INDONESIAN OIL PALM COMPETITIVENESS:
PT. Socfindo as a Private Sector Example[1]

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ABSTRACT

PT. Socfindo is a long established, foreign owned, plantation company with operations in North Sumatra and Aceh.

This paper provides a brief review of the background situation to the Indonesian Oil Palm industry, whilst noting the continued rapid expansion of this sector. The paper also provides a detailed example of how, over the past 30 years, PT. Socfindo has retained its competitive advantage in terms of production costs and profitability through the twin mechanisms of increased productivity (internal factor) and Rupiah devaluation (external factor).

Provided the continued improvement in productivity of every hectare of planted land can be sustained by progressive improvements in planting materials and agricultural practices, the future prospects of this company remain extremely positive.

Therefore, the experience gained by PT Socfindo over this extended period of increasing competition and a declining trend in palm oil commodity prices, could act as an example for the new players to follow in order to sustain the competitiveness of the Indonesian Oil Palm sector.

INTRODUCTION : PT SOCFINDO

PT. SOCFIN INDONESIA (Socfindo) is a dedicated plantation company established in 1968 as a result of a joint venture partnership agreement between Plantations Nord-Sumatra S.A. (a subsidiary of Socfin S.A. of Belgium), and the Government of the Republic of Indonesia.

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[1] Communication presented at PIPOC 2005 Int. P. O. Cong. – Economy Conf., Petaling Jaya, Malaysia, 25 – 29 September 2005

The Company is a continuation of the former Belgian owned company Société Financiére des Caoutchoucs Medan S.A. founded in 1930, but which had originated from plantations established in Indonesia since 1909.

In fact, one of the Company's oldest plantations, Sei Liput/Medang Ara situated in East Aceh, was planted with oil palms in 1911 by Adrien Hallet, one of the very first two commercial oil palm plantations to be established in South-East Asia.

Oil palm and rubber are the only cultivars currently exploited by the Company, on 9 specific oil palm estates situated in Nanggroe Aceh Darussalam and North Sumatra Provinces, and 5 specific rubber estates situated in North Sumatra, as indicated in Table 1.

TABLE 1 : TOTAL CONCESSION/PLANTED AREA BY LOCATION

District	Estate	Crop	Planted (ha)		Concession
West Aceh	Seunagan	OP	4,498		4,899
West Aceh	Seumanyam	OP	4,417		4,608
East Aceh	Sei Liput	OP	3,657		3,740
South Aceh	Lae Butar	OP	4,196		4,261
			16,768	**34.5%**	**17,508**
Deli Serdang	Mata Pao	OP	2,294		2,347
	Bangun Bandar	OP	2,849		2,968
	Tanjung Maria	R	1,750		1,769
	Tanah Besih	R	1,355		1,386
			8,248	**17.4%**	**8,470**
Asahan	Lima Puluh	R	1,891		1,925
	Tanah Gambs	OP	3,614		3,705
	Aek Loba/P. Pulo	OP	9,964		10,142
			15,469	**32.6%**	**15,772**
Labuhan Batu	Aek Pamienke	R	3,896		4,068
	Halimbe	R	1,302		1,531
	Negri Lama	OP	2,168		2,216
			7,366	**15.6%**	**7,815**
	Total		**47,851**		**49,565**

A location map of these estates is provided (Appendix 1), whilst a summary of the planted area as at the end of 2004 is given in Table 2.

TABLE 2 : PLANTED AREA (HECTARES)

	Rubber	**Oil Palm**	**Total**
Mature	6,675	32,255	38,930
Immature	2,767	3,862	6,629
New/Replanting	752	1,540	2,292
Total	10,194	37,657	47,851

To process the field production, the Company operates 3 modern crumb rubber factories, and 9 palm oil mills. Some 55 % of the crude palm oil (CPO) production from the oil mills is refined to RBD Olein, RBD Stearin and Fatty Acid at the company's refinery (FRF) situated at Tanah Gambus estate. Normally all the palm kernel (PK) production from the oil mills is crushed at the company's crushing plant (PKOF) also situated at Tanah Gambus estate, into crude palm kernel oil (CPKO) and meal (PKE). Dependant on market requirements, the CPKO may be further refined to RBD PKO at the adjacent refinery.

The company also purchases and processes crop from outside sources to fill surplus milling capacity at certain estates, especially at the west coast of Aceh mills.

In a normal year almost 100 % of the rubber production is exported, whilst some 60 % of the total production from the oil palms is also exported, the balance sold on the local market.

In addition, PT. Socfin Indonesia is a producer of high quality oil palm planting materials with the capacity to produce up to 25 million prime D x P seeds each year. Socfindo works jointly with CIRAD of France on the breeding aspects of the seed production process, whilst the quality of the process is ensured and improved through adherence to ISO 9001 – 2000 certification.

The Company employs some 12,300 employees and has the added responsibility for the welfare of in excess of 30,000 family members and dependants. The actual number of employees as at the end of 2004 is provided in Table 3.

TABLE 3 : EMPLOYEES (2004)

	Rubber Estates	Oil Palm Estates	Head Office	Total
Staff	24	113	73	210
Subalterns	436	1,643	189	2,268
Workers	2,836	6,915	17	9,768
	3,296	8,671	279	12,246

This paper concentrates on the situation pertaining to the exploitation of Socfindo's main cultivar, oil palms.

The financial figures provided in Part II of this paper do not include the downstream processing of CPO and PK, or the purchase of palm fruit from outside sources.

I. BACKGROUND TO THE INDONESIAN PALM OIL INDUSTRY

The development of the oil palm industry in Indonesia has been extensively reviewed elsewhere (Kabul Pamin et al, 1999; Corley & Tinker, 2003; Barlow et al, 2003). A short summery of the background situation is however appropriate.

World demand for palm oil

TABLE 4 : WORLD CONSUMPTION

World consumption for food per capita (kg / yr)

	1961 / 1963	1979 / 1981	1997 / 1999
Veg. Oils	4.8	7.4	10.0
Fat	3.0	2.8	2.4
Total	7.8	10.2	12.4

From Hirsh, 2001

The world demand for palm oil, as with other vegetable oil commodities, is highly correlated to its consumption for food. Since the beginning of the sixties to the end of the nineties, this consumption increased by 59% from 7.8 kg / year per capita to 12.4 kg / year per capita (Table 4). But, during the same period, the ratio of animal fats to vegetable oils declined from 0.62 to 0.24 indicating a strong disinclination towards the animal fats and an impressive improvement in the demand for vegetable oils.

The evolution of this demand differs considerably within the various countries or continents (Table 5). By the end of the nineties, the demand for fat and vegetable oil for food rises to 22 kg / year per capita in North America and Europe, 14.7 kg / year in South America and 8 to 9.5 kg per capita for the developing countries.

TABLE 5 : CONSUMPTION BY CONTINENT

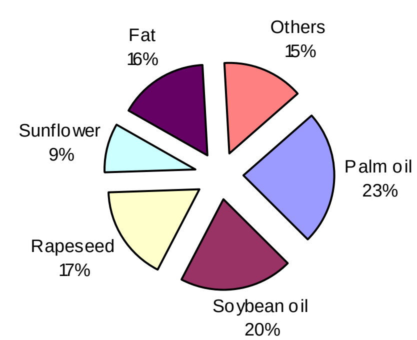
Consumption for food per continent

	Veg. Oils	Fats	Total
Asia	8.0	1.5	9.5
North / Central Am.	18.0	4.2	22.2
South America	12.5	2.2	14.7
Europe	14.9	7.4	22.3
Africa	7.6	0.4	8.0

From Hirsh, 2001

The 1999 / 2000 world supply of vegetable oils and fats represents more or less 18.8 kg per capita. Non-food demand appears to rise to 50% of the actual food demand. It is anticipated that palm oil will share the top position of world non-mineral oil commodity supply together with soybean oil by 2012 – 2016, palm oil covering up to 23 % of total market needs (Hirsch, 2001; Corley and Tinker, 2003).

Figure1: Expected world production 2016 / 2020



The annual growth of world population is estimated at 1.3% per year. This increase mostly concerns the developing areas of Asia and Africa for which significant potential for growth of demand for food oils remains important for the next 15 – 20 years (FAO, 2004).

Global demand for farm resources will probably triple during the next 45 years (Avery, 2005).

Finally, it is anticipated annual demand for palm oil will increase by up to 50%, from 23 to 35 million tons, by 2011 – 2015 (Teoh, 2002).

Expansion of the industry in Indonesia

TABLE 6 : INDONESIAN HECTARAGE

Expansion of the industry

Year	Surface (ha)
1960	<100,000
1970	133,000
1980	295,000
1990	1,127,000
2000	3,810,000
2003	4,695,000

The Oil Palm industry in Asia had its beginnings early in the 20th century in Indonesia. Although initially the leader in palm oil production, the Indonesian industry only developed in the eighties to become the second major producer of the palm oil world, after Malaysia.

Having reached 4.7 million planted hectares in 2003, oil palm growth is extending by 250,000 to 300,000 hectares per year since this date, mainly in Kalimantan. Commercial estates, including the public sector, cover 61% of this surface area, whilst smallholder programmes (plasma and individuals) cover the rest.

The annual growth of this expansion exceeded 100,000 ha in the middle of the eighties, 200,000 ha in the middle of the nineties and 500,000 ha per year in 1999 and 2000. After 2 years of reduced development due to the impact of the monetary crisis, the unstable political environment and low commodity prices for CPO, there is now a major demand for planting material indicating a new planting boom commencing 2003 (Jacquemard and Jannot, 1999; Corley and Tinker, 2003).

Currently the average palm age for all the Indonesian oil palm plantations is 8.4 years, and 10 years old for the mature plantings.

In comparison, these average ages are respectively 12.9 and 14.0 years old at PT Socfindo.

The young average palm age of the Indonesian industry could partially explain the weak national yield recently observed (± 2.0 tons CPO / ha).

Issues relating to plantation expansion

The major new expansion of Indonesian oil palm plantings is raising many questions:

Land allocation:

The misuse of land, particularly concerning the remaining forested areas of Sumatra, Kalimantan and Irian Jaya, is a major source of contention and negative impact for oil palm expansion (Casson, 1999; Corley and Tinker, 2003; Darussamin et al, 2004).

TABLE 7 : CONVERSION FOREST

Remaining conversion forest (x 1000 ha)

Province	Surface
S. Sumatra	1,800
W. Kalimantan	1,050
E. Kalimantan	4,000
C. Kalimantan	4,700
S. Kalimantan	600
Maluku	900
Irian Jaya	6,300

Only conversion forests designated for plantation development, and degraded land, should be utilized for oil palm establishment. But, over the 4.1 million ha of forest converted from 1982 to 1999, 4% was converted from limited production forest, 11% from production forest, and 3% from forest land designated for other use. A large deficit of conversion forest affects mainly Riau and Aceh provinces (Casson, 1999). At the beginning of the millennium, the remaining conversion forest[2] covered around 20 million hectares (Table 7). But large areas of degraded land are also available. In 1998, such land covered 3.2 million hectares in Sumatra and 2.9 million hectares in Kalimantan.

[2] According 1982 TGHK (Land Forest Use Consensus)

In fact, oil palm plantation development is competing with all other agricultural sectors, including family farm lands, for the use of conversion forest and degraded land.

Laws:

The legal procedures required to establish a new oil palm plantation in Indonesia includes at least the following (Darussamin et al, 2004):

- Agreement from the Minister of Forestry for the release of forest areas if the status of the land is forest
- Letter of principal agreement on plantation activities from the Minister of Agriculture
- Issuance of *Hak Guna Usaha* (HGU) from National Land Agency
- Environmental Impact Assessment (EIA)
- Permit to build oil palm mill(s) from the Minister of Agriculture

Taking into account the necessity to protect one of the world's mega-centers of biological diversity represented by the remaining rain forest in Indonesia, should be the opportunity for Indonesian legislators to introduce the concept of High Conservative Value Forest (HCVF) in the Land Forest Use Consensus (TGHK).

Labour:

One of the major constraints to plantation development is the availability of manpower. Commercial growers concentrated their activities in Sumatra initially because of the availability of a large work force (indentured labour from Java) used to plantation work requirements there. Development in Kalimantan and Irian Jaya requires the establishment of plantations with transmigrant labor, or conversion of the local community from individual farming to employment, on their own lands.

These two factors are potential sources of conflict: between transmigrants and local populations, and between local populations and the plantation management (Casson, 1999; Jacquemard and Jannot, 1999; Geissler and Penot, 2000).

Social and political:

The fast expansion of the oil palm sector, particularly from 1995 to 2000, induced many social troubles with the surrounding communities because the legitimate expectation for a quick improvement of their way of life was frequently disappointed (Geissler and Penot, 2000).

The social integration of transmigrant workers and their families needs to be improved through a proper policy at national and provincial level. Disputes over land rights with local communities remain a frequent and major problem for most new expansion projects.

Political disorders also continue in several Indonesian provinces, mainly in Sulawesi, Irian Jaya and in Aceh (but where the consequence of the recent tsunami disaster seems to advance the parties on a path to a peaceful solution).

However, the expansion of the oil palm sector into Irian Jaya and Kalimantan should contribute to an improvement in the way of life of the local communities, providing economic resources such as infrastructure, employment, livelihood, contribution to their education and welfare, etc.

Environment:

As indicated in the previous section, a revision of the 1982 TGHK including the HCVF concept, full compliance to the spirit and letter of the laws, and a better soil, land formation and social assessment prior to felling the forest, should improve the poor public reputation of the oil palm sector.

For instance, it is a great pity, and economically unsound, to destroy a forest covering deep peat or pure sandy soils, very steep slopes, etc.; many such examples can be demonstrated. Such areas are good candidates for HCV forest corridors, or the establishment of small forestry diversification projects if a secondary growth of invasive weeds already occurs.

Sustainable practices:

In many cases, the reputable companies involved in the Indonesian palm oil industry are using sustainable management practices dictated by the current state of the art such as:

- Preparing a complete impact assessment (economic, technical, social and environmental) prior to establishment of new extensions / plantations
- Planting the best planting material available from the market
- Implementing best management practices for upkeep, the fertilization programme, harvesting and processing of the fruits
- Zero burning policy
- Implementing Integrated Pest Management to control pests and invasive weeds

- Developing improved social, welfare and health programmes for their employees

As with Malaysia, the development of stricter codes of practice for sustainable palm oil production is receiving increasing attention in Indonesia through the Roundtable on Sustainable Palm Oil (RSPO) forum.

II. PT. SOCFINDO AS AN EXAMPLE OF INDONESIAN OIL PALM INDUSTRY COMPETITIVENESS

The oil palm production and cost structure trends of PT. Socfindo are provided as an example of how a private sector plantation company has maintained its competitive advantage over the past 30 years of operations in Indonesia.

The Company has retained detailed annual reports since its reformation in 1968 from which can be extracted data based on unchanged methodologies, these providing clear and precise trend indicators on production and costs, especially over the period 1975 - 2004. It is also significant that the land areas and overall hectarage under cultivation have not changed greatly over this 30 year period.

However, prior to 1975 the company had undergone a period of upgrading and rehabilitation following the period of nationalization from 1964 to 1968 – the yield and cost trends for the period 1968 to 1975 are not considered representative, and are not therefore included in this study.

PRODUCTION AND YIELD TRENDS

The trend in production of fresh fruit bunches (FFB) from the Company's plantations from 1975 to 2004 is provided in Table 8.

TABLE 8 : FFB PRODUCTION & YIELD 1975 – 2004

	1975	1980	1985	1990	1995	2000	2004
Mature Area	27,260	28,853	30,103	29,569	30,856	29,435	32,255
Total FFB (tons)	371,211	516,224	615,691	656,363	633,231	654,232	743,226
Yield FFB (tons/ha)	13.6	17.9	20.5	22.2	20.5	22.2	23.1

The trend line indicates a 44 % improvement over the 30 year period, as shown in Figure 2.

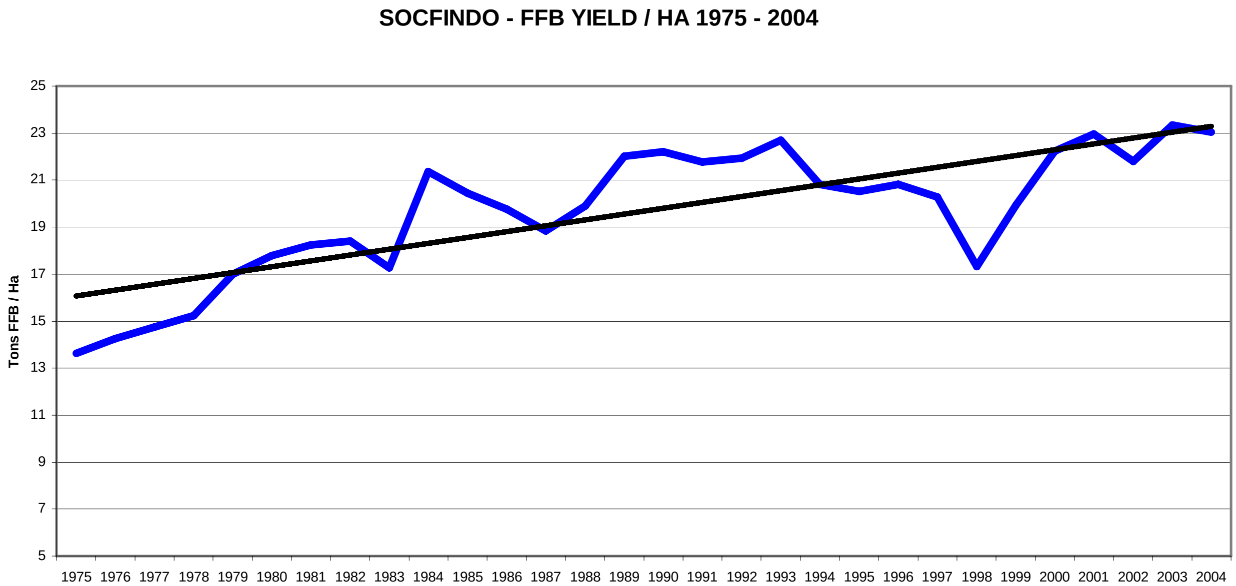


Figure 2: Trend in FFB production/ha

The trends in crude palm oil (CPO) and kernel (PK) extraction rates achieved by the Company's 9 palm oil mills are indicated in Table 9.

TABLE 9 : CPO & PK EXTRACTION 1975 - 2004

	1975	1980	1985	1990	1995	2000	2004
Total CPO (tons)	68,745	105,099	134,531	147,519	150	156,608	186,678
Total PK (tons)	11,517	17,099	25,951	31,173	28,942	29,549	33,135
OER (%)	18.52	20.43	21.85	22.48	23.72	23.94	25.12
KER (%)	3.10	3.32	4.21	4.75	4.57	4.52	4.46

The trend for palm oil extraction indicates a 30 % increase over the 30 year period. The long-term trend in kernel extraction clearly shows the dramatic increase in kernel weight following introduction of Elaeidobius pollinating weevils in May 1983. However, there is little change in kernel extraction thereafter. These trends are shown in Figures 3 and 4.

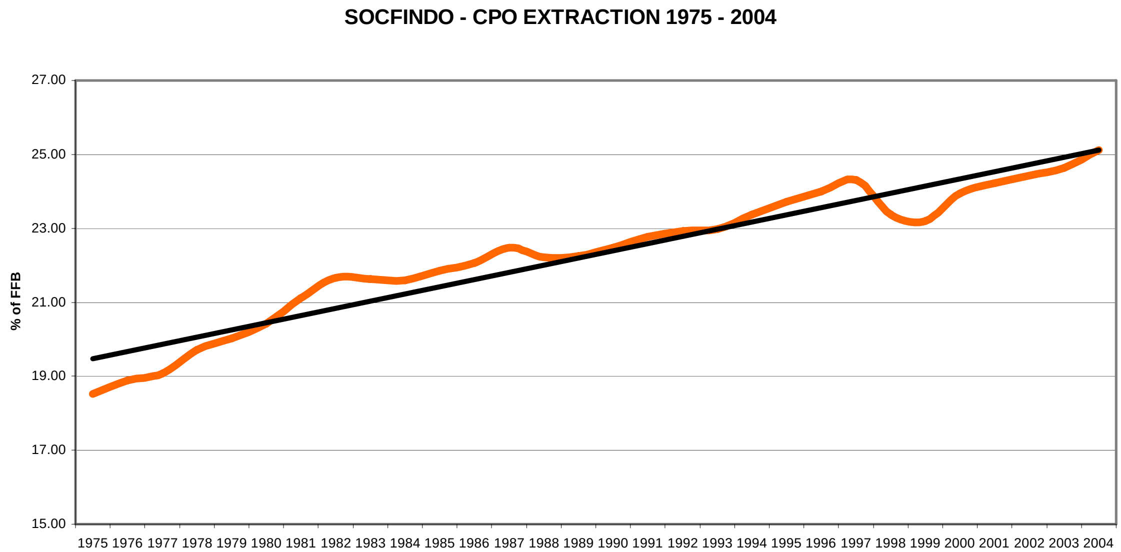


Figure 3: CPO extraction trend

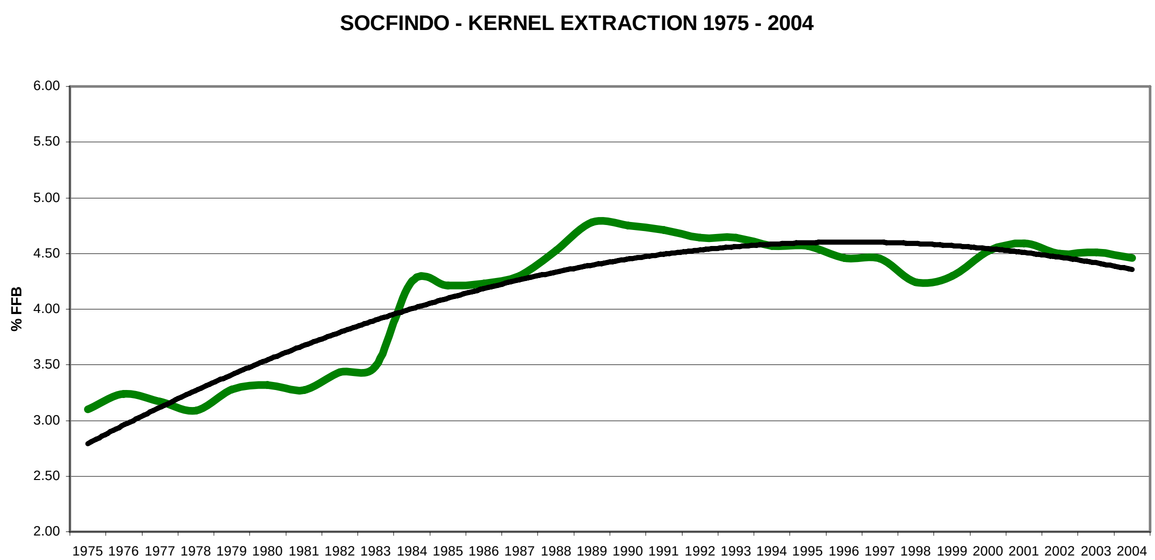


Figure 4: PK extraction trend

Thus the average yield of CPO per planted hectare for all the company estates combined (including those located in Aceh) rises from 2.52 tons/ha in 1975, to 5.79 tons/ha in 2004, as shown in Table 10.

TABLE 10 : YIELDS OF CPO AND PK

	1975	1980	1985	1990	1995	2000	2004
Total CPO/ha (tons)	2.52	3.63	4.47	4.99	4.87	5.32	5.79
Total PK/ha (tons)	0.42	0.59	0.86	1.05	0.94	1.00	1.03

The trend line for the full annual results (Figure 5) indicates that over a 30 year period, the palm oil per mature hectare yield has risen by 84 %.

Kernel production has more than doubled over the same period on a per hectare basis.

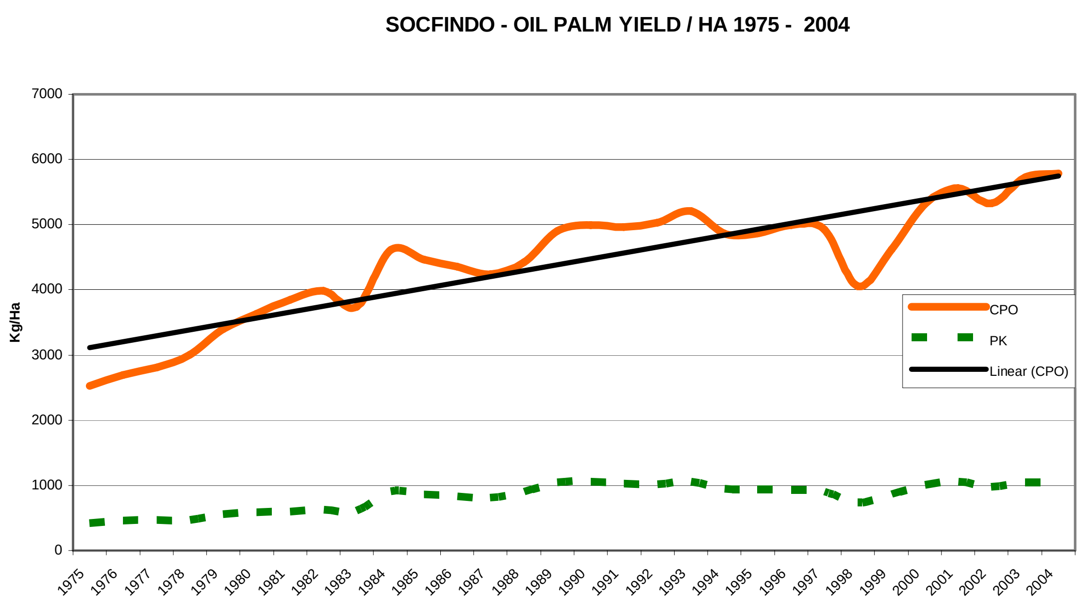


Figure 5: CPO and PK yield trends

An analysis of reasons for this major improvement in crop productivity of each planted hectare of the Company focuses on the following factors:

- <u>Planting material:</u> Through the process of plant breeding, there has been a sustained improvement in the potential of new planting materials. This can be well indicated by the graphic depictions attached (Appendix 2) of yields from the commercial areas planted

at Seumanyam (West Aceh), Aek Loba (Asahan) and Negri Lama (Labuhan Batu) estates.
The commercial plantings have been split, on a purely arbitrary basis, into 1970s, 1980s and 1990s plantings. These depictions do not provide any more than an indication of trends as it is impossible to segregate the fruit from the various areas for a commercial assessment of extraction. However, actual research results from breeding trials at Aek Loba estate indicate materials currently being planted would, with good agricultural and processing inputs, continue to provide incremental yield increases. Socfindo relies entirely on its own planting material.

- Introduction of Elaeidobius kamerunicus: The pollinating weevil was introduced into Socfindo estates in May 1983. Oil palm yields in that year were suffering from extended drought conditions experienced through 1982. However, the yields in 1984 improved very considerably as a result of the subsequent good pollination, and increased rainfall during the latter half of 1983.

- Agricultural inputs: Improvements in nursery practice, planting, upkeep, fertilizer usage, pest and disease control, control of erosion and moisture retention have ensured earlier harvesting and higher yields. From our experience, poor nursery practice and selection, poor planting and upkeep standards, and lack of attention to pest and disease attacks can have long lasting effects on future yield profiles. Fertilizer applications based on situational requirements need to be optimized.

- Harvesting, transport and processing: Socfindo lays great emphasis on maintaining 7 day harvesting intervals, collecting all loose fruit (easier to do if the 7 day intervals are maintained) rigorous checking that fruit is harvested at optimum ripeness standard (ripeness standards are more uniform with the 7 day intervals), all fruit delivered to the mills (in Socfindo, every oil palm estate has its own mill) on the same day as harvesting, and processing within 20 hours of harvesting. Processing operations are also optimized to ensure low losses and high extraction rates. The harvesting, transport and quick processing measures stated above ensure low FFA's which in turn minimizes losses in down stream processing.

PRODUCTION COST TRENDS

The trend in production cost (measured throughout this paper as the cost of producing one ton of CPO – kernel production cost not included – but never the less, a consistent formula provides the trend) for the period 1975 to 2004 is provided in Table 11.

TABLE 11 : CPO PRODUCTION COST/TON (USD)

Cost/ton CPO (USD)	1975	1980	1985	1990	1995	2000	2004
Upkeep	22	17	16	15	12	9	11
Fertilizing	26	29	9	9	13	14	22
Harvesting	20	23	22	16	17	13	20
Processing	19	24	22	17	19	12	17
Gen. Exp.	20	22	23	17	23	16	22
Ex-Factory	107	115	92	74	84	64	92
Cash Cost	139	156	111	85	97	77	116
Rupiah/USD	414	625	1,106	1,901	2,308	8,400	9,011

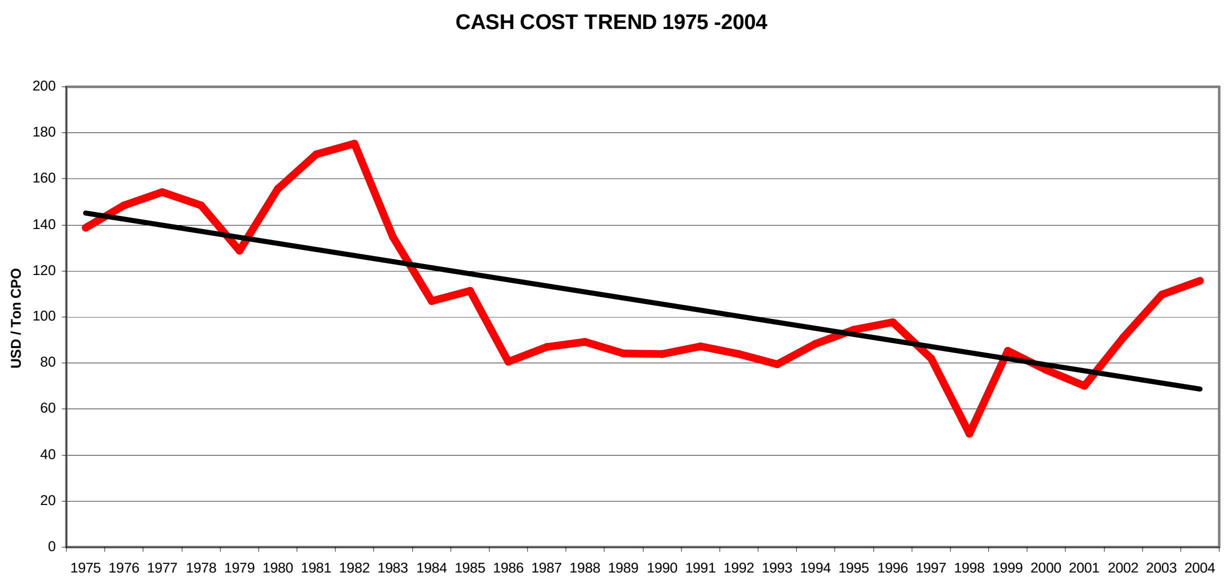


Figure 6: Cash cost of production 1975 - 2004

The trend line (in Figure 6) indicates a 50% fall in the Cash cost of production in USD terms over the 30 year period, although it will be noted that there is almost a flat cost/ton trend line for the 20 year period between 1985 and 2004 (as indicated by Figure 7). The much higher cost per ton from 1975 to 1983 is attributed to the proportionally higher costs of fertilizers and assisted pollination (pre weevil) magnified by the lower yields obtained.

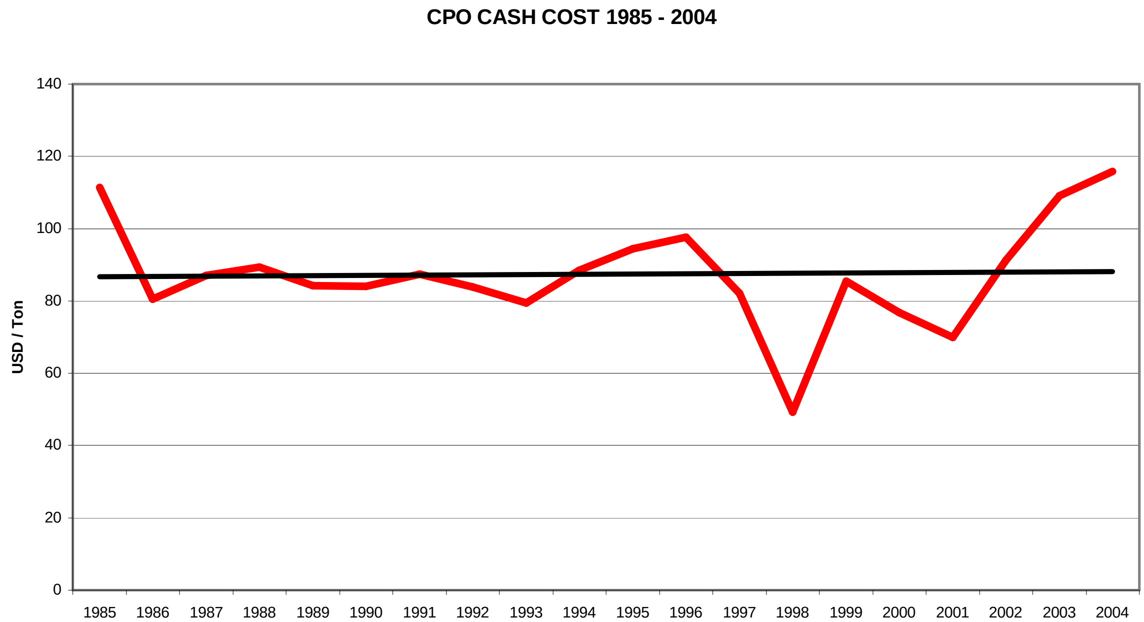


Figure 7: Cash cost of production 1985 - 2004

After 1983, the most important reason for this flat cost/ton trend is the evolution of the devaluations of the Rupiah against the USD over the period, as indicated by the Figure 8. These devaluations in USD terms generally offset the high inflationary Rupiah trends, but those advantages were in turn rapidly offset by further high inflation, particularly following the Asian monetary crisis and the major Rupiah devaluation of 1997/98.

A very good example of this is shown in Figure 9. This is a graphic representation of the annual basic monthly wage for the estate workers, converted into USD at the prevailing exchange rate. The various devaluations of the Rupiah can be easily identified, followed by subsequent inflationary wage increases.

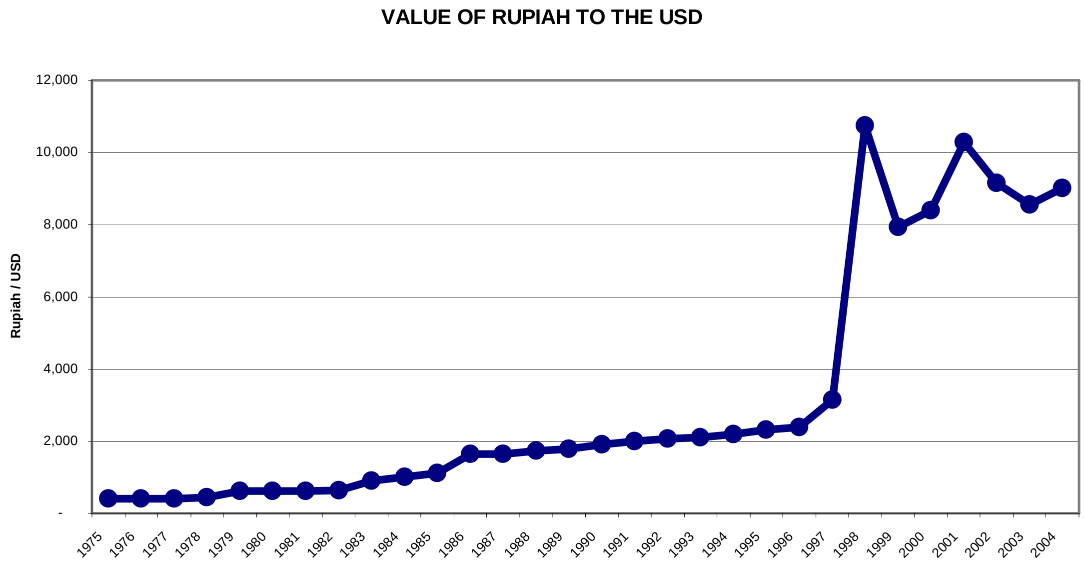


Figure 8: Rupiah value to USD

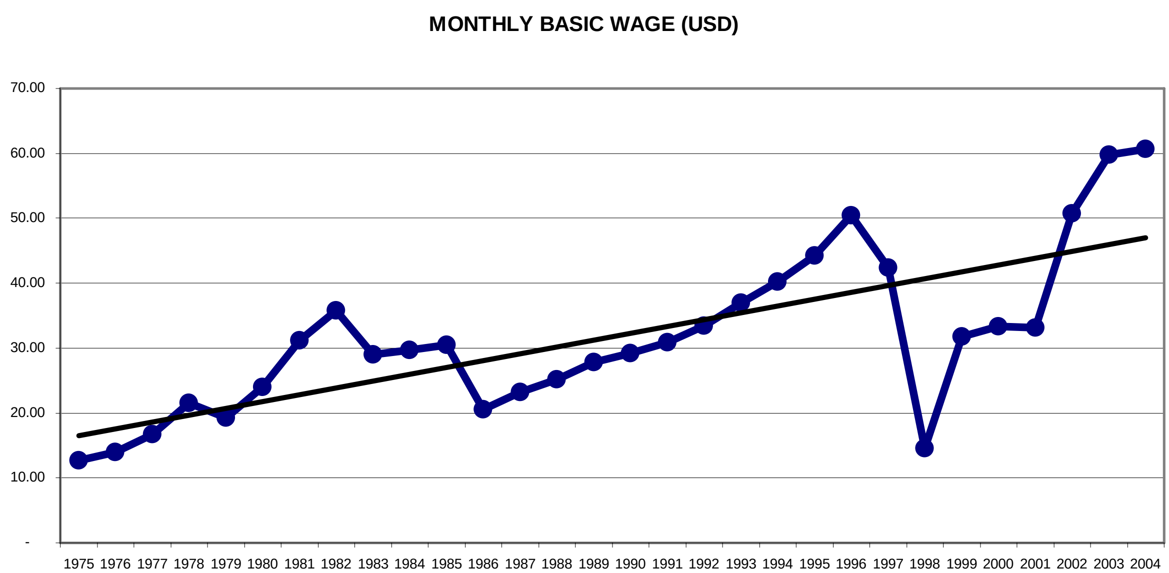


Figure 9: Worker's basic wage in USD

The second significant reason for this flat USD cost/ton trend is the consistent improvement of CPO production yield per hectare, as indicated earlier in this paper. The increase in yield over the years has had the effect of improving worker productivity, and in reducing the unit cost of all fixed overheads, and other fixed costs.

A breakdown of ex-factory cost for 2004 by cost component is indicated in Figure 10.

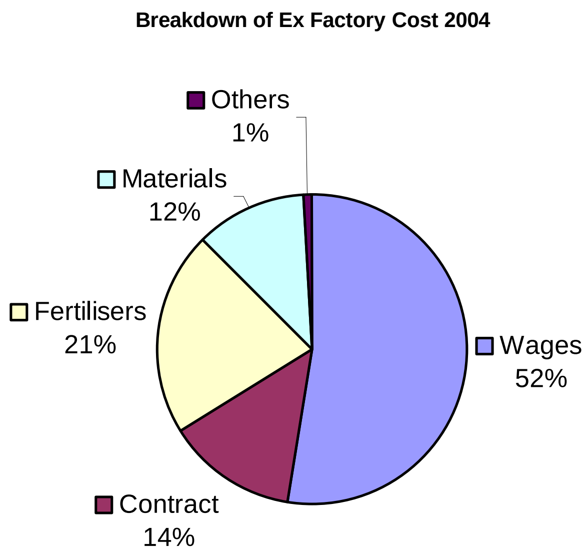


Figure 10: Breakdown of ex-factory cost 2004.

It will be observed, not unexpectedly, that the main cost components are salary and wages, and fertilizers.

It is interesting therefore to note that workers wages have increased over the period as shown in Table 12.

TABLE 12 : WORKER'S BASIC WAGE

	1975	1980	1985	1990	1995	2000	2004
Basic Labour Wage							
Rp/month	5,250	15,000	33,750	55,500	102,000	279,720	546,510
USD/month	12.68	24.00	30.49	29.20	44.19	33.30	60.65

The annual percentage increases agreed between the plantation companies and the worker's union are usually also applied to the salaries of staff and sub-staff.

PROFITABILITY MARGIN

From the preceding information, if we know the average price of palm oil, we can make a crude, but very interesting, profitability margin trend for the 30 year period which shows quite clearly the advantages of the improvements in yield.

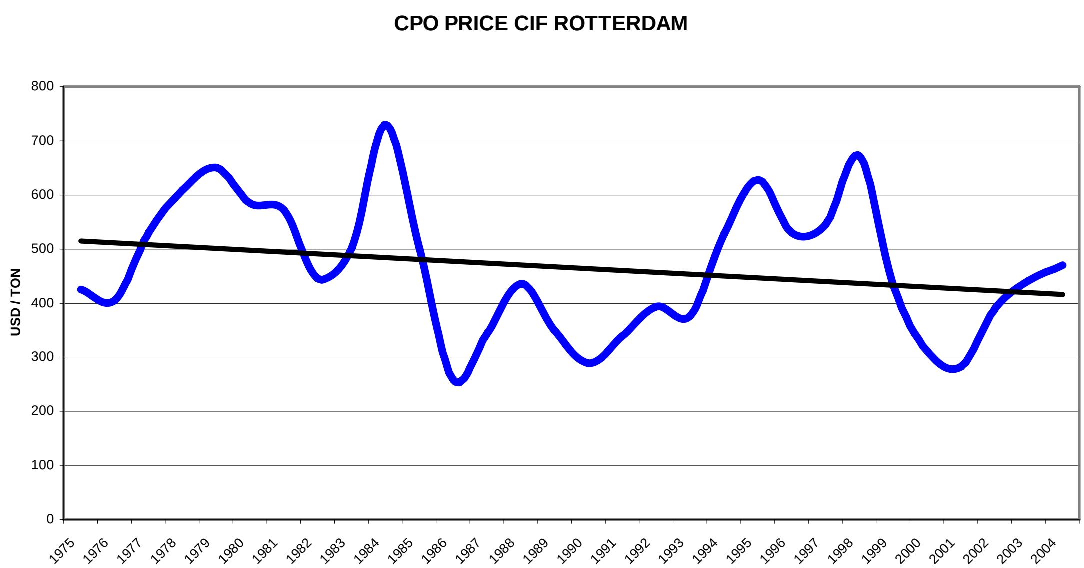


Figure 11: CPO price in USD/ton cif Rotterdam

The average price of CPO for the whole 30 year period is USD 465 per ton cif Rotterdam. However, the linear trend line (Figure 11) indicates a 19 % decline in constant USD price over the period. [Fry, 1998 on the other hand, clearly indicates an average decline in oil palm commodity prices in real USD terms of about 3 % per year.]

To convert the cif Rotterdam price trend to a fob CPO value, we note that shipping costs have not risen, but have fluctuated between USD 35 to USD 60 per ton over the 30 year period. In 1975, the difference between cif and fob price was reported to average USD 55 per ton, whilst in 2004 it averaged USD 50 per ton CPO.

We have shown that Socfindo's Cash Cost has declined by some 59 % in constant USD terms over the 30 year period, due to two main factors – rupiah devaluation and improvements in palm oil yield / ha.

The Cash cost trend therefore shows a greater decline in constant USD terms than does the price of palm oil over the past 30 years, although it will be noted from the graphs that the Cash cost is now on an increasing trend following the major depreciation of the Rupiah during the Asian monetary crisis of 1997/98, and subsequent inflationary trends.

Using the coarse trends that we have established above in terms of CPO per hectare yields, average fob sales prices, but using actual cash costs/ton for CPO, we can show (Figure 12) that in constant USD terms, the trend in "profit" margin per hectare in production has risen significantly, especially over the period 1975 to 1990, after which the declining trend in FOB price for CPO and rising cost of production nullify to a large extent this trend.

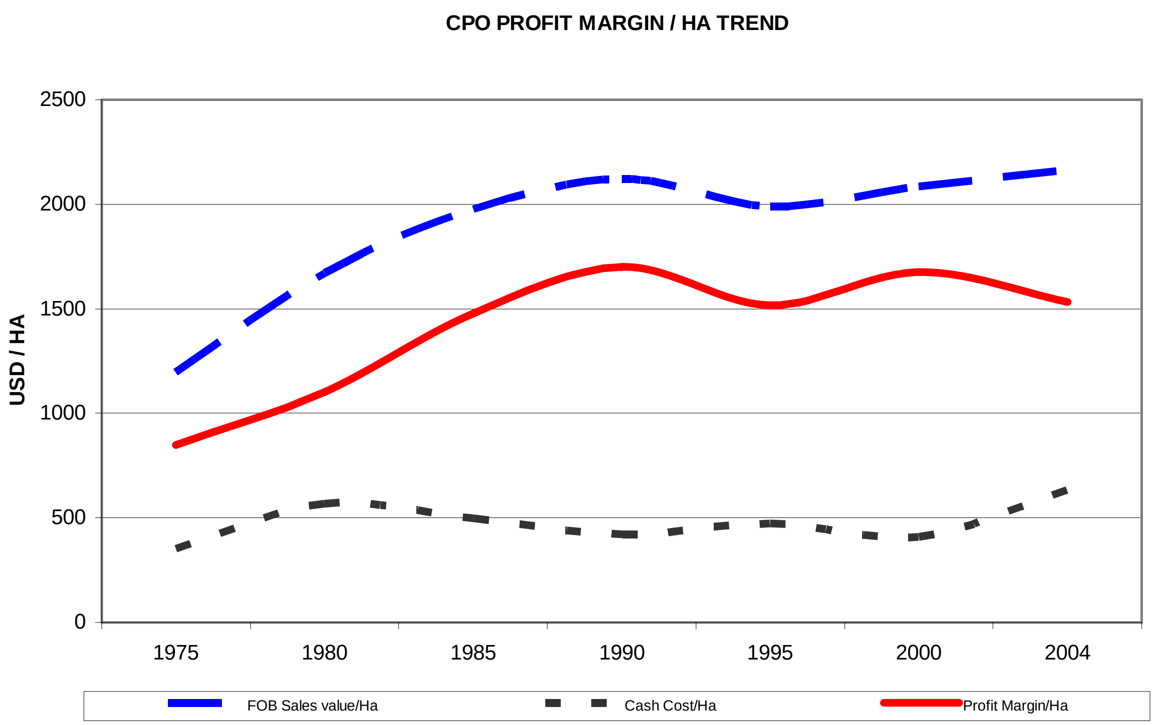


Figure 12: Trend in "Profit" margin

III. FUTURE PERSPECTIVES

The question then arises as to where we go from here? Will Socfindo manage to retain its competitive advantage, and what are the prospects for the Indonesian oil palm industry as a whole.

Of course the industry has no control over monetary policy and can not influence exchange rates. Competitiveness must therefore be maintained by continually improving yields, and tackling inflationary costs.

The future for palm oil yield trends

The planting material currently planted (and sold to outside parties) by PT Socfindo (Generation II) is a product of the Aek Kwasan genetic block. Comparing the production obtained in the AK trials and the realization of the commercial blocks (Table 13), the level of the respective yields is very close, with excellent yields obtained at the full mature stage due to the improvements in cultural practices since the dates of trial observations. In Aek Loba and Padang Pulo estate conditions, the commercial crop rises to 7 - 9 tons CPO/ha/ annum (Asmady et al, 2002). In average North Sumatra commercial conditions, the Generation II material is producing 3.8 tons CPO / ha at 3 – 5 years old and 7.5 tons / ha CPO at the full mature stage.

Because of the large area of the genetic blocks, the good connection between the trials and the efficiency of the data recording, it is determined that there is a close correlation between the commercial crop and the trial crop results, giving a strong confidence in the data recorded and the expected commercial crop for the future.

The future Generation III material will be derived from the Aek Loba Timur Genetic Bloc planted between 1995 and 2000 at Aek Loba estate. The average potential observed at this genetic block is as follows: 5.8 tons CPO at 3 – 5 years old, and 8.0 to 8.2 tons CPO at the full mature stage. The estimated commercial potential for this third generation planting material, commercially available in the near future, is 7 – 9 tons CPO / ha / year (mean: 8.1 t).

The top progenies of this generation material, which should be available after the completion of recording at the ALT genetic block (best GIII) should rise to between 8 to 10 tons CPO / ha /year.

TABLE 13: OBSERVED AND FUTURE YIELDS FOR PLANTING MATERIALS

Age	AK trials	Com. GII	ALT trials	GIII	Best 3P	Best GIII
3	3.259	2.075	3.665	3.780	3.936	3.900
4	3.602	3.960	6.382	6.300	6.966	6.900
5	5.023	5.320	7.460	7.400	8.180	8.000
6	5.929	6.220	8.203	7.900	8.999	8.700
7	6.223	6.400	8.046	7.950	8.906	8.800
8	7.277	7.360	8.094	8.000	8.953	8.900
9	7.742	7.660	8.107	8.050	8.686	9.000
10	7.056	7.800		8.100		9.000
11	7.081	7.920		8.100		9.000
12	7.252	7.600		8.100		9.000
13	6.934	7.767		8.100		9.000
14	7.179	8.450		8.100		9.000
15	7.375	7.600		8.100		9.000
16	7.056			8.100		9.000
17	6.640			8.100		9.000
18	6.934			8.039		8.950
19	6.321			7.977		8.900
20	6.297			7.916		8.850
21	6.150			7.855		8.800
22	6.076			7.793		8.750
23				7.732		8.700
24				7.670		8.650
25				7.609		8.600

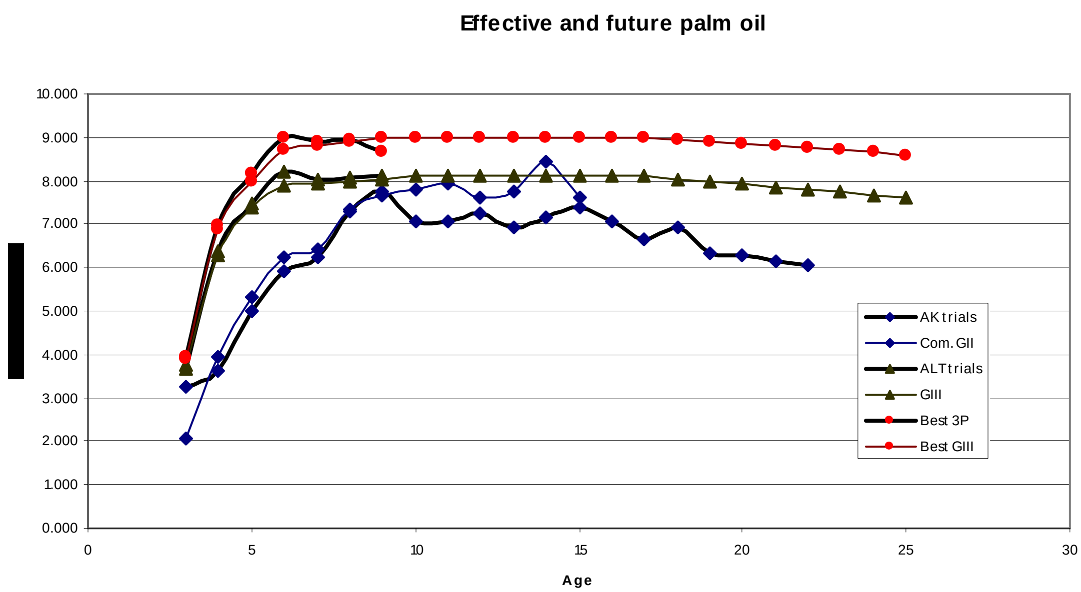


Figure 13 : Yield trends from Table 13

Research and development is required, and is being actively pursued, to prepare for the future a new generation of planting materials. In addition to the traditional FFB and OER, the other characteristics to be considered are:

- Palms better adapted to specific environmental conditions
- Tolerance to various stress factors such as drought, wind, temperature, etc.
- Palms better adapted to specific nutrient requirements
- Resistance or tolerance to specific diseases and pests, such as Ganoderma, Fusarium wilt, Oryctes, etc.
- Economic considerations such as; fast/slow growth, height increment, high bunch number/low weight or low bunch number/high weight, high extraction/lower bunch weight, sex ratio, CPO/PK ratio, compact palms, etc.
- Downstream or end-user requirements such as olein/stearin ratio, Iodine Value and carotene content, etc.

The future for lower production costs

An important measure for reduction of production costs is the continuous enhancement of yields, as shown in section II of this paper. Enhanced yields help to lower fixed costs on a per ton production basis, and aid in improving general productivity of operations.

In the Indonesian context, it is widely reported that the productivity of labour is lower than in Malaysia (Corley & Tinker, 2003; Barlow et al, 2003), and that there is considerable room for productivity improvements.

Noting that salaries and wages make up some 50 % of ex-factory costs in Socfindo, we can speculate that further cost reductions are certainly possible as wages continue to increase, through improved worker productivity.

Also most large companies in Indonesia should be able to take a major advantage from economies of scale based on the large projects being developed in South Sumatra and Kalimantan.

With Indonesia’s huge labour resources and need for employment, it is considered that the Indonesian oil palm industry will remain competitive on this basis with all other palm oil producing countries well into the future.

Other factors affecting the future of the Indonesian Oil Palm industry

Currently there are many factors that affect the development of the Indonesian oil palm industry. These have been highlighted elsewhere (Kopot, 1997; Baskett et al, 2002; Barlow et al, 2003).

However, given the importance of this industry to the development of the country, we believe that Government policies will also be adapted over time to ensure that competitive development takes precedence.

There are two other factors that may take longer to resolve, those being the improvement of the country's infrastructure such as roads, ports, electrical supply, etc which have been neglected since the Asian monetary crisis, and the development of which have not kept pace with the development of the industry.

The other factor is the dirth of plantation management expertise which has been diluted by the very rapid expansion of the industry. There is no doubt, however, that this situation will be overcome with time.

CONCLUSION

The demand for palm oil on the world market is expected to remain robust. A new factor in this regard is the progression to using greater volumes of vegetable oils in the oleo chemical industries, and as a fuel substitute in the face of rising mineral oil prices.

The Indonesian palm oil industry is expanding rapidly to fulfill both world demand, as well as demand from its own large domestic market.

PT Socfindo has shown how it is possible to remain competitive as a palm oil producer in the Indonesian context.

It is considered that with the advantages of the major economies of scale open to Indonesian companies, and the vast potential for land, labour and smallholders, the industry will quickly adapt to the economic necessities in order to remain a competitive producer of palm oil.

However, an intensive input into extension services and training of personnel at all levels will be required to ensure that the full potential of crop yields, and the productivity of operations is maximized.

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