

RED PALM OIL - A CAROTENE-RICH, NUTRITIOUS OIL

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JUNE 1993

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PORIM INFORMATION SERIES

ISSN 0128-5726

INTRODUCTION

Palm oil is one of the richest natural plant source of carotenes with the concentration from 500 - 700 ppm. The production of palm oil in 1992 was 6.4 million tonnes and it is projected that Malaysian production will reach over 8 million tonnes by the year 2000. Hence, the potential availability of carotenes in the year 2000 is about 4800 tonnes. Currently, however all the carotenes are destroyed during the refining process. In view of the importance of carotenes, and in order to preserve the carotenes in palm oil, a process has been developed to produce deacidified and deodorized red palm oil*.

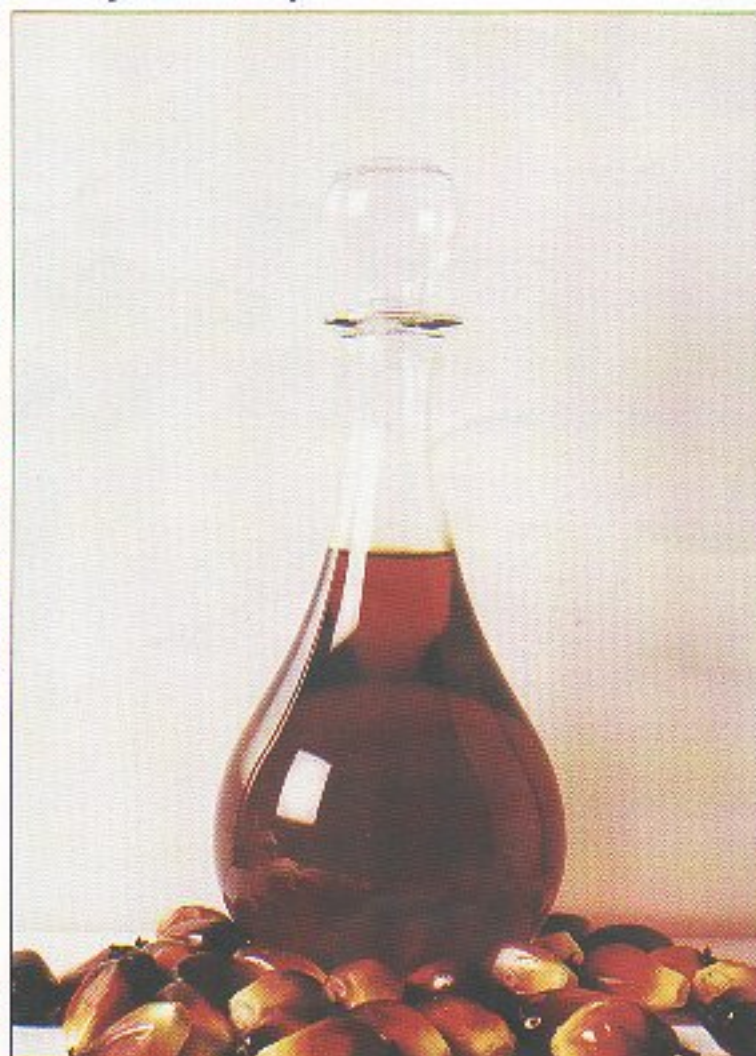
PRODUCTION TECHNOLOGY

The process to produce deodorized and deacidified red palm oil involves two

stages i.e. pretreatment of the crude palm oil followed by deodorization and deacidification by molecular distillation. The pretreatment is carried out in a conventional manner using phosphoric acid followed by bleaching earth. This allows the impurities and phospho-

lipids in the crude palm oil to be removed. The deodorization and deacidification stage is then carried out using molecular distillation unit under low temperature and pressure.

It must be mentioned that degumming and bleaching stages could be carried out in a typical palm oil refinery, and this has been demonstrated by treating the sample obtained from the refinery after degumming and bleaching stage with molecular distillation. The results are shown in Table 1.



Red Palm Olein

* A patent has been filed for the process



Table 1. Analyses of deacidified and deodorised red palm olein

Analyses Samples	FFA (%)	Carotenes (ppm)	Vitamin E (ppm)				PV (meq/kg)	E ^{1%} Icm ²³³	E ^{1%} Icm ²⁶⁹	Fe ppm	M&I %	P ppm
			α-T	α-T ₃	γ-T ₃	δ-T ₃						
Crude palm olein ^a	3.53	643	187	207	374	96	2.32	1.47	0.69			
Bleached palm olein ^a	3.53	514	220	214	353	82	0.44	1.34	0.69			
Deacidified and deodorised red palm olein ^b	0.04	513	166	202	275	64	0.10	0.89	0.62	0.2	0.02	1.6
RBD palm olein ^a	0.04	NIL	139	163	205	54	0.10	0.69	0.60	0.2	0.03	1.6

Footnote: ^aSamples obtained from palm oil refinery

^bBleached palm olein samples from refinery, processed by molecular distillation in PORIM

FFA : Free fatty acids

Fe : Iron

PV : Peroxide value

P : Phosphorus

M & I : Moisture & Impurities

PRODUCT

The deacidified and deodorized red palm oil has been evaluated to retain >80% of carotenes and vitamin E originally present in the crude palm oil. The free fatty acids (FFA) content has been determined to be <0.1% and other quality parameters such as iodine value (IV), moisture and impurities (M&I), slip melting point (SMP) all conform to the PORAM specifications for the refined, bleached and deodorized (rbd) palm oil. The peroxide value is also very low, <0.1 meq/kg. In terms of stability, carotenes as well as other quality parameters have been found to be stable when the red palm oil was kept at 30°C over a period of half a year.

Pilot Scale Molecular Distillation Unit



APPLICATIONS OF RED PALM OIL

The red palm oil produced has been demonstrated for applications in curry, satay sauce and sambals. It can be used for margarine formulation to give the required colouration for the final product and the desired level of pro-vitamin A. It has also been used for frying french fries which acquire an attractive colouration. The red palm oil can be expected to be applicable to other dishes which are reddish in colour. It is definitely ideal for dishes which are stir-fried as most of the carotenes are not destroyed. It can also be used in salad dressing and cake making.

In fact, sensory evaluation carried out on the red palm oil showed that it is of very good quality, and is comparable to rbd palm oil.



Food cooked in red palm oil

ADVANTAGES OF RED PALM OIL VIS-A-VIS RBD PALM OIL

The most important feature about red palm oil is that it contains > 80% of the carotenes originally present in crude palm oil. In contrast rbd palm oil does not contain any carotenes. The vitamin E content in red palm oil is also relatively higher than that is present in rbd palm oil. In terms of quality and application, except for colour, all quality parameters of red palm oil conform to the PORAM specification for the rbd palm oil, and products cooked in red palm oil are found to be equally if not more acceptable than those cooked with rbd palm olein. Hence, from nutritional point of view,

there is no doubt that red palm oil is of better product than rbd palm oil.

IMPORTANCE OF CAROTENES

Increasing evidence shows that carotenes, in particular β -carotene, besides providing vitamin A activity, also possess anti-atherosclerotic effect as well as anti-cancer properties for certain types of cancers, such as oral, pharyngeal, lung, stomach and colon cancers. More importantly, the latest findings have shown that

α -carotene (30% of the carotenes in the palm oil) is ten times more potent as an anti-cancer agent than β -carotene. Both of these carotenes are retained in the red palm oil and they constitute about 90% of the total carotenes present. The other carotenes are phytoene, phytofluene, lycopene, neurosporene, ζ -carotene, γ -carotene, α -zeacarotene, β -zeacarotene and δ -carotene. It is worth noting that among these carotenes, phytoene and lycopene have also been reported to possess anti-cancer properties with the latter recently reported to be a more efficient singlet oxygen quencher than β -carotene and as such an efficient anti-oxidant as well. Needless to say, palm oil present a very important potential source of α -carotene, β -carotene and other carotenoids.

CONCLUSION

In conclusion, the technology of producing deacidified and deodorized red palm oil for edible use is available. Industrial molecular distillation units are available commercially and a refinery interested to employ the process would only need to invest on such a unit together with minor modification of the refining pro-

cess after the bleaching step. The capital outlay on equipment will therefore depend on the size or capacity of the molecular still, while the latter will in turn depend on projected market demands. Based on our economic analysis, the payback period is attractive. Hence, this paper intends to inform the potential investors that the technology for production of deacidified and deodorised red palm oil is ready for commercialisation.



Margarines and Salad dressing formulated with red palm oil.

Acknowledgement

The authors wish to thank Keck Seng (M) Bhd. for the supply of crude palm olein and bleached palm olein and RBD palm olein samples and Dr. Nor Aini Idris (PORIM) for carrying out sensory evaluation of red palm oil.

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