



The potential of palm oil for developing countries and its role in the food and fuel debate

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Presentation

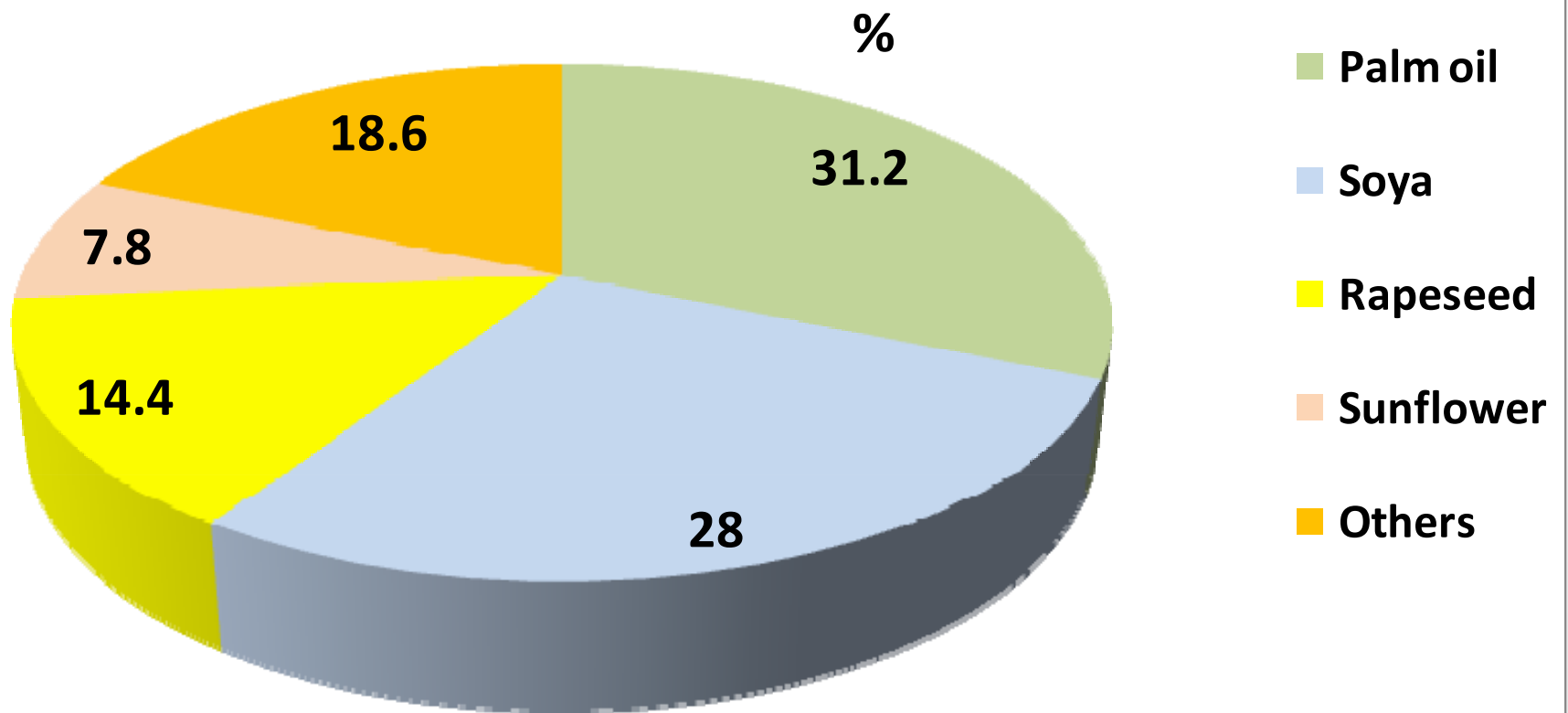
- Importance of palm oil to meet world's demand for food & biofuel
- How palm oil can meet world's requirement through wise use of limited land resource
- How palm oil has resulted in avoided deforestation in importing oils & fats countries
- Why palm biofuel is green
- Why palm biofuel demand is not the cause of high price of vegetable oils
- Showcase oil palm as right crop in 21st century for developing countries
- Conclusions

Need to use land wisely

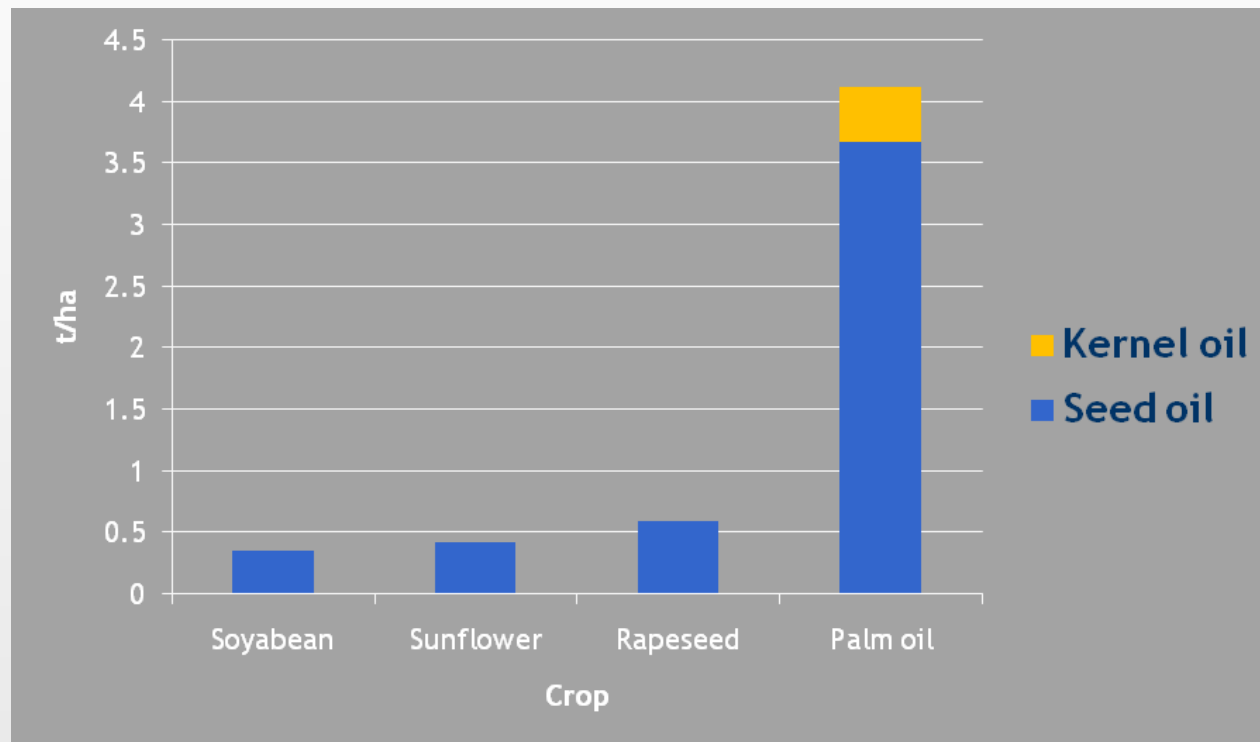
Year	World population (billion)	Arable land per capita ($\times 10^{-3} \text{ km}^2$)	Arable land per capita (ha)
1922	2.0	7.50	0.75
1975	4.0	3.75	0.38
2005	6.6	2.27	0.23
2030	8.0	1.88	0.19
2042	9.0	1.67	0.17

- World population increasing
- Limited land resource decreasing

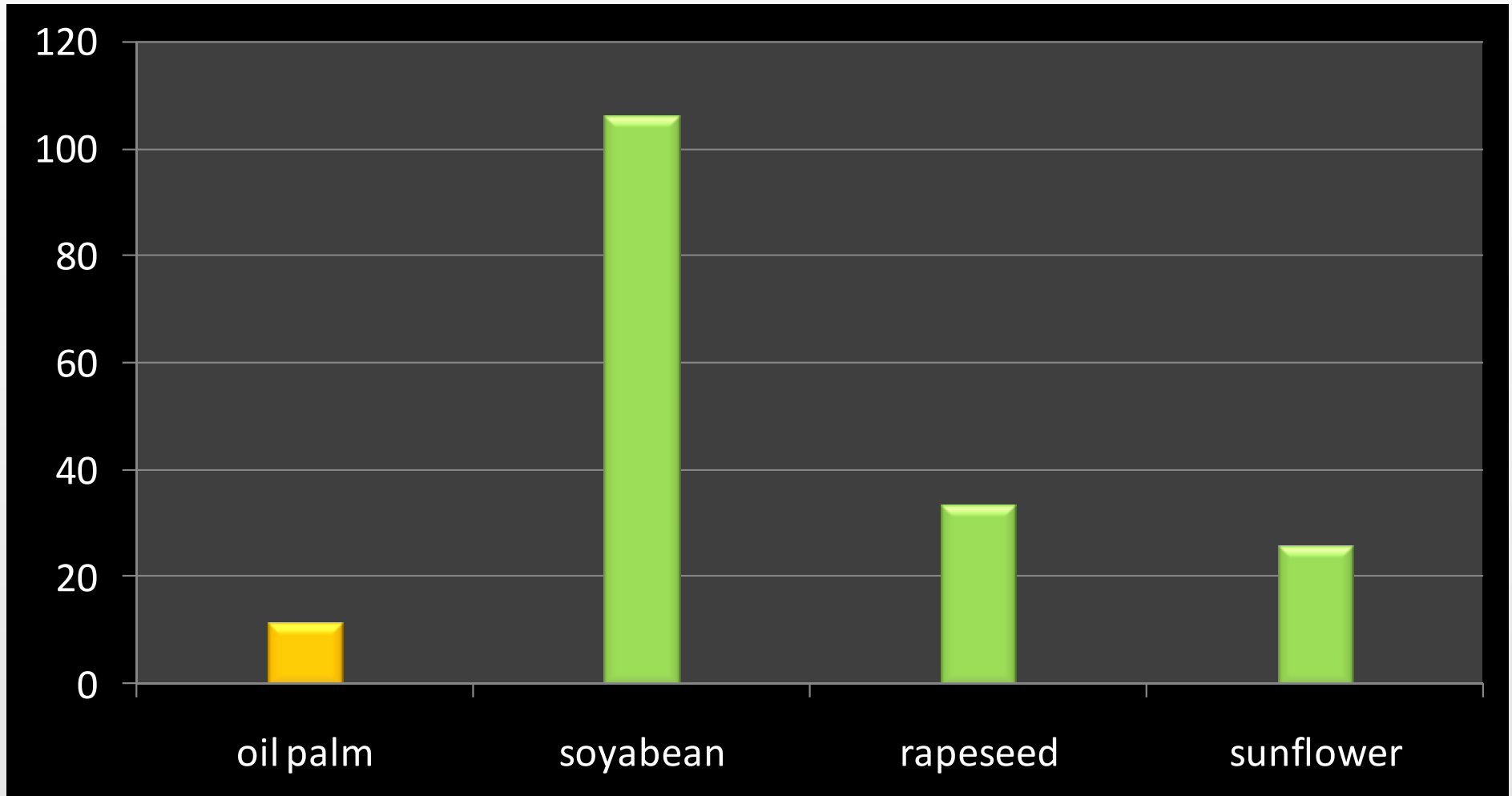
Palm oil's contribution to world supply



High land productivity of oil palm



Harvested area of oil crops in world (million ha)



Oil palm occupies less than 5% of oil crops area and less than 1% of agricultural land area in world

Cultivated area of oil seeds in the world

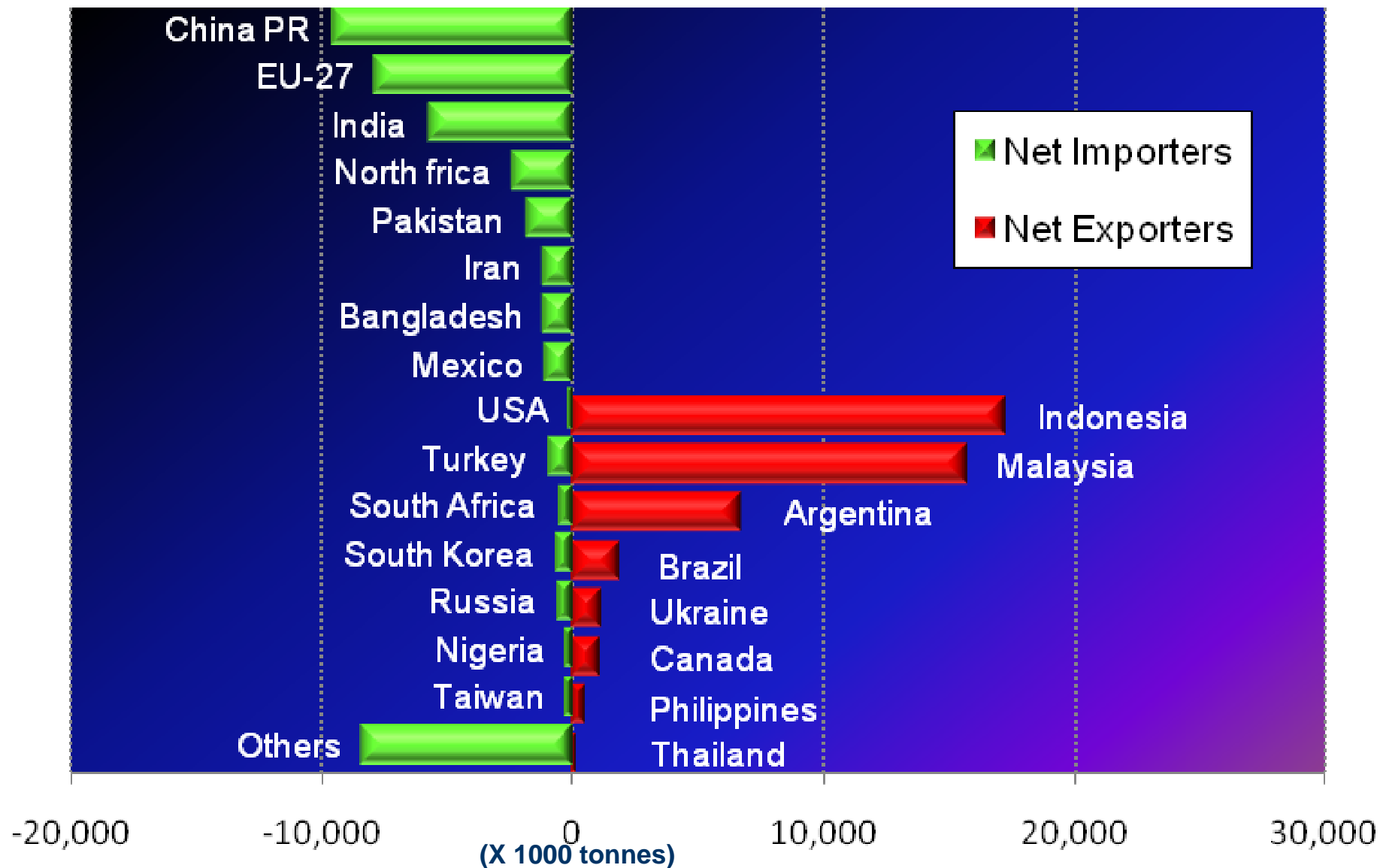
Land use type	Total area (million ha)	As % of total area
Total agricultural land*	4967	100%
Oil seeds **	233	4.69%
Oil palm**	11	0.22%***
Soyabean**	92	1.85%
Rapeseed**	30	0.60%
Sunflower**	23	0.46%
Coconut**	9	0.18%
Other oil seeds**	68	1.37%
Malaysian oil palm	4.3	0.09%
*** oil palm cultivation comprises 4.7% of total land area planted with oil seeds & 0.22% of world agricultural land		

Sources: * FAO ** Oil World

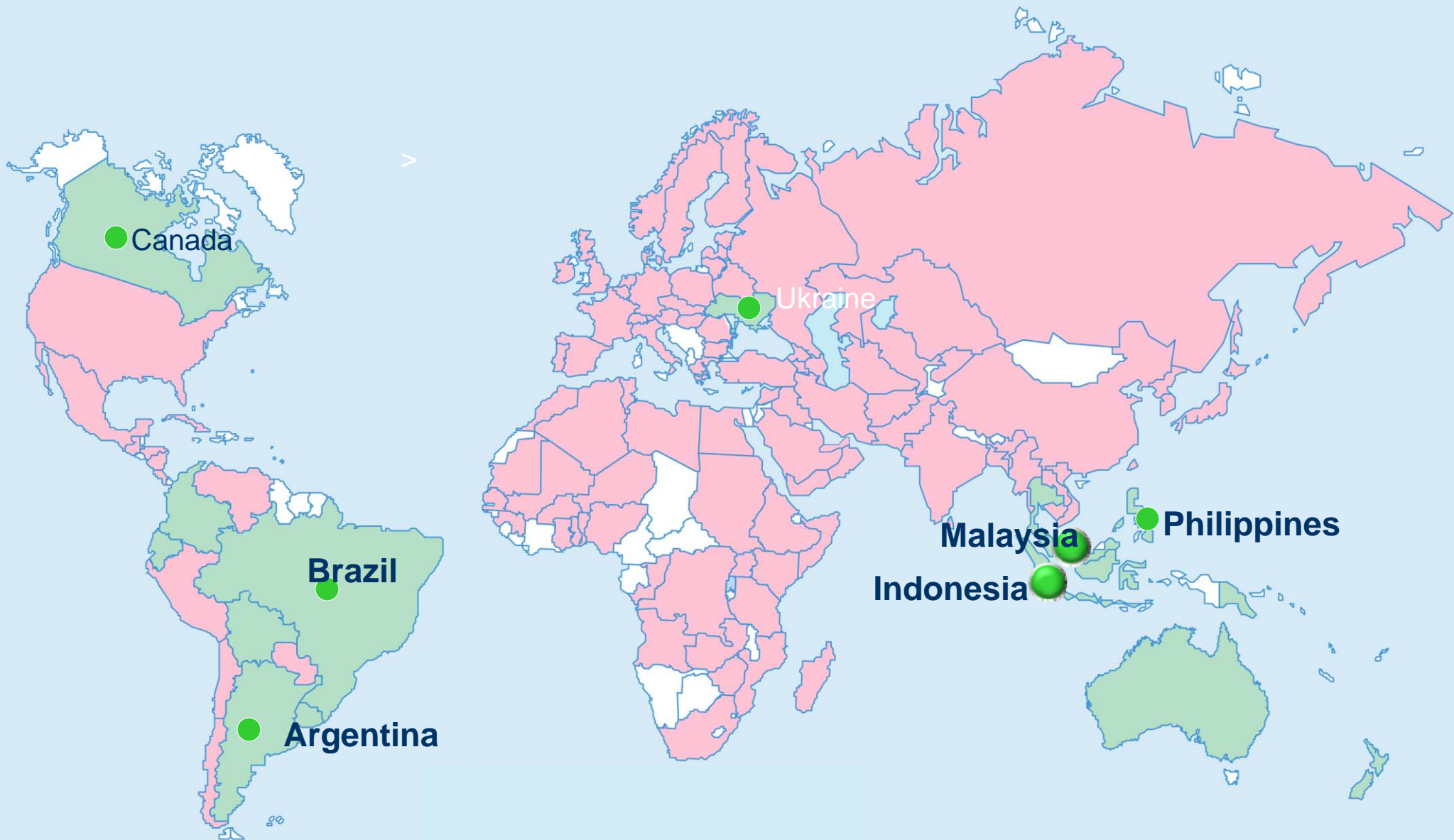
Efficient use of land

- Current total land to produce 4 major vegetable oils is 176.8 m ha
- Hypothetically, if oil palm, being the most efficient oil crop, given the role to produce vegetable oil for the world, it only needs 30.3 m ha
- Making available 146.5 m ha or 6 times size of UK for other land use
- If all 176.8 m ha planted with oil palms, 651 m tonnes oil produced; equivalent to 5 times present demand
- Rest of the oil can be used for other purposes eg for biofuel
- This is more than enough to meet world's demand for food & biofuel of 263 m tonnes in the year 2030

Net importing and exporting countries for oils & fats



Main exporters of oils & fats are palm oil producing countries.
Oil palm producers avoid deforestation in importing countries
Oil palm producers accused of deforestation while helping
importing countries not to deforest.



World-wide avoided deforestation in importing countries by choosing palm oil as food & biofuel

Parameter	Amount
Avoided deforestation when oil palm substitutes <ul style="list-style-type: none">•Rapeseed cultivation•Soyabean cultivation	53 million ha 87 million ha
Avoided carbon stock loss in this <ul style="list-style-type: none">•Rapeseed area•Soyabean area	4 billion tonnes of C 6.7 billion tonnes of C

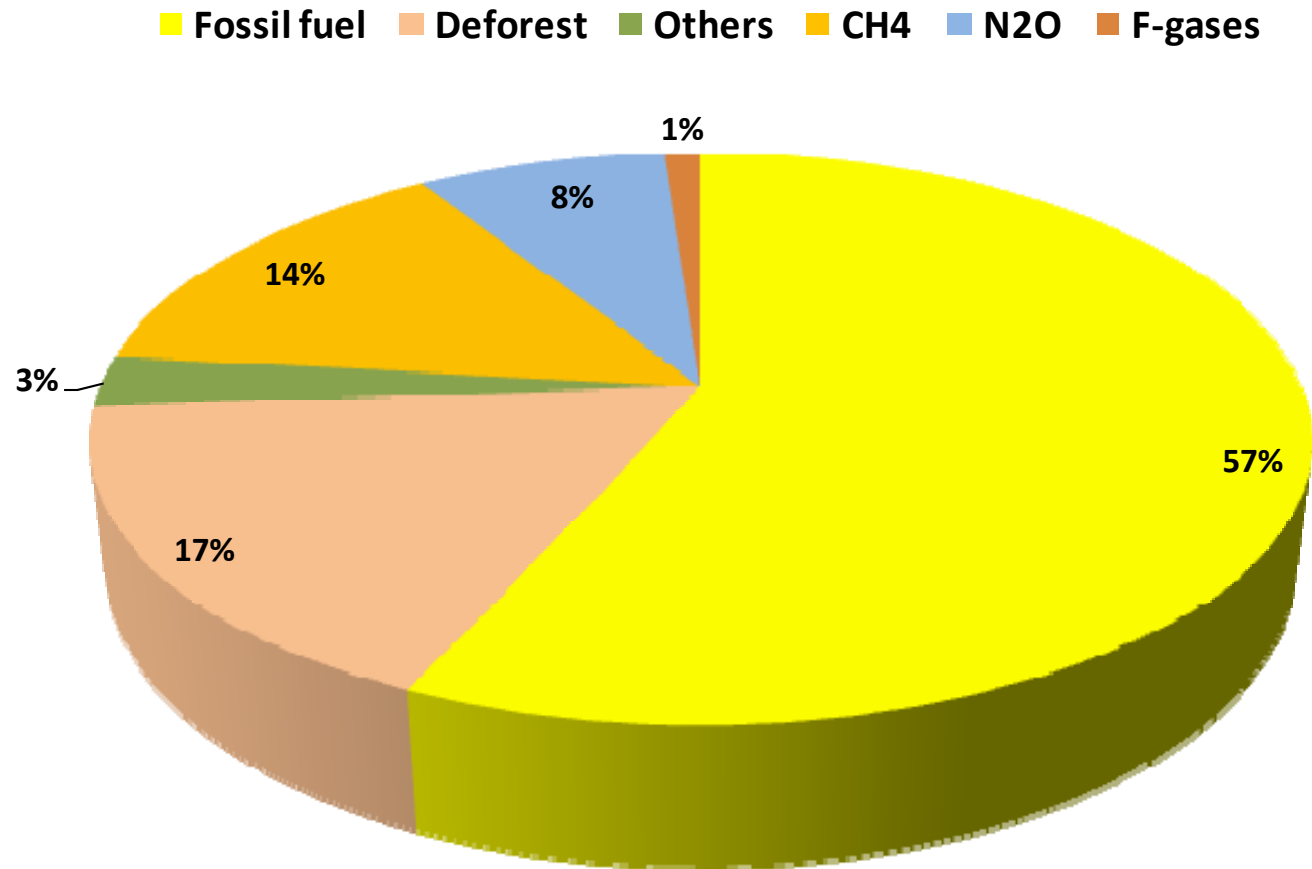
Indirect land use change effect

- Direct land use change results eg by Fargione et al (2008) stated that palm oil production from clearing forested land gives palm oil a carbon debt lasting 86-840 years
- Indirect land use change effect of oil palm substituting (or avoiding) rapeseed & soyabean from being cultivated not considered
- Palm oil production has a carbon credit (not a carbon debt) if this is considered

Palm oil substitution carbon credit (POSCC)

- Defined as number of years needed in production of palm oil to produce the same amount of CO₂ emitted by substitution oil crops during land clearing
- If oil palm substitutes rapeseed, POSCC is 324 years (if oil palm cultivated on degraded tropical forest) and 472 years (oil palm to oil palm replant)
- If oil palm substitutes soyabean, POSCC is 1,395-1,543 years
- Oil palm cultivation results in a carbon credit (not carbon debt)

Sources of GHG emissions (CO₂ equivalent)



Largest amount of GHG from fossil fuel use makes biofuel use a good option to arrest climate change

Mileage per hectare per year -based on a VW Polo-



Soy Biodiesel

8,000 km

440 litre

Rapeseed Biodiesel

23,660 km

1,300 litre

Bioethanol

33,000 km

2,500 litre

Jatropha Biodiesel

45,500 km

2,500 litre

Yield per hectare

Sundiesel (BtL)

75,330 km

4,050 litre

Biomethane

99,600 km

4,980 litre

Palm Biodiesel

109,000 km

6,000 litre

Source: "Biofuels", Fachagentur
Nachwachsende Rohstoffe e.V. (FNR),
2006 and own data

LCA GHG emissions of palm biodiesel

Emission sources	Amount (kg CO ₂ /tonne biodiesel)	
1. Production of fertilizers used	185	(11.5%)
2. Nitrous oxide emitted	130	(8.1%)
3. Use of pesticides	34	(2.1%)
4. Transportation & machinery use	89	(5.6%)
5. Milling & refining of palm oil	19	(1.2%)
6. EFB	87	(5.4%)
7. Effluent ponds	824	(51.5%)
8. Transportation to mills, refineries	36	(2.3%)
9. Biodiesel refining	197	(12.3%)
Total	1,601	(100%)
10. Production & use of fossil fuel	4,228	
11. Palm biodiesel savings	2,627	
12. GHG emission savings relative to fossil diesel	62%	

Source: van Zutphen (2007)

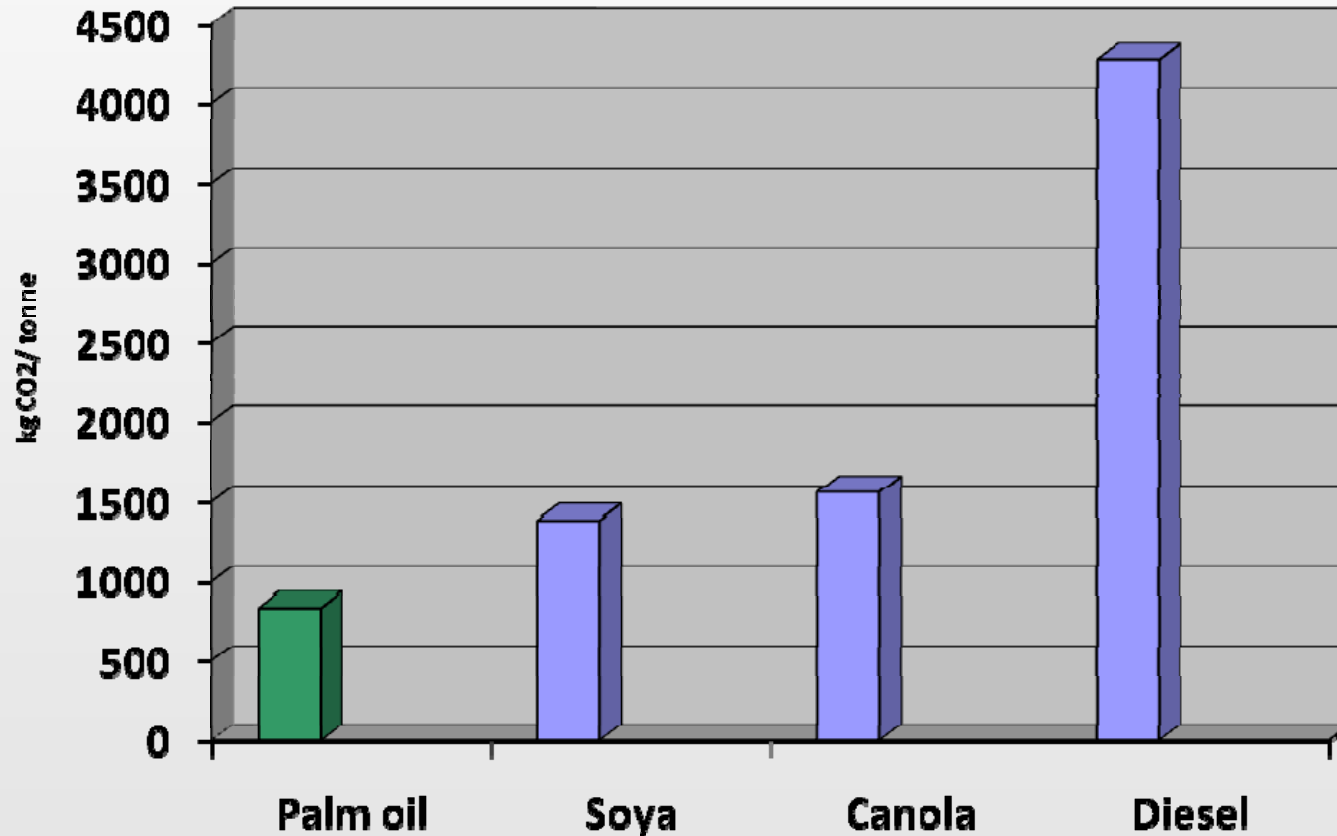
GHG emission savings exceed 35% threshold value of EU Directive

Oil palm is a net carbon sequester

Parameter	Practice if methane not trapped in effluent ponds (kg CO ₂ -e/tonne CPO)	Practice if methane trapped in effluent ponds (kg CO ₂ -e/tonne CPO)
1)LCA CO ₂ -e emitted	-1,601	-1,601
2)LCA CO ₂ -e emitted after allocation to co-products	-1,143	-512
3)CO ₂ -e sequestered	+870	+870
4)Avoided deforestation	+8,266	+8,266
Net CO ₂ -e emitted (-) or Sequestered (+)	+7,993	+8,624

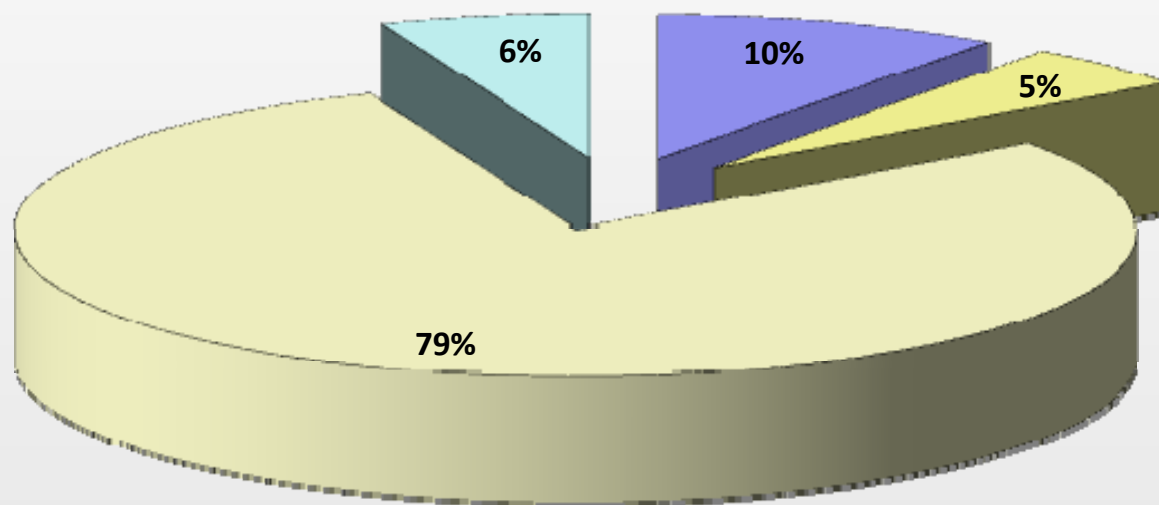
1)GHG emission allocated to CPO, palm kernel oil, palm kernel cake and EFB based on weight (2) life cycle of oil palm is 25 years

Lower C footprint for biofuel production

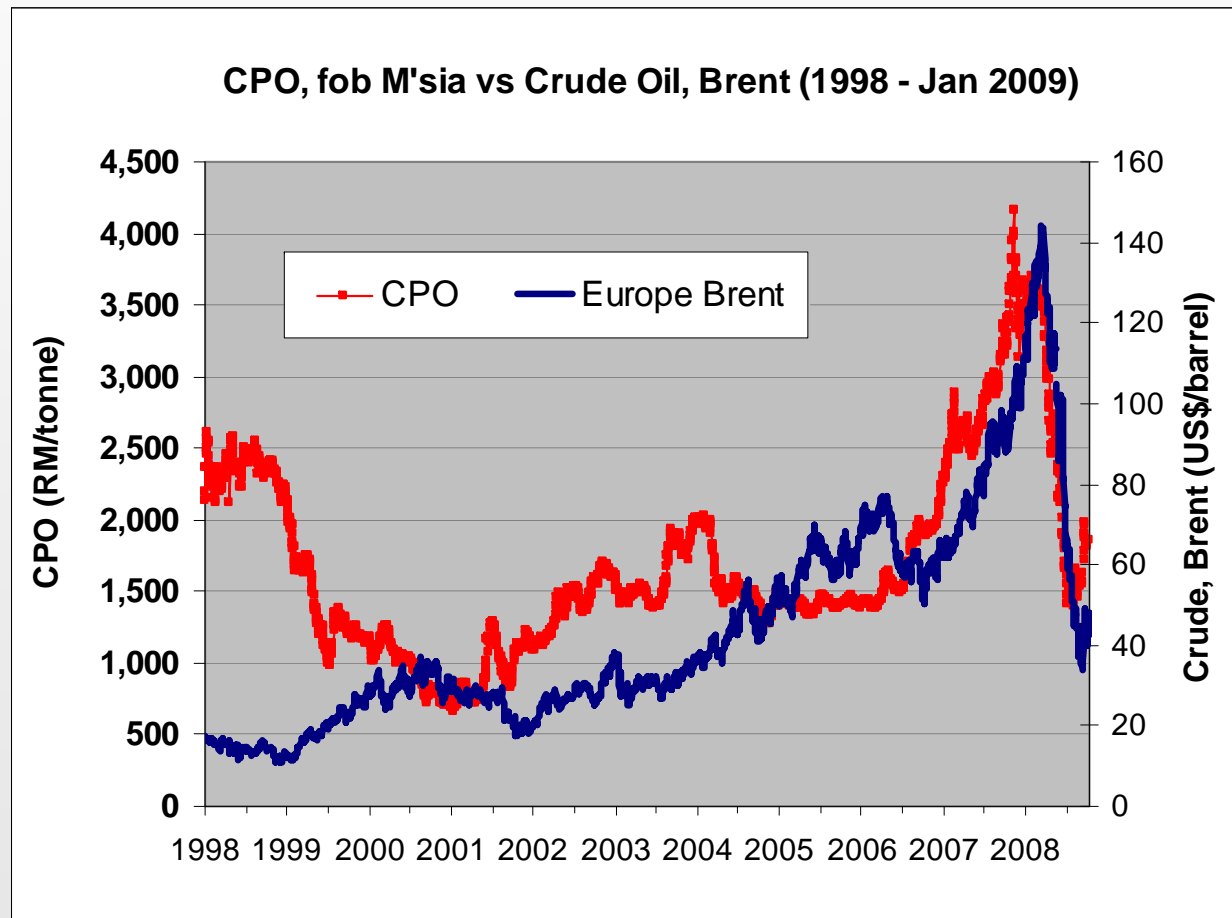


Source: van Zutphen(2008)

Global market share of industries for oils & fats



Correlation between CPO price and diesel oil price



Oil palm is right crop for developing countries

- Malaysia as example
- Oil palm is grown on legal agricultural land in Malaysia
- Adopts responsible practices just like rapeseed and soyabean
- Adopts good agricultural & management practices eg zero burning, integrated pest management, trapping methane
- RSPO (proof of sustainable production)

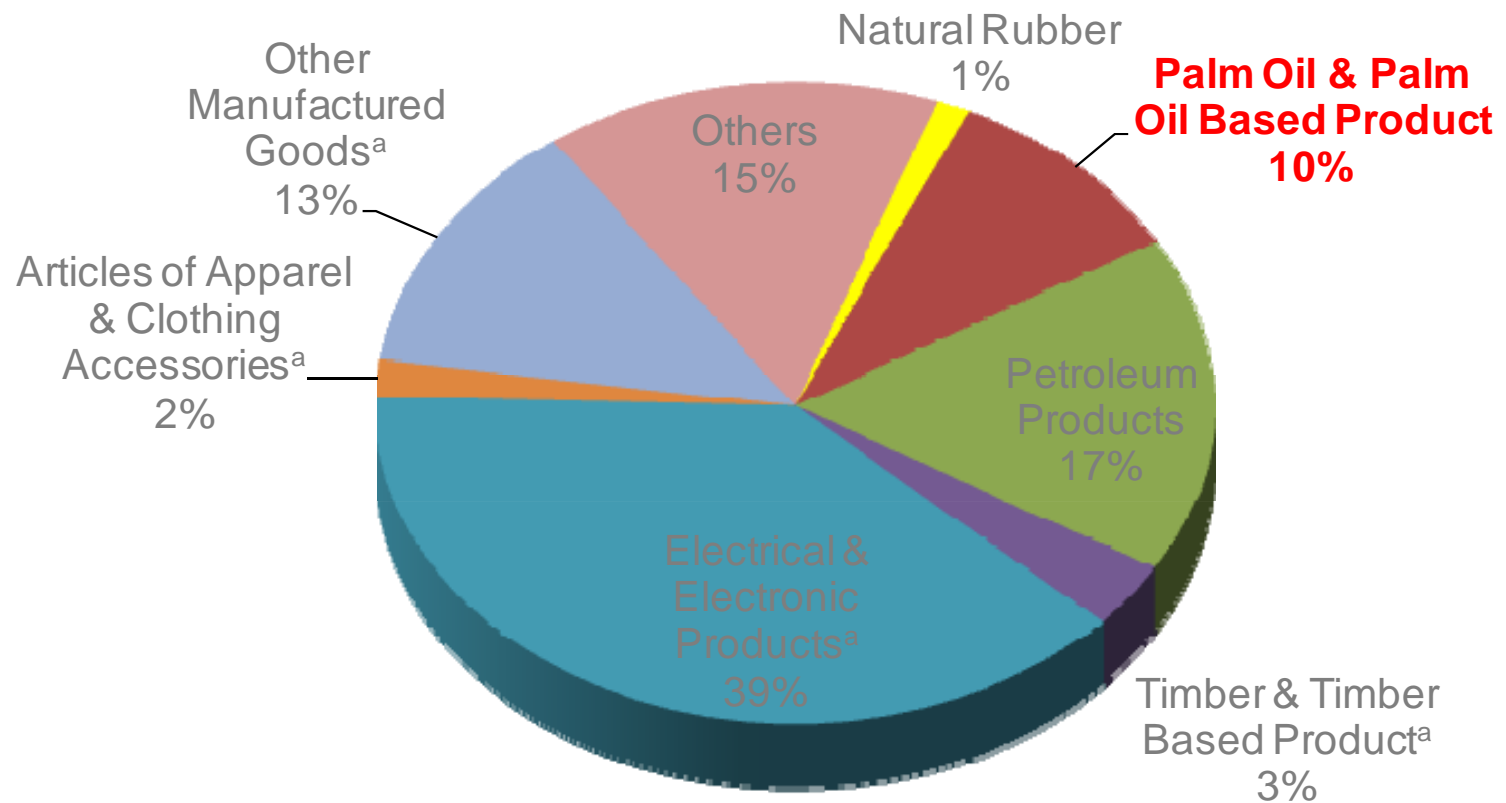
Oil palm is right crop for developing countries

- Oil palm is a suitable crop for tropical developing countries
- Palm oil is a major revenue earner for Malaysia (10% of total export earnings for country)
- Poverty eradication in Malaysia with income of FELDA settlers significantly higher than national rural poverty line
- This is possible by respecting 3Ps principles of sustainability

Felda as a good role model to develop agriculture in developing countries

Land use	Area	Area as % of total land
Oil palm	720,076	84.4
Rubber	86,183	10.1
Sugar cane	2,449	0.3
Other agriculture	2,432	0.3
Housing/infrastructure	42,173	4.9
Total	855,313	100

Palm oil's significant contribution to Malaysian economy in 2008



Potential of developing countries to produce more food & biofuel from oil palms

Country	Forest land (m ha)	Agric (m ha)	Urban & built up area (m ha)	Idle land (m ha)	Total (m ha)
Brazil	477.7(56.5%)	263.6(31.2%)	84.6	20.0	845.9
Indonesia	88.5 (48.8%)	47.8 (26.4%)	18.1	26.8	181.2
Malaysia	20.9 (63.5%)	7.9 (24.0%)	3.3	0.8	32.9
PNG	29.4 (64.9%)	1.1 (2.4%)	4.5	10.3	45.3
Philippines	7.2 (24.1%)	12.2(40.9%)	3.0	7.4	29.8
Thailand	14.5 (28.4%)	18.6 (36.4%)	5.1	12.9	51.1
Total	638.2 (53.8%)	351.2 (29.6%)	118.6 (10%)	78.2 (6.6%)	1,186.2 (100%)

Potential production of palm oil from idle land

- 78.2 million hectares of idle or under-utilized land in developing countries
- If planted with oil palms, potential yield of 288 million tonnes of palm oil without need to deforest or open up new land
- Therefore, oil palm expansion in oil palm growing countries need not be curtailed

Conclusions

- Continuous need for oils & fats to feed ever growing world population
- New era of using vegetable oils for biofuel production
- Palm oil contributes significantly to 31% of total vegetable oil production
- Yet occupies less than 5 % of oil crops area and less than 1% of agricultural land in world
- Hypothetically, if oil palm given role to produce oil supplied by 4 major oil crops in world, it requires only 30 million ha
- This will free 147 million ha of land for other land use without need to deforest or open new land

Conclusions

- Alternatively if land area currently devoted to 4 major oil crops is to be planted with oil palm, palm oil production is 5 times current requirement
- Plenty of oil for other uses including biofuel use
- Only 8 countries in world self sufficient in oils and fats, the rest are mostly net importers
- Palm oil already avoids deforestation (53-87 m ha) and avoids loss of carbon stock (4-6.7 billion tonnes C) in importing countries
- Palm oil substitution carbon credit (POSCC) of 324 - 472 years from indirect land use effect when oil palm substitutes rapeseed
- For soyabean substitution, POSCC is 1,395-1,543 years

Conclusions

- Palm oil biofuel is green biofuel and LCA GHG emission savings definitely exceeds 35% threshold value (EU Directive) but proper studies must be carried out
- In reality, palm oil biodiesel is a net carbon sequester if logical contributions of all credits are accounted for
- Oil palm cultivation is proven crop to eradicate poverty and uplift economy of developing countries
- Estimated 78 million ha of idle or under-utilized land in oil palm growing countries with a potential yield of 288 million tonnes CPO without need to open up new land
- Oil palm expansion in developing countries must not be curtailed unless the alternatives offer better GHG emission reduction effects

The background image is a landscape photograph. The foreground is filled with dense, dark green foliage, possibly ferns or similar plants, which are slightly out of focus. In the middle ground, there is a layer of white mist or fog that obscures the details of the landscape. Above the mist, the background shows more distant, hazy greenery and a pale, overcast sky. The overall mood is serene and atmospheric.

Thank You