VALUE-ADDED PRODUCTS FROM PALM-PRESSED FIBRE

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Palm-pressed fibre is a by-product produced by palm oil mill after screw-pressing of palm fruits during the production of crude palm oil (CPO). The palm-pressed fibre generated is normally burnt as solid fuel to self-supply steam and electricity required for the operation of the mill. However, the residual oil in the pressed fibre contains high level of carotenes (3500-5000 ppm), tocols (2000-3000 ppm), sterols (4000-5000 ppm) and squalene (1000-1800 ppm) (Choo *et al.*, 1996; Choo and Ma, 2000; Harrison *et al.*, 2003). Recent findings show that there are significant amount of high value co-enzyme Q10 (Choo and Ng, unpublished data) water-soluble phenolics (antioxidants) in the fibre oil recovered by supercritical fluid technology (Choo and Harrison, unpublished data).

Figure 1. Palm-pressed fibre and fibre oil.

PRODUCTION TECHNOLOGY

The palm-pressed fibre oil is recovered using a single step supercritical fluid extraction (Choo *et al.*, patent application). By manipulating the extraction conditions (temperature and pressure), 5%-7% of fibre oil can be recovered.

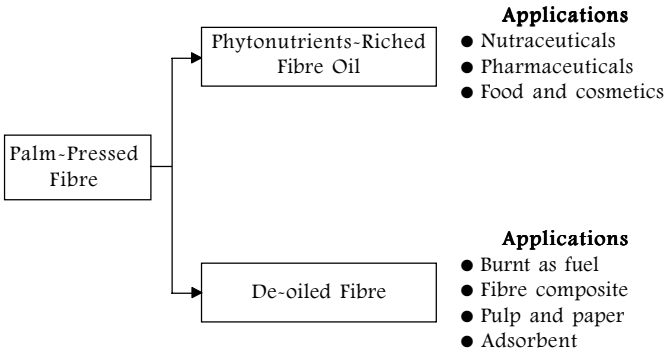
ADVANTAGES OF SUPERCRITICAL CARBON DIOXIDE EXTRACTION TECHNOLOGY

This technology is more environmentally friendly as it:

- generates no waste in the process;
- uses naturally available gas, *e.g.* carbon dioxide, which is non-toxic, non-inflammable and non-hazardous;
- leaves no residual solvent in the product; and
- simultaneously extracts carotenes, tocols, sterols, squalene, co-enzyme Q 10 and other water-soluble phenolic antioxidants in the fibre.

APPLICATIONS OF PRODUCT

The fibre oil is a good source of health supplement to meet certain daily vitamins requirement. This product has a wide range of applications in pharmaceutical and nutraceutical industries. The resulting de-oiled palm-pressed fibre can still be used as solid fuel or in the manufacturing of fibre composite.



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ECONOMICS

Investment of a supercritical fluid extraction plant is about RM 3 million inclusive of other infrastructures. The plant is able to produce 40 kg day^{-1} of value-added fibre oil. Taking average of 300 working days per year, there will be 12 t yr^{-1} of fibre oil being recovered. A daily requirement of 2500 IU of vitamin A is equivalent to 1.5 g of fibre oil. Assuming 1 g of such oil can fetch RM 0.10, then 12 000 kg of fibre oil would fetch RM 1 200 000 yr^{-1} (RM 0.10 x 12 000 000 yr^{-1} = RM 1 200 000 yr^{-1}). By considering the depreciation of plant of 10 years, the investment cost shared per year is RM 300 000. The projected payback period would be four to five years.

CONCLUSION

The fibre oil is a high valued product as compared to CPO. This could increase greatly the revenue of the existing palm oil processing mills. The resulting de-oiled fibre can be used as solid fuel, made into fibre composite and others.

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