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Corn Silk Tea: An Artificial Chemical-Free

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Abstract : Corn silk usually used as an alternative remedy to treat infections of the urinary and genital system, such as cystitis, prostatitis and urethritis. The additional of stevia leaves into organic chemical free product give beneficial effect on blood glucose and insulin levels in human bodies because of its natural and sweet-tasting calorie free botanical. Drying process was use in the production of an organic chemical-free tea product from corn silk with stevia leaf. The pH of the corn silk and dried stevia mixture tea leaves is 7.54, which lies within the consumable pH drink. The phenols and aromas ring at wave number 3300 cm^{-1} and 1500 cm^{-1}, respectively that technically give the astringency taste and relaxing aromas from the tea. Moreover, 72% respondents agrees that the corn silk tea release a very pleasant aroma and 68% respondents love its taste due to less sweet and less bitterness effect of the tea to compare with a X-brand tea. Also, through the literature survey, it is find that corn silk with stevia leaves is effective for treatment related to blood sugar level, stress, and urinatary problems as well as an alternative natural sweetener that suitable to replace a white sugar. The results of the current study provide knowledge and information about both corn silk and stevia leaves in production of the organic free chemical tea product.

Keywords: Corn Silk Tea, Artificial Chemical-Free, Sugar-Free Product, Remedy Tea

1. Introduction

Corn silk or scientifically known as *Stigma Maydis* is an important herb used traditionally by the Chinese, and Native Americans to treat many diseases. It is also used as traditional medicine. Its potential antioxidant and healthcare applications as diuretic agent, in hyperglycemia reduction, as anti-depressant and anti-fatigue use have been claimed in several reports [1]. Other uses of corn silk included teas and supplements to treat urinary related problems. The potential use is related to its properties and compositions of its plant's bioactive constituents such as flavonoids and terpenoids. Flavonoids are a

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widely distributed group of plant phenolic compounds which are effective as antioxidants [2]. Phytochemicals are defined as bioactive non-nutrient plant compounds in fruits, vegetables, grains, and other plant foods that have been linked to reducing the risk of major chronic diseases [1]. Various herbs and plants are being utilized for their potential benefits in preventing diseases related to oxidative stress and in preserving health in human [3]. In addition, the botanical description, antioxidant activities, phytochemical composition, and pharmacological are studies for diseases prevention.

The corn silk is usually considered as a waste material that is yellowish thread like strands from female flower of Zea mays. However, in certain country, it has been used as traditional medicine used for the treatment of cystitis, oedema, kidney stones, diuretic, prostate disorder, and urinary infections as well as bedwetting and obesity [4]–[9]. Diuresis is a condition which a discharge of urine in a large amount, while kaliuresis is the secretion of potassium in a large amount in urine [3]. The corn silk helps to soothes and relaxes the lining of the bladder and urinary tubules, hence reducing irritation and increasing urine secretion [10]. The effect of corn silk belongs to its composition that contain different materials specially potassium which considered to be a urinary pH modifier, which works to reduce the amount of acid in the urine [11].

For medicinal purpose corn silk is harvested just before pollination occurs and can be used in fresh or dried form [3]. It is a waste material from corn cultivation and available in abundance [12]. It has been consumed for a long time as a therapeutic remedy for various illnesses and is important as an alternative natural-based treatment [3]. The leaf extract of this plant has been used traditionally in the treatment of diabetes [13]. Stevia leaf is recommended for diabetes and has been extensively tested on animals and has been used by humans with no side effects [13]. Stevia Rebaudiana is certainly very unusual in accumulating secondary metabolites like Stevioside and rebaudioside A at such high abundance in its leaves [14] [15]. Such compounds, whether natural or synthetic, should exhibit a sucrose-like taste, and should also lack any offensive odour, exhibit satisfactory water solubility and hydrolytic and thermal stability, and should not be toxic [16].

2. Materials and Methods

The materials and methodology used for this project is described in details in the following sub-topic.

2.1 Materials

The main materials used in this project are corn silks and stevia leaves. The corn silk was collected from several corn farm located in Terengganu and specifically from Alai Nursery in Malacca. The chemical properties of the corn silk tea is analyse using a pH meter and Fourier Transform Infrared (FTIR) Spectroscopy available at the Food Instrumentation Laboratory, Faculty of Applied Sciences and Techology (FAST), Universiti Tun Hussein Onn Malaysia (UTHM) Pagoh Campus. Besides, survey was also conducted among 50 respondents UTHM students to analyse the statistical data on sample's physical factor.

2.2 Methods

Figure 1 shows the technical flow of the product making procedures. Initially, corn silk was removed from fresh young corns and mature corn that was collected previously. The corn silk that was removed from the kernel is then underwent a pre-treatment process. First, the collected corn silk was cut into desired sizes in about 2 cm-long. Then the corn silk was dried for approximately 18 minutes at temperature 108 ºC. This step is important to ensure that humidity caused by water absorption in corn silk was totally removed to prevent any contamination of some fungi and other microorganisms. The dried corn silk was crushed into smaller pieces and divided into several equal parts of weight. Stevia leaves was underwent the similar procedure in order to produce a dried stevia leaves.

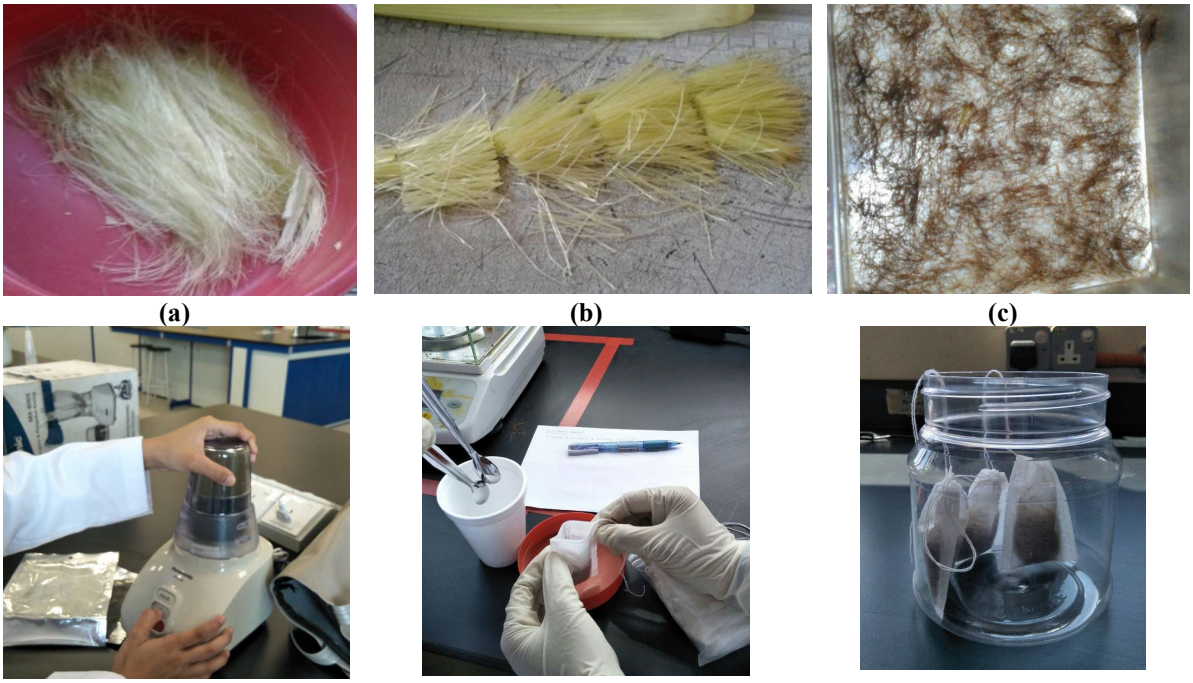


Figure 1: The corn silk tea production begin with (a) removing the corn silk from its kernel, followed by (b) cutting into shorter length before underwent (c) drying process. The dried corn silk was then (d) grinded and (e) mixed with dried stevia leaves before placed into a tea bag. (f) The corn silk tea product is ready to be used.

Following that, the dried corn silk and stevia leaves are mixed together at ratio of 2:1 of corn silk to stevia leaves. Approximately 0.2 g of dried corn silk was mixed with 0.1 g dried stevia and were placed inside a cotton tea bag. Stevia leaves was used in order to replace the used of white sugar or any artificial sugar in drink. The chemical composition and pH value of dried corn silk, stevia leaves, and the mixture of both samples was analysed by using FTIR and pH meter respectively. As for comparison, a local brand tea named as X-brand was underwent the same analysis procedure.

3. Results and Discussion

The chemical and physical properties of the corn silk tea is presented in the following sub-topics.

3.1 Chemical properties

The potential hydrogen (pH) value of each sample, which are dried corn silk, dried stevia leaves, a type of brown tea, and the added dried stevia leaves are tabulated in **Table 1**.

Table 1: Data of pH value of the samples

Samples	Volume of water, (ml)	Weight of sample (g)	pH Value
Dried corn silk	250	0.5179	7.63
X-brand tea	250	0.5179	7.85
Dried stevia leaves	250	0.1082	7.78
Corn silk + dried stevia leaves	250	0.6261	7.54

From the table, the pH value for mixture of corn silk and dried stevia leaves is 7.54. In addition, from all of the samples that had been analyze, the pH value for mixture of corn silk and dried stevia

leaves is close to the standard pH value that can be consume by humans where the range of standard value of pH is between 6.5 to 7.5 [11].

Alongside, FTIR analysis was also performed to analyse the chemical compound in corn silk tea. **Figure 2** shows the graph of spectrum of dried corn silk and stevia leaves samples using FTIR. The functional group present in both dried corn silk and dried stevia leaves are similar, which are phenol, alcohol, alkanes, ketones, amides, aromatic rings, esters and ethers. The wavelength of each chemical compound present in the sample are listed in **Table 2**.

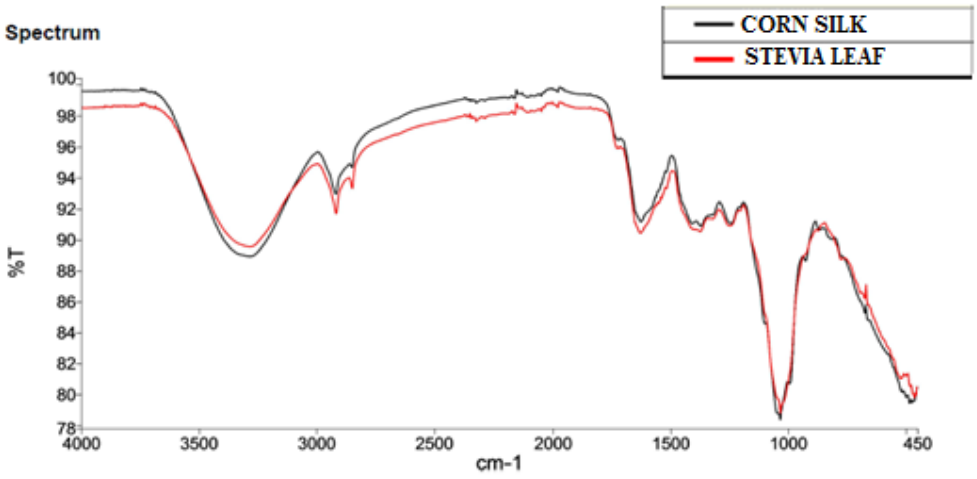


Figure 2: Spectrum of dried corn silk and stevia leaves samples using FTIR.

Table 3: The chemical compounds in dried corn silk and stevia leaves sample.

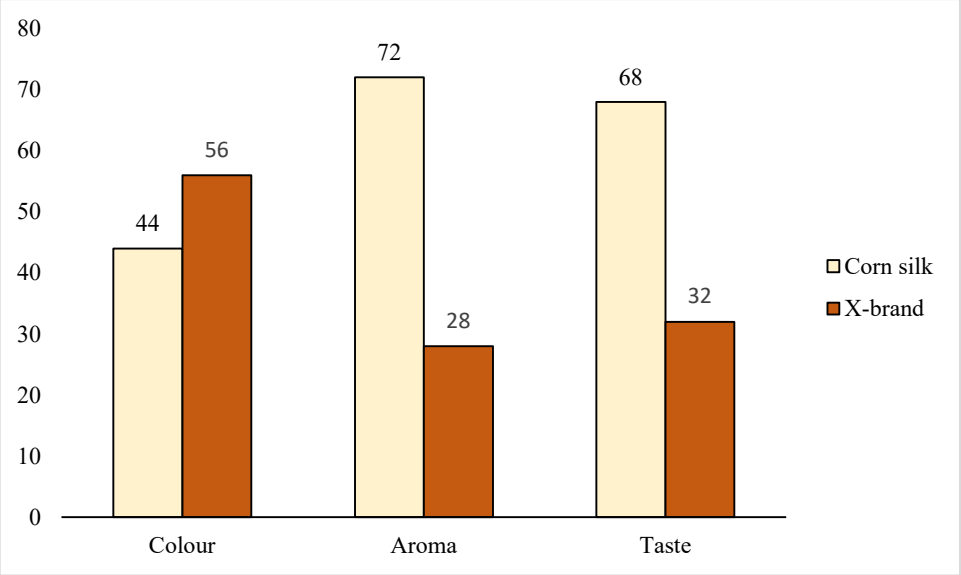
Wave number	Functional Group	
	Dried corn silk	Dried stevia leaves
3500 - 3000	Phenol and alcohol	Phenol and alcohol
3000 - 2800	Alkanes	Alkanes
1750 - 1625	Ketones	Ketones
1670 - 1600	Amides	Amides
1500 - 1450	Aromatic rings	Aromatic rings
1500 - 1440	Alkanes	Alkanes
1300 - 1000	Esters and Ethers	Esters and Ethers

The phenols ring (wave number of 3300 cm^{-1}) exist in dried corn silk tea is known to be responsible for astringency, which is a taste experience that causes a drying sensation on the tongue and bitterness. The relaxing aromas of the corn silk tea as well as stevia leaf present is strong due to the present of aromatic rings at wavelength of 1500 cm^{-1}.

3.2 Physical factor

Survey was conducted purposely to gather information on the product physical factor, that are including the colour, taste, and the aroma of corn silk tea. There are 50 respondents that is consist of 36 female students and 14 male students involed in this survey. In this attempt, two types of tea are used

as sample that are the corn silk tea and the X-brand tea. **Table 3** shows the result from the survey based on the three factor; colour, taste, and aroma of the tea samples.



The colour of corn silk tea is light yellow and at some point it looks 'pale'. This may be the main reason why most respondents likely prefer the X-brand tea in terms of it colour due to the brownish colour of X-brand tea. Only 44% agree that the colour of corn silk tea looks tempting while the othe 56% has chosen the X-brand tea as the most tempting looks tea. Increadibly, majority of 72% respondents find that the corn silk tea release a very pleasant aroma compare to the X-brand tea. In term of the taste of the tea, 68% respondents prefer the corn silk tea rather than X-brand tea due to less sweet taste and less bitterness effect of the tea. Through this survey, most of the respondents have no clue about corn silk tea. However, most of the respondents aware of the natural sweetener of stevia leaves and its benefits rather than white sugar. Thus, this project indirectly expose and create more information about the corn silk benefits.

4. Conclusion

This project has succesfully produced an organic and chemical-free tea product from corn silk with dried stevia leaves in a tea bag. Each tea bag suitable for one cup which about 250 ml of hot or warm water. This is due to the suitable nutrient content that can help people treat their related urinary system and diabetic problems. Furthermore, the data obtained from the survey shows that the people can consume this kind of tea product made from natural organic dried corn silk and stevia leaves. Thus, this project strongly supports the making of product from corn silk with stevia leaves rather than people throw the corn silk away.

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