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The health, environmental and economic benefits of palm oil

Oils and fats have been essential components of human life for thousands of years, whether as a source of food, illumination, soap, or as lubricants for machinery. At the turn of the 20th century, improvements in refining technologies and long distance transportation turned palm oil into a globally traded commodity and a dominant force in the global vegetable oil market. According to USDA data, in 2011/12, palm oil contributed 32.7% of the world vegetable oil supply, the bulk of which (above 85%) was produced in Malaysia and Indonesia.

Palm oil has been denigrated by its opponents (who were often historically producers of potential alternatives) as being 'impure, unhealthy, outright dangerous, and a threat to the environment'. As with all other agricultural productions in history, palm oil production takes place on formerly 'wild' land.

Western NGOs such as Friends of the Earth and Greenpeace have been especially active in denouncing the expansion of this industry as the cause of massive deforestation and the extermination of charismatic species such as the *orang utan*. In the meantime, the World Wildlife Fund published its 'Palm Oil Buyers' Score Card 2011' which assessed the palm oil buying practices of 132 major retailers and consumer goods manufacturers.

Their campaigns have affected many corporate policies. Nestlé has excluded the Indonesian paper and palm oil producer Sinar Mas Agro Resources and Technology from its supply chain. Since 2010, Carrefour has purchased Green Palm certified oil for its own brand products sold in France and has committed itself to purchasing only Certified Sustainable Palm Oil by 2015. Casino has

banned palm oil from all its food products for health considerations while committing itself to purchasing only certified 'sustainable' supplies for its non-food products.

However, we will argue that, while not perfect, palm oil displays a number of advantages over actual and potential alternatives in terms of its versatility, productivity, price and volume availability that does indeed make it a superior product in many respects. Boycotting palm oil would fail to deliver any environmental and economic benefits while severely hurting the growth prospect of impoverished communities.

Health and nutritional value

Commercial palm oil is extracted from the fruit of the oil palm tree (*Elaeis guineensis*) native to West Africa, and a botanical relative of the coconut. Palm-oil use goes back at least 5,000 years to ancient Egypt, but only became a truly global commodity over a century ago when its production took off in other parts of the world characterised by tropical climates with high annual rainfall, and located within 10° of the Equator.

The oil palm produces two very different types of oil: crude palm oil from the fibrous mesocarp and crude palm kernel oil from seed kernels whose composition is actually closer to coconut oil. Between 80% and 90% of palm oil production is destined for human food consumption either as frying and cooking oil or as an ingredient in a wide range of food products. The remaining 10% is consumed by various industries, from biodiesel to cosmetics and pharmaceutical producers.

The most unique property of palm oil when compared to its most common alternatives (typically rapeseed and soybean oils) is that it is semi-solid at room temperature, with a specific origin melting point of 33-39°C, which derives from its about 1:1 ratio of unsaturated to saturated fatty acids. In practice, this makes it very easy to work with.

Palm oil has often been accused of being less healthy than other alternatives. To better understand the issue, however, one must first get acquainted with some basic nutritional facts.

Fats consist mainly of four types of fatty acids: polyunsaturated fatty acids, monounsaturated fatty acids, saturated fatty acids and *trans*-fatty acids. In France and elsewhere, the use of palm oil in food preparation has been criticised because it contains saturated fatty acids which can increase the levels of the LDL (low density lipoprotein) cholesterol.

However, palm oil is a healthier source of solid fats than hydrogenated vegetable oils (soybean or rapeseed oils) which are solid or semi-solid at room temperature, and more resistant to oxidation. In the process of partial

hydrogenation, artificial *trans*-fatty acids are formed. The intake of *trans*-fatty acids has been linked to heart disease, increased levels of unhealthy LDL cholesterol and lowered levels of good HDL (high density lipoprotein) cholesterol. Thus, '*trans*-fats free' is a property that makes palm oil a substitute for many animal fats like tallow or other partially hydrogenated vegetable oils.

In general, zero *trans*-fatty acids, less saturated, and more mono and polyunsaturated fatty acids in oil are healthier options. However, products rich in saturated fats have other qualities such as better oxidative stability, a creamier consistency and a high melting point, to make these a necessary ingredient especially for confectionery manufacturers.

On a practical level, there are significant trade-offs as less saturated fats means less functionality, less flavour and texture, less stability and higher costs. Once all trade-offs are factored in, palm kernel oil, palm oil, or a blend of these with other liquid oils are typically the most practical and economical options. For example, there is a growing demand for palm kernel oil products as ingredients in the production of non-hydrogenated *trans*-fats free margarine.

As for nutrition, the bottom line is that, as the founder of modern toxicology Paracelsus observed nearly five centuries ago, it is the dose that makes the poison. Palm oil is stable at high heat and rich in antioxidants, carotenes (Vitamin A) and Vitamin E. Among other advantages, these characteristics make it ideal for frying, to extend the shelf life of the food products in which it is used, and to significantly boost the nutritional and health content of foods, especially in developing countries.

Tocotrienols (a type of Vitamin E) are found in abundance in palm oil. It is used by, among others, the high-end cosmetics manufacturer Crabtree & Evelyn as an active ingredient to increase sunscreen efficiency by reducing UV ray penetration which can cause cellular ageing. Because of innovations in processing and reformulation, there is an increasingly wide range of uses for palm oil products.

Low input, low land usage and high yields

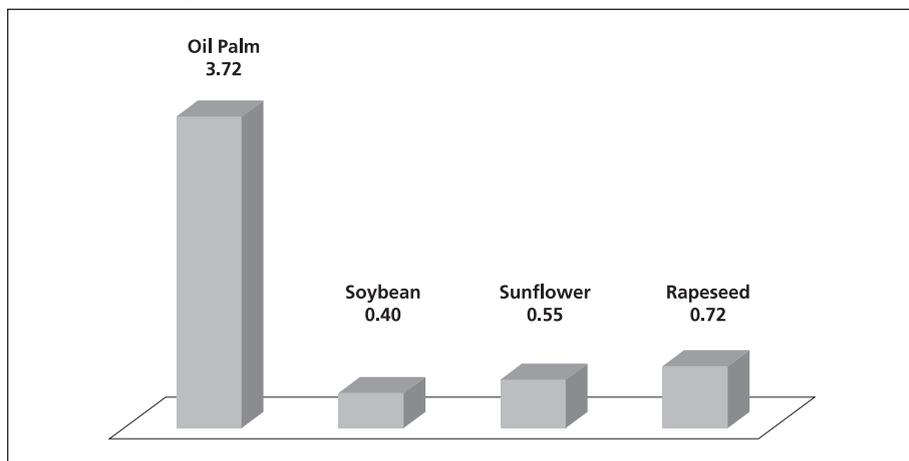
From 1980 to 2011, the annual world production of palm oil more than decupled, from 4.5 million tonnes to 55 million tonnes. Much of this expansion took place in Indonesia and Malaysia because of good growing conditions, the greater productivity of the oil palm over potential alternatives and advances in cultivation, refining and transportation technologies. In 2011, Malaysia and Indonesia produced 36.3% of the total global edible oil supply using only 5.3% of oilseed planted area, a result entirely attributable to the high productivity of the oil palm.

According to *Oil World 2007* data, oil palm yields an average of 3.72 tonnes of oil per ha compared to 0.4 tonnes and 0.72 tonnes respectively for soybean and rapeseed. In other words, oil palm produces almost 10 times more oil per ha than soybean and five times more than rapeseed (Figure 1).

In terms of unit of input per unit of output, the oil palm also requires significantly less fertilisers, pesticides and fuel per unit produced than rapeseed and soybean, in the end delivering over three times more oil per unit of input.

Along with this high productivity, Southeast Asian and South American countries have also the lowest production costs for edible oil crops – the EU and other countries have higher costs attributable to a range of factors, from high fertiliser usage and overhead costs to higher taxation. According to *Oil World*, crude palm oil price was on average 10-30% lower than that of soybean and rapeseed oils.

Figure 1: Average annual oil yield for major edible oil crops (tonnes/ha/year)



Source: *Oil World*

Another advantage of palm oil production is the relative reliability of its supply. While all large-scale agricultural productions are subjected to some degree to various natural hazards (from droughts and floods to frost and hurricanes), the oil palm – a perennial plant that is productive year round and has a useful life of between 20-25 years – is typically more reliable than its (annual plant) alternatives.

It has also benefitted from modern breeding techniques and ever more sophisticated production technologies that have delivered an ever more affordable, versatile and high quality supply. The obvious advantages of palm oil, especially in terms of productivity, volume, price and versatility, explain its success in world markets.

Oil palm and deforestation

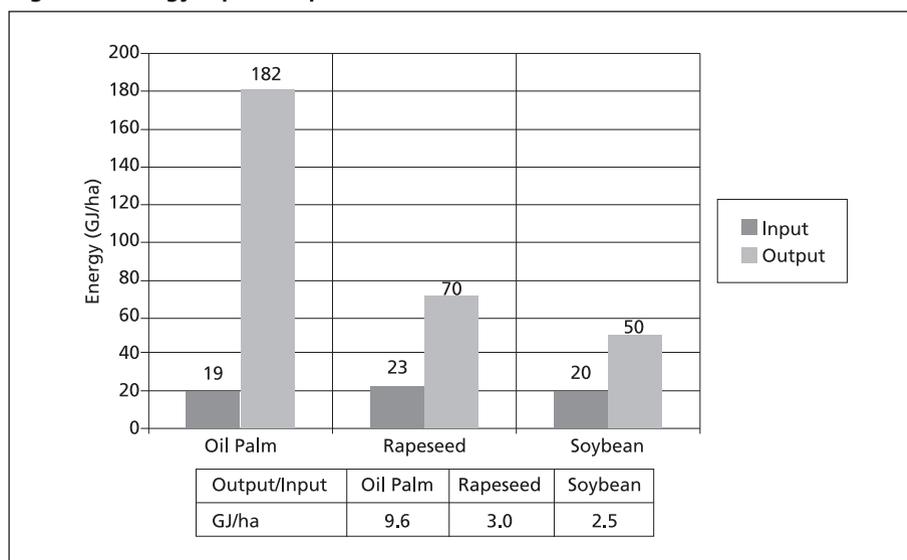
All agricultural activities ultimately require the conversion of what were once 'wild' areas. In many cases, however,

the increased production of a particular agricultural commodity can be achieved by switching production on a plot of land that is already being used. This has been the case for the oil palm.

In Malaysia for instance, the surface area devoted to oil palm plantings in 2011 was about 5 million ha, a five-fold increase since 1975. Approximately 1.39 million ha of this were the result of conversion from other tree crop productions such as rubber, cocoa and coconut. It is also worth pointing out that, while the surface area devoted to palm oil production increased by a factor of five, total output increased more than 16 times between 1975 to 2011 (from 1.1 million tonnes to 16.6 million tonnes) because of much higher yields. A case can thus be made that the improvement in yields since 1975 has actually 'spared' perhaps as many as 15 million ha to achieve the 2011 production volume.

Activists from advanced economies who are quick to

Figure 2: Energy input/output ratio



Source: Wood BJ et al 1991. 'The energy balance of oil palm cultivation', Proceedings of the 1991 PORIM International Palm Oil Conference

denounce deforestation in faraway lands should also keep in mind that, far from being a recent occurrence, perhaps as much as nine-tenths of all deforestation caused by human beings since the emergence of civilisation had occurred before 1950, as people needed to clear massive amounts of forested land in order to provide themselves with shelter, food, warmth and a multitude of objects.

The significant increase in the use of coal in the early decades of the 19th century, however, marked the beginning of a reversal of this trend which was later accelerated by the advent of natural gas and petroleum. These not only acted as substitutes for the use of biomass fuels, but also drastically improved agricultural productivity and eliminated farm animals, which consumed a significant portion of agricultural crops.

France was perhaps the first major country to experience what has since been termed a “forest transition” as its forest area expanded by one-third between 1830 and 1960, and by a further quarter since 1960. Similar processes, although of varying intensity and scope, have been occurring in all major temperate and boreal forests and in every country with a per capita Gross Domestic Product exceeding US\$4,600 as well as in some developing economies, most notably China and India.

Tropical rainforests and the *orang utan* would not be better protected with punitive measures to slow down the development of palm oil producing countries, but rather through a sustained increase in the productivity and sustainability of their crops. Only with a more efficient use of land and increased wealth will they be

better able to devote more resources to the protection of those ecosystems. Fortunately, with economic development and its attending productivity gains, and development of substitute products, reforestation has become a dominant pattern in all advanced economies.

Consequences of a boycott

World population growth, improved standards of living and biofuel mandates mean that the demand for vegetable oil is bound to increase significantly in the coming decades. Any deliberate move to reduce palm oil production in locations like Malaysia and Indonesia thus inevitably implies a shift in production towards lower yielding and more expensive substitutes. These would have a few unavoidable consequences:

1. Increases in land and resources requirements

Corley (2009) calculated several scenarios to meet future vegetable oil demand using various alternative sources of supply. According to his medium variant scenario in which 9.2 billion human beings in 2050 consume at least 25kg per person per year of vegetable oil, the total global demand would be 240 million tonnes – about 40% more than is currently the case. Responding to this additional demand would require from 12-19 million ha devoted to palm oil production or alternatively 95 million ha devoted to soybean production. Of course, as already noted, soybean production would not only require significantly more land, but also more input such as fertilisers, pesticides, water and fuel.

2. Higher price of foods and consumer items in EU

Since palm oil is currently used in the production of

many consumer products and food items because of its lower price, a switch to costlier and less reliable substitutes would negatively affect both manufacturers and consumers.

3. *Undermining RSPO and sustainable palm oil sources*

Sensationalistic anti-palm oil campaigns have tarnished the images of both the product and producers, resulting in retailers and manufacturers switching away from palm oil towards substitutes. These campaigns can only undermine the market for certified 'sustainable' oil at a time when the Roundtable on Sustainable Palm Oil has been struggling to expand its scope. In 2010 only 10% of the world's palm oil production (about 5 million tonnes) was certified 'sustainable' and only half of that was sold on the market. With their all-or-nothing stance, negative campaigns can only hinder real progress in the industry and prevent meaningful and sustainable economic, environmental and social benefits in both developed countries and developing countries.

4. *Delaying economic development in Malaysia and Indonesia*

In both Malaysia and Indonesia, the palm oil industry represents a viable and significant growth industry. In Malaysia, the industry currently provides employment to more than half a million people, and livelihood to about one million people. Any restrictions on this industry

would primarily affect small farmers whose lack of alternative employment might incite them to increase less desirable activities such as (often illegal) logging.

Today, most activists justify their actions on environmental grounds and pressure manufacturers and retailers to give up using palm oil. Such an attitude, however, is short-sighted. It will ultimately fail to achieve the alleged broader goals of environmental remediation and improvements in the living standard of poorer populations, since no other source of vegetable oil than the oil palm can actually spare more land and deliver more accessible, abundant and affordable calories to people worldwide.

Assuming that a significant increase in the demand for vegetable oil is a given, the real question then becomes how it can be met most efficiently, economically and sustainably. As with any other line of work, the real emphasis should be on encouraging better agronomic practices and improving governance in less advanced economies.

Whether legal or voluntary, sustainable policies also need to be based on sound science, and be workable and verifiable throughout the supply chain. Human ingenuity has long delivered and can continue to deliver ever greater output ever more efficiently, in the process providing both economic and environmental benefits. The palm oil industry is no exception.

