20.4-34.4
C18:2	10.1	11.6	13.4	5.0-8.9
C18:3	0.4	0.3	0.3	0.1-0.5
C20:0	0.4	0.2	0.3	0.3-0.6

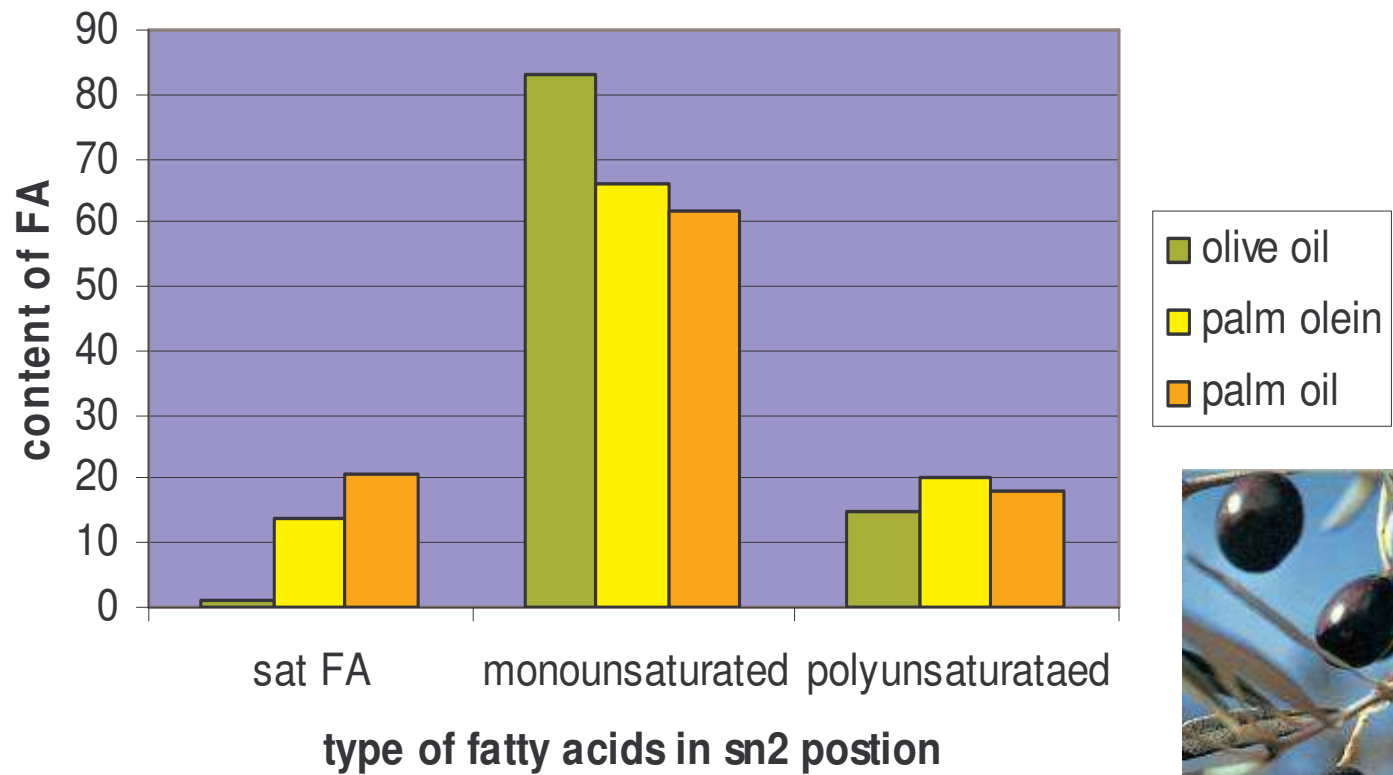
Positional distribution of fatty acids in palm oil and palm olein

	Sat FA	oleic	linoleic
Palm oil			
sn -2	20.6	61.9	17.5
Position 1,3	70.5	25.2	4.3
Palm olein			
sn-2	13.7	66.3	19.9
Position1,3	72.9	23.8	3.3

Total and positional distribution of fatty acids in PMF

Fatty acids	Sat FA	oleic	linoleic
total	56.5	36.6	6.6
Sn-2	20.8	65.1	14.0
Position 1,3	74.7	22.3	2.9

Comparison of palm oil and palm olein with olive oil



Triacylglycerol composition of palm oil

TAG	wt%	TAG	wt%	TAG	wt%	TAG	wt%	TAG	wt%
All 0 db	7.4	All 1 db	36.8	All 2 db	34	All 3 db	16.1	All>3 db	5.6
PPP	5.1	MOP	0.9	POO	20.3	OOO	4.4	LOO	1.8
PPSt	1.2	POP	23.7	StOO	2.4	POL	4.1	OLO	1.2
PStP	0.3	POSt	5.7	OPO	1	PLO	5.6		
		PPO	4.4	PLP	6.5				
		PStO	0.2	StLP	1.6				

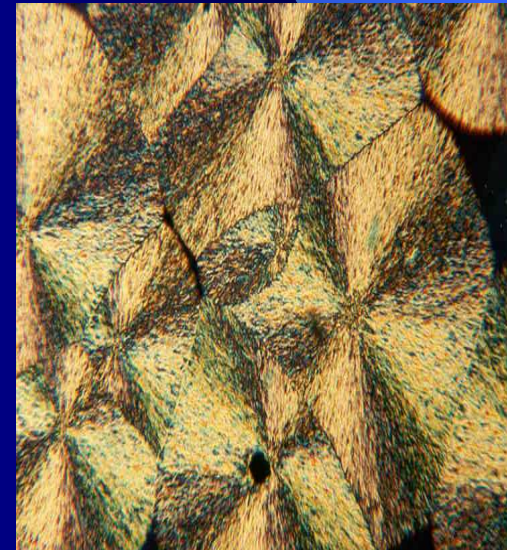
TRIGLYCERIDES OF PALM OIL PRODUCTS(C No.)

C. No	Palm Oil	Palm Olein	Super Olein	Palm Stearin
C46	0.8	0.8	0.2	3.1
C48	7.4	3.3	1.9	23.7
C50	42.6	39.5	30.8	40.3
C52	40.5	42.7	53.4	25.3
C54	8.8	12.8	13.6	6.9
C56	-	0.7	0.2	0.5

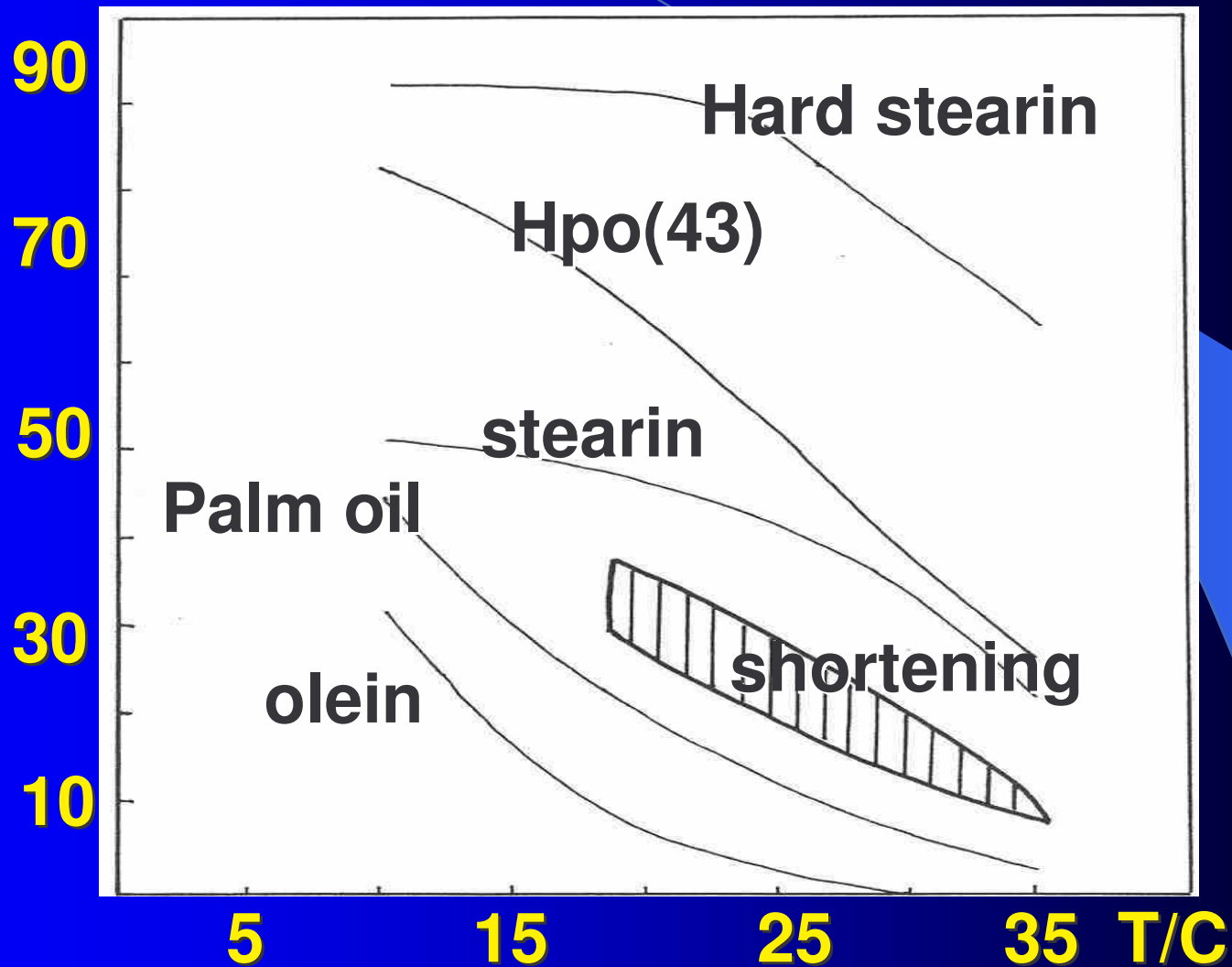
Two important physical properties of palm oil

SOLID FAT CONTENTS

POLYMORPHISM

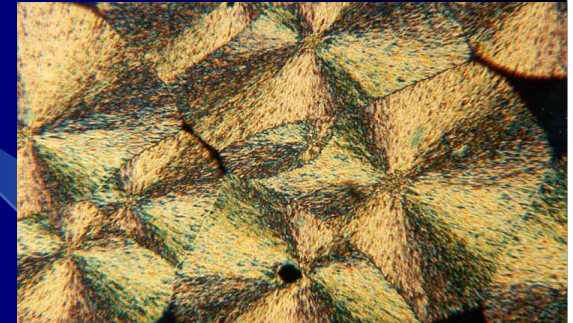
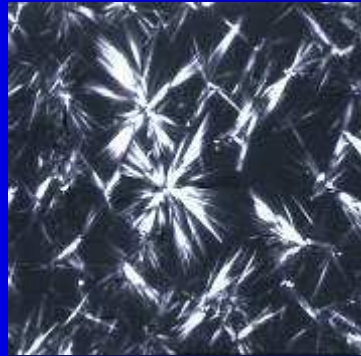


Solid fat contents of palm oil products



Morphology of Crystals

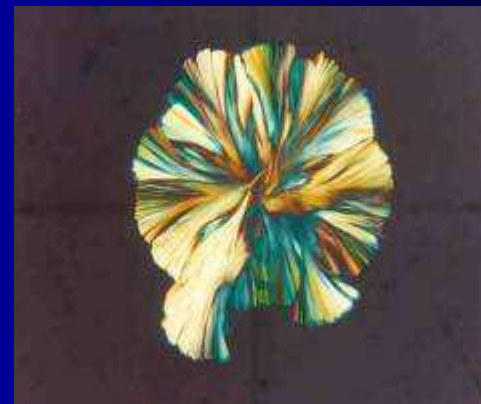
α Small



β' Small, $\approx 5 \mu\text{m}$, needle-like

β large, coarse, as large as $50 \mu\text{m}$ or more, dense, flat

β' TENDING



Palm oleins



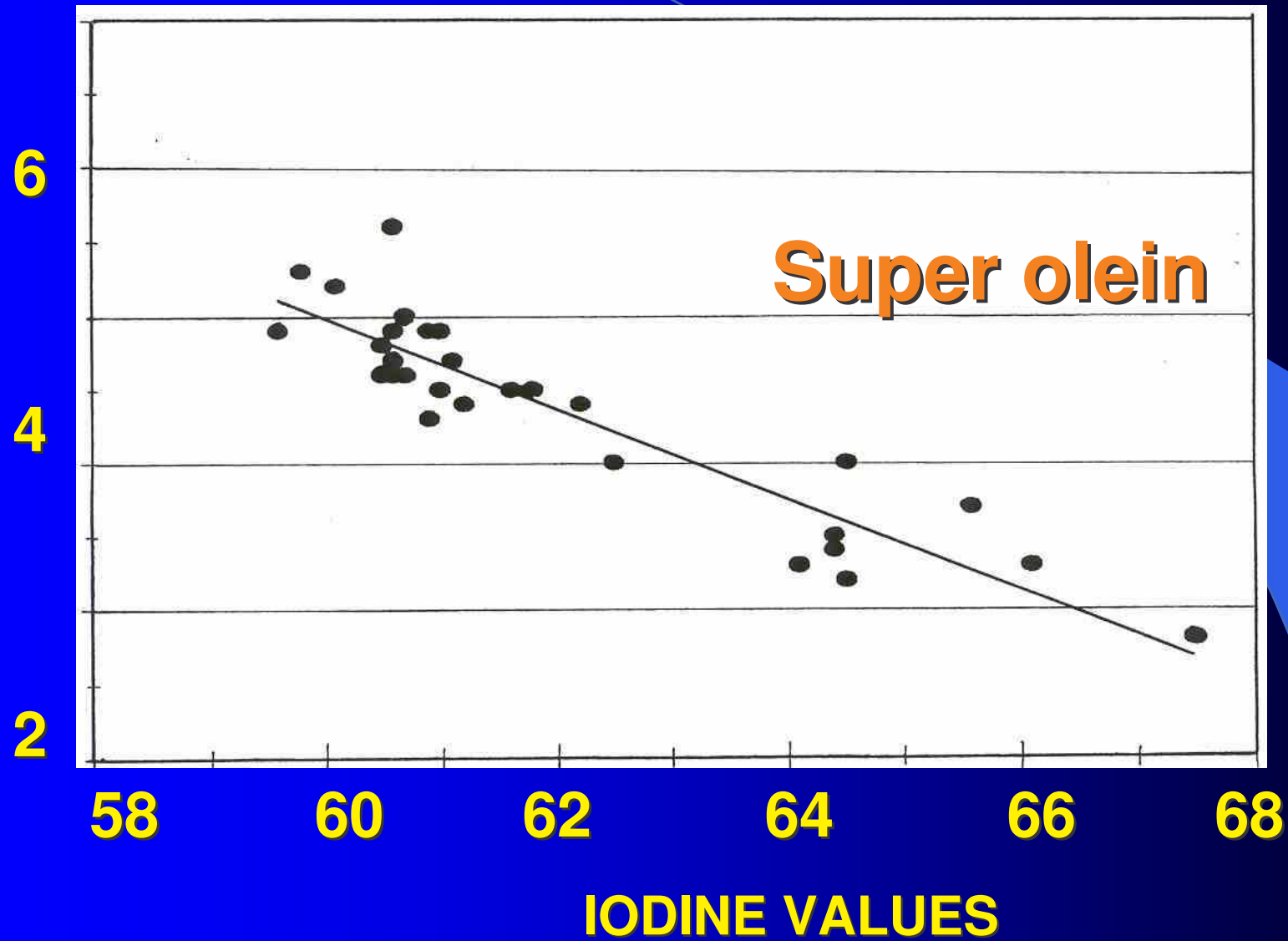
TWO TYPES

- IV 56 – 60
- IV >60

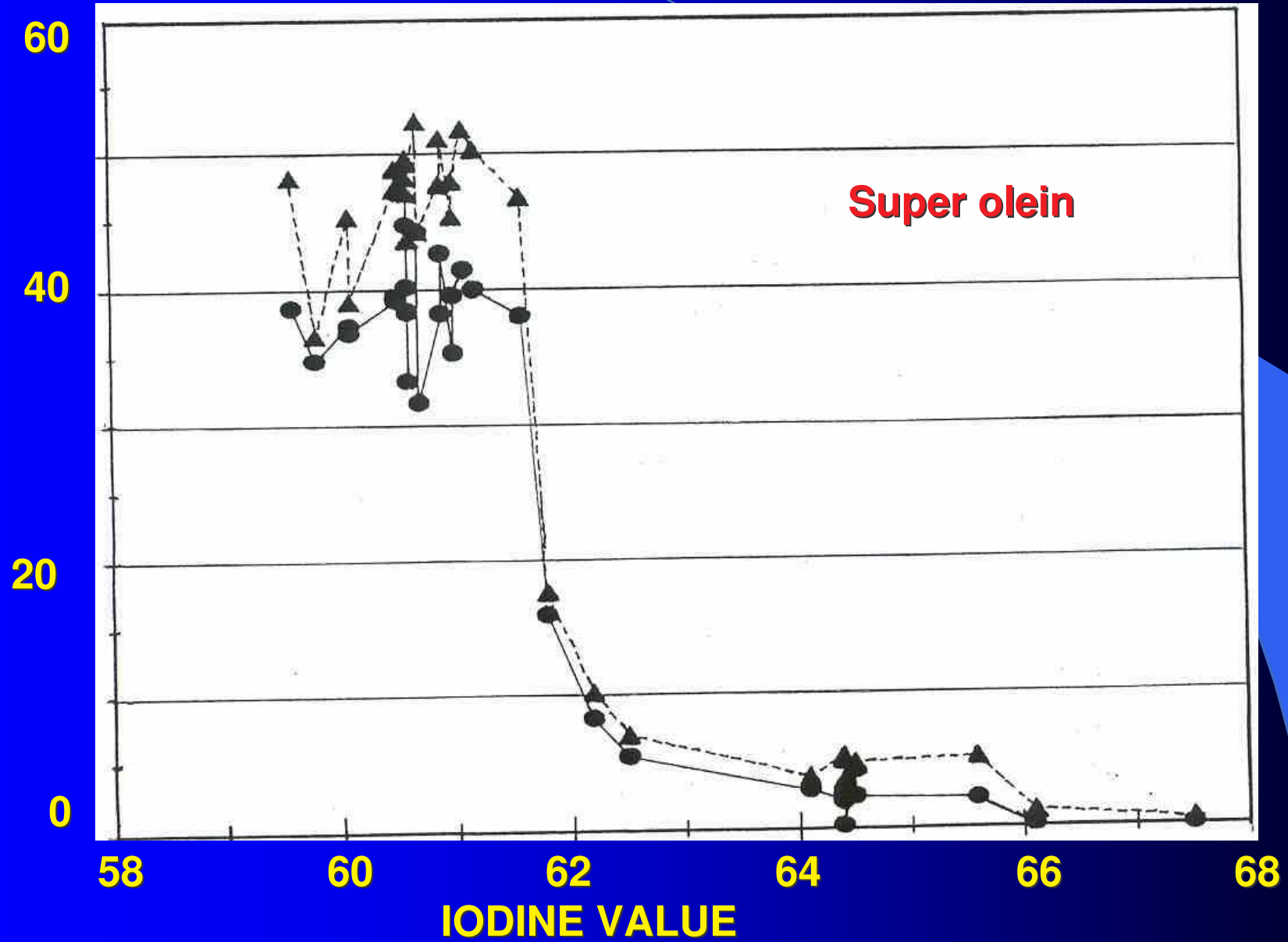
Fatty acid composition(wt%) of palm olein

IV	C14	C16	C18	C18-1	C18-2
<60	1.0	37.9	4.1	43.4	12.5
60-64	1.0	34.8	3.8	45.5	14.2
>65	1.0	30.8	3.6	47.9	15.4

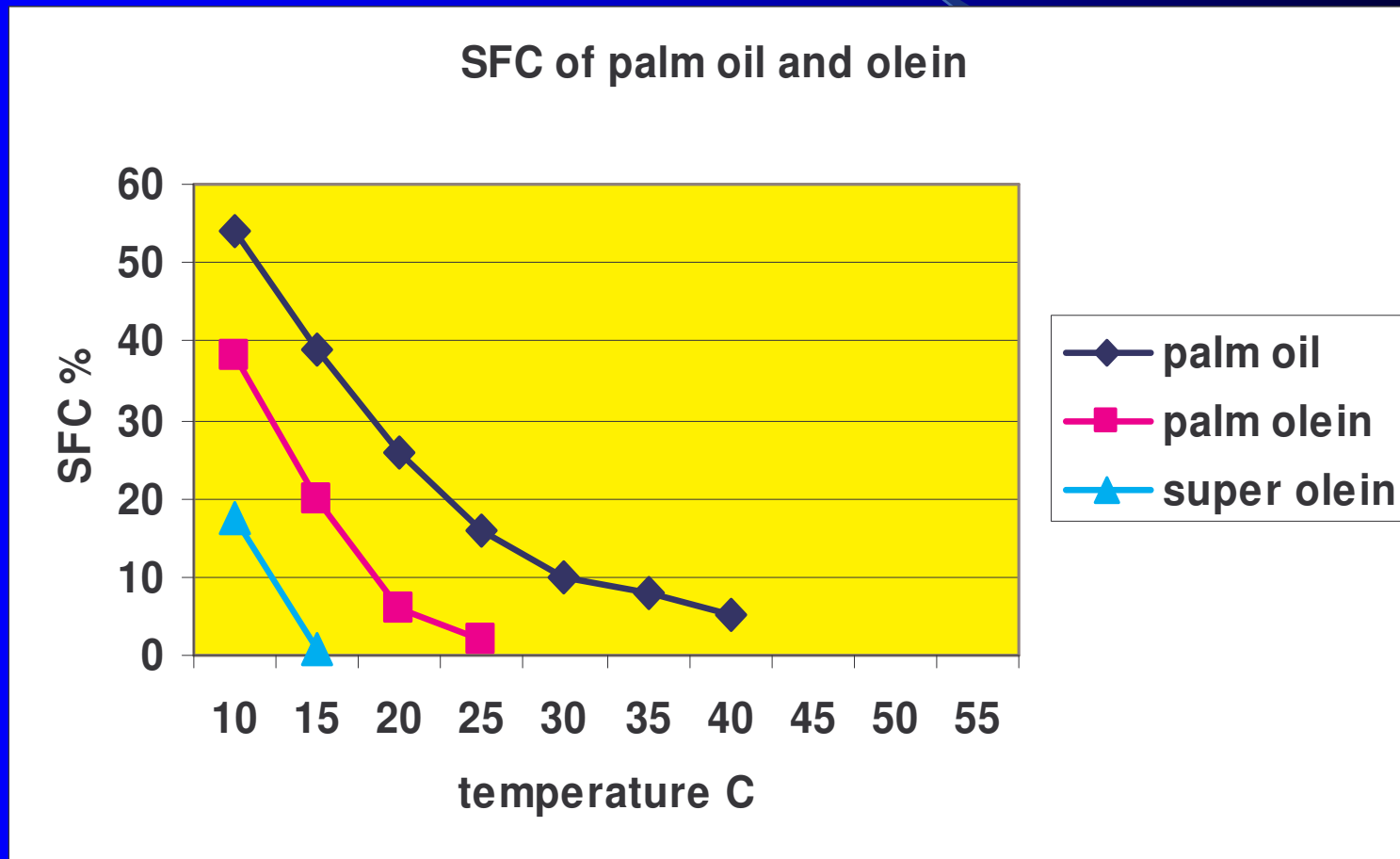
CLOUD PT (C)



SFC AT 2.5 AND 5C



SFC of palm oil and oleins



Typical specifications of palm olein for snack food frying

- FFA <0.05%
- PV <1
- M&I <0.1%
- COLOUR <3R
- FLAVOUR BLAND
- SMOKE POINT 220-240C

Palm Stearins

Fatty Acid Composition of Palm Stearins

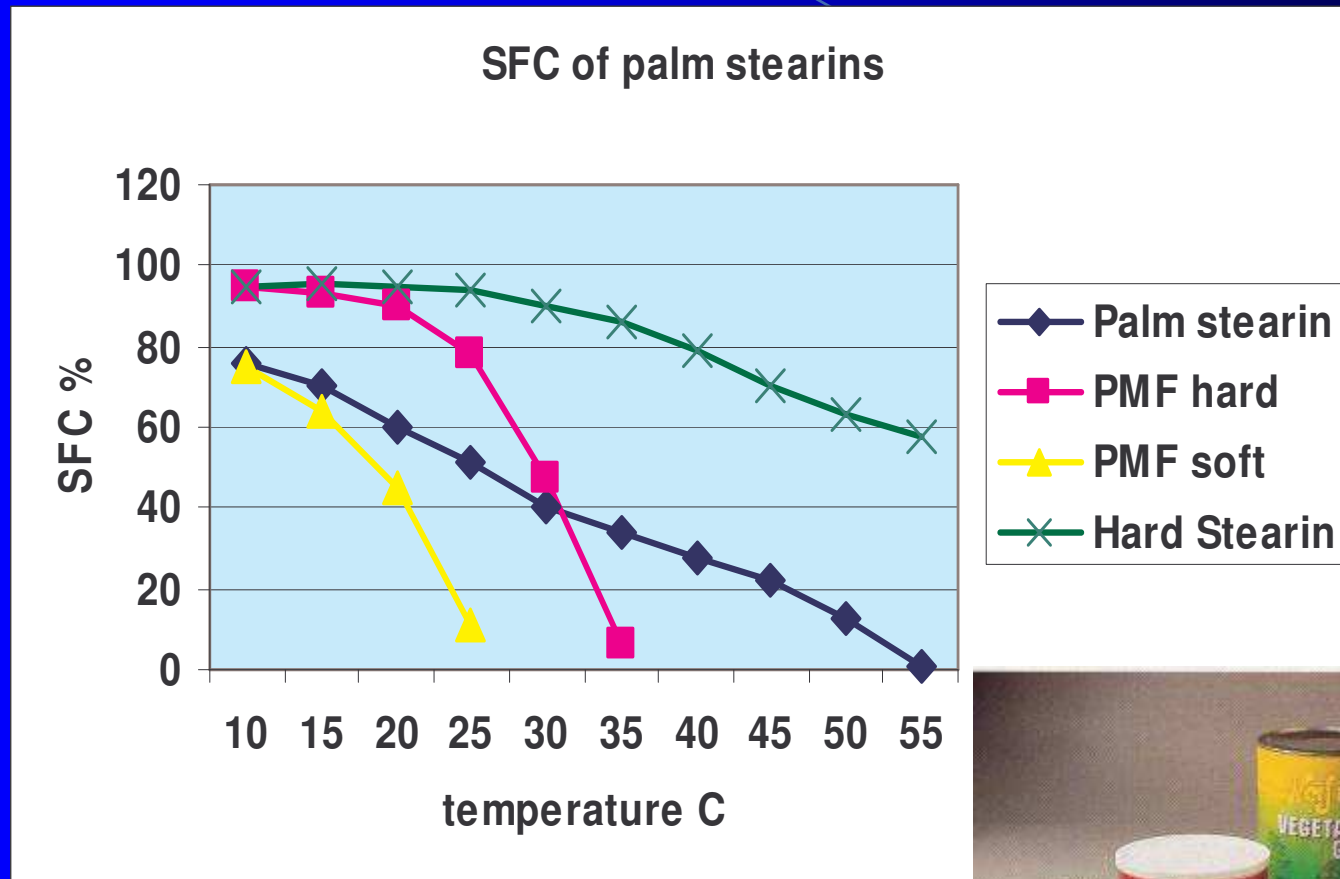
Fatty acids	Range(wt%)
16:0	47 - 74
18:0	4 - 6
18:1	15 - 37
18:2	3 - 10

Characteristics of Palm Stearin

Parameters	Range
Slip Melting Point °C	44 - 56
Iodine Value	21 - 49



SFC of palm stearins



PROPERTIES OF PALM MID FRACTION

Fatty Acid Composition (%)

C12	0.1
C14	0.8
C16	56.6
C18	4.1
C18:1	34.4
C18:2	3.7
C20	0.3

TRIGLYCERIDE COMPOSITION OF PMF

C NO	%
C46	1.1
C48	5.5
C50	76.1
C52	16.4
C54	1.0



PROPERTIES OF PALM MID FRACTION

Iodine value
Slip melting point



34.6
33.5°C

Solid fat content °C

10 90
15 85
20 80
25 63
30 42
35 3
40 0

Typical Formulae & Application of cocoa butter equivalent fats

Table 6

Composition	Chocolate type			
	Plain	Milk 5% milk fat	Milk 15% milk fat	Milk 30% milk fat
100% P.M.F.	✓	✓	-	-
70 - 80% P.M.F. 20 - 30% Shea or Sal Stearin	✓	✓	✓	-
60 - 65% P.M.F. 20 - 30% Shea or Sal Stearin 15 - 20% Illipe	✓	✓	✓	✓

Minor components



TOCOPHEROLS/ TOCOTRIENOLS IN OILS

**TOCOPHEROL
- RICHED**

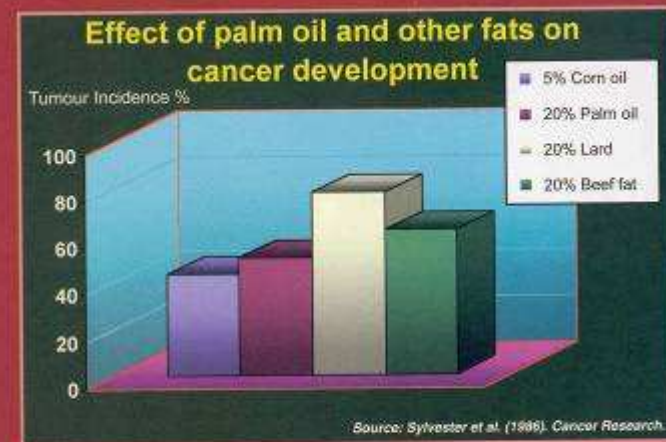
**SOY, CORN
COTTONSEED,
SUNFLOWER,
RAPESEED**

**TOCOTRIENOL-
RICHED**

**PALM,
WHEATGERM,
RICEBRAN**

TOCOPHEROLS/TOCOTRIENOLS IN PALM OIL PRODUCTS

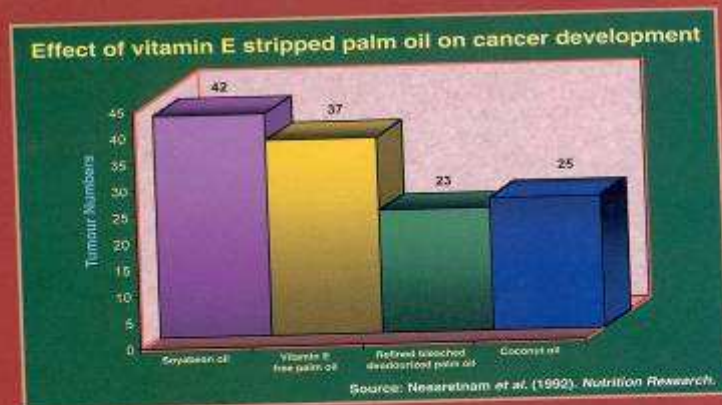
Type	mg/kg
Crude palm oil	600 - 1000
Crude palm olein	800 - 1000
Refined palm oil	350 - 630
Refined palm olein	468 - 673



A 20% palm oil (PO) diet was protective and comparable to a 5% corn oil (CO) diet. It was also better than a 20% lard and a 20% beef fat (BF) diets.

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Managing Breast Cancer with Tocotrienols



Palm oil (RBDPO) was protective compared to vitamin E stripped palm oil (EPPO).

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Managing Breast Cancer with Tocotrienols

Composition of tocopherols in crude palm oil (% of total)

Roles in cellular ageing, arteriosclerosis, and cancer.

Scavengers of free radicals



α -tocopherol	21.5
β -tocopherol	3.7
γ -tocopherol	3.2
δ -tocopherol	1.6
α -tocotrienol	7.3
β -tocotrienol	7.3
γ -tocotrienol	43.7
δ -tocotrienol	11.7

CAROTENOID COMPOSITION IN CRUDE PALM OIL



TYPE	%
PHYTOENE	1.3
β CAROTENE	56
α CAROTENE	35
LYCOPENE	1.3
OTHERS	6.4

Vitamin A precursor

Novel palm products-nutrolein

- A nutritious cooking oil, extracted from selected palms and processed under stringent QC to retain carotenoids and tocopherols.

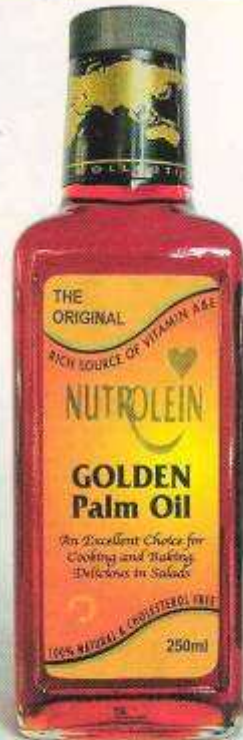
	specifications
FFA	0.10%
IV	64 min
Cloud point	4C
SMP	16C
carotene	400ppm min
tocols	800ppm min



400

525

800



THE ORIGINAL



THE EXCLUSIVE



THE ROYAL

Why choose palm oil?

- Price consideration
- Functionality
- Trans-free formulations
- Stability
- Consistent supply
- Healthy, natural oil
- Contains vitamin E, sterols,
- Unique in composition
- Variety of products



THANK YOU



M P O B