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FACTSHEET

FACTS ON THE USE OF *PALM (KERNEL) OILS* IN DETERGENTS AND MAINTENANCE PRODUCTS FOR PRIVATE HOUSEHOLDS IN GERMANY

Introduction

The detergents and maintenance products industry in Germany uses both inorganic and organic ingredients in the manufacture of its products. Some organic ingredients can be obtained based on fossil or renewable raw materials.[1]

In the year 2010, volumes of ingredients in detergents and maintenance products for private households totalled ca. 605,000 tonnes (excluding water)[2] in Germany. Here, surfactants (surface-active substances) have an important role: their annual input volume amounts to ca. 183,000 tonnes and thus constitutes roughly one third of the total tonnage of all ingredients combined in these products.[2] Both fossil raw materials (e.g. mineral oil) and also certain plant oils (mainly coconut oil from coconut palms and palm kernel oil from oil palms) come into question for large-scale surfactant manufacture, because of their high shares of fatty acids of medium carbon chain length (C_{12-14}).[3] The plant oils currently produced in Central Europe are technically unsuitable for surfactant manufacture for most uses.

In Western Europe, today some 20 percent[4] of surfactants in detergents and maintenance products are based on palm kernel and coconut oils. For Germany, this resulted in ca. 36,600 tonnes in 2010. An exact breakdown into shares of palm kernel oil and coconut oil in surfactants does not exist at the moment. Both oils are equivalent to each other in technical respects so that their use is determined rather by prices and availability. The remaining surfactants (ca. 80 percent) are obtained from fossil raw materials. At present, surfactants manufactured in biotechnological processes are of much less importance to the detergents and maintenance products industry, given the aspects of cost and performance.

In the following part of this document, a closer look will be taken at palm (kernel) oil from oil palms. Furthermore, a factsheet on the use of *coconut oil* in detergents and maintenance products can be accessed on the internet at www.forum-waschen.de (in German language).

More details on the use of palm kernel oil and coconut oil as input materials are provided in a study which was carried out by the Deutsche Gesellschaft für internationale Zusammenarbeit (GIZ, agency for international cooperation services) for the German Federal Ministry for Economic Cooperation and Development (BMZ).[5]

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[1] According to Fachagentur Nachwachsende Rohstoffe e.V. (Agency for Renewable Resources) (2007): Renewable raw materials are products generated in agriculture and forestry, which are channeled into uses in the non-food sector. (http://www.nachwachsende-rohstoffe.de)
[2] IKW ingredients survey for detergents and maintenance products for private households in Germany for the reporting year 2010
[3] Including lauric acid; therefore, these oils are frequently called laurics.
[4] Market estimate by the Project Group for Renewable Resources in FORUM WASCHEN, July 2009
[5] Study: "Nachwachsende Rohstoffe für die stoffliche Nutzung – Auswirkungen für Entwicklungs- und Schwellenländern" (Renewable resources for use as raw materials – impacts on developing and emerging countries), GIZ, Eschborn, 2011: http://www.giz.de/Themen/de/dokumente/giz2012-de-Nachwachsende-Rohstoffe.pdf

Oils from oil palms: production and uses

Initially, oil palms were cultivated predominantly to obtain palm oil, which is mainly used as a food ingredient. Since the beginning of the present century, the use as energy (biodiesel) has also been gaining in importance.[6, 7, 8]

Oil palms are grown on ca. 12.8 million hectares worldwide (2009). A major cultivation country is Indonesia with 5.4 million hectares[9] in that year. Data on areas under cultivation vary strongly: for the year 2010 the figures of 4 and 8 million hectares[5] were stated by one source for Malaysia and Indonesia, respectively, whilst other sources speak of 4 and 7 million hectares[10]. Even with such varying data - especially for Indonesia - it should be uncontested that these two countries combined account for around 85 percent of the global palm oil production.[9]

The fruits of oil palms provide two different types of oils: oil from fruit flesh is "palm oil"; oil from fruit kernels is "palm kernel oil". Depending on the origin, yields per hectare of cultivation area ranged in the year 2007 between 3.5 to maximally 7 tonnes of palm oil and 0.4 to maximally 0.8 tonnes of palm kernel oil.[11] In 2008, the average yield globally was 3.7 tonnes of palm oil per hectare.[9] Typically, this corresponds to 18 tonnes of fruit ("fresh fruit bunches").

According to the “Malaysian Palm Oil Association”, top yields of 8 to 9 tonnes of palm oil per hectare were achieved in 2011 whereas so-called smallholders had yields of only 4 tonnes per hectare.[12] Generally speaking for 2010, yields under smallholder conditions were up to 40 percent lower than yields in large-scale agricultural production.[13]

In comparison with palm oil, obtaining palm kernel oil requires more technical effort and a higher energy input. With the growing cultivation of oil palms, volumes in the production of palm kernel oil are today twelve times as high as they were back in the 1960s.[14] As compared with palm oil, the use of palm kernel oil in the food sector is much lower. Palm kernel oil rather serves as a raw material in the chemical industry where it competes with coconut oil.[5]

In the year 2011, the global production volumes of palm kernel oil and coconut oil amounted to 5.7 and 3.7 million tonnes, respectively. In the same year, the global production of palm oil totalled 50.6 million tonnes.[15]

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[6] WWF Deutschland (2007): Regenwald für Biodiesel? Ökologische Auswirkungen der energetischen Nutzung von Palmöl, Frankfurt am Main (Rain forest for biodiesel? Ecological impacts of the energy utilization of palm oil), Frankfurt am Main

[7] How the Palm Oil Industry is Cooking the Climate, Greenpeace, Amsterdam, 2007

[8] Friedel Hütz-Adams, Palmöl: Vom Nahrungsmittel zum Treibstoff? (Palm oil: from food to fuel?), Brot für die Welt, Stuttgart, 2011

[9] Key Sustainability Issues in the Palm Oil Sector, Report, The World Bank/ International Finance Cooperation, Washington 2010

[10] Green Purchasing Asia, 14-25, 09/2011

[11] Wuppertal Institut für Klima, Umwelt, Energie (September 2007): Sozial-ökologische Bewertung der stationären energetischen Nutzung von importierten Biokraftstoffen am Beispiel von Palmöl, Wuppertal (Wuppertal Institute for Climate, Environment, Energy: Socio-ecological evaluation of the stationary energy use of imported biofuels on the example of palm oil)

[12] Palm Oil Investor Review: Investor Guidance on Palm Oil, WWF Report, 2012

[13] Improving the Livelihoods of Palm Oil Smallholders: the Role of the Private Sector; FSG Social Impact Advisors, 2012

[14] Chris de Lavigne, Global VP, Consulting, Fourth Palm Oil Summit, July 2012

[15] Oil Seeds: World Markets and Trade, USDA-FAS, December 2011

Sustainability aspects in the use of palm kernel oil

For surfactants used in detergents and maintenance products, there are no significant differences between surfactants based on fossil or renewable raw materials – neither regarding performance nor in respect of price. As described earlier, mainly fossil raw materials (e.g. crude oil) are used in present-day surfactant manufacture. However, this is increasingly becoming an ecological, economic and political challenge, also against the backdrop of the ongoing climate debate, the risk of accidents in maritime transport, the finiteness of these resources, and the political situation in producer countries. Therefore, the use of renewable raw materials can provide an alternative to fossil non-renewable resources; it can contribute to climate protection, too.[16]

The sustainability assessment of palm kernel oil – as a renewable raw material in surfactant manufacture – depends on the ecological, economic and social conditions in which the palm kernel oil is produced. For altogether positive effects of the use of palm kernel oil on the environment and the socio-economic situation in the countries of origin, certain sustainability criteria[17] need to be taken into consideration in the cultivation and harvesting of oleiferous fruits:

- **Ecological goals: Nature conservation** (e.g. maintaining biodiversity and especially valuable habitats, such as rainforests and grasslands), **climate protection** (e.g. protection of land with high carbon capture, such as peatlands and wetlands), and **environmental protection** (preserving the quality of water and air and, in particular, the fertility of soils).

- **Socio-economic goals** (e.g. protection of indigenous groups of the population, working conditions on plantations, land right issues, income of the workforce to ensure sufficiently high standards of living).

The goal of sustainability cannot be reached where tropical primary forests are cut down or peatlands are drained for oil palm plantations or other types of plantations.

Generally, the conversion of primary forests into plantations involves the release of carbon dioxide (CO_2), the major greenhouse gas in terms of volume. For example, a tropical natural forest in Asia binds some 138 tonnes of carbon per hectare, as compared with only 30 to 50 tonnes bound by a palm oil plantation. The differential of roughly 100 tonnes of carbon corresponds to 365 tonnes of CO_2 of per hectare of land. The CO_2 release intensifies where natural forest was cleared by slash-and-burn or where peatlands were drained and carbon - stored in layers of peat partly several metres high – is released as CO_2 into the atmosphere.[6]

Also degraded areas (e.g. degraded farmland or secondary forest on flat land) can be used for the cultivation of oil palms.[18] Further increases in yields can be achieved through higher productivity (improved plant materials, modern cultivation and harvesting techniques). These measures combined could contribute to covering future rises in demand (palm oil for foods and biodiesel), without resorting to lands that should be protected.

Another issue is the changeover of existing farmland (e.g. rubber plantations) into palm oil plantations, Here, generally the competition for agricultural and forestry areas – for the production of basic foods, energy sources and other renewable raw materials – needs to be

[16] Van Zutphen, Hans (2008): Comparative LCA Analysis of Different Edible Oils and Fats. Lecture (recorded in written form) at the "International Palm Oil Sustainability Conference" 13/15 August 2008, Sutera Harbour Resort, Kota Kinabalu, Malaysia

[17] General information about the three pillars of sustainability (in German language) at http://www.forum-waschen.de/drei-saeulen-der-nachhaltigkeit.html

[18] T. Fairhurst, D. McLaughlin, Sustainable Oil Palm Development on Degraded Land in Kalimantan, WWF, January 2009

taken into account. In the years from 1990 to 2010, the areas for oil palm cultivation were extended significantly (in Malaysia from 1.7 to 4 million hectares and in Indonesia from 0.7 to 5 million hectares)[19], partly with existing plantations formerly used for other tropical crops (e.g. rubber) now being designated to oil palms. In Malaysia, two thirds of the increase (1.4 million hectares) in the cultivation area of oil palms in the period from 1990 to 2000 were attributable to the described changeover.[6] Such (direct and indirect) changes in land use are difficult to measure, and there is no consensus as yet on how to include this in certification systems. The crucial aspect is the changeover of areas previously used for food production.

In the ecological-agricultural perspective and also from the viewpoint of the impacted rural population, the cultivation of oil palms in monocultures can cause problems, because there is a potential for destroying the economic, social and cultural basis for living, mainly for indigenous population groups.

All in all, with the very high productivity of oil palms[20] the palm oil industry makes important contributions not only to food production globally but also to the gross national product and the export proceeds of cultivation countries. For example, the goods value of palm oil exports rose from 903 million USD (2.98 billion Malaysia Ringgits) in the year 1980 to 13.8 billion USD (45.6 billion Malaysia Ringgits) in the year 2007.[9] In the year 2008, the palm oil industry in Malaysia generated around 18 billion USD in total and employed 800,000 people (population of Malaysia: ca. 24 million).[21]

Supply chain for surfactants based on palm kernel oil

In the manufacture of surfactants based on palm kernel oil, the supply chain starts with plantation companies or oil palm farmers. They harvest oil palm fruit from which palm oil is obtained, usually directly at the plantation. Palm kernels are more durable; for this reason, they are frequently stored prior to processing or they are transported to oil mills and processed into oil. But only part of the kernels are used, because their processing is highly intensive and, therefore, not always rewarding in the traditional palm oil production, e.g. in Ghana. The development of cultivation areas for oil palms is driven forward rather by the goal of obtaining palm oil and not palm kernel oil.[5]

Surfactant manufacturers buy palm kernel oil and other raw materials on international spot markets.[22] They supply surfactants, inter alia, to producers of detergents and maintenance products.

Share of surfactants based on palm kernel oil in detergents and maintenance products for private households in Germany

In the year 2010, some 36,600 tonnes of surfactants based on palm kernel oil and coconut oil were used in detergents and maintenance products for private households in Germany. If these surfactants were obtained exclusively on the basis of palm kernel oil, around **41,000 hectares of agricultural land** (see annex 3: calculation basis) – or ca. 0.32 percent of the worldwide cultivation areas for oil palms – could cover the annual demand for palm kernel oil for surfactants in these products in Germany. This would correspond roughly to the city area of Cologne. This calculation is based on the assumption that ca. 1 tonne of palm kern oil is needed for the manufacture of ca. 2 tonnes of surfactants.[4]

Action aspects for industry and consumers

[19] http://faostat.fao.org – research of 24 July 2012
[20] Soy oil 0.36 t/ha, sunflower oil 0.42 t/ha, rapeseed oil 0.49 t/ha, palm oil 3.7 t/ha – source: MPOC (Malaysian Palm Oil Council)
[21] Int. Herald Tribune, 10.09.2009
[22] A spot market is a market where an agreed transaction – consisting of delivery, acceptance and payment – is carried out directly.

A first step towards the development of criteria for a more sustainable palm oil industry is the initiative *Roundtable on Sustainable Palm Oil* (RSPO). The RSPO membership consists of delegates from operators of oil palm plantations, palm (kernel) oil traders, the processing industry, consumer goods manufacturers, banks and environmental/nature conservation and social organizations (NGOs).
In November 2007, the RSPO established a certification scheme for the sustainable production and trade of oil from oil palms (palm oil and palm kernel oil).[23]

At present, buying RSPO certificates is the only way for the detergents and maintenance products industry to support a sustainable palm oil production. For this purpose, volume equivalents of RSPO-certified palm (kernel) oil are produced which subsequently go into the general production stream of palm (kernel) oil (RSPO supply chain system: "Book & Claim").[24]

The first surfactants based on RSPO-certified, sustainable palm kernel oil have been announced for 2015.[25] Certified palm kernel oil from various certified plantations is to be used, and throughout the supply chain the certified palm kernel oil will be physically kept apart from non-certified palm kernel oil (see annex 2: RSPO supply chain system: "Segregated").[24]

The RSPO has been moving strongly towards a sustainable palm oil economy, but progress is not yet satisfactory from the viewpoint of some stakeholders. It is criticized, for example, that forests continue to be cleared for setting up oil palm plantations and that smallholders are driven off their land – irrespective of the RSPO. Against this backdrop, initiatives such as e.g. the "Palm Oil Coalition" or the Forum Nachhaltiges Palmöl (FONAP)[26] were launched, in order to support the RSPO in the further development of standards.

The RSPO regularly reviews the principles and criteria of certification. At present, the focus is on topics such as the application of pesticides, a wider protection of biologically valuable lands, and reducing greenhouse gases – with an emphasis on peatland protection. Further certification systems[27] have been elaborated beside the RSPO certification scheme.

For example, the ISCC system has been available since 2010 for the certification of biomass. ISCC certification comprises both ecological criteria (e.g. greenhouse gas balances, sustainable land use, protection of natural habitats) and social criteria (promoting adequate working conditions, health, safety and the prosperity of workers in biomass production).[28] ISCC certification was created originally to implement the Renewable Energies Directive (2009/28/EC). Under this Directive, requirements needed to be laid down in the European Union for the sustainable production of biomass (liquid biomass and biofuels).

With an increasing use of inputs based on renewable raw materials in the detergents and maintenance products industry, an involvement of consumers and a responsible and transparent communication with consumer groups are getting ever more important.

As a matter of principle, the following applies: renewable resources are <u>not</u> per se sustainable or non-sustainable. A differentiated examination of <u>cultivation and production conditions</u> is needed.

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[23] www.rspo.org
[24] RSPO Supply Chain Systems Overview, RSPO Factsheets: www.rspo.eu/docs/rspo_fact_sheets_systems.pdf
[25] www.basf.com/group/corporate/de/sustainability/environment/resource-conservation/index
[26] www.dialoggestalter.de/projekte/projekte/forum-fuer-nachhaltiges-palmoel.html
[27] A table-style overview of further certification schemes is given on the website www.fao.org/bioenergy/foodsecurity/befsci/compilation
[28] ISCC – International Sustainability and Carbon Certification, www.iscc-system.org

Annex 1: Facts at a glance

	Geographical reach	Period of time	Volume or area, resp.
Detergents and maintenance products, ingredients	Germany	2010	ca. 605,000 t
Surfactants	Germany	2010	ca. 183,000 t
Surfactants based on palm kernel oil and coconut oil	Germany	2010	ca. 36,600 t
Volume of palm kernel oil needed to manufacture the surfactants	Germany	2010	ca. 18,300 t
Mean surfactant yield from 1 tonne of palm kernel oil	Germany	2008	2 t surfactant
Production palm oil	global	2011	50.6 million t
Production palm kernel oil	global	2011	5.7 million t
Average productivity palm oil	global	2008	3.7 t/ha
Productivity palm kernel oil	global	2007	0.4 – 0.8 t/ha
Lauric acid share in palm kernel oil	-	-	ca. 40–52%
Cultivation area – oil palms	global	2009	ca. 12.8 million ha
Cultivation area – oil palms	Indonesia	2010	ca. 7 million ha
Cultivation area – oil palms	Malaysia	2010	ca. 4.7 million ha

Annex 2: Description of RSPO certification

Level	Contents	Certification system
1. Identity preserved	The origin of the certified palm oil can be traced back to the certified oil palm plantation (level: plantation).	Certified throughout the supply chain
2. Segregated	Certified palm (kernel) oil from various certified plantations, which is physically kept apart from non-certified palm oil throughout the supply chain (level: oil mill).	Certified throughout the supply chain
3. Mass Balance	Certified palm (kernel) oil is physically present but can be mixed with conventional palm (kernel) oil throughout the supply chain (level: storage tank).	Certified throughout the supply chain
4. Book & Claim	Certified palm (kernel) oil is physically present but goes into the general production stream of palm (kernel) oil so that only certificates for the volume of sustainably produced palm (kernel) oil can be traded.	Companies at the end of the supply chain can buy from GreenPalm[29] the certificates reflecting the volume of palm (kernel) oil used in the additionally purchased surfactants (certificate trading)

[29] www.greenpalm.org

Annex 3: Calculation basis for estimating the cultivation area

Some 20 percent (ca. 36,600 tonnes) of the surfactant input for detergents and maintenance products in Germany in the year 2010 were manufactured based on palm kernel oil and coconut oil. An exact breakdown into shares of palm kernel oil and coconut oil, respectively, is not possible, due to fluctuating trade volumes. Therefore, in this calculation an exclusive use of palm kernel oil is assumed.

Roughly 1 tonne of palm kernel oil is needed for the manufacture of ca. 2 tonnes of surfactants.[4] This mean yield value is calculated for surfactants obtained from palm kernel oil and individually depends on the type of surfactant used.

Based on the mean yield value for surfactants, thus in the year 2010 some 18,300 tonnes of palm kernel oil were needed in Germany for the manufacture of surfactants in detergents and maintenance products. Simultaneously obtained palm oil is available for other uses.

This would roughly correspond to 0.32 percent of the annual global production of palm kernel oil. Assuming in the calculation that oil palms for palm kernel oil production are cultivated on an area of 12.8 million hectares globally, out of this total 0.32 percent of the area – or ca. 41,000 hectares – are needed to obtain palm kernel oil for the manufacture of surfactants for detergents and maintenance products in Germany.

For 2010 the required cultivation area would more or less correspond to the city area of Cologne (a city of circa 1 Million inhabitants in North Rhine-Westphalia/Germany).