

RED PALM OIL (RPO) BEVERAGE

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Beverage emulsions are oil-in-water dispersions in which oils are uniformly distributed within a water-based solution with the aid of emulsifiers. These emulsions can be further enriched with vitamins, preservatives, and nutrients, depending on their solubility in either the oil or water phase. The global beverage emulsion market is projected to reach USD526.5 million by the end of 2023, with an estimated compound annual growth rate (CAGR) of 4.3%, potentially expanding to USD754.0 million by 2033 (Future Market Insights, 2023). This growth is primarily driven by the rising consumer preference for healthier and naturally sourced beverages.

Red palm oil is a nutrient-rich source of phytonutrients, including carotenes, vitamin E, phytosterols, squalene, and coenzyme Q10

(Loganathan *et al.*, 2017). The high content of vitamin E and carotenes enhances the oxidative stability of the oil while also serving as potent antioxidants. These bioactive compounds may contribute to reducing the risk of diseases associated with oxidative stress, such as cancer, cardiovascular conditions, neurological disorders, and eye diseases (Crupi *et al.*, 2023; Sathasivam *et al.*, 2018). Additionally, red palm oil's distinct flavour and aroma make it a valuable ingredient in beverage formulations.

Integrating red palm oil into beverages presents an effective strategy to enhance its consumption, particularly among children. This approach facilitates the delivery of essential phytonutrients, such as vitamin E and carotenes, which support overall health and development. Moreover, incorporating red palm oil into familiar beverage formats improves consumer acceptance and encourages consistent intake, thereby maximising its nutritional benefits.

THE TECHNOLOGY

The technology presented involves the formulation and processing method for a red palm oil beverage. The processing method is straightforward, requiring only simple procedures and eliminating the need for refrigeration during storage.

The nutritional composition of the red palm oil beverage is compared to a commercial beverage in *Table 1*. This product is designed for further dilution, with a recommended ratio of one part red palm oil beverage to four parts water. At this dilution, a single glass of the beverage provides 4.11 mg of beta-carotene and 6.56 mg of vitamin E, making it a valuable source of essential nutrients.

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TABLE 1. COMPARISON OF THE NUTRITIONAL CONTENT OF RED PALM OIL BEVERAGE WITH COMMERCIAL BEVERAGE

Parameters	Red palm oil beverage	Commercial product
Fat (g/100 g)	15.95	0.85
Protein (g/100 g)	0.15	0.70
Carbohydrate (g/100 g)	44.85	35.55
Total soluble solid (°Brix)	57.60	57.70
Beta-carotene (mg/kg)	514.91	0.00
Vitamin E (mg/kg)	823.33	0.00

The sensory attributes of the red palm oil beverage were evaluated in comparison to a commercial beverage, as illustrated in *Figure 1*. The attributes assessed included appearance, colour, aroma, taste, sweetness, and overall acceptability, with 60 trained panellists participating in the evaluation. The results demonstrated that the sensory scores of the red palm oil beverage were comparable to those of commercial products, indicating high consumer acceptance.

NOVELTY

Unlike conventional beverage, red palm oil beverage is naturally rich in vitamin E and beta-carotene (provitamin A), offering a nutritious and convenient way to incorporate these essential nutrients into the diet. This formulation is particularly beneficial for children, addressing nutritional gaps through a flavorful and easily consumable product.

BENEFITS AND ADVANTAGES

- Simple processing method.
- Excellent taste.
- A good source of vitamin E and beta-carotene.
- Flavour can be tailor-made according to preferences.

ECONOMIC ANALYSIS

The production cost of one bottle of red palm oil beverage is RM6.90 per bottle of 840 mL. The estimated retail price in supermarkets is RM14.00 per bottle of 840 mL, while the selling price for commercial products ranges from RM13.60 to RM15.99 per bottle of 840 mL.

CONCLUSION

Red palm oil beverage is a nutritious and convenient option for red palm oil consumers.

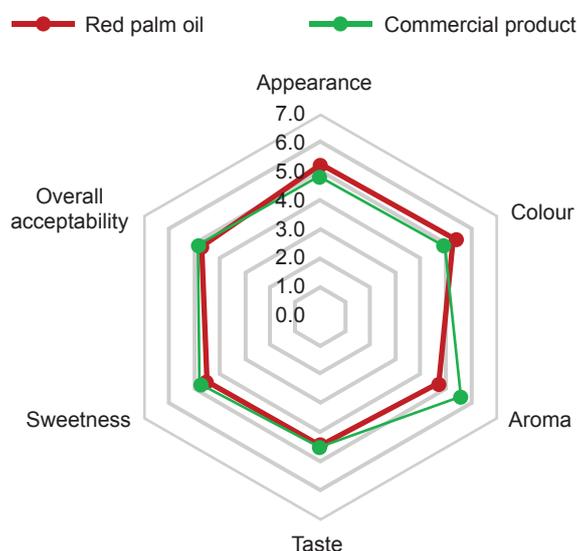


Figure 1. Sensory scores of red palm oil beverage emulsion against a commercial product.

By incorporating red palm oil into beverages, this formulation enhances consumer acceptance, particularly among children, making it a practical and accessible dietary source of essential phytonutrients.

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