

ZEA MAYS FLOUR

Tepung *Zea Mays*

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ABSTRACT

In today's society, there is a great demand for appreciating nutritional standards in which characterized by rising costs and often decreasing availability of raw material together with concern about environmental pollution. Consequently, there is a considerable emphasis on their recovery, recycling and upgrading wastes. The food industry produces large volumes of wastes, both solids and liquids, resulting from the production, preparation and consumption of food. Due to legislation and environmental reasons, the food and beverage industry is highly enforced to find an alternative use for the residual matter. The latest trends impacting the food industry include moves to reduce the huge amount of food waste, as consumers simultaneously adapt their habits in times of continuing austerity. In the last decades, consumers demand in the field of food production has changed considerably. Consumers believe that food contribute directly to their health. Therefore, the idea of using underutilized and waste food products was triggered, where the main ingredient is made of plants waste which is corn silk. It is an invention to transform plant waste to corn silk flour – *Zea Mays Flour (ZMF)* that benefit the society through its help of increasing food for the world. Furthermore, it can help to enhance global efforts towards food security, nutrition, dietary needs, as well as foster health and income generation. Recycling products using underutilized and waste food products also could help to sustain the environment. There is one fact that must be beared in inventors' mind that scientific research alone does not guarantee for a product to be successful in the market. The product invented should fit the taste and needs for the consumers as the market success rate is influenced by the degree of familiarity and acceptance toward the product being sold. Many of the today's food and beverage products are not intended merely to satisfy hunger and provide humans with necessary nutrients, as they aim to prevent nutrition related diseases and increase physical and mental well-being of consumers. Therefore, it is necessary for product development to explore which need that consumer are concerned about, so that the product could achieve success and market acceptance. The idea using food product using underutilized/waste product, corn silk become *Zea Mays Flour (ZMF)*, is hoped will support the idea of sustainability, specifically ins steadily gaining more attention from many food producers worldwide, to save the environment while at the same time boost the business through reduction of costs and considerable amount of waste.

Keywords: Underutilized¹; Waste Product²; Corn Silk³

1. Introduction

Innovation is regarded as a key ingredient in the recipe for a successful enterprise that determined to embrace the challenges of an uncertain economic climate. The best way to innovate is to use the appropriate method of innovation tailored to the appropriate environment. At present, both innovation departments within an organization and open

innovation provide their own challenges in realizing this ambition. Zea Mays Flour (ZMF) is as a new invention of product where the main ingredient is made of plants waste called corn silk. It is also an invention to transform plant waste to corn silk flour that delivers benefit to the society. Based on studies that have been done, exploring and developing new products based on corn silks is one of the purposes of gaining these benefits as this plant waste has various good nutrients for human in general. Therefore, the development of this product from plant waste material in creating an added value on existing the product is not only attractive but nutritious for human consumption. Initially, this product is not only could be enjoyed by the consumers through the taste, but also the quality of the product as a whole.

The present study tries to investigate the following objectives:

To develop new product based on food waste/scrap.

Creating an attractive and nutritious product even though it is derived from food waste.

In this study, an experimental approach is been used to extract the corn silk into flour and to analyze the nutrition fact and sensory evaluation analysis.

2. Literature Review of Corn Silk

Botanical name of corn silk is Zeamays. This species is from Poaceae or Gramineae family. Other names of corn silk are Mothers hair, Indian corn, maize jagnog, Turkish corn, yu mi xu, stigmata maydi, sweet corn and maize (Healing Herb News, 2012). Throughout history, corn has been among the important grains. Originally, a wild tropical grass native to the America's namedd corn (also known as maize), was domesticated an estimated of 7,000 years ago by the indigenous tribes of Central America. Being a staple food in their diets has made the crop continued to develop and adapt, as it spread to the varying climates in both North and South America. Upon their arrival to the New World, American Indians taught Christopher Columbus and other European settlers on how to grow corn. Without that knowledge, many of the original colonizers would have starved to death. Columbus took corn and its cultivation methods with him when he returned back to Spain. There, the crop quickly spread throughout Europe and eventually the rest of the world.

Hasanudin K. et. al (2012) stated that corn silk (CS) is made from stigmas, which is the yellowish thread like strands from the female flower of maize. Bhaigyabati et. al, (2011) stated that corn silks are scientifically referred to Maydis stigma or Zea mays as they reflect the soft or fibre-like growth that accompanies the ear of the corn. This yellowish thread-like strands or tassels called stigmas are found inside the husks of corn. They are relatively 4 to 8 inches long with a mild sweetish taste. It is a waste material from corn cultivation and available in abundance. It has been consumed for a long time as a therapeutic remedy for various illnesses and alternative natural-based treatment.

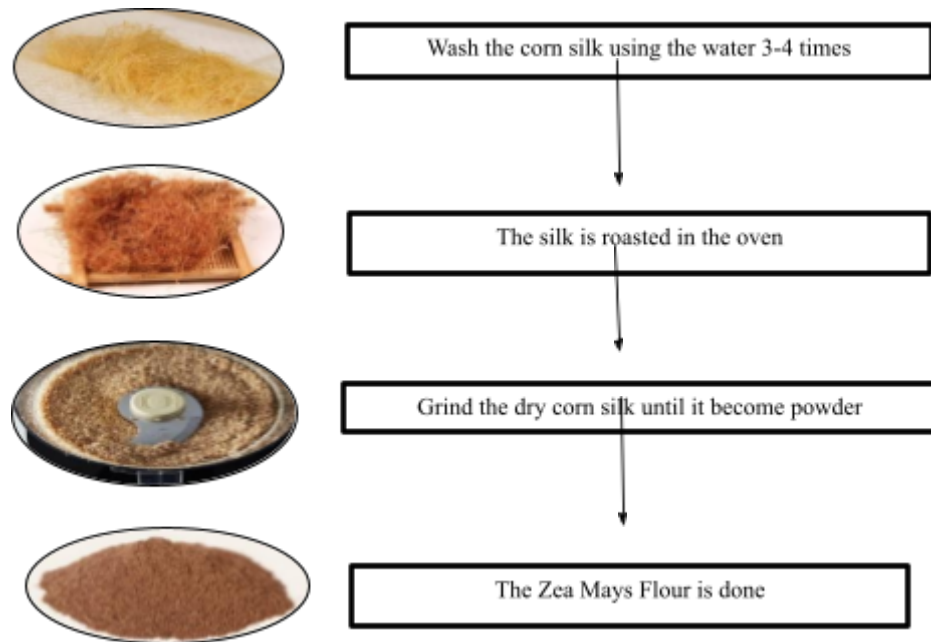
Meanwhile, Solihah et.al, (2012) cited from previous researcher that traditional use of medicinal plants is well known for thousand years ago. Commonly, the ailment incidence in the rural area is treated with local plants that contain many pharmaceutical constituents (Sofowora, 1982). Due to the effectiveness in treating various ailments, CS is frequently chosen, and world widely used as an old folk therapeutic agent. CS belongs to family Gramineae (Canadian Food Inspection Agency, 1994). It can be found in tropical regions for instance North American, China, India (U.S Grain Council, 2010) and various parts of the world including Malaysia. However, Hasanudin K. et. al (2012) mentioned, a recent study has

showed that there is no antibacterial activity in CS when it was investigated against bacterial species such as *Pseudomonas aeruginosa*, *Klebsiella pneumonia*, *Staphylococcus aureus*, *Streptococcus pneumonia*, *Escherichia coli*, and *Streptococcus pyogenes*.

3. Research Methodology

This study uses experimental approach in order to turn the corn silk into powder. The experiment has been conducted in the laboratory. Beforehand, the corn silk has been harvested from the targeted area which is Kota Marudu. Then, the corn silk will be washed by using water around 3 to 4 times. Once it has been washed, the corn silk will be roasted. The intention to roast the corn silk is to make it dry before undergone the grind process. The next process is to grind the dry corn silk into powder. This process needs to be conducted for few times in order to meet the product innovation standard. To indicate the nutrition of the corn silk, proximity analysis is conducted to analyze the corn silk nutrition.

Figure 1.0 The Flow of Zea Mays Flour



4. Result and Discussion

Product History

The product history is important to indicate the growth and progress of each product innovation before it is successfully meet the acceptability of the product quality standard. Product history can be seen as below:

Table 1: Product History

No.	Date	Product	Difficulty	Achievement
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1.	25.10.2019	Zeamays flour	The flour texture was just fine but cannot be kept long (the condition of the corn silk flour is moist and not completely dry)	Almost Succeed
2.	8.11.2019	Zeamays flour	The color of corn silk flour is change to mode spores and pale color	Failed
3.	22.11.2019	Zeamays flour	The color and texture of corn silk flour changes to the proper texture and brown color	Succeed

Proximity Analysis Result

Table 2 shows the result of nutrition information intake per100gm/serving size that is done from recommended food laboratory for further information. A thorough laboratory test will be done in the future to improve on the nutrition intake for this product.

Table 2: Result of Nutrition Content of Corn Silk Flour (as per sample)

Parameter, Unit	Result	Test Method
Protein, g/100	16.0	In house method
Fat, g/100	0.9	In house method
Carbohydrate, g/100	70.9	In house method
Ash, g/100	4.5	In house method
Moisture, g/100	7.7	In house method
Energy, Kcal/100g	356(1495kJ)	In house method

According to Hasanudin K. et. al (2012), corn silk has been used as traditional medicine in many parts of the world including China, Turkey, United States, and France. It is used for the treatment of cystitis, edema, kidney stones, diuretic, prostate disorder, urinary infections, as well as bed-wetting and obesity. Besides, it is capable to soothe and relax the lining of the bladder and urinary tubules, hence reducing irritation and increasing urine secretion. Other beneficial treatments of CS include anti-fatigue activity, anti- depressant activity, and kaliuretic. In addition, it possesses excellent antioxidant capacity and demonstrated protective effects in radiation and nephrotoxicity. Practically, the Native Americans used CS to treat urinary tract infections, malaria and heart problems. In China, it is considered as very important medicinal plant in the treatment of prostate problems. CS has been claimed to have many benefits to human health such as lowering blood pressure, decrease prostate inflammation, diabetic and urinary tract infection, edema, obesity, and promote relaxation.

Meanwhile, Solihah et.al, (2012) mentioned that CS has been claimed to have more effect, particularly on renal diseases including chronic nephritis, benign prostate hyperplasia, gout and cystitis (Ribeiro et al., 1988; Maksimovic et al., 2004; Tahraoui et al., 2007). It helps to pass stone from kidney and urinary tract and prevent the inflammatory effect. Besides, CS has anti-prostatitis and anti-spasmodic activities (Buhner, 2007). Recently, CS has been reported to have anti-fatigue activity. The flavonoids compound in the hair has affected the mechanism in the blood. Hence, it increased the hepatic glycogen and consequently, increased the exercise tolerance (Hu and Deng, 2011). The hair has antioxidative properties. They protect cells from damages due to oxidation process in the body triggered by free radicals (Eman, 2011). Wang et. al (2011) stated that, corn silk has a long history of consumption for therapeutic remedy. Nowadays, corn silk also serves as a remedy for heart trouble, jaundice, malaria, and obesity. Other than aforementioned practices, some local species are powdered as food additive and flavoring agents in several regions of the world (Koedam, 1986; Yesilada & Ezer, 1989). For example, corn silk powder is used as food additive that improves the content and physical characteristics of beef patties (Wan Rosli et al., 2008).

Solihah et.al, (2012) pointed that corn silk contains various bioactive constituents comprise of proteins, vitamins, alkaloids, tannins, mineral salts (Namba et al., 1993), flavonoids (Maksimovic and Kovacevic, 2003), steroid (Abdel-Waheb et al., 2002), carbohydrate (Tang et al., 1995) and volatile components (Zeringue, 2000). Phytochemicals in present showed potential activities against hypoglycaemic (Guo et al., 2009). On the other aspect, corn silk extract has been reported as having a capability to increase insulin level and healed injured β -cell. Corn silk also has been claimed to have immunology activity. It is said to treat hypersensitivity related to type I allergy disease (Namba et al., 1993; Kim et al., 2004). Besides, corn silk has been documented to exhibit anti-proliferative effect on cancer cell line (Habtemariam, 1998). It has also been used to lessen the effects of premenstrual syndrome and said to promote relaxation (Wan Rosli et. al, 2008).

Based on a study conducted by Hasanudin K. et. al (2012), to date, there are various CS commercial products for medicinal uses in the market. CS is rich in phenolic compounds, particularly flavonoids. It also consists of proteins, vitamins, carbohydrates, calcium, potassium, magnesium and sodium salts, volatiles oils and steroids such as sitosterol and stigmasterol, alkaloids, and saponins. Due to its potential benefits, there are several studies reported on the pharmacological activities of CS.

Studies on Egyptian corn silk have shown that the upper parts of corn silk (dark brown part exposed to air) was found to have highest total antioxidant activity then the lower parts (light yellow parts, not exposed to air). The results indicate that corn silk is rich in phytochemical, which may be responsible for its medicinal property. The antioxidant activity of corn silk may be due the presence of flavonoids and tannins (Bhaigyabati et. al, 2011).

7. Conclusion

From the study, it may be concluded that corn silk is a rich source of phytochemical and has antioxidant property. A lot of benefits and nutrition content could be attained for those who consume it. Thus, this product was developed as in China, where this plant has been commercialized as a healthy drink (corn silk tea) for many years. This thus trigger the researchers' idea to create something that can be utilized by everybody at any time, and

anywhere. This Zea Mays Flour product can be commercialized since it gives no harm to consume. Based on some studies, they have confirmed the earlier findings and new research coveries by proving CS as safe and non-toxic. Moreover, it also easy to find, cheap, and innocuous. Further research should be conducted since the corn silk base product is having a high potential to be marketed and fulfil the people's concerns about health.

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