

Survey of Crude Palm Oil Quality Ex-Mill Sabah

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RINGKASAN

Satu kajiselidik dilakukan bagi menentukan kualiti minyak sawit mentah (MSM) dari Sabah. Perbandingan hasil kajiselidik ini dengan yang telah dijalankan oleh PORAM (Wong, 1981) menunjukkan bahawa MSM Sabah, pada umumnya, mempunyai kualiti lebih baik berbanding MSM Semenanjung Malaysia.

Kajiselidik ini juga menunjukkan bahawa parameter kualiti MSM Sabah, iaitu asid lemak bebas, lembapan dan bendasing adalah dalam lingkungan spesifikasi Piawaian SIRIM (1983).

Dari kajian ini kita dapati bahawa kawasan Tawau dan Sandakan menghasilkan MSM berkualiti lebih baik berbanding dengan kawasan Lahad Datu.

INTRODUCTION

Malaysia is today the world's largest producer and exporter of palm oil, accounting for some 60% of world production. However, it is facing serious competition in the international edible oil market, not only from other major palm oil producing countries such as Indonesia, but also from producers of other oils and fats. To remain competitive therefore, the Malaysian palm oil industry must, among other measures, produce CPO of the highest quality with the following characteristics:

- Low FFA
- Low moisture and impurities
- Minimum oxidation
- Good stability to further oxidation
- Good bleachability

In this connection, several surveys have been conducted since 1973 to examine the quality of Malaysian CPO (Jacobsberg, 1974; Johansson, 1976; Chooi *et al.*, 1981; Wong,

1981). However, no such study has been initiated solely for Sabah CPO, which today accounts for some 10% of the country's total production. It is therefore the aim of this paper to present an overall survey on the quality of CPO from Sabah.

METHOD OF SURVEY

This survey was divided into two parts. In Part One, a total of 21 mills participated, comprising seven from the Tawau region, three from the Lahad Datu region, and eleven from the Sandakan region. In all, the tonnage of CPO surveyed was 467 462, which represented about 87% of the total of 540 028 tonnes of CPO produced for the twelve months of 1989. The monthly breakdown of tonnage surveyed against tonnage produced, and the number of mills involved, are shown in *Table 1*. The participating mills were requested to submit monthly analytical data on quality parameters (FFA, moisture and impurities)

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throughout 1989 to the Kulumpang Development Corporation's Laboratory (KDCL).

In Part Two of the survey, the 21 participating mills were requested to despatch samples of their weekly production of CPO to KDCL for detailed quality analysis, which included tests for Deterioration of Bleachability Index (DOBI), oxidation values, iron and phosphorus. A total of 140 weekly CPO samples were analysed over a period of seven weeks, from 9 April 1990 to

26 May 1990.

RESULTS AND DISCUSSION

Part One

The overall results of Part One of the KDCL survey are summarized in *Table 2*. For more meaningful presentation, comparisons are made with the results of the PORAM survey carried out from late 1979 to 1980.

TABLE 1. QUANTITY OF CPO SURVEYED AND QUANTITY PRODUCED IN SABAH DURING 1989

Month	Quantity produced	Quantity surveyed	% Surveyed	Number of mills
January	32 235	28 461	88	19
February	29 192	26 322	90	19
March	30 414	27 551	90	19
April	36 048	31 863	88	19
May	39 432	35 223	89	20
June	39 429	35 768	91	20
July	41 533	36 331	87	21
August	51 040	43 408	85	21
September	56 006	47 261	84	21
October	59 776	50 505	84	21
November	62 986	52 885	84	21
December	61 937	51 884	84	21
Total	540 028	467 462	87	

TABLE 2. COMPARISON OF KDCL AND PORAM SURVEY RESULTS

Test Parameter	KDCL Survey			PORAM Survey	
	n	\bar{X}	SD	\bar{X}	SD
FFA (%)	242	2.99	0.76	3.66	0.75
Moisture (%)	242	0.135	0.039	0.18	0.05
Impurities (%)	242	0.019	0.020	0.04	0.03

TABLE 3. COMPARISON OF KDCL SURVEY RESULTS ON A REGIONAL BASIS

Test Parameter	Sandakan			Tawau			Lahad Datu		
	n	\bar{X}	SD	n	\bar{X}	SD	n	\bar{X}	SD
FFA (%)	128	2.77	0.69	84	3.01	0.69	30	3.47	0.87
Moisture (%)	128	0.139	0.048	84	0.135	0.026	30	1.25	0.017
Impurities (%)	128	0.015	0.006	84	0.015	0.004	30	0.041	0.045

The results show that lower FFA was recorded for Sabah CPO, averaging 2.99% as against 3.66% in the PORAM survey. Lower contents of moisture and impurities were also noted in the study.

On a regional basis, the results of the survey show that Lahad Datu had the highest mean FFA of 3.47%, as compared with 2.77% and 3.01% for Sandakan and Tawau, respectively (Table 3). This could be attributed to serious delays between harvesting and processing in the Lahad Datu region, brought about by a comparatively poor infrastructure which hampers evacuation of FFB, especially during rainy and peak cropping periods. The Lahad Datu region also registered a high mean value of 0.041% for impurities. This could be due to some milling difficulties in the mills of the region.

Seasonal Variation in Quality

The monthly breakdown of the survey results is presented in Table 4.

The monthly means of FFA are high in January, February, March and December, which is a reflection of production difficulties associated with rainy periods and, to certain

extent, with the high cropping season. No monthly trend could be observed for moisture and impurities.

Comparison of KDCL survey with SIRIM Standard

The overall results of the KDCL survey are compared with the SIRIM standard in Table 5. It can be seen that mean values of FFA, moisture and impurities are within the specifications set by SIRIM in 1983.

Part Two

A summary of the results from Part Two of The KDCL survey and from the PORAM survey is shown in Table 6.

Briefly, in regard to the quality of Sabah CPO the comparison shows the following:

FFA, moisture and impurities

The overall mean values for FFA, moisture and impurities from the KDCL survey are lower than those from the PORAM survey. On a regional basis, the results (Table 7) show that Lahad Datu recorded

TABLE 4. MONTHLY ANALYTICAL RESULTS OF KDCL SURVEY, 1989

Month	% FFA				% moisture				% impurities			
	n	\bar{X}	SD	range	n	\bar{X}	SD	range	n	\bar{X}	SD	range
January	19	3.62	1.04	2.03-6.01	19	0.133	0.049	0.068-0.281	19	0.017	0.006	0.009-0.026
February	19	3.50	0.96	2.06-5.51	19	0.137	0.047	0.073-0.258	19	0.016	0.005	0.008-0.026
March	19	3.34	0.88	2.09-5.51	19	0.131	0.044	0.071-0.297	19	0.013	0.005	0.007-0.025
April	19	2.99	0.79	2.14-5.41	19	0.134	0.041	0.058-0.284	19	0.015	0.006	0.008-0.033
May	20	2.76	0.48	2.10-3.82	20	0.127	0.041	0.057-0.248	20	0.016	0.004	0.007-0.025
June	20	2.97	0.73	1.97-5.15	20	0.124	0.041	0.053-0.238	20	0.018	0.018	0.008-0.103
July	21	2.84	0.78	1.99-5.12	21	0.135	0.037	0.065-0.233	21	0.019	0.019	0.007-0.099
August	21	2.62	0.46	1.75-4.06	21	0.134	0.033	0.065-0.220	21	0.020	0.022	0.008-0.110
September	21	2.65	0.46	1.98-4.19	21	0.135	0.029	0.079-0.224	21	0.021	0.026	0.007-0.120
October	21	2.81	0.58	2.03-3.98	21	0.139	0.032	0.074-0.221	21	0.023	0.028	0.008-0.129
November	21	2.96	0.61	2.25-4.18	21	0.139	0.031	0.061-0.204	21	0.021	0.025	0.008-0.119
December	21	3.26	0.69	2.26-4.76	21	0.137	0.031	0.086-0.214	21	0.020	0.025	0.008-0.119

the highest FFA content of 3.18%, against 2.75% and 2.83% for Sandakan and Tawau, respectively. The highest level of impurities (0.033%) was also noted for the Lahad Datu region. These observations are in agreement with the findings from Part One of the survey.

DOBI, UV 233, UV 269 and Carotene

The results of the KDCL survey show that the overall mean level of DOBI is 3.01. On a regional basis, Lahad Datu recorded the lowest mean of 2.63, as against 3.06

TABLE 5. COMPARISON OF KDCL SURVEY RESULTS WITH THE SIRIM STANDARD

Test parameter	KDCL survey	SIRIM Standard
FFA (%)	2.99	5
Moisture (%)	0.140	0.20
Impurities (%)	0.019	0.05

TABLE 6. COMPARISON OF RESULTS FROM THE KDCL SURVEY (9.4.90-26.5.90) AND THE PORAM SURVEY

Test parameter	KDCL survey			PORAM survey	
	n	\bar{X}	SD	\bar{X}	SD
FFA (%)	169	2.75	0.76	3.66	0.75
Moisture (%)	169	0.162	0.033	0.18	0.05
Impurities (%)	169	0.020	0.028	0.04	0.03
DOBI	169	3.01	0.25	-	-
Carotene, ppm	169	586	33	587	61
UV 233	169	1.14	0.08	-	-
UV 269	169	0.24	0.04	-	-
Peroxide, meq/kg	169	0.48	0.60	2.70	1.26
Anisidine value	169	3.52	0.87	4.55	1.49
Iodine value	169	52.1	0.9	53.2	1.50
Iron, ppm	169	4.9	1.2	-	-
Phosphorus, ppm	169	8.9	1.4	-	-

TABLE 7. COMPARISON OF KDCL SURVEY RESULTS ON A REGIONAL BASIS

Test parameter	Sandakan			Tawau			Lahad Datu		
	n	\bar{X}	SD	n	\bar{X}	SD	n	\bar{X}	SD
FFA (%)	93	2.75	0.83	49	2.83	0.87	27	3.18	0.83
Moisture (%)	93	0.139	0.035	49	0.126	0.065	27	0.127	0.032
Impurities (%)	93	0.020	0.018	49	0.017	0.015	27	0.033	0.029
DOBI	93	3.06	0.26	49	3.09	0.25	27	2.63	0.16
UV 233	93	1.13	0.09	49	1.15	0.07	27	1.22	0.09
UV 269	93	0.23	0.03	49	0.23	0.03	27	0.29	0.02
Carotene, ppm	93	587	32	49	590	35	27	565	42

and 3.09 for the Sandakan and Tawau, respectively. This indicates that Lahad Datu CPO is probably more difficult to bleach than CPO from the other two regions.

On a regional basis, higher UV 233 and UV 269 values but a lower carotene content were noted for CPO in Lahad Datu as compared with data from Sandakan and Tawau. This suggests that the Lahad Datu CPO had undergone more oxidative deterioration than the CPO from the other two regions. Studies have shown that CPO with high UV values and a low carotene content gives poor colour stability in the refined products.

Anisidine Value

The overall mean for anisidine value was 3.52, against 4.55 recorded in the PORAM survey. It is well known that CPO with a high anisidine value gives rise to a bad taste in the refined products.

Iron and Phosphorus

The overall mean levels of iron and phosphorus were 4.9 ppm and 8.9 ppm, respectively. These values are generally acceptable. An in-house quality standard on iron and phosphorus set by a well-established Malaysian plantation group stipulates 5 ppm and 8 ppm, respectively.

CONCLUSION

In comparison with the PORAM survey conducted in 1979-1980, the KDCL survey indicates that, in general, Sabah CPO is of better quality than CPO from Peninsular Malaysia. The survey results also show that the Sandakan and Tawau regions produce CPO of better quality than that from the Lahad Datu region. The study further shows

that the values for FFA, moisture and impurities in Sabah CPO are within the specifications of the SIRIM Standard.

ACKNOWLEDGEMENT

The author wishes to thank Taiko Plantations Sdn Berhad for permission to publish this paper.

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