INTRODUCING A NEW NATURAL PRODUCT FROM DRAGON FRUIT INTO THE MARKET

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ABSTRACT

Natural source of food additives play prominent role in improvinghuman health conditions. However, importance and application of these additives have been widely neglected in food industry and its sub sectors. This paper is aimed to introduce Dragon FruitColoring Powder named (DFCP) as a natural food additive using dragon fruit albedo. It is expected to be tremendously healthy and attractive especially for consumer, since, dragon fruit is an edible fruit with water-soluble fiber and has high source of vitamin C.The albedo of dragon fruit was dried using conventional method to color rice, milk, yoghurt, juice, and pastry. Developing DFCP as the natural food colorants is not only healthy for human body, but also is friendly for society and environment. DFCPis estimated to be cost effective, as it is sourced from the only disposable part (peel) of the fruit. Further, since process of DFCPpreparation does not affect the natural benefit of dragon fruit, the original nutritional values of the fruit will still be preserved.

Keywords: *Dragon Fruit Coloring Powder, Natural food additive, Albedo, Consumer health.*
Abbreviation: *DFCP = Dragon Fruit Coloring Powder.*

1. INTRODUCTION

1.1 Dragon Fruit As A Natural Food Colorant

Recently, consumers are more concerned about their health rather than price of the products they use, since they are more knowledgeable and aware about the product in today's market [3]. Unfortunately, there are an unlimited number of products, which remarkably affect the human immune system and health. Synthetic food coloring, as an example, is used as a food additive, only to make the food attractive in order to get higher price in the market. Many business practitioners invest on making synthetic food coloring as a food additive and introducing it to the market to attract consumers. Traditionally, people use natural food coloring, which had been obtained from nature. Romans used turmeric, saffron, various flowers petals, paprika and beet extracts as yellow, red, etc. colors into various foods that significantly help the vitality of health. But now, as people are using more synthetic food coloring,scientists are expressing their cautiousness in this regard [1]. According to the report fromCenter for Science in the Public Interest, some food colorings have been banned in U.S. In the beginning of the 20th century, numerous synthetic food additives had been produced, although there were only few synthetic colors approved to be used[11]. Since, the banned items have been identified as being potential cancer-causing chemicals. According to FDA, since 1955 the trend of synthetic food consumption has been stronger in Europe than the United States, with a remarkable five-fold increase in consumption of synthetic colors [cited in 11].There is also a significant growth in consumption of synthetic food additives in U.S. started from only 10 percent per capita per day (mg) in 1955 and crossed over 60 percent in 2009[7]. The excessive increase is due to higher consumer's reliance on processed foods, such as soft drinks, breakfast cereals, candies, snack foods, baked goods, frozen desserts, pickles, and salad dressings, where synthetic colors being used extensively. Synthetic products such as Jell-O and Froot Loops are colored with bright dyes to attract consumers to purchase those products. However, the question is how we can replace synthetic food coloring with a natural one.

In reality, consumer's choice has been increasedin recent years towards using natural food additive [3]. However, synthetic food additives are more available in the market as there are no alternate substitutes in the market for the consumers. In that case, there is no surprise that if organizations attempt to produce natural food additives rather than producing synthetic food additives. Therefore, the current paper is aimed to introduce a natural food additive by using dragon fruit albedo namely Dragon Fruit Coloring powder (DFCP). It is expected to be tremendously healthy and attractive especially for consumers. DevelopingDFCPas the natural food colorants is not only healthy for human

body, but also is friendly for the society and environment. DFCPis estimated to be cost effective, as it is sourced from the only disposable part (peel) of the fruit. The companies that make products from dragon fruit might diversify their production line into new product using fruit peel to avoid waste. The DFCPitself has several properties compared to the extracted flesh from fruit, which is feasible to carry, packing and less space for storing.

2. DRAGON FRUIT AS A FLAVONOIDS SOURCE

"*Hylocereuspolyrhizus*","red pitaya", or dragon fruit is a member of the Cactaceae family from the subfamily "Cactoidea"[14] with red purple colored flesh and black seeds. Dragon fruit has obtained attention during last few years among the people in society, mostly in Asian countries, due to its color, nutritional value, and other features[9, 8].It representsa significant source of antioxidants which is a valueadded characteristic to any food crop [15].

The red layerof the fruit has rich sources of vitamins e.g. B1, B2, B3, and C, minerals e.g. potassium, sodium, calcium, iron,and phosphorus,and nutrientse.g. fat, protein, carbohydrate, flavonoid, crude fiber, thiamin, phytoalbumin,niacin, pyridoxine, kobalamin,glucose, betacyanins, phenolic, carotene,and polyphenol [12]. Moreover, this fruit has relatively high antioxidant activity in comparison with other subtropical fruits[4].

Betalins, for the first time, extracted from red beet (*Beta vulgaris*) and is used largely for food coloring additives and the extract includes red and yellow pigments, namely betacyanins and betaxanthins, respectively.Betalinswere assumed to be flavonoids, however,the evidence determines thatit contains nitrogen and may notalterthe color reversibly in anidentical way as an anthocyanin do to pH.Betacyanin is the main component (95%) of the red pigments in the extract. In addition, dragon fruit peel includes betacyanin that can make contribution to produce beauty and health products[5].In Caryophyllales family,the betalins are placed in same group to anthocyanin pigments [2, 10, 16]. Due to unfavorable earthy flavor of geosmin and pyrazine derivatives as well as possibilities of carcinogenic nitrosaminesin red beet, there is a high demand to replace this source [6]. Since dragon peel contains betalins and lacks the disadvantages of beetroot, it can be replaced as a new red dye. Further, the flesh of dragon fruit, according to a study Luders and McMahon [13], can be mixed with milk, soft drink, ice cream, jellies, and marmalades. Moreover, Malaysia has tropical climate and trend for growing dragon fruit that is considerable and it is one of the main producers of *HylocereusUndatus* (red dragon) in South East Asia and the trend of production has been increased during past few decades.

3. PREPARATION STEPS

Previousstudy mentioned that dragon fruit peel has a high potential to be used as a natural dye [8]. However, theinner layer of dragon fruit peel (Albedo, Figure 1)can have a high potential as a color powder and a natural food additive.

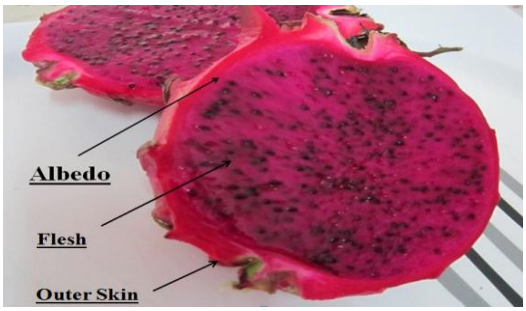

Figure 1.Three layers of Dragon Fruit. Albedo was used in this study.

In this study, a conventional method was used to assess thealbedopowder as a food additive in a similar process toSaffron,as afood coloring. To add Saffron in varieties of food e.g. rice, cookies, ice cream, chocolate, chicken, etc. the dried powder of Saffron is dissolved in boiled water to provide a colored solution. Adding Saffron to food would not only change the color to attract consumers, but also nutritionally increase the food value, similarly to DFCP as been proposed in this study.

In an attempt to prepare powder from the albedo, thethick albedo of dragon fruit was driedon stove after the outer layerwas peeled (a). Heating method as one of the conventional method for food drying was used to dry dragon fruit

albedo in this study (b). Both sides of the albedo were evenly dried for approximately one hour with low temperature. The dried layer was then groundin a mortar and pestle to make a fine powder (c), which was filtered through a strainer(d) anddissolved in boiling water (e). These preparationsteps were shown in Figure 2.

(a) (b) (c) (d)(e)

Figure 2.Preparation steps of dragon fruit albedo as follows: (a): Peeling, (b): Drying, (c): Grinding, (d): Powdering, (e): Dissolving

The prepared solution of dragon fruit albedo was then added to milk (a), yogurt (b), pastry (c),juice (d) and rice (e)in order to test dragon fruit albedo ability to change the color. The coloring steps were shown in Figure 3.

(a,b) (c) (d) (e)

Figure 3. Coloring steps of albedo to some food substances;(a) Milk, (b) Yogurt, (c) Pastry, (d) Juice, (e) Rice

4. DISCUSSION AND FUTURE RESEARCH

This paper is aimed to introduce DFCPas a natural food additive by using dragon fruit albedo. In the previous study, researchers have found that the red peel of dragon fruit contains varieties of vitamins, minerals and nutrients with remarkable amount of antioxidant compounds compared to other subtropical fruits[9, 18]. Importantly, dragon fruit peel includes betacyanin,which can contribute in production of beauty and health products as well as betalins, which can replace disadvantages of beetroot. It has a source of functional ingredients that providenutrients to prevent nutrition-related diseases and improvemental and physicalwell-being of the consumers[17].

Through a conventional method in this study, different parts of dragon fruit e.g. outer layer, inner layer (albedo) and flesh were used, however only the albedo part was successful in the preparation of powder, which was the main concern. From marketing point of view, powder is more convenient than liquid for customers, distributors, and producers. Since the peel of dragon fruit is considered a waste material, therefore, the powder would be cost effective. Previous researches showed that other parts of dragon fruit were used in production of jam, juice and wine in market, thus this study can propose a new additional production line for dragon fruit. On the other hand, as the current trend of consumers is towards natural product due to health concern, it would be a good opportunity for manufacturers to capitalize consumers concern.Studies revealed that consumers prefer chemical free products especially when it is related to food consumption. Environmentally, today's consumers are more concern while purchasing products to avoid any further damagesto environment. Taken together, these concerns should drive

manufacturer'sattention in pursuing business using dragon fruit peel as their raw material. The process to prepare dragon fruit powder is also believed to be less time consuming, which might affect production run-time asa crucial matter for the manufacturers. In the economies of scale of the production, it is also expected that they can produce more with less time.

In conclusion, the albedo powder of dragon fruit can be used for food coloring. This study suggests that the DFCP is worth to examine in laboratory to assess longevity of the powder, nutrition level of the powder, optimal temperature, optimal pH value, optimal length of time to heat exposure, flavonoids measurement (e.g. betalins) and color stability. In addition, in order to mass production of DFCP, there would be a need for future research in wider perspective to introduce this new product not only to Malaysia but also to Malaysia's neighbors like Singapore, Indonesia, China and Philippines as well as middles eastern countries.

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