Main oils of the Middle East Region; their quality and safety control points

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Ben & Jerry's Cherry Garcia · Knorr · Bertolli Passione Italiana · Lipton Tea · Maille · PG Tips · Flora · Hellmann's Real Mayonnaise · Magnum Classic · Slim·Fast · Rama · Cif Gel Ocean Fresh · Vaseline Intensive Care · OMO Multi Ação · Rexona Men Ultra · Domestos WC-Aktiv Gel · Comfort · Dove · Lux Skincare · Signal · Pond's Perfect · Axe Alaska · Sunsilk

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Topics

- Middle East Region - oils and fats overview
- Sources of the major oil streams
- Impurities and contaminants in the supply chain
  - Risk levels
  - Removal steps
- Industry's quality standards

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Countries included in the Middle East Region
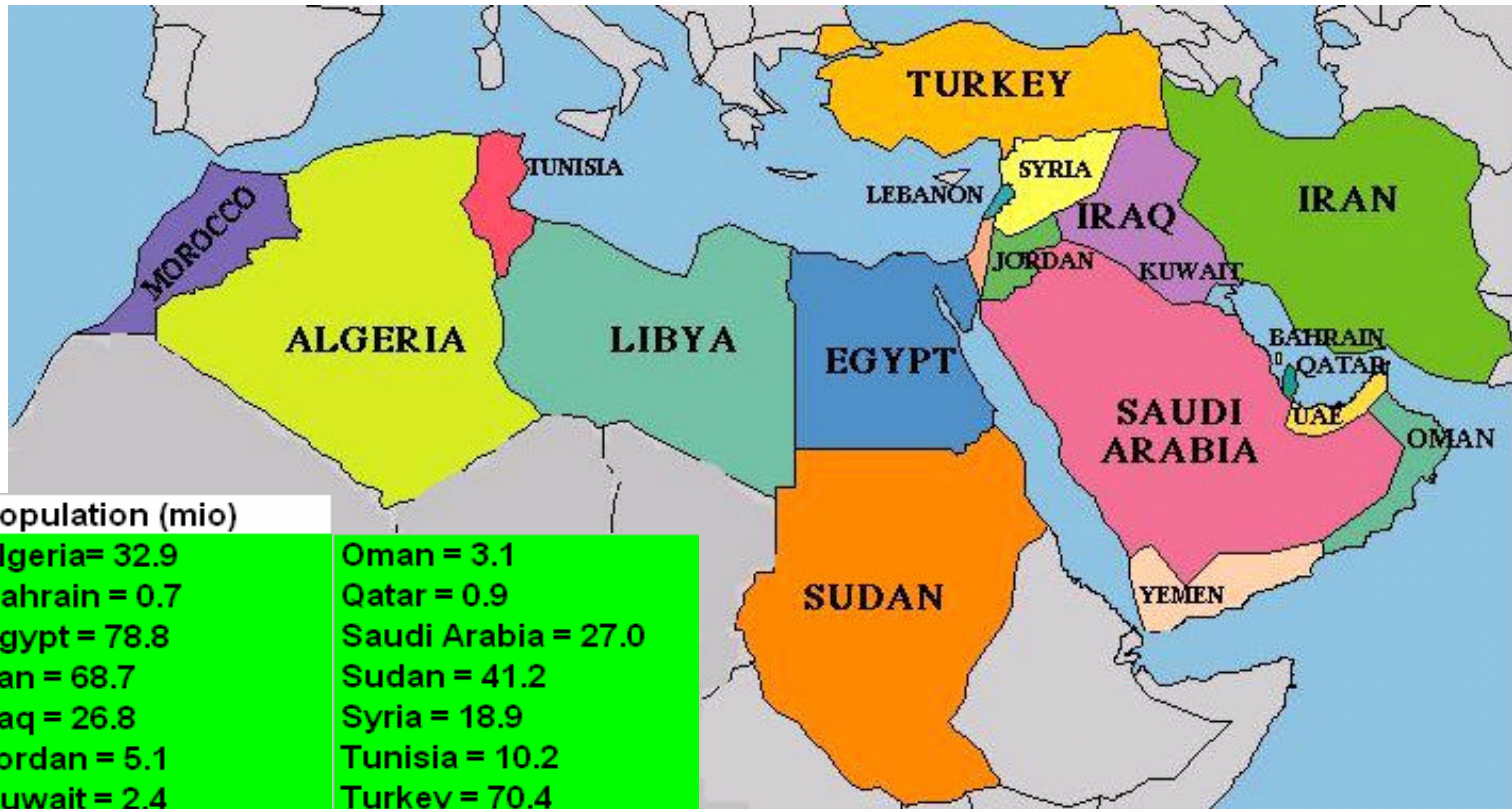
Population (mio)

Algeria = 32.9	Oman = 3.1
Bahrain = 0.7	Qatar = 0.9
Egypt = 78.8	Saudi Arabia = 27.0
Iran = 68.7	Sudan = 41.2
Iraq = 26.8	Syria = 18.9
Jordan = 5.1	Tunisia = 10.2
Kuwait = 2.4	Turkey = 70.4
Lebanon = 3.9	U.Arab Emirates = 2.6
Libya = 5.9	Yemen = 21.5
Morocco = 33.2	Total = 465

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Oil Use (1999-2007)

• *Approx. 50% increase from 1999-2007*

Year	Volume x 1000.MT
1999/2000	6,469
2000/2001	6,650
2001/2002	6,911
2002/2003	7,366
2003/2004	7,984
2004/2005	8,513
2005/2006	9,282
2006/2007	9,575

Oils: Palm, Soybean, Sunflower, Cottonseed, Corn, Olive, Canola, Palmkernel, Coconut and Linseed

Oil World 2006/2007

Oil use per country

Oil World 2006/2007
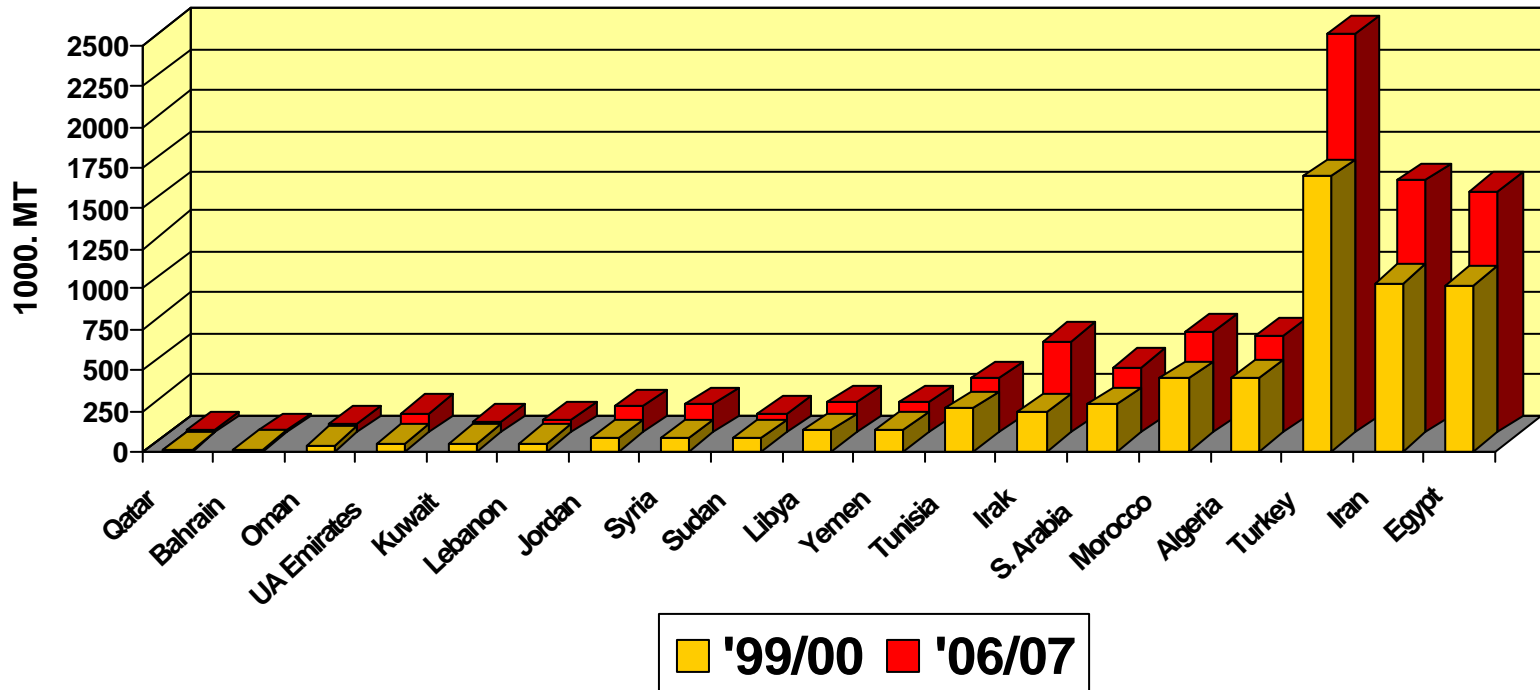
Use - Middle East Region vs EU-25

	Middle East	EU-25
Population - 10^6	465	456
Use – 10^6 MT	9,5	16,5
Use per capita** – kg	20,6	36

**World use oils & fats – 148.3 mio MT
World average – 20.97 kg

Main oils used in 2006/2007

	Oil	Use – x 1000.MT	%
L A R G E	Palm	2,899	30
	Soybean	2,773	29
	Sunflower	1,619	17
M E D I U M	Cottonseed	717	7.5
	Maize (Corn)	497	5.2
	Olive	495	5.2
S M A L L	Canola (Rapeseed)	276	3
	Palmkernel	232	2.4
	Coconut	39	0.4
	Linseed	28	0.3
	Total	**9,575**	**100**

Palm and Palm Kernel Oil

Palm oil
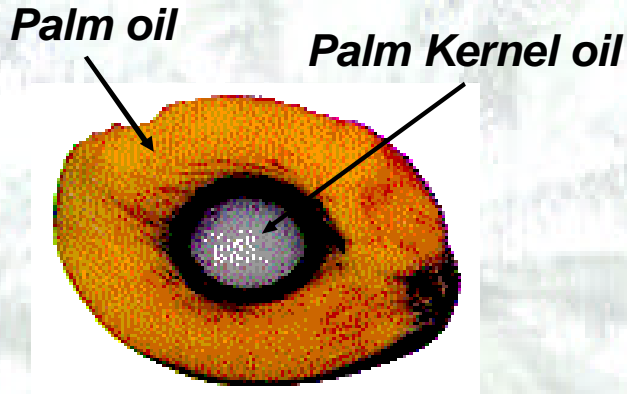
Palm Kernel oil

Palm fruit: Palm oil (50% sat. – C16:0)
Palmkernel (80% sat. – C12:0
C14:0)
Economic life around 25 years
Oil recovered by pressing
Applications:
       Cooking/frying oil
       Hardstocks for spreads
       Soap making

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Soybean Oil

Oil: 20 % => 40 % crop value
Meal for animal feed
Rotation crop
Oil recovered by hexane extraction
Applications:
   Cooking/frying/salad oil
   Liquid oil in spreads
   After hydrogenation in hardstock (USA)

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Sunflower Oil

Oil: 40 % => 80 % crop value
Meal for animal feed
Rotation crop
Oil recovered by pressing and extraction
Applications:
       Cooking/frying/salad oil
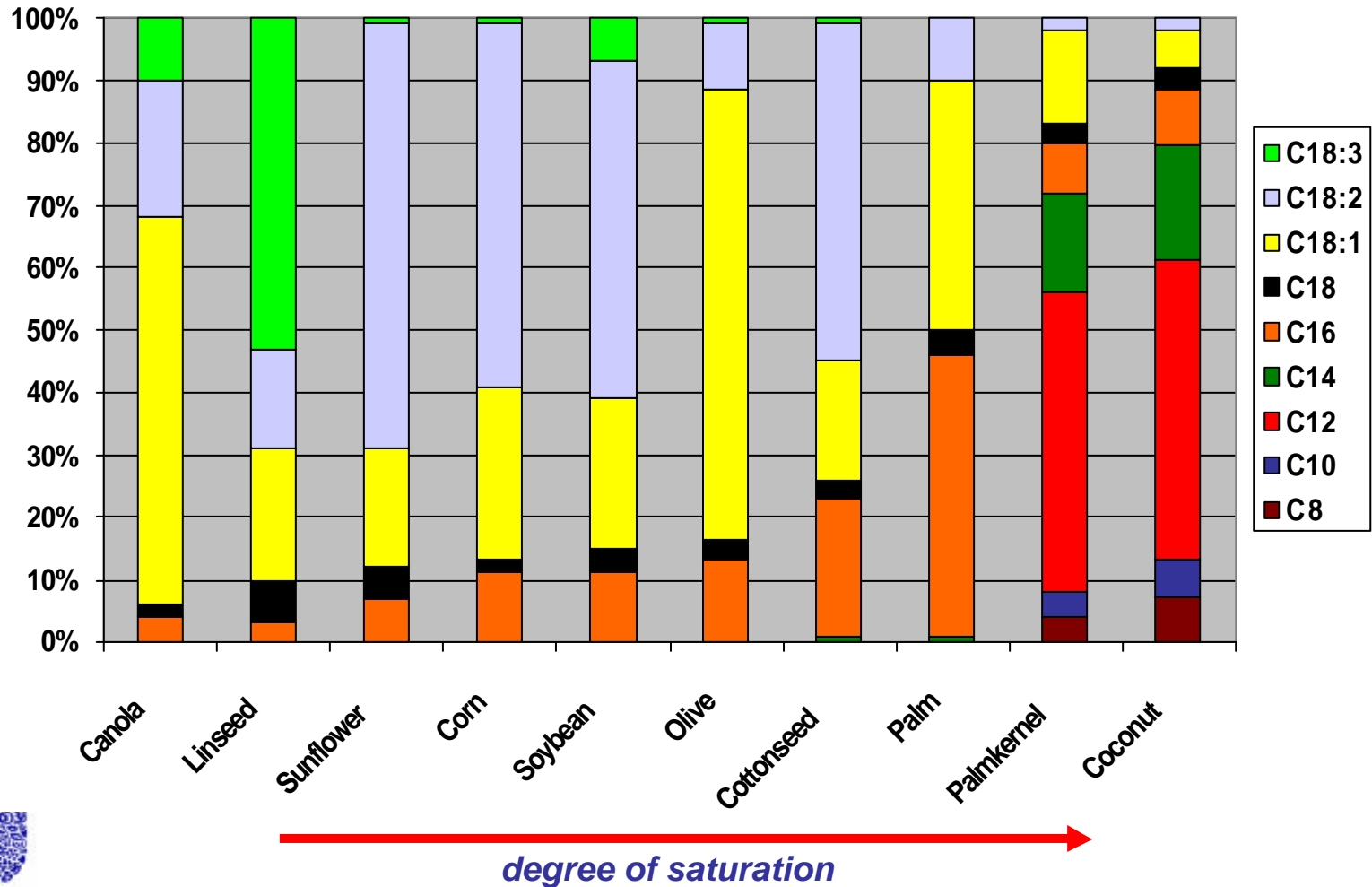   Liquid oil in spreads
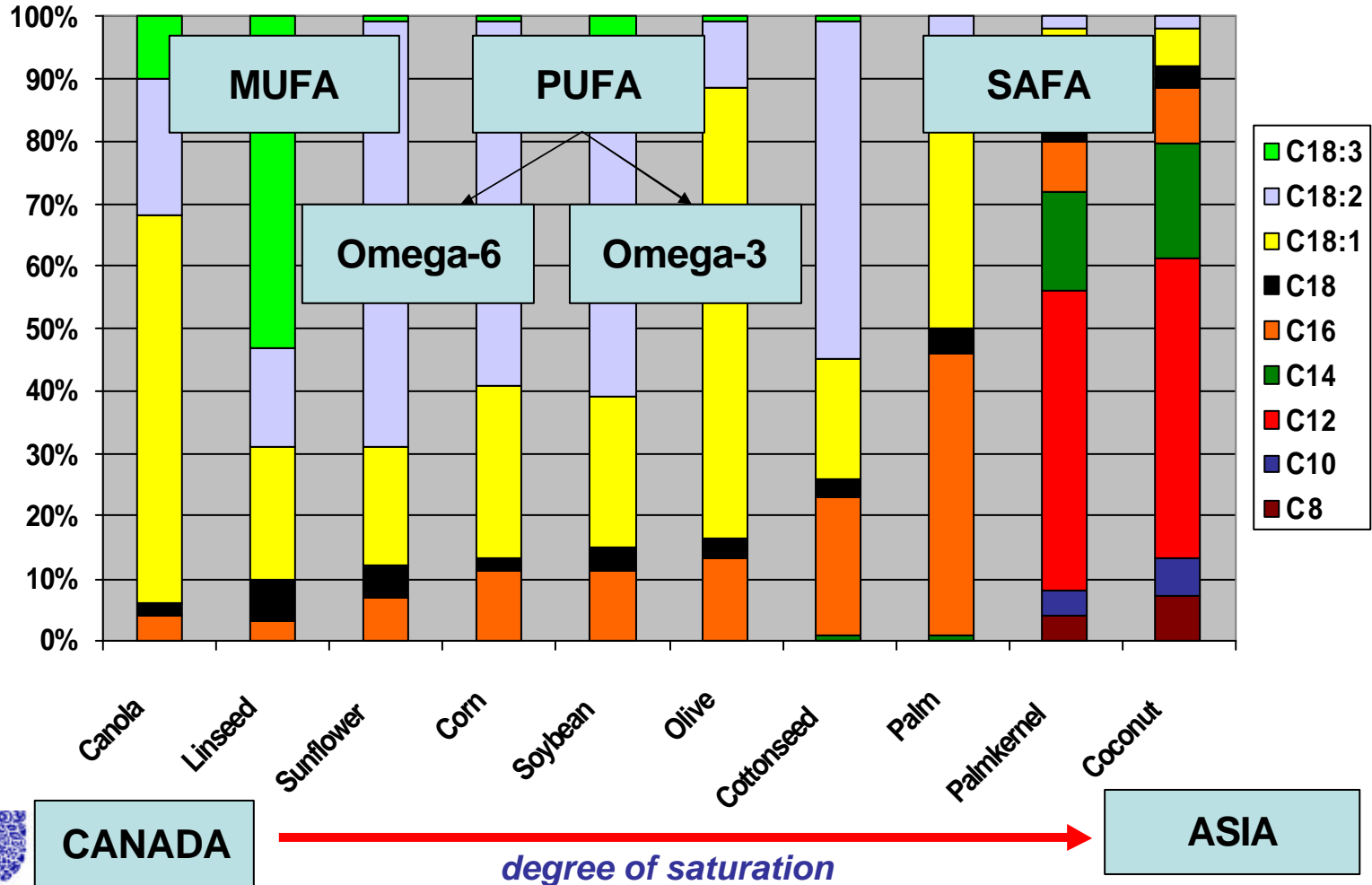

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Major oils agricultural characteristics
Tonnage vs acreage

Oil	Tonnage 06/07 mio MT	Yield MT/ha/yr	Acreage 06/07 mio hectares	
Palm	36.84	3.74	9.8	Area of Lebanon
Soybean	35.26	0.38	92.8	Area of Egypt
Sunflower	11.1	0.48	23.1	Area of Kuwait & Oman

Fatty acid composition of main oils and fats

Legend:
- C18:3
- C18:2
- C18:1
- C18
- C16
- C14
- C12
- C10
- C8

Oils (x-axis): Canola, Linseed, Sunflower, Corn, Soybean, Olive, Cottonseed, Palm, Palmkernel, Coconut

degree of saturation

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Fatty acid composition of major oils

Definitions

- Impurities:
  - These are the parameters that are related to the quality of the oil; thus affecting taste, colour, stability, odour.

- Contaminants:
  - These are the parameters that are related to food safety.

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Contaminants in Oils and Fats Supply Chain

Supply Chain step	Contaminants
Growing ⟶	Pesticides
Harvesting/Storage ⟶	Post harvest pesticides
	Poly aromatic HC
Oil Milling ⟶	Hexane
Transport ⟶	Previous Cargo
Refining ⟶	Removed mainly for safety

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Contaminants in Crude Oils

Impurity	Typical Level
Hexane	100-1000 ppm
Pesticides	0-10000 ppb
Benz(a)pyrene*	0-50 ppb
Mineral oil	5-25 ppm

*: indicator for presence of poly aromatic hydrocarbons

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Impurities in Crude Oils

Impurity	Typical Level
Iron	10 ppm
Phosphorus	10-500 ppm
Moisture & Dirt	0.4%
Free fatty acids	0.5-5%
Peroxide Value	10 meq/kg
Taste & colour components	Specific to oil type

List of 65 pesticides

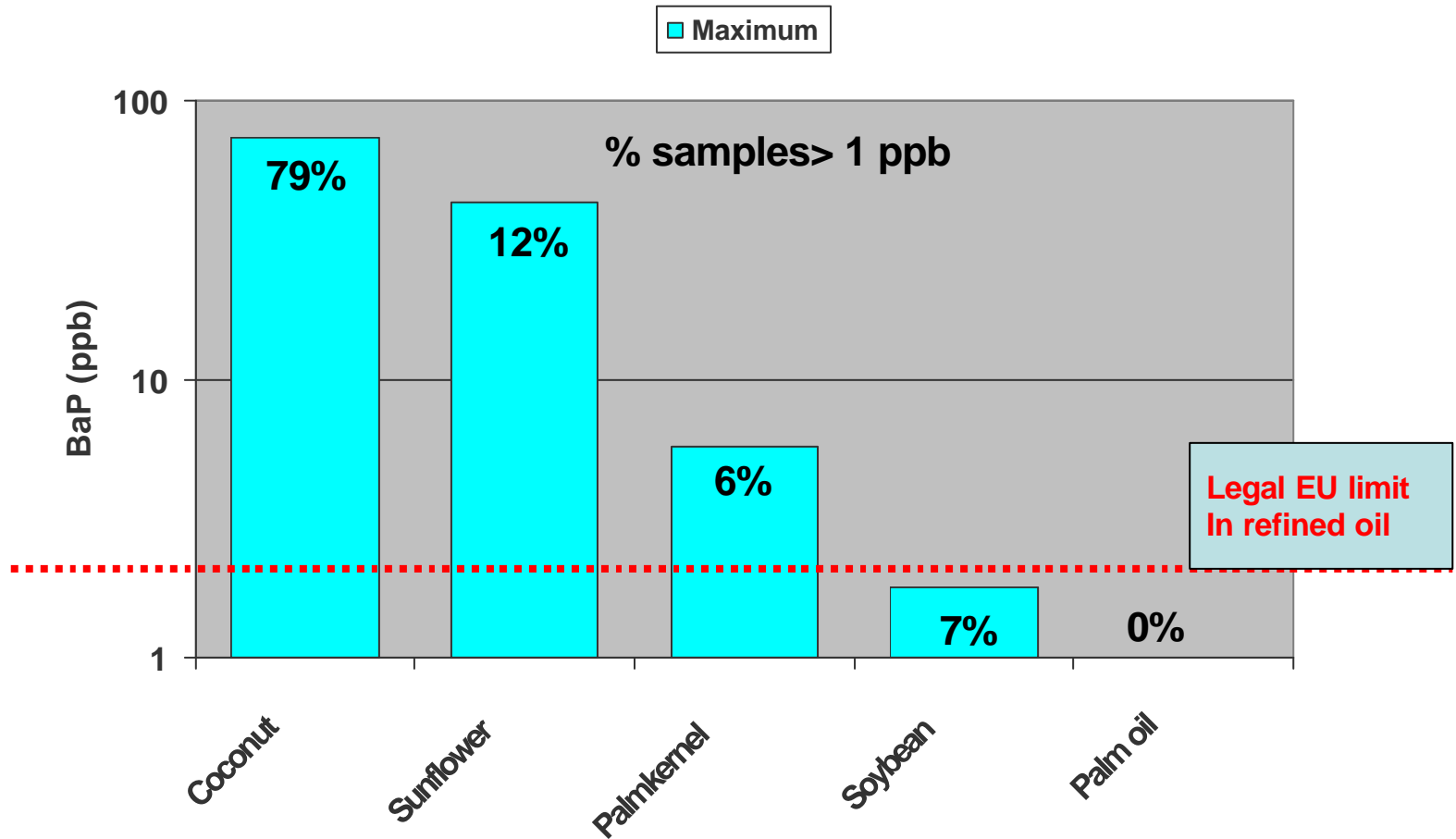| Chloro-based (24)	Phospor-based (28)	Nitrogen-based (9)	Pyrethoides (4)
Aldrin			
Chlordane	**Herbicides: reduce weeds**		
op DDD			
pp DDD			
op DDE	Chlorpyriphos	Procymidon	
pp DDE	Chlorpyriphos-methyl	Vinclozolin	
op DDT	**Insecticides: protect crop from insects either during**		
pp DDT			
Dieldrin	**ripening or during storage**		
Endosulfan	Disulfoton		
Endosulfan sulphate	Ethion		
Endrin			
Heptachlor	**Fungicides: protect crop from fungus during storage**		
HCB			
Alpha HCH			
Beta HCH	Mevinphos		
Delta HCH	Mevinphos		
Gamma HCH			
Methoxychlor	**Rodents: control rodents**		
PCB			
Toxaphene			
Tetradifon	Primiphose-ethyl & methyl		
	Sulfotep		
	Trichloorphon		

Why list of 65 pesticides

- EU banned pesticides
- Pesticides used by farmers (seed oils)
- Pesticide list of plantations companies (fruit oils)
- Information shared by pesticide manufacturers
- Pesticides reported by European oil producing industry

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Pesticides in Crude Oils

No pesticides detected in Palm oil

Max. level (ppb)

Legend:
- LOD
- BO
- SF

Data labels by category:

Fenitrothion: LOD = 1, BO = 1, SF = 24

Malathion: LOD = 1, BO = 1, SF = 2

Chlorpyriphos -methyl: BO = 2

Pirimiphos -methyl: LOD = 1, BO = 1, SF = 2

Parathion -methyl: LOD = 1, BO = 1, SF = 2

Dichlorvos: SF = 26

Chlorpyriphos: SF = 1

Endosulfan total: BO = 11
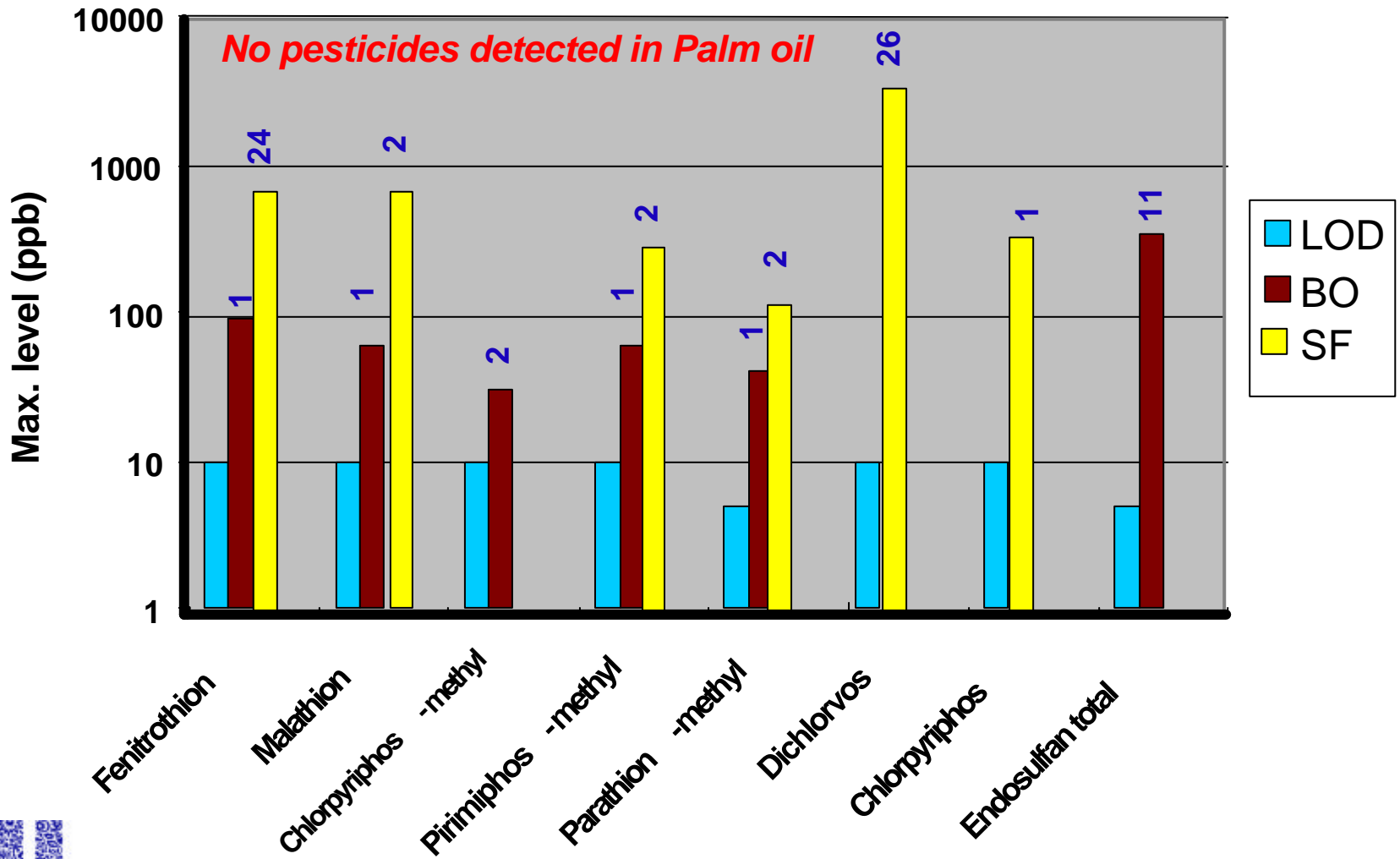
No of samples analysed: Palm = 318, Soybean = 157, Sunflower = 154

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Benzo(a)pyrene in Crude Oils

No of samples analysed: Coconut = 164, Sunflower = 154, Palm kernel = 236, Palm = 318, Soybean = 157
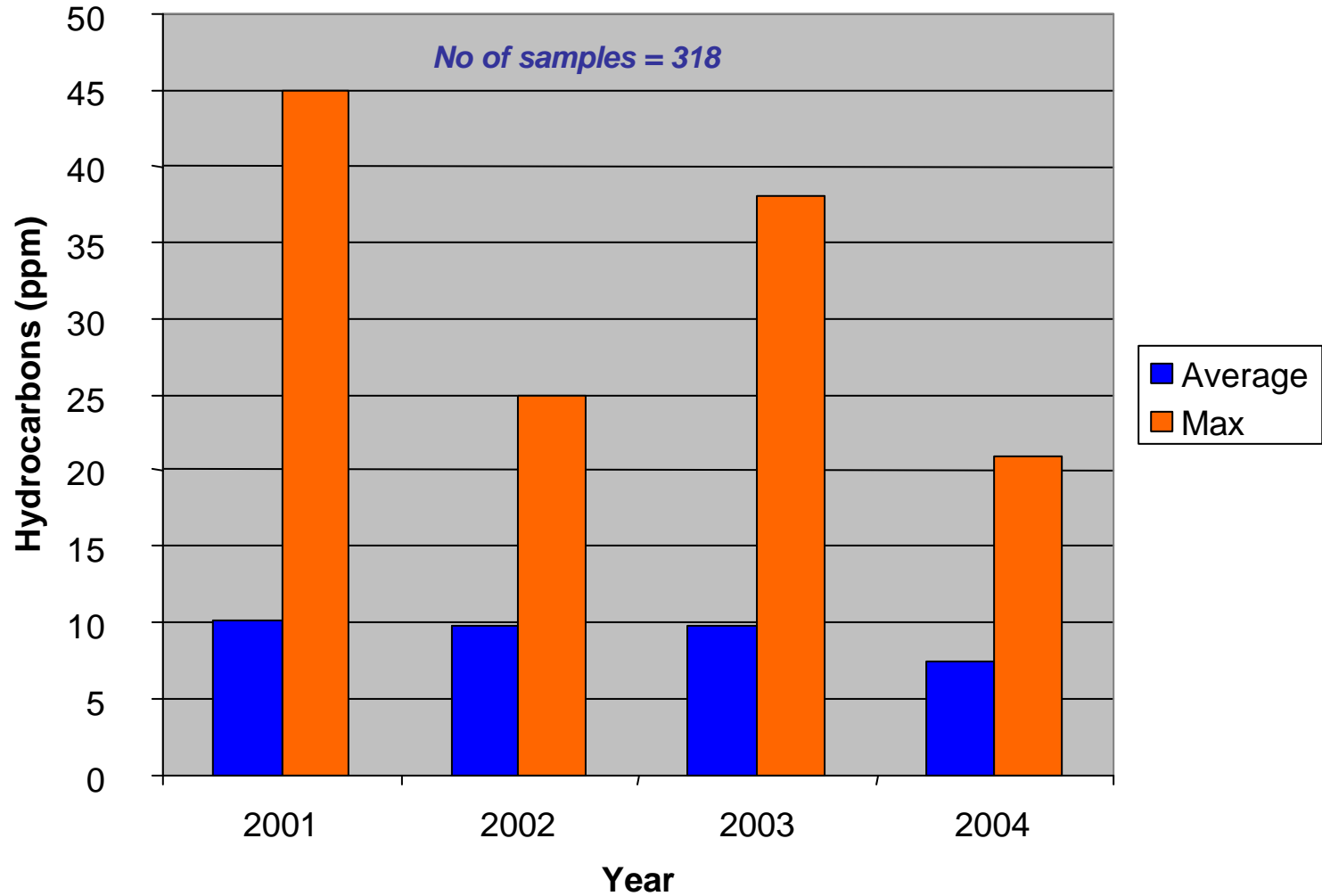
Crude Oil Risk Matrix

	Pesticides	Benzo(a)pyrene	Mineral Oil	Previous Cargoes
Palm Oil	🟦	🟦	🟥	🟥
Soybean	🟨	🟨	🟦	🟦
Sunflower	🟥	🟥	🟦	🟨
Maize	🟨	🟨	🟦	🟦
Cottonseed	🟦	🟨	🟦	🟨

Frequency of Analysis

high risk	🟥	every batch
medium risk	🟨	min. Once per quarter
low risk	🟦	max. once per quarter

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Refining link table to remove impurities

	FFA	POV	P	Metals	Taste & Colour components
Degumming			🟩		
Neutralisation	🟦		🟦	🟦	
Bleaching		🟨	🟩	🟩	🟨
Deodorisation	🟩	🟨			🟨

🟩 **Physical refining**   🟦 **Chemical refining**

🟨 **Both processes**

Refining link table to remove contaminants

	Hexane	Benzo(a)pyrene	Pesticides
Degumming			
Neutralisation	🟥		
Bleaching	🟥	🟥	
Deodorisation		🟥	🟥

🟥 **Removed**

Quality of refined oils

Impurity	Specification	Legislative Body
Taste & Colour	Bland	Customer
Moisture	Max. 0.05%	
Phosphorous	Max. 5 ppm	
Insolubles	Not visible	
Free fatty acids	Max. 0.1%	Industry standards
Peroxides	Max. 1.0 meq/kg	
Iron	Max. 0.5 ppm	
Copper	Max. 0.05 ppm	
Mineral oil	Max. 1 ppm	
Lead	Max. 0.1 ppm	EC 1881/2006
Hexane	Max. 5 ppm	EC 88/344/EEC
Benz(a)pyrene	Max. 2 ppb	EC 1881/2006
Pesticides	LOD	EC 90/642/EEC
Residues previous cargoes	Complete removal	EC 2005/26/EC

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Conclusions

- Use per capita is 20.6 kg/annum (EU25 is 36). Thus there is scope for growth.
- Major oil streams in ME region are palm, soybean and sunflower
- Crude oil risk matrix is of crucial importance in defining:
  - the focus areas in supply chain,
  - the analytical control of vulnerable oils,
  - the refining steps required.
- Monitoring of refined oils is a must to check effectiveness of the system.

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Thank-you

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