Oil Palm...

tree of life

MPOC

MPOC Official Report 3

Oil Palm... tree of life

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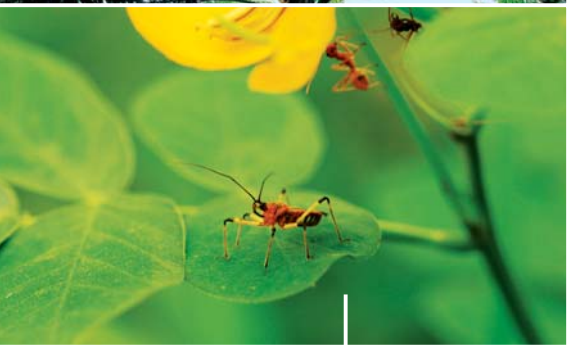

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Palm Oil... facts, not fiction

Forget the myths - get the facts fast

Palm oil is the newest world commodity, but is already the target of scare-mongering that mixes bad science with poor knowledge.

Those who would deny Malaysian palm oil its place are putting out one-sided stories that appeal to romanticism and nostalgia. BUT:

- Are primary rainforests really being *cleared wholesale* for oil palm planting?
- Are endangered wildlife species being decimated due to *habitat destruction*?
- Do *all* native populations agree that their human rights are being violated?
- Is consumption of palm oil *harmful*?

Malaysia, the world's largest producer of palm oil, can answer critics and sceptics with confidence.

Fact

In Malaysia, oil palm plantations are mainly established on old agricultural land or previously logged-over forest land. Planting practices, long rooted in environmental considerations, are reaching for even higher standards of sustainability.

Fact

The plantation industry drives economic growth. In short, this creates jobs for the poorest people, including native populations; triggers downstream activities; and brings in revenue for national development and stability.

Fact

Palm oil and derived products are channelled into worldwide industrial and commercial activities that churn out everything from food products to bio-fuel and feedstock for cosmetics, toiletries, industrial cleaning agents and candles.

Fact

Palm oil consumption has a recorded history of 5,000 years. Today it feeds 3 billion people in 150 countries, boosting global food security and curbing nutrition deficiency as well as heart disease.

Fact

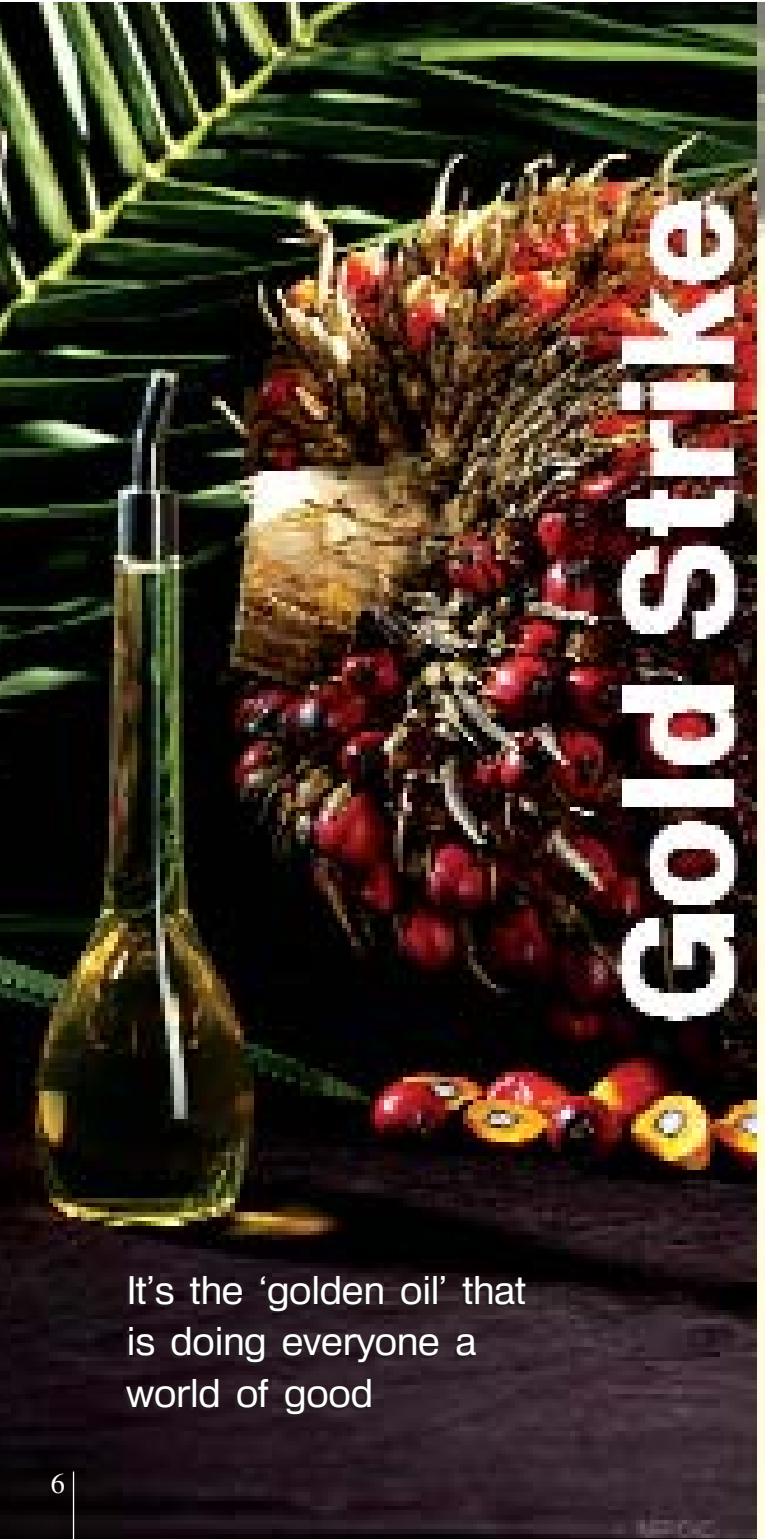
The Food and Agricultural Organisation and World Health Organisation have endorsed palm oil as meeting food standards under the Codex Alimentarius Commission Programme. A balanced vegetable oil and source of energy, it is free of death-inducing cholesterol and trans fatty acids and packed with health-inducing carotenoids (a rich source of Vitamin A) and Vitamin E.

Food and Agricultural Organisation

World Health Organization

Fact

The US Food and Drug Authority has given approval for palm-based products sold under the *Smart Balance* brand (containing up to 50% palm oil and 50% local oils) to carry the US patented label, *To help increase HDL ('Good' Cholesterol) and improve the Cholesterol Ratio (HDL/LDL)*.



It's the 'golden oil' that is doing everyone a world of good

Palm oil is the most versatile of 17 major oils traded in the global edible oils and fats market. About 80% of Malaysian palm oil goes into food uses. It is found in one out of 10 food products worldwide as it can be used without - or only minimal - modification.

Traditional applications

- *Food uses*

Palm oil and palm kernel oil is used wholly or in blends with other oils. Look for these basic ingredients in frying/cooking oils, shortenings, vegetable ghee (vanaspati), margarines and spreads, and confectionery fats.

New applications include use in emulsion-based powdered and consumer foods such as pourable margarine, mayonnaise, soup-mixes, imitation cheese and micro-encapsulated palm oil. Red palm oil or red palm olein offers healthy alternatives to conventional cooking and salad oils.

Comparison of Vitamin A Content

Food	µg Retinol Equivalent / 100g E.P.
Oranges	21
Bananas	50
Tomatoes	130
Carrots	400
Red Palm Oil (refined)	5,000
Crude Palm oil	6,700

- *Non-food uses*

Palm oil by-products are biodegradable and often cheaper, 'greener' and equally-effective substitutes for materials like petrochemicals. They are suited to making soaps; skincare and cosmetic products; floor-cleaning liquids and fabric detergents; candles; and plasticisers and stabilisers for industrial processes. A proportion of Malaysian palm oil is channelled into bio-fuel production for a clean, renewable source of energy.

Competitive pricing

Palm oil is competitively priced because of its guaranteed consistent supply.

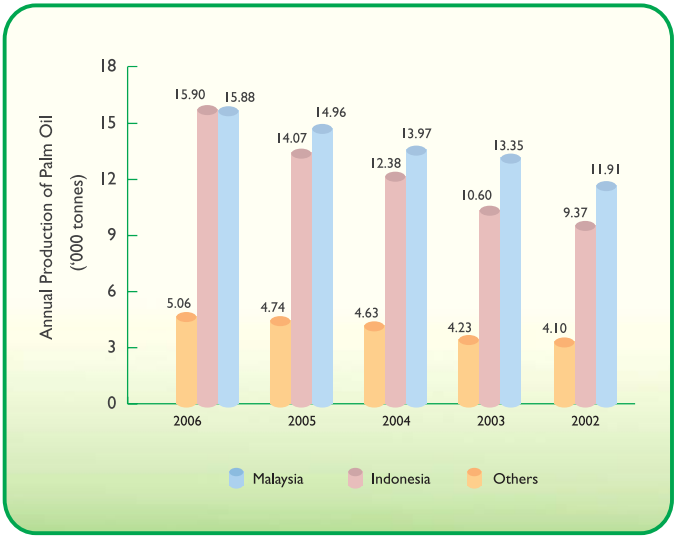
Malaysia is one of the world's largest producers and exporters of palm oil. From its 4.17 million ha of oil palm, it produces about 15.9 million tonnes of palm oil annually to corner the biggest share of the global export market to date (Table 1).

Palm oil and palm kernel oil contributed the highest percentage (27.5%) of global production of oils and fats in 2006 (Chart 1).

Palm oil and palm kernel oil were also the most traded oils in the global oils and fats market with a market share of 56.2% (Chart 2).

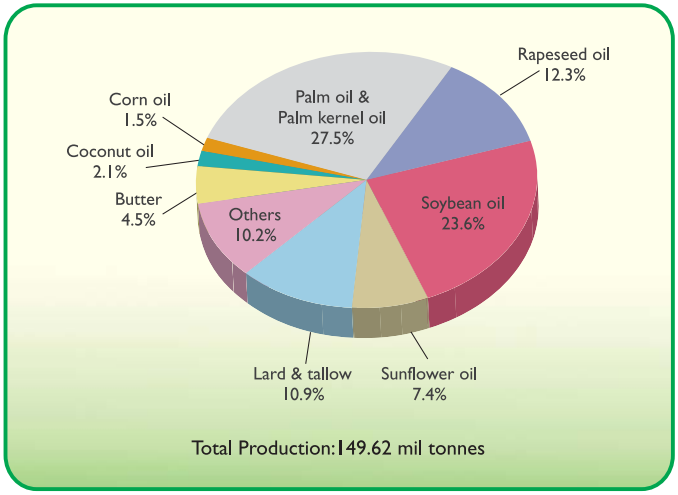
Of the 148.26 million tonnes of edible oils and fats consumed, palm oil and palm kernel oil held the biggest share (27.1%) (Chart 3).

Table 1: Comparison of Annual Production of Palm Oil between Malaysia and Other Producers, 2002-2006



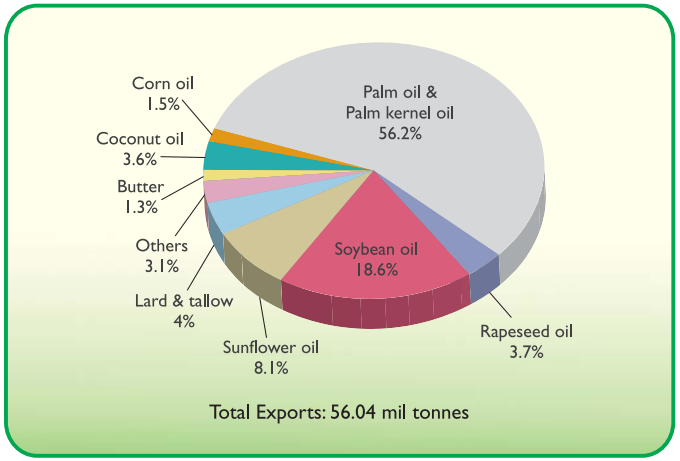
Source: Oil World Feb 16, 2007; Oil World Annual 2006
Note : [1] Malaysia's production during 2006 is estimated at 14.4 million tonnes by MPOB

Chart 1: World Production of Oils and Fats, 2006



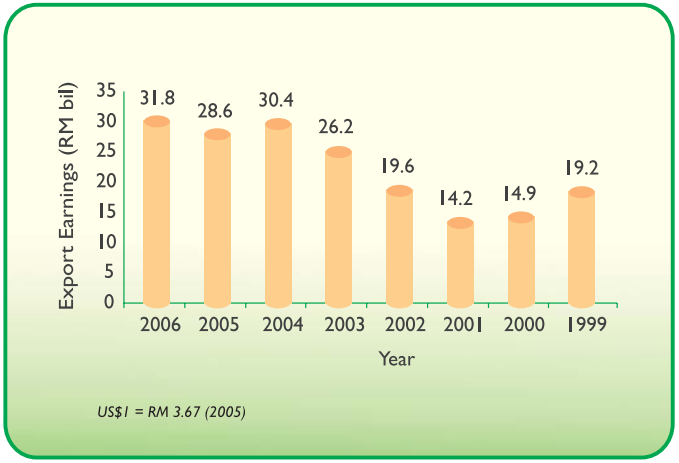
Source: Oil World (2007, 2006)

Chart 2: World Exports of Edible Oils and Fats, 2006



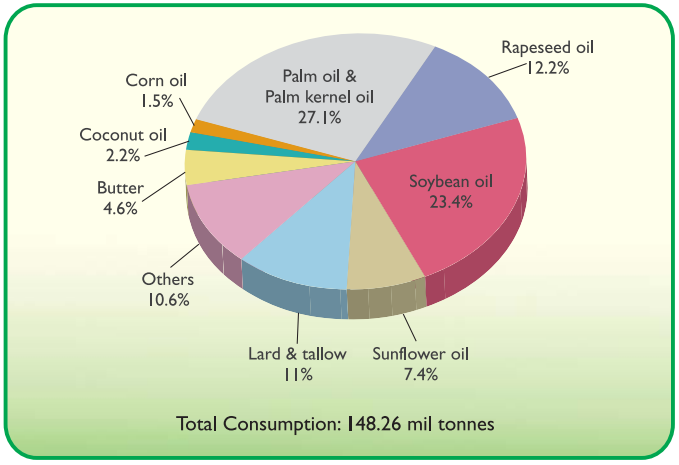
Source : Oil World, No 7 Vol 50 February 16, 2007; Oil World Database, December 2006

Table 2: Export Earnings from Malaysian Oil Palm, 1998-2006



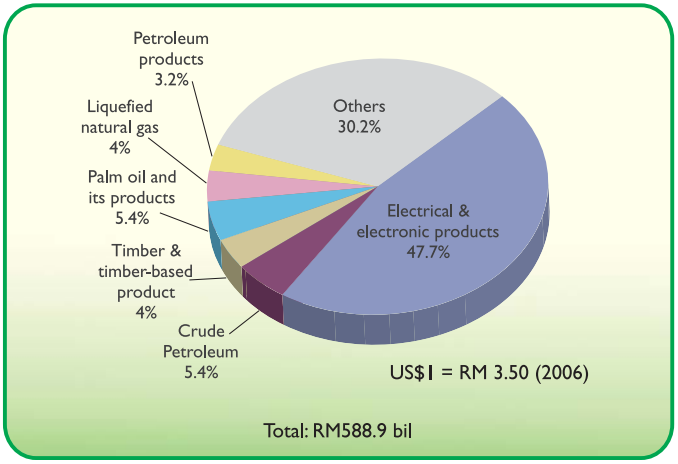
Source: MPOB, 2007

Chart 3: World Consumption of Oils and Fats, 2006 (`000 tonnes)



Source: Oil World, 2006

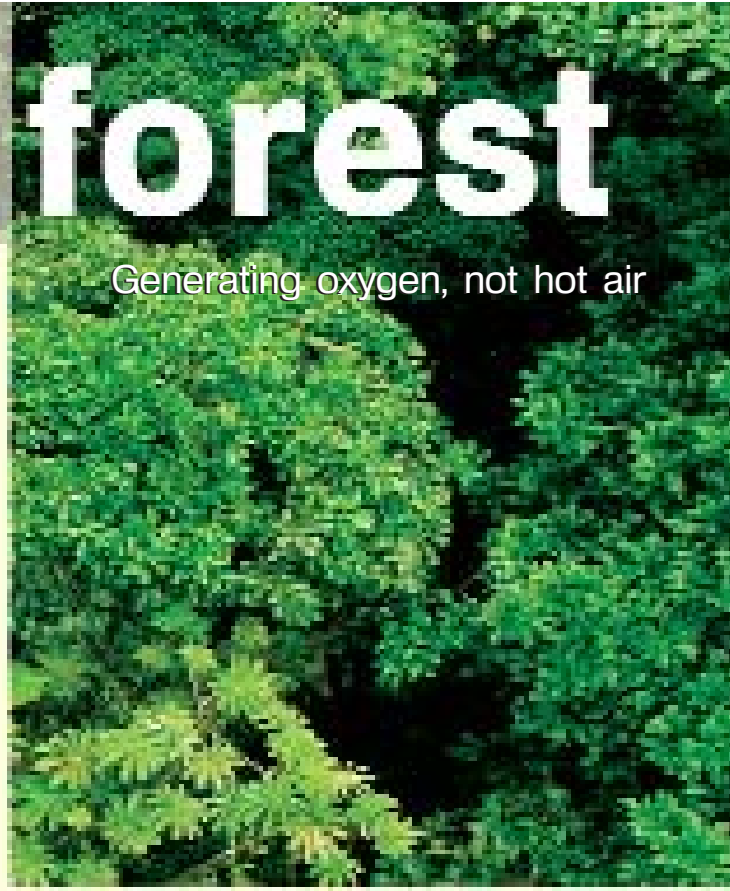
Chart 4: Malaysia External Trade 2006 (RM bil)



Source: Department of Statistics, Malaysia

The oil palm industry has contributed billions of ringgit (RM31.8 bil) in export earnings to the Malaysian economy (Table 2). It is the third-largest contributor to external trade after electrical and electronic products and crude petroleum (Chart 4).

The planted forest



Generous tree cover

Contrary to graphic descriptions, pristine rainforests in Malaysia are not being chain-sawed round the clock for oil palm cultivation at the expense of wildlife habitats.

Some 64% of forest, including some of the world's oldest virgin rainforests, remain intact despite centuries-old reliance on agriculture and forest resources for livelihood (Table 3).

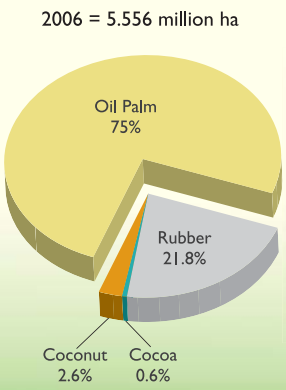
Add agricultural tree cover - oil palm, rubber, coconut and cocoa (Chart 5) - and a stunning green expanse covers 81% of the country's total land mass of 32.86 million ha. Can most of the developed world claim the same?

Table 3: Forest Areas in Selected Countries

Country	% Forest Area	Total Forest Area (mil ha)	Total Land Area (mil ha)
France	28.3	15.55	55.01
Sweden	66.9	27.53	41.16
Germany	31.7	11.08	34.9
Malaysia	**63.6**	**20.89**	**32.86**
UK	11.8	2.85	24.09
Brazil	57.2	477.7	835.56
Argentina	12.1	33.02	273.67
USA	33.1	303.09	915.89
Denmark	11.6	0.5	4.31

Source: FAO, Global Forest Resources Assessment 2005

Chart 5: Land Use of Selected Tree Crops in Malaysia



Crop	Total Planted Area (Million ha)
	Year 2006
Oil Palm	4.170
Rubber	1.212[e]
Cocoa	0.032[e]
Coconut	0.142
Total	**5.556**

Note: [e] = estimated
Collectively, rubber, cocoa and coconut have lost 0.98 mil ha, which were mainly converted to oil palms
Source: MPOB, MRB, MCB, Agriculture Department

Previously logged-over land has been converted to production forestry and agriculture:

- 6.57 million ha (20% of total land mass) have been planted with food and economic crops. Of this, 4.17 million ha are under oil palm (about 63%).
- Oil palm expansion over the last 50 years has mainly been on land converted from rubber, cocoa and coconut cultivation.

Since the 1990s, the government has stopped new forest land from being opened up for crops including oil palm. Only logged-over land zoned for agriculture can be used.

Sustainable Forest Management is being phased in under globally developed criteria. These enable extraction of certified timber, while preserving the habitats of the totally-protected *Orang Utan* (great ape, *Pongo pygmaeus*), among other wildlife species.

Closed green canopy

Higher levels of greenhouse gases such as carbon dioxide and methane have led to rising global temperature, which is wreaking environmental havoc worldwide. Increased production of chlorofluorocarbons (CFCs) has depleted the ozone layer which protects against harmful UV radiation.

Malaysia's sprawling oil palm plantations - some 500 million trees - throw a protective green canopy over the environment. The impact of this planted forest is incalculable.

• Oxygenating the air

Like all living plants, the oil palm absorbs carbon dioxide (CO_2) from, and returns oxygen (O_2) to the atmosphere through photosynthesis. But it does more. As a comparison:

Table 4: Performance of Oil Palm vs Soybean in CO_2 Sequestration

Oil Crop	Total Global Planted Area in 2006 (mil ha)	O_2 Released (mil tonne)	CO_2 Absorbed (mil tonne)	Average O_2 Released (t/ha)	Average CO_2 Absorbed (t/ha)
Oil Palm	9.24	196.8	270.7	21.3	29.3
Soybean	92.40	236.5	325.2	2.56	3.52

Source: Chan (2002), Oil World (2007)

- Oil palm released 196.8 million tonnes of O_2 to the atmosphere from a mere 9.24 million ha of total global planted area in 2006 or an average of 21.3 tonnes of O_2 per ha. In the same year, soybean released 236.5 million tonnes of O_2 from a much larger area of 92.40 million ha or an average of 2.56 tonnes of O_2 per ha.
- From the same planted areas, oil palm absorbed 270.7 million tonnes of CO_2 or an average of 29.3 tonnes per ha, while soybean absorbed 325.2 million tonnes of CO_2 or an average of only 3.52 tonnes per ha.

In short, oil palm is more effective than soybean in cleaning up the atmosphere.

• Absorbing air pollutants and generating biomass for fuel

Studies suggest that oil palm plantations may be more effective than rainforests in serving as 'carbon sinks' - areas of dry matter that absorb harmful greenhouse gases. Henson (1999) showed that an oil palm plantation

assimilates up to 36.5 tonnes of dry matter/ha/year, better than 25.7 tonnes by natural rainforest. The study also showed that the plantation accumulates up to 8.3 tonnes of biomass a year, higher than 5.8 tonnes in the rainforest (Table 5). This biomass can be further studied to provide 'green' fuel such as ethanol and thus, reduce dependency on fossil fuels in future.

- Positive effect on global warming (GWP)

Another study by Melling on tropical peatland in Sarawak shows that the peat soil ecosystem planted with oil palm lowers the global warming potential (GWP) to 5706g CO_2 $m^{-2}y^{-1}$ compared to that of the peat swamp forest ecosystem (7850g $CO_2m^{-2}y^{-1}$). The data imply that oil palm plantations on peatland have a positive effect on global warming (Table 6).

- Cooling effect

With the shade that its trees provide and humidity they help maintain, oil palm plantations cool the air. Millions of oil palm fronds reaching skyward to protect the atmosphere must be surely be preferred to desertification, irrigated agriculture or unbridled industrialisation as the outcome of economic development.

Table 5: Physiological Parameters of Oil Palm and Tropical Rainforest

Parameter	Oil palm (plantation)	Rainforest
Gross Assimilation (t CO_2/ha/yr)	161	163.5
Total respiration (t CO_2/ha/yr)	96.5	121.1
Net assimilation (t CO_2/ha/yr)	64.5	42.4
Leaf area index	5.6	7.3
Photosynthetic efficiency (%)	3.18	1.73
Radiation conversion efficiency (g/M)	1.68	0.86
Standing biomass (t/ha)	100	431
Biomass increment/yr (t)	**8.3**	**5.8**
Dry matter productivity/yr (t)	**36.5**	**25.7**

Source: Henson, 1999

Table 6: GWP of soil in forest, sago and oil palm ecosystems

Ecosystem	GWP (g CO_2 m^{-2} y^{-1})			
	CO_2	CH_4	N_2O	Total
Forest	7,817 ± 774 (99.6)	0.56 ± 0.55 (0.0)	32.6 ± 8.13 (0.4)	7,850 ± 779
Sago	4,074 ± 154 (96.3)	5.49 ± 1.44 (0.1)	153.4 ± 37.7 (3.6)	4,233 ± 152
Oil Palm	5,652 ± 1,355 (99.1)	-0.46 ± 0.18 (-0.0)	54.3 ± 19.4 (0.9)	5,706 ± 1,335

** Figures within brackets signifies the % contribution of each GHG to total GWP*

** The figures show the mean ± SE*

Source: Melling and et al (2004)

Sustaining the earth

From planting to production, the oil palm is a true friend of the earth

Living soil

Uncompromising commitment to sustainability has nurtured technology and good agricultural practices in Malaysia's oil palm industry over the last century. These particularly protect the soil, its most valuable resource.

- Higher yield, lower strain

Malaysian palm oil comes from the *Tenera* variety - a cross between the *dura* and *pisifera* - which produces 25% more oil than others. The search continues for even more productive cultivars, in order to supply world demand without straining natural resources.

- Soil conservation

Steps are taken to conserve and enrich the soil in a cycle that stretches from planting right through replanting.

Erosion control:

As least six species of leguminous ground-hugging creepers are grown as cover crops to reduce soil erosion and improve rainfall retention. This also injects up to 250kg of nitrogen into every hectare. On steeper slopes, erosion is minimised through contour terracing and using silt pits to trap soil. Lining terraces with pruned fronds helps retain rainfall. It allows seepage into the ground and reduces the velocity of run-off during heavy rain.

'Zero' burning policy:

Replanting traditionally involved burning the felled palms at the end of their 25-year productive cycle. Trees are now mechanically felled, then windrowed, shredded and allowed to decompose on site. This recycles 90-100 tonnes of organic matter per hectare.

Natural fertilisers:

Biomass like pruned fronds, empty fruit bunches (EFB) and old palm stems are an excellent source of fertiliser - high in potassium, nitrate, magnesium, phosphate and other soil nutrients - and also enrich soil organic matter and humus. Some 35 million tonnes of fronds are recycled each year.

Moisture retention:

Water used in processing palm fruits - palm oil mill effluent (POME) - is biologically treated and returned to the land for its fertiliser and moisture benefits. The soil filters the organic matter and nutrients, returning clean water to the ground. POME, combined with EFB, produces compost. Used in sufficient amounts, it replaces 66% of chemical fertilisers otherwise required.

Caring for the eco-system

Agriculture in the tropics must take into account a highly dynamic eco-system. The Malaysian oil palm industry has developed eco-friendly practices over the last century.

- Reduced herbicide use

Blanket spraying of herbicides is discouraged as it can result in erosion under the intense tropical rains. The resulting loss of fertility is expensive to remedy with fertilisers. Any spraying is confined to a small circle at the base of the palm and in strips along planting rows or harvesting paths. This covers about 25% of the planted area. If sheep, cattle, goats or deer are reared, weeds are 'cleared' naturally.

- Integrated Pest Management (IPM)

Rats, bagworms, nettle caterpillars and *Oryctes* rhinoceros beetles can seriously reduce yields and quality of palm oil. But plantations have chosen a balanced IPM solution over use of chemical pesticides. Barn owls and snakes check rodents, while predatory insects, parasitoids and entomo-fungi eliminate leaf-defoliating insects.

- Dealing with diseases

This is crucial, particularly to prevent *Ganoderma* basal stem rot which can wipe out over 50% of an oil palm stand through severe infestation. Eco-friendly steps include proper deboling and shredding of oil palm debris during replanting, timely removal of infected palms, and inoculation of seedlings with *arbuscular mycorrhizal* fungi.

Barn Owl

Innovative recycling

New uses have been found for residues and waste materials from cultivation. These are now renewable raw materials for value-added commercial products:

- Pulverised fronds, trunk tissues, palm kernel cake and EFB go into animal feed and paper production.
- Palm trunks are sawn up as lumber for furniture.
- Fibre from trunks and fronds is used in making medium density fibre board.
- EFB, fibre and palm shell are burnt to generate steam and electricity for palm oil mills, and reduce use of fossil fuel. Surplus energy is channelled to the national electricity grid.

3Ps for palm oil

Profit, people, planet - palm oil has the answers

The 1992 Earth Summit in Brazil formulated the 3P concept - profit, people and planet - for sustainable development. This simply means managing competing needs without depleting natural resources. Malaysia's oil palm industry is striving to do just that.

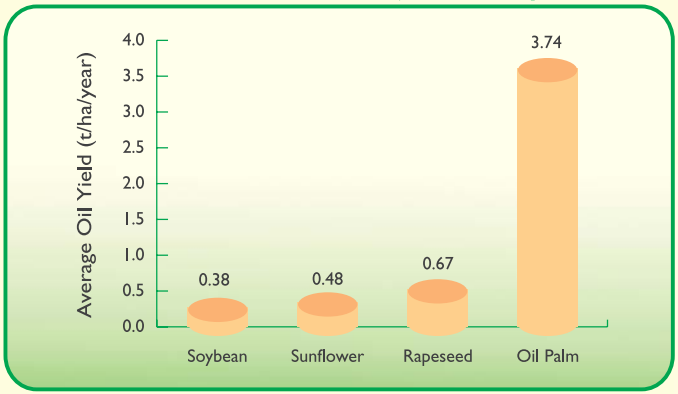
Profiting from productivity

Is Malaysian oil palm a sustainable commodity? Here's a test of the main parameters:

- Economic land use

Oil palm is the world's most efficient oil-bearing crop in terms of land utilisation, efficiency and productivity. A single hectare produces up to 10 times more oil than other oilseeds. Oil palm yields an average of 3.74 tonnes of oil per ha/year (projected to rise to 6 tonnes within the next decade) compared to soybean (0.38 tonnes/ha/year); sunflower seed (0.48 tonnes/ha/year) and rapeseed (0.67 tonnes/ha/year; (Table 7).

Table 7: Oil Palm vs Other Major Oil Crops



Source: Oil World (2007)

With only 0.4% of the world's population, Malaysia produces 11% of the global vegetable oils and fats output and accounts for 26% of the export trade in oils and fats. All this comes from a mere 1.84% of the 231 million ha under global oilseeds cultivation.

And this is done without farming subsidies as in Europe and the US. Income from a hectare of Malaysian oil palm, based on 2005 data, equals about €1,600/year, compared to €1,400 for agricultural crops in the UK - of which €400 is from EU subsidy.

- Energy-efficient production

One measure of efficiency and greenness of an agricultural system is its energy balance, derived from output-to-input ratio. Oil palm uses less agrochemicals (fertilisers and pesticides) and fossil fuel to produce a tonne of oil than other oilseeds. It therefore has an efficient energy ratio of output to input at 9:6, compared to rapeseed (3:0) and soybean (2:5). This futher leads to reduced emissions and pollutants which in turn preserves water, soil and air quality (Chart 6).

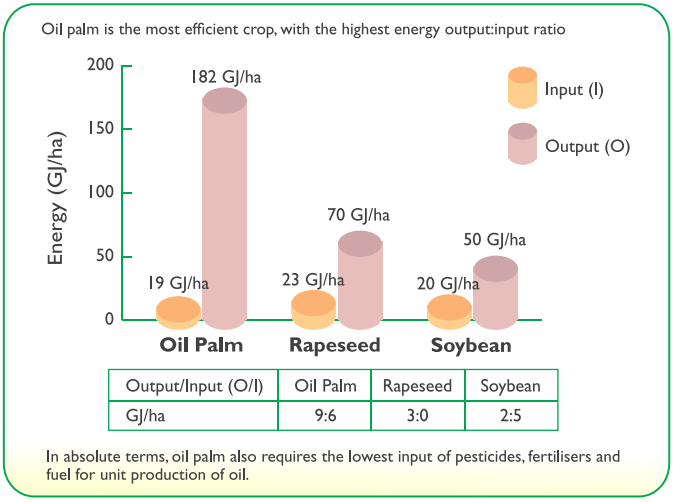
Providing for people

The perennial conflict in development comes down to a toss-up between the interests of Man and Nature. Sustainable oil palm cultivation hosts a win-win situation.

- Upgrading of livelihood

A surge in oil palm planting in Malaysia from the 1980s corresponded with a higher standard of living achieved through direct and indirect employment. The sector absorbs some 860,000 workers - including interested native peoples - whose employment rights and related needs are covered by law.

Chart 6: Comparison of Energy Input and Output to Produce Palm, Soybean and Rapeseed Oils



Output/Input (O/I)	Oil Palm	Rapeseed	Soybean
GJ/ha	9:6	3:0	2:5

In absolute terms, oil palm also requires the lowest input of pesticides, fertilisers and fuel for unit production of oil.

Source: Wood & Corley (1991)

Plantations have become focal points for rural communities. They provide hands-on job training that uplifts the skills of workers with low education. The populations also have access to free housing, clean water, electricity, telephones, health services, schools and places of worship.

- Economic and social benefits

Malaysian plantation management is highly developed, working with technical know-how enhanced through an industry-funded R&D system. Even smallholders have access to

technologies via an extension service provided by the Malaysian Palm Oil Board and by experts from estates participating in a nucleus partnership system.

Palm oil processing has triggered downstream industrial, commercial and retail operations in the food and oleochemical sectors. This has had a positive knock-on impact on jobs and wealth creation. Billions of ringgit (RM28.6 bil in 2005) earned from trade in palm oil are also channelled to economic development and social well being.

- Poverty alleviation

In 1956, the Malaysian government set up the Federal Land Development Authority (Felda) to reduce rural poverty through planting of economic crops, including oil palm. Felda develops land schemes, adds infrastructure and amenities, distributes 4ha-plots to landless small farmers, and provides management services as they work towards ownership. The scheme has grown to cover 853,000 ha and over 100,000 settlers and their families. Unsurprisingly, it has caught the eye of countries seeking a successful model of poverty alleviation.

- Global food security

Exports of affordable, healthy, nutritious and high-yielding Malaysian palm oil now feed some 3 billion people in 150 countries. Staving off looming global hunger is a matter of urgency as populations grow and land runs out for food crops.

Protecting the planet

The oil palm is an eco-friendly crop by its very nature.

- Criteria for sustainable production

Oil palm growers and processors have joined investors, bankers, traders, retailers and relevant NGOs in a voluntary Roundtable on Sustainable Palm Oil. It has approved criteria and principles for sustainable production and use of palm oil based on economic, social and environmental viability. Traceability along the palm oil supply chain and certification are the ultimate targets.

- Renewable fuel source

Part of palm oil output is being converted to bio-fuel, a renewable and 'green' alternative to fossil fuel. Malaysia is pilot-testing B5, a blend of 5% refined olein and 95% diesel, in vehicles. Commercial production will begin by end 2006.

As the lowest priced feedstock, palm oil could tap Asia's sizeable bio-fuel market as countries like Japan, Singapore, South Korea, China and India have ratified the Kyoto Protocol 2005. This requires the first targets in reduction of greenhouse gas emissions - including carbon dioxide - to be achieved by 2012.

- A home for life

Oil palm plantations are 'alive', promoting more biodiversity in and around them than cereal, vegetable and other short-term cropping systems.

Typically, an estate is home to 268 species of flora and fauna - think multitudes of microbes, insects, arthropods, reptiles, fish, birds (resident and migratory), small mammals, and even the relatively rare leopard cat *Felis bengalisis*. Almost 100 species of plant life thrive because of good agricultural practices that include planting of agro forestry species (teak and bamboo).

Oil palm areas located on jungle fringes help preserve wildlife by maintaining riparian reserves along rivers and oxbow lakes. These conserve biodiversity, control erosion and serve as wildlife corridors for accessibility to habitats.

- Fund for biodiversity

In May 2006, the Malaysian Palm Oil Council (MPOC) announced a revolving fund of US$5.5 million. It will support efforts to enhance biodiversity conservation related to palm-oil production worldwide. Industry players contributed half the sum, with the balance made up by government agencies and the public. MPOC will manage the fund and match contributions, up to US$2.7 million.

This opens the door to scientists, researchers, conservationists, environmental experts and NGOs to submit proposals. The fund will support related studies and activities; sustainability measures in plantations; and conservation efforts.

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Malaysian Palm Oil Council (192835-K)

2nd Floor, Wisma Sawit, Lot 6, SS6, Jalan Perbandaran, 47301 Kelana Jaya, Selangor, Malaysia

Tel: +603 7806 4097, Fax: +603 7806 2272
websites: www.mpoc.org.my, www.malaysiapalmoil.org