The Emerging Oleochemical Industry in Malaysia

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Five fatty acid plants with a total capacity of 142 000 tonnes/year are now in operation in Malaysia (*Table 1*). They are situated in the three ports which are the major centres for palm oil processing in Malaysia. Acidchem is in Butterworth in the north, Malaysia Oleochemicals is in Pasir Gudang close to Singapore in the south, while Unichema and Southern Acids are near Port Kelang, the port for the capital city of Kuala Lumpur. Port Kelang is also the site for Henkel Oleochemicals' processing of methyl esters. All three ports have excellent modern bulking storage and loading facilities.

Malaysian oleochemicals plants. Malaysian companies also supply specific products and blends to suit the customer's requirements. For example, blends of distilled palm and palm kernel fatty acids in the ratios such as 83:17 are available to the international market for high grade toilet soaps. In the production of food-grade stearic acid, *etc* these companies ensure that only top quality food-grade palm oil is used as starting material. The Malaysian fatty acid producers are determined to meet demands for fatty acids and eventually other oleochemicals.

TABLE 1. FATTY ACID PLANTS IN MALAYSIA

Company	Capacity/ Year	Date of Completion
Acidchem, Butterworth	30 000	1980
Unichema, Kelang	28 000	1981
Malaysian Oleochemicals, Pasir Gudang	30 000	1982
Southern Acids, Kelang	30 000	1983
Henkel Oleochemicals	24 000	1984
Total Capacity	142 000	

The five plants (except Henkel which produces methyl esters) produce a whole range of products from fatty acid mixtures for soap making and rubber-grade stearic acid to highly refined fractionated products, such as 95% lauric acid and 95% myristic acid for cosmetic and toiletry preparations and the plastics industry and also 99.5% glycerine for food and pharmaceutical purposes. Soap noodles for high quality toilet soap are also produced in

Palm oil and palm kernel oil are produced from a perennial crop as a primary product for both edible and non-edible uses. The trees have a productive life of about 25 years and with Malaysia's unique climatic and geographical advantages, the level of production is highly predictable. This is why processors are looking to palm oil as an essential component in their long term raw material strategy. Palm and palm kernel oil derivatives are recognised as vegetable

oils and therefore their derivatives are fully acceptable to people for whom animals fats may raise religious or ethical problems. Commercial grades of stearic acid made from palm oil have a higher palmitic acid content than those derived from tallow, and this may call for minor adjustment in some applications. The composition of palm kernel oil shows a lower content of C8 (caprylic) and C10 (capric) acids than coconut oil. This is obviously a disadvantage when these acids are in demand. It is however a distinct advantage in soap manufacture, where the short chain acids are liable to cause skin irritation.

The production volume of Malaysian palm oil and palm kernel oil is increasing annually and is expected to continue to do so well into the next century (*Table 2*). The oils are proving to be suitable replacements for tallow and coconut oil respectively. This will be seen by examination of the analytical data for the two oils given in *Tables 3* and *4*. *Table 3* includes the data for palm olein and stearin, obtained by the large scale fractionation of palm oil. Palm fatty acid distillate, a palm oil refinery by-product is also a suitable starting raw material to produce some grades of fatty acids. Although palm acid oil is also a good starting material, its supply is becoming scarce because of the current structure of the Malaysian refining industry which prefers physical refining.

The world consumption of fatty acids is about 1.6 million tonnes a year, of which about 85% is used by the major industrialised countries in Western Europe, the U.S.A. and Japan. The uses are: nitrogen derivatives (17.3%), esters (16.8%), metal salts (13.8%), emulsion polymerisation (19.4%), rubber processing (19.4%) and soap making (13.3%).

TABLE 2. MALAYSIA – OIL PALM AREA AND PRODUCTION

YEAR	OIL PALM AREAS (hectares)	CRUDE PALM OIL PRODUCTION (tonnes)
1960	54 638	91 793
1965	96 945	150 411
1970	300 607	431 069
1975	641 910	1 256 573
1980	1 042 708	2 575 865
1981	1 138 676	2 823 679
1985 (F)	1 414 000	4 000 000
1990 (F)	1 582 000	6 000 000

Note: (F) – *Forecast*
Source: Dept of Statistics, Malaysia
Palm Oil Registration and Licensing Authority
Malaysian Oil Palm Growers' Council

TABLE 3. FATTY ACID COMPOSITION OF MALAYSIAN PALM OIL

FATTY ACIDS	PALM OIL		PALM OLEIN		PALM STEARIN
	RANGE	MEAN	RANGE	MEAN	RANGE
12:0	0.1 – 1.0	0.2	0.1 – 1.1	0.2	0.1 – 0.6
14:0	0.9 – 1.5	1.1	0.9 – 1.4	1.0	1.1 – 1.9
16:0	41.8 – 46.8	44.0	37.9 – 41.7	39.8	47.2 – 73.8
16:1	0.1 – 0.3	0.1	0.1 – 0.4	0.2	0.05 – 0.2
18:0	4.2 – 5.1	4.5	4.0 – 4.8	4.4	4.4 – 5.6
18:1	37.3 – 40.8	39.2	40.7 – 43.9	42.5	15.6 – 37.0
18:2	9.1 – 11.0	10.1	10.4 – 13.4	11.2	3.2 – 9.8
18:3	0.0 – 0.6	0.4	0.1 – 0.6	0.4	0.1 – 0.6
20:0	0.2 – 0.7	0.4	0.2 – 0.5	0.4	0.1 – 0.6
Iodine Value (Wij's)	51.0 – 55.3	53.3	56.1 – 60.6	58.0	21.6 – 49.4

TABLE 4. FATTY ACID COMPOSITION OF MALAYSIAN PALM KERNEL OIL

FATTY ACIDS	RANGE	MEAN
C6	0.1 – 0.5	0.3
C8	3.4 – 5.9	4.4
C10	3.3 – 4.4	3.7
C12	46.3 – 51.1	48.3
C14	14.3 – 16.8	15.6
C16	6.5 – 8.9	7.8
C18	1.6 – 2.6	2.0
C18:1	13.2 – 16.4	15.1
C18:2	2.2 – 3.4	2.7
Others	TR – 0.9	0.2
Iodine Value	16.2 – 19.2	17.8

TR – *trace*