

Crude palm oil (CPO) is produced in palm oil mills by squeezing the oil out from the digested mesocarp of the palm fruits. The current practice at all the palm oil mills in Malaysia is to use mechanical screw presses to squeeze out the oil from the mesocarp. However, mechanical methods have their limitations as some oil will still remain in the mesocarp even after high pressure mechanical squeezing. The pressed mesocarp fibre retains about 5.0%-8.0% (Harrison Lau *et.al.*, 2006) oil as a ratio to dry matter which translates to an oil loss per tonne of fresh fruit bunches (FFB) in the range of 0.24%-0.38% at an average moisture content of 34% in the pressed mesocarp fibre.

THE TECHNOLOGY

In order to recover part of this residual oil in the pressed mesocarp fibre, a residual oil recovery system (RORS) was developed. This system has the ability to recover the residual oil in the pressed mesocarp fibre by using a washing technique, followed by pressing to recover CPO. Water at a certain temperature is used to wash the pressed mesocarp fibre in the digester, following which the fibre is pressed in a screw press. The water and oil expelled by pressing are then sent to a vibrating screen to remove any solids, and are recovered in the oil recovery tank in the palm oil mill. The oil is then sent to the pure oil tank or clarification tank, while the water is sent for treatment or recycling. Figures 1 to 3 show various aspects of RORS.

The results show that the moisture content of the pressed mesocarp fibre decreases after going through RORS which involves the pressed mesocarp fibre being washed and pressed again. The average moisture content of the pressed mesocarp fibre before entering RORS is 35.4%, and drops to 32.11% after passing through RORS. The system is found to bring down the residual oil content in the pressed mesocarp fibre to as low as 2.0% on a dry basis. This translates to 0.68% on a wet basis. The normal oil loss in pressed mesocarp fibre in the mill is 5% to 8% to a dry basis (equivalent



Figure 1. Residual oil recovery system.

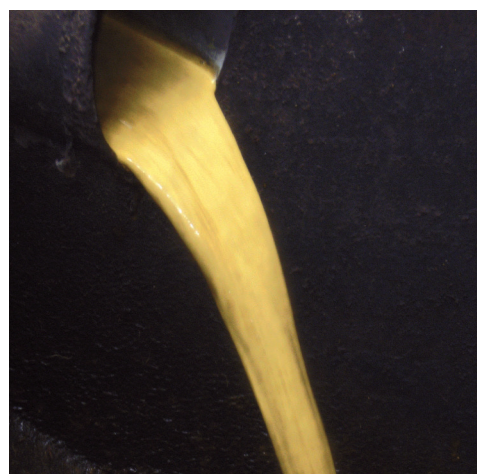


Figure 2. Mixture of oil, solids and water coming out of RORS.



Figure 3. Oil extracted by RORS being recovered at the oil recovery tank in the palm oil mill.

to 1.7% to 2.72% on a wet basis). The oil extracted by RORS also depends on the amount of oil loss, and will range from 3.0% to 6.0% on a dry basis, or 1.02%-2.04% on a wet basis. This translates to 0.14% to 0.29% oil recovery per tonne of FFB.

THE PRODUCT

CPO that is extracted from the pressed mesocarp fibre by RORS exhibits even better oil quality than normal CPO as is shown in *Table 1*.

TABLE 1. OIL QUALITY PARAMETERS

Item	Oil extracted from pressed fibre by RORS	Normal CPO
Vitamin E (ppm)	1700-2600	600-1000 (Mei Han <i>et al.</i> , 2004)
Carotenes (ppm)	1400-1600	500-700 (Bonnie Tay, 2007)
FFA (%)	3.33-3.85	5 (max.) (Siew, 2004)
DOBI	2.8-3.0	2.31 (min.) (Siew, 2004)



Figure 4. Pressed mesocarp fibre.



Figure 5. Crude palm oil.

COMMERCIAL BENEFITS

With a total of 360 000 t FFB processed per year at a typical 60 t palm oil mill, at a average CPO price of RM 2500 t⁻¹, the recovered oil will bring in additional revenue ranging from RM 1.3 million to RM 2.5 million per year, depending on the oil loss of the mill. At the current CPO price of RM 3700 t⁻¹, the additional revenue will range from RM 1.9 million to RM 3.8 million, again depending on the oil loss of the mill. The water required to extract the oil from the pressed mesocarp fibre is about 0.011 t t⁻¹ FFB. The wear and tear of the system is similar to that of the screw press, *i.e.* having a lifespan of more than 400 hr for 6000 t of FFB processed.

REFERENCES

BONNIE TAY, Y P (2007). Palm carotene concentrates from crude palm oil using vacuum liquid chromatography on silica gel. *J. of Oil Palm Research*, 19: 421-427.

HARRISON LAU, L N; CHOO, Y M; MA, A N and CHUAH, C H (2006). Extraction of palm pressed fibre oil using SC-CO₂. *2006 National Seminar on Palm oil Milling, Refining Technology, Quality and Environment*. 21-22 August 2006. Kuching Sarawak.

MEIHAN, N; CHOO, Y M; MA, A N; CHUAH, C H and MOHD. ALI, H (2004). Separation of Vitamin E (tocopherol, tocotrienol, and tocomonoenol) in Palm Oil. *Lipids*, Vol. 39, no. 10 (2004) (1031-1035)

SIEW, W L (2004). Deterioration of bleachability index. *MPOB Information Series No. 253*.

For more information, kindly contact:

Director-General
MPOB
P. O. Box 10620
50720 Kuala Lumpur, Malaysia.
Tel: 03-8769 4400
Fax: 03-8925 9446
www.mpob.gov.my