# PALM OIL INDUSTRY IN MALAYSIA
## - A SUCCESS STORY

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The oil palm (*Elaeis guineensis,* Jacq.), originated from the tropics of Guinea Coast of West Africa, found its way to Brazil and other tropical countries through the Portugese during the 15th Century and later to Bogor, Indonesia during the 19th Century by the Dutch people. The progenies of these palms planted in Deli which was popularly known as *deli dura* served as an important source of dura palm the world over. Concept of commercial planting of oilpalm was started in 1910. Indonesia and Malaysia took up commercial plantings during 1915 and 1917, respectively. Now oilpalm is cultivated in 3.56 m/ha with a production of 11.29 mt (1991) and has emerged as one of the major vegetable oil source in the world.

Malaysia successfully demonstrated the establishment of extensive oilpalm plantations during 1950s, through its agricultural diversification policy. The production of palm oil increased from 0.1 mt in 1960 to 0.4 mt during 1970s, 2.6 mt in 1980s and 7.4 in 1993. It also aims to produce 8.8 mt by 2000 AD. Such a success was possible through research and developmental efforts both for production and processing of oil palm.

In the past, five success stories have been published by APAARI, which have received wide appreciation. These are:

1. Baby corn production in Thailand
2. Tilapia farming in the Philippines
3. Hybrid Rice in China
4. Dairying in India
5. Hybrid Cotton in India

In this publication the details concerning the role of oilpalm in Malaysian economy, palm oil production, development of palm industry, research and development in oilpalm, transfer of technology, key factors for success and future strategies have been presented. This story will be an eye opener for other countries and possibly may motivate others in the region to take up the production of palm oil. I also congratulate Dr. Yusuf B. Basiron, Director General, Palm Oil Research Institute of Malaysia (PORIM) for attempting this story which has been revised and edited in its present form by APAARI Secretariat. I am sure, the readers would find this publication both interesting as well as informative.

(R.S. Paroda)
Executive Secretary
APAARI

31 March, 1995

# PALM OIL INDUSTRY IN MALAYSIA - A SUCCESS STORY

## I. INTRODUCTION

The oil palm, (*Elaeis guineensis* Jacq) the 'golden crop' of Malaysia has gained its intensive cultivation during the last three decades and turned into a major 'money spinner' for the agricultural sector of the country. Malaysia is now a large supplier of palm oil and palm kernel oil accounting for one quarter of world export trade in oils and fats and play a vital role in the international oils and fats trade.

The Agricultural Diversification Policy introduced by the Malaysian Government in the late 1950s which paved way for establishment of extensive oil palm plantations in Malaysia is often cited as

Dumpy Oil Palm Tree

one of the most successful agricultural development programmes of the world. This policy encouraged various government authorities and the private sector to grow oil palm as an alternative to rubber, the products of which were having price uncertainties because of competition from the synthetic rubber industry. It became firmly established that oil palm cultivation would be more profitable and less labour intensive than planting rubber. The Federal Land Development Authority (FELDA) which had the task of opening up new land areas to resettle landless farmers in various resettlement schemes throughout the country took up planting of oil palm in a big way since its establishment in the late 1950s. Today FELDA accounts for one third of oil palm areas in Malaysia making it the single largest producer of palm oil in the world.

The superior economic returns of oil palm compared to rubber and other crops stimulated the rapid expansion of its cultivation by the private plantation companies. Old rubber plantations were mostly replaced with oil palm in addition to the opening up of new areas for planting the crop. During the 1970s, many plantation companies were targetting a 60:40 ratio of oil palm to rubber in their crop allocation strategies. This ratio was improved in later years in favour of higher percentage of oil palm as the crop continued to provide higher profitability to the planters. Other agencies such as the Federal Land Rehabilitation and Consolidation Authority (FELCRA) and the Rubber Industry Smallholders Development Authority (RISDA) joined in the euphoria to plant oil palm and through these agencies, oil palm cultivation was introduced to a large number of the small farmers.

Thus, oil palm cultivation which was confined to large plantation agencies because of the substantial investment needed to establish the crop and set up the mills to process the oil palm fruits has become a small holders crop.

The success of oil palm cultivation in Malaysia has encouraged other countries to develop their oil palm industry. While Malaysia is by far the largest producer and exporter of palm oil in the world, countries such as Indonesia and Papua New Guinea have also become important producers and exporters of the commodity (Table 1). Many other tropical countries in Africa and Latin America have also aspired to expand their oil palm industry.

**Table 1: Producers and Exporters of Palm Oil ('000 tonnes)**

| Country | 1980 | | 1993 | |
|---|---|---|---|---|
| | Production | Export | Production | Export |
| Malaysia | 2576 | 2277 | 7402 | 6045 |
| Indonesia | 691 | 513 | 3300 | 1719 |
| Nigeria | 433 | 0 | 645 | 2 |
| Columbia | 84 | 0 | 323 | 4 |
| Ivory Coast | 182 | 80 | 310 | 166 |
| Papua New Guinea | 36 | 33 | 220 | 214 |
| Others | 616 | 888 | 1467 | 1413 |
| World Total | 4618 | 3791 | 13667 | 9563 |

*Sources: Oil World Annual 1994, PORLA*

## II. ROLE IN NATIONAL ECONOMY

One-third of the cultivated area in Malaysia is under oil palm. Significant employment opportunities are provided by the oil palm sector and thus helps to reduce poverty especially among the farming community. In addition to providing employment and income to about 300,000 Malaysian and immigrant workers, the oil palm industry is a major source of foreign exchange earnings for the

Bulking Facilities at Pasir Gudang (Johor)

Palm Oil Being Pumped into a Ship

ELSBETT Crude Palm Oil Engine

country. In 1993, the country's earnings from the exports of palm oil products exceeded US$ 2.8 billion representing about 6% of the total export of the country.

The oil palm sector contributes significantly to the development of processing and manufacturing industries in Malaysia. There are already 272 mills and 40 refineries being established and many factories utilise palm oil in end-products for both food and non-food applications. Total cumulative investments in the planting of the crop amounting to about US$ 3 billion are matched by an equally big investment in the establishment of the mill, refineries, oleochemical plants, bulking installations and other infrastructural facilities needed to support the palm oil trade. Although the oil palm sector is often regarded as an agricultural activity, the associated upstream and downstream activities can be regarded as manufacturing or industrialisation activities. In this respect, the oil palm is essentially contributing to the enhancement of industrialisation in Malaysia. It is no secret that Malaysia had declared to aspire to be a developed country by the year 2020 and this would be achieved through rapid industrialisation of the economy. Palm oil seems to fit in well in supporting this vision by participating in agro-based industrialisation.

## III. PALM OIL PRODUCTION IN MALAYSIA

Being a perennial crop, the oil palm produces fruit bunches throughout the year; these are harvested by workers who make harvesting rounds every 10 days to see if there are ripe fruit bunches that can be harvested and brought to the palm oil mill for oil extraction. The oil palm takes three years to reach maturity after field planting and it will continue yielding fruits up to twenty-five years. At this age, replanting is normally recommended as the palms are too tall for easy harvesting.

**An Oil Palm Plantation**

The success of oil palm as an agricultural crop is partly attributed to its high yield. One hectare of oil palm can yield 5 tonnes of palm oil and 0.5 tonnes of palm kernel oil as a co-product and thus the palm yields ten times more than soyabean or other oilseed crops. This suggests that the oilpalm is competitive not only in relation to other oilseed crops but also the improved yield observed during the last three decades suggests that oil palm is able to offset the rising cost of production through increased productivity.

Planted area for oil palm has increased at 12.0% per annum from 54000 hectares in 1960 to 2.28 million hectares in 1993. Production of palm oil increased at 14% annually from 92000 tonnes to 7.4 million tonnes during this period. While the planted area has undergone a 40 fold increase between 1960 and 1993, production of palm oil has increased by 8 times during the same period. About 45% of the planted area is under the private estate ownership and the rest is owned by organised smallholders, State land schemes and independent small farmers (Table 2). As the industry becomes established with the set-up of more mills and other facilities, many independent small holders have participated in the cultivation of the oil palm. Over the years, there has been a gradual increase in the share of planted areas by the small holders and the share of the estate sector has declined from 52% in 1980 to 45% in 1993 (Table 2).

**Table 2: Oil Palm Planted Area in Malaysia**

| Country | 1980 | | 1993 | |
|---|---|---|---|---|
| | Ha | % | Ha | % |
| Estates | 557,659 | 52.1 | 1,039,185 | 45.5 |
| Smallholdings | 511,848 | 47.9 | 1,241,825 | 54.5 |
| Felda | 316,550 | 29.6 | 676,075 | 29.6 |
| Felcra | 18,851 | 1.8 | 132,415 | 5.8 |
| Risda | 20,472 | 1.9 | 40,687 | 1.9 |
| State Schemes | 85,529 | 8.0 | 196,683 | 8.6 |
| Independent farmers | 70,446 | 6.6 | 195,965 | 8.6 |
| Total | 1,069,507 | 100.0 | 2,281,010 | 100.0 |

*Sources: PORLA*

## IV. DEVELOPMENT OF THE OIL PALM INDUSTRY

The expansion of the oil palm industry can be divided into four phases as follows:

### A. First Phase, 1876 to 1960: Introduction of the Oil Palm:

The oil palm was brought into Malaysia as ornamental plants in 1876. The first commercial plantation was established in 1917 but during the ensuing period, production grew very slowly with planted area reaching only about 54,000 hectares by 1960.

### B. Second Phase 1960 to 1975: Establishment of Production Systems:

The introduction of the diversification policy and the establishment of land development authorities led to the rapid expansion of oil palm cultivation during this period. The main product was crude palm oil exported mostly to Europe and the USA.

## C. Third Phase, 1975 to 1985: Establishment of Refineries:

The refineries were established during this decade to enable refined palm oil products to be exported especially to markets in the developing countries. Export of crude palm oil was greatly reduced (Figure 1) as the refined products gained expanded markets. The improved demand stimulated price increases which in turn led to continued expansion in palm oil production.

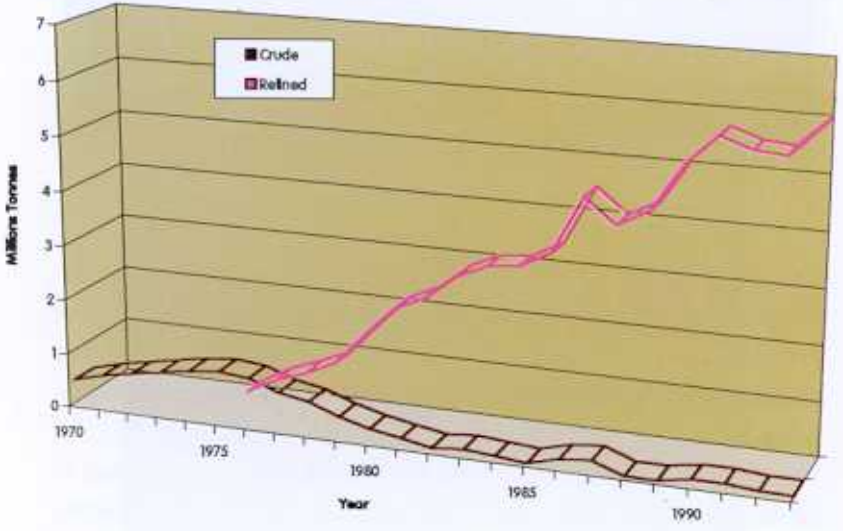



Fig. 1: Exports of Refined and Crude Palm Oil from Malaysia

## D. Fourth Phase, 1985 to 1994: Establishment of the Oleochemical Industry:

The abundance of raw materials in the form of palm oil and palm kernel oil attracted the establishment of downstream oleochemical production industries. By 1994, some 900,000 tonnes of oleochemical production capacity was established compared to only about 160,000 tonnes in 1985.

**View of an Oleochemical Plant**

Government policies were instrumental in stimulating the development of the various phases of the oil palm industry. For example, the second phase of increase in oil palm cultivation was stimulated by the agricultural diversification policy and the establishment of land development agencies to reduce poverty. FELDA was given loans by the Federal Government and the World Bank to establish the plantations and bring in settlers who work as owners on their allocated holdings. The settlers were to later repay the loans from income derived from the sales of their oil palm fruits.

The establishment of refineries was encouraged by the Government's policy of agro-based products instead of raw commodities. Another benefit was the stimulation of new markets for palm oil. By exporting refined palm oil products, markets in India, Pakistan and West Asia which did not have enough refining capacities of their own were able to accept refined palm oil from Malaysia to meet their expanding demand for cooking oils (Table 3).

**Table 3: Major Export Destinations of Malaysian Palm Oil (tonnes)**

| Countries | 1980 | 1993 |
|---|---|---|
| Pakistan | 117,397 | 1,040,294 |
| China PR | 49,781 | 769,454 |
| EEC | 463,691 | 531,102 |
| Singapore | 653,754 | 528,753 |
| Eqypt | 0 | 424,856 |
| Japan | 142,861 | 339,120 |
| USA | 120,371 | 259,196 |
| Korea Rep | 12,752 | 188,370 |
| Jordan | 0 | 178,690 |
| Myanmar | 21,988 | 146,752 |
| Indonesia | 0 | 126,916 |
| Bangladesh | 29,040 | 106,972 |
| India | 398,195 | 82,552 |
| Others | 273,867 | 1,322,643 |
| Total | 2,283,697 | 6,045,670 |

*Source: PORLA Update*

Finally, the Industrial Master Plan introduced in 1984 can be regarded as another policy which stimulated the expansion of the oleochemical industry. The plan set out targets that the oleochemical capacity would expand to reach 750,000 tonnes by 1995 from 160,000 tonnes in 1985. This target was achieved well ahead of schedule with the oleochemical production capacity exceeding 750,000 tonnes by 1993, ahead of the target year of 1995.

## V. RESEARCH & DEVELOPMENT IN OIL PALM

Each of the development phases experienced by the Malaysian palm oil industry was preceeded by improvements in R & D and advancement in technology.

Research has been emphasised as an important input needed to sustain the growth of the Malaysian palm oil industry. In the early days, the Department of Agriculture was involved in conducting oil palm research but this task was passed on to the Malaysian Agricultural Research Institute (MARDI) when it was formed in 1973. With the continuing rapid expansion of the industry, the Palm Oil Research Institute of Malaysia (PORIM) was formed in 1979 to take over the task of oil palm research from MARDI. The formation of PORIM at the request of both the industry members and the government was legislated through an Act of Parliament which requires that the industry must pay a research cess of about US$ 2.00 for every tonne of palm oil produced at the mills. The money received by PORIM has been used to conduct intensive research work in the fields of production, processing, product improvements and market development of palm oil.

The major achievements are highlighted hereunder.

To widen the genetic base of oil palm, prospection work has been carried out by PORIM Scientists to collect oil palm seeds from several African and Latin American countries. These have now been planted in PORIM's Experimental Stations for breeding and selection trials. New planting materials with high yields and better attributes have been developed from the genetic pool and these are being introduced to the industry.

Oil palm planting technology was improved tremendously by the introduction of better yielding *tenera* planting material in the


Fresh Fruit Bunch (TENERA)

early 1960s. *Tenera* is a cross between the *Dura* and *Pisifera*. The *Dura* is characterised by thick shell and thin mesocarp in the fruit and its oil recovery is low. The *Pisifera* has no shell. Its thick mesocarp gives a high oil content, but the *Pisifera* is often female sterile. The cross between the two gives the Tenera a fairly thin shell and high oil content.

New materials are being introduced to improve the yield up to 10 tonnes per hectare per year as well as offer the dwarfness characteristic to facilitate easier harvesting of the bunches. Another improvement relates to production of a more unsaturated oil to enhance the competitiveness of palm oil in the liquid oil market.

Subsequently, different *Pisifera* sources were introduced to improve the yield characteristics. The yield of oil palm as shown in Figure 2 has improved from 2 to 8 tonnes of oil per hectare per year over the last 30 years.

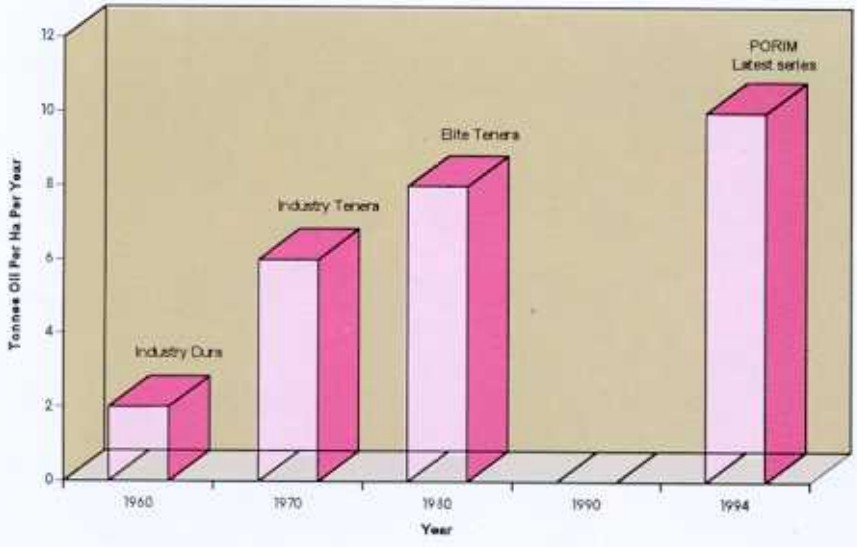
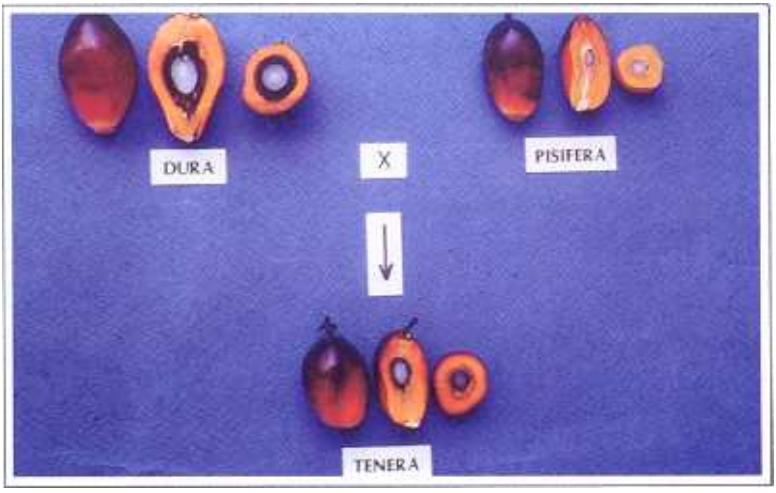



**Fig. 2: Oil Palm Yield Improvements in Malaysia**



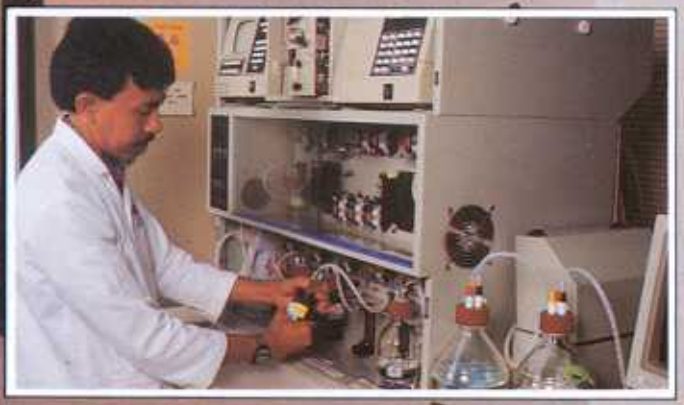

**Crossing of D x P for TENERA**

Mechanisation has been introduced extensively to overcome labour shortages. While the harvesting of the fruit bunches is still performed manually, in field transportation of the fruits, manuring and weeding operations can easily be mechanised. Land preparation for new planting and clearing of old palms are usually mechanised. Production efficiency has been improved as a result of the introduction of high yielding planting materials and the extensive use of mechanisation.

Improvement in agronomic practices and fertilizer recommendations have helped the industry to derive maximum yield at reasonable cost. Problematic land such as acid sulphate soils and peat soils can now be profitably cultivated with oil palm, thus increasing the potential land area for the expansion of the crop.

New technologies are continuously being introduced to improve utilisation of by-products generated by the oil palm industry. Under the newly introduced 'zero burning concept', the old palm


R & D Facilities at PORIM
(Capillary Viscometry)



Protein Sequencer

trees are no longer burnt during land clearing for replanting. Under the same concept, empty fruit bunches from the mills are no longer allowed to be burnt but instead they are sent back to the nearest plantations for mulching purposes. Effluent generated at the palm oil mill is either processed for the production of fertiliser or it is pumped back to a nearby plantation for irrigation after suitable initial treatment. Some of the other waste products such as the fronds may no longer be left to rot away as organic nutrients for the palms but they can be converted into higher value added products through the manufacture of particle boards or medium density fibre boards. With improvement of technology brought about by R & D, the oil palm industry is increasingly looking at the prospect of a 'Zero Waste Policy' which could again propel the industry into another phase of development in the future.

As most of the palm oil is used in food products, research on the nutritional values of the oil has been intensified. Where facilities and expertise are lacking, PORIM has contracted out the research projects to various Universities and other centres of excellence to enable such nutritional studies to be carried out. Palm oil is shown to be cholesterol free and its use in food does not raise serum chloesterol. The presence of vitamin E and provitamin A (carotenoids) impart further positive attributes which make


Vitamin E

palm oil a wholesome, nutritive and safe oil for use in food. The results of these studies have been published in international journals in the USA and Europe, and they form authentic information to counter any negative nutritional allegations thrown at palm oil.

## VI. TRANSFER OF TECHNOLOGY

An Extension and Technology Transfer Unit has been established by PORIM to disseminate the latest recommendations on fertilizer application and other agronomic practices to the planters. Through various seminars, conferences and dissemination of information via publications, PORIM is able to help improve the productivity of the oil palm plantations in the country. Specific technologies developed in the laboratories are packaged suitably and licensed off for commercial adoption by local investors. These activities improve the total income that the palm oil producers are able to derive from their outputs and consequently the competitive strength of the oil palm industry is enhanced.

## VII. KEY SUCCESS FACTORS

The ideal climatic conditions in Malaysia have been the key to her success in propagating large scale oil palm cultivation. Oil palm requires tropical climates with over 2000 mm of annual rainfall spread evenly throughout the year and temperature range of about 28°C to 33°C. Countries within 5 degrees north or south of the Equator normally enjoy this climate, while those away from this zone would often have long stretches of drought months which would reduce the yield of oil palm. Cold temperatures also retard the growth of the crop. Although many countries are keen to plant oil palm, not many would be as competitive as Malaysia or Indonesia, because they do not have the optimal climatic conditions.

Even with the right climatic conditions, there must be adequate management skills in running large plantations to ensure profitable operations. Malaysia's long experience in operating the rubber plantations could be easily adapted in managing the oil palm sector.

Establishing an oil palm plantation industry may be difficult for the individual farmers as mills are needed for the fruits from the plantations to be processed rapidly (usually within a day) to ensure extraction of fresh and high quality oil. Once an industry has been established, there would be adequate number of mills which could buy fruits from the small holders and selling of the fruits would not be a problem. Because of the large number of mills already established in Malaysia, the industry can expand rapidly with both the small holders and large plantation companies participating in the planting of oil palm.

The experience that has accumulated over the years in milling and refining technology has been utilised to improve the efficiency of milling and refining processes. New mills have more efficient designs and automation has been introduced making present mills technically more efficient compared to the situation 20 years ago. Refineries too are benefitting from the hands-on experience of handling millions of tonnes of palm oil processing over the years. Some of the modern refineries in Malaysia have capacities exceeding 2500 tonnes per day or ten times the average size of refineries usually found in other countries. By continuously improving their processing units, the new refineries are using less steam and power and less bleaching earth for each tonne of oil processed and this improvement in efficiency has enabled the Malaysian exporters to be very competitive in offering their products to the world market.

A similar pattern of improved efficiency is obtained in the oleochemical sector. By inviting joint-venture partners to build the

oleochemical plants, new technologies are introduced and the Malaysian oleochemical plants are more efficient than older plants existing in Europe and USA. Also, by processing the locally available fresh oil, the quality of the finished oleochemical products is much better than that from the plants in Europe or USA where the input oils are often not as fresh in quality due to the long transportation, handling and storage time involved.

Malaysia has emerged as the world's largest producer and exporter of palm oil and palm kernel oil, and through these two commodities, the country has also become a major supplier of oils and fats. When combined with Indonesia, the Philippines, Papua New Guinea and Thailand which are major producers of coconut oil as well, the region as a whole accounts for 41 percent of world export of oils and fats. In contrast, many countries are short of oils and fats supply, and for these countries, importing palm oil from Malaysia is an economically attractive option as opposed to producing their own oils and fats at high costs.

The sources of lauric oils such as palm kernels and coconut oils are confined to Malaysia, Indonesia and the Philippines. Again, most countries of the world would depend on these South East Asian countries for their sources of supply. Lauric oils are needed for making high quality soaps and detergents, and only the South East Asian countries are strategically capable of supplying the world needs. For this reason, many multi-national oleochemical companies are presently having joint ventures in establishing oleochemical plants in Malaysia, Indonesia and the Philippines. The joint ventures provide them an additional assurance of supply for intermediate raw materials as feedstocks to the parent companies in their respective countries.

Another important requirement to succeed in the oil palm in-


Bottling of Cooking Oil


Salad Dressings

Excavator Fitted with Blade for Shredding Oil Palm Trees

Furnitures Made from Oil Palm Trunks and Fronds

dustry is to have adequate infrastructural facilities. Handling millions of tonnes of fruits and oils for processing, storage and shipment for the export market require good roads or railways and efficient means of handling and disposal of the oils. Malaysia has for this reason many ports which are export points for palm oil trade. Most of the ports have extensive bulking installations to handle oil products. Malaysia has also established the Kuala Lumpur Commodities Exchange to facilitate the marketing of palm oil. Efficient marketing is essential to move products from the producers to the consumers at minimal costs so that the producers continue to receive remunerative income for their produce while the consumers remain satisfied with the prices and quality of palm oil products.

## VIII. FUTURE STRATEGIES

The oil palm industry provides a renewable source of raw materials for the food and non-food industry. It is one of the best models for sustainable agriculture where high productivity and low generation of waste can contribute to preservation of the environment and minimal use of land.

With the increase in world population and improvement in their income, the demand for oils and fats is projected to exceed their supply as we enter the early part of the next century. The projected high growth in food and non-food applications may continue to sustain a strong demand for oils and fats and provide remunerative prices to palm oil suppliers.

In addition, research has shown that palm oil, like other vegetable oils, can be used as a diesel fuel substitute. This would create an enormous demand outlet. Tests undertaken at PORIM show that it takes one acre of oil palm plantation to supply enough fuel to operate a car perpetually. Other studies indicate that palm oil is the

most viable vegetable oil for use as fuel because of its high yield. It would be viable to use it as fuel even at present but the food and oleochemical industries are prepared to pay a higher price for competing use of the same commodity.

## IX. EPILOGUE

Palm oil production will continue to expand to meet world demand. Its superior versatility and competitiveness will be improved with further innovations in efficiency of production, quality of products and diversification of uses.

Sustainable agriculture is amply demonstrated in the oil palm plantation industry. Past, prudent policies have stimulated its development and these must be continued in the future. Palm oil is becoming a strategic commodity for meeting the oils and fats needs of most countries. It will become more important as shortages become prevalent both in food and non food applications in many of the consuming countries. Palm oil is thus projected to play an even greater role in the future compared to what has been seen in the past and Malaysia is fortunate to be able to contribute in this development.

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