

# NOVEL REFINING TECHNOLOGY OF PALM-PRESSED FIBRE OIL

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Malaysia is the world's second largest producer of palm oil. In 2012, Malaysia produced 18.79 million tonnes of crude palm oil from 96 million tonnes of fresh fruit bunches (FFB) processed and generated 13 million tonnes of palm-pressed mesocarp fibres. Several attempts have been made to recover the residual oil from the mesocarp fibre. The mesocarp fibres are expected to contain up to 5% of palm pressed fibre oil (PPFO) on dry basis. Based on the FFB harvested in 2012, potentially the palm oil industry can recover 390 000 t of PPFO from all the 432 mills in the country.

The extraction of PPFO has been successfully carried out at certain palm oil mills using the solvent extraction method. Other techniques, including supercritical carbon dioxide, extraction have been reported (Choo *et al.*, 1996; Lau *et al.*, 2006; 2008). PPFO is rich in carotenes, vitamin E (tocopherol and tocotrienols) and sterols (Choo *et al.*, 1996). Currently, most of the PPFO is used as a supplementary ingredient in animal feed. Further processing of the PPFO into high value products is challenging, as the oil contains high concentrations of phospholipids and wax esters that need to be removed.

The quality of PPFO varies depending on the extraction methods (Lau *et al.*, 2006; Rusnani *et al.*, 2012). Crude PPFO contains high levels of gummy materials and free fatty acids (FFA) which is inferior for refining. In the conventional refining process, phosphorus is removed through degumming and bleaching. The FFA can be removed through either steam stripping (high temperature) or short path distillation (low temperature). The latter method helps preserve the carotenoids compounds (Choo *et al.*, 1993). With the knowledge acquired on PPFO, MPOB has developed a new refining method of treating crude PPFO, which will then make the oil versatile

and suitable for further downstream applications. Refined PPFO contains high level of carotenoids and other phytonutrients that can be developed into high value products.

## METHODOLOGY

The process flow diagram for the refining technology is shown in *Figure 1*. Crude PPFO is refined using a combination of processes including degumming, bleaching and deacidification. Hot distilled water is applied during water degumming to remove soluble and hydratable gummy materials in crude PPFO. Acid degumming is applied to enhance the degumming process to obtain oil with low phosphorus content. Bleaching earth is used to adsorb trace metals (such as iron and copper), phosphatides and oxidation products. The bleached PPFO is then subjected to deacidification to remove FFA. The oil can be further fractionated for different applications.

## ECONOMICS

Capital expenditure for a refining plant with a capacity of 50 t per day is about RM 15 million. On an average of 300 working days per year, 15 000 t of refined PPFO is produced annually. The projected payback period would be less than two years depending on the selling price of the end product.

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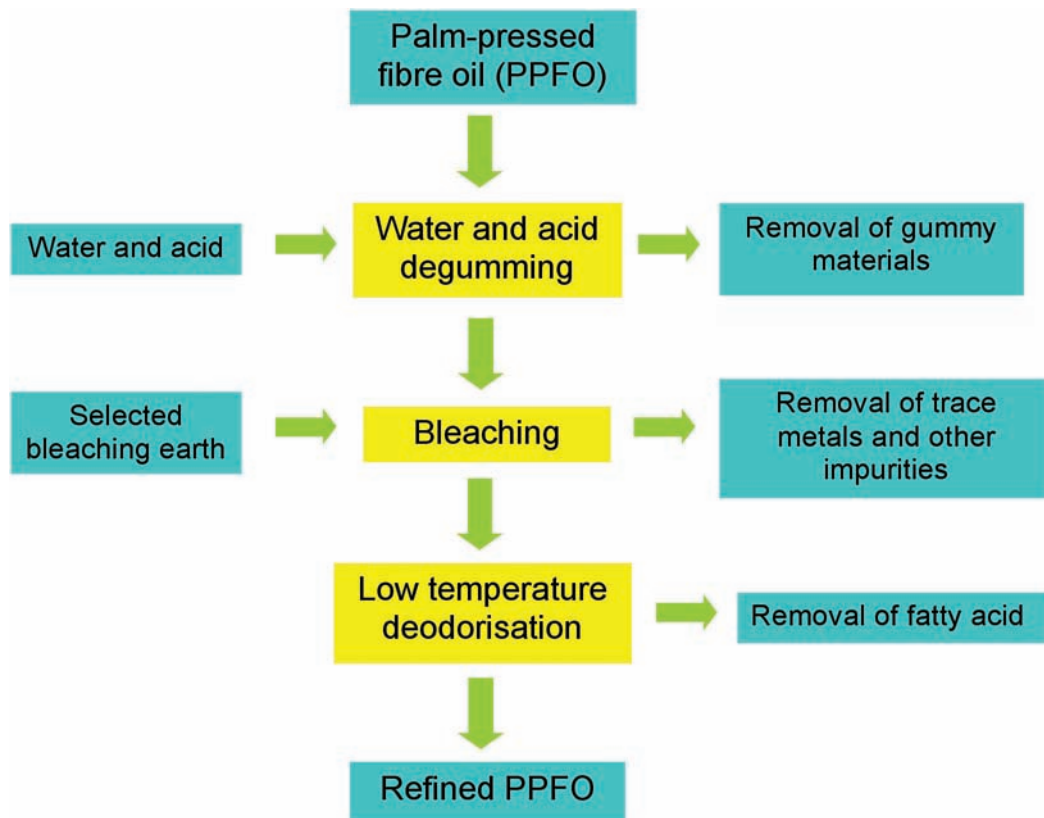


Figure 1. Process flow of refining palm-pressed fibre oil (Malaysian patent application No. PI 2013001075).

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