Guava Pulp Composition
- Moving from Industrial Waste to Useful Functional Food Ingredients

Malaysia is practicing the agricultural-based industries; hence the growing numbers of manufacturing annually. As a consequence, a great amount of by-products are produced each year. Due to the increase in production, by-products of plant food processing represent a major disposal problem for the industry concerned, but they are also the promising sources of compounds which may be useful because of their favourable technological or nutritional properties. Considerably, high ratios of by-products arise from tropical and subtropical fruit processing. The use of by-products by the food industry is a great interest because of its economic profitability, since these by-products are available in large quantities and may be easily to dispose. By-products derived from food processing are attractive sources of valuable components. The primary wastes and by-products fractions, which are peel, flesh and seed residues, contain high amount of bioactive compounds that can be exploited as functional food ingredients and nutraceuticals. Since synthetic additives are progressively being rejected by consumers; functional ingredients should preferably originate from natural sources.

Pink guava is a delicious fruit which is very nutritious and famous due to its high content of dietary fibre, vitamin C, polyphenols (ellagic acid and anthocyanin) and lycopene. Malaysia is one of the largest pink guava puree exporters which supplies about 20% of the world’s pink guava puree market. During the production of pink guava puree, by-products that are created make up 25% of the total loading weight. Three types of by-products are discarded from three different processing stages; namely refiner, sliver and decanter. Our study found that decanted portion is the last fraction of the by-products, which consists of pink flesh pulp and has the highest lycopene content and antioxidant capacity among the by-products. The by-products of pink guava puree industry can be a potential source of lycopene and antioxidant compounds. As shown in Figure 1, our work showed that the presence of lycopene in decanted by-product could be a major contributor to the antioxidant capacity, and further exploitation and utilisation for food application of this by-product is warranted.

Investigation of appropriate thermal processes for the drying of decanted pink guava by-product will provide an opportunity for the food industry to produce a dried decanted product with high lycopene content. We utilised a response surface methodology to optimise the drying conditions for the lycopene content and antioxidant capacity in decanted by-product. It was found that drying at certain conditions were the most efficient way in producing the decanted by-product powder with high lycopene content and antioxidant capacity. Nowadays, there is a growing interest in "green technology" to produce high quality products that are safe and environmentally friendly. Supercritical fluid extraction (SFE) is an alternative to conventional solvent extraction that has gained importance in various industries by isolating desirable compounds from pharmaceutical and nutraceutical uses. Thus, in our work, an attempt was made to extract lycopene from the decanted by-product using the SFE. This extraction is more preferable due to its higher extract yield and also the total lycopene obtained. Figure 2 shows that a significant protective effect of lycopene-rich fraction against hydrogen peroxide (H₂O₂)-induced cytotoxicity and DNA damage in a human liver cell line. Lycopene-rich fraction from pink guava by-products may have a potential use as functional food ingredients in preventing the promotion of oxidative stress.

Figure 1: Representation of Lycopene in a Guava Pulp Composition

Figure 2: Appearance of Cells Following Different Treatments


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