

**1.0 Research title:**

*Effect of pasteurisation on physicochemical properties, antioxidant capacity and consumer acceptability of sugarcane juice.*

**2.0 Principal investigator:** *Chong Yin Hung***3.0 Co-researchers:** *Dr Maizura Murad***4.0 Introduction:**

*Sugarcane, Saccharum officinarum L. is one of the popular cultivar grown in Malaysia. According to the statistical report from Department of Agriculture, there is 2,021.85 hectares of yellow sugarcane plantation in Malaysia in 2015.....*

*Studies showed that sugarcane juice contains phenolic acids, flavonoids and other phenolic compounds which could account for the antioxidant activity (Singh et al., 2015).....*

*Sugarcane juice is a highly nutritious and popular thirst quenching drink in Malaysia. It is often freshly extracted by using roller drums and .....*

**Problem statement & Study rationale:**

*Sugarcane juice sold at roadside as well as the wet and night market is usually unpasteurised, making the juice susceptible to microbial spoilage.....*

*Studies on effect of heat treatment on yellow sugarcane juice are abundant. But, the effect of heat treatment on antioxidant capacity of sugarcane juice is rarely been studied. In this study, we are going to evaluate .....*

**Literature review:****4.1. Sugarcane**

*Sugarcane, genus Saccharum, is a tall perennial tropical grass that grown in the tropical and sub-tropical countries. Sugarcane plant can grow with unbranched stem to a height of 6 to 7 meters (Galloway, 2005). .....*

*S.officinarum, also known as noble cane, is originally cultivated for the sugar production. Brazil is the world largest producer of sugarcane followed by India. In Malaysia, sugarcane is cultivated for sugar production and juice production.*

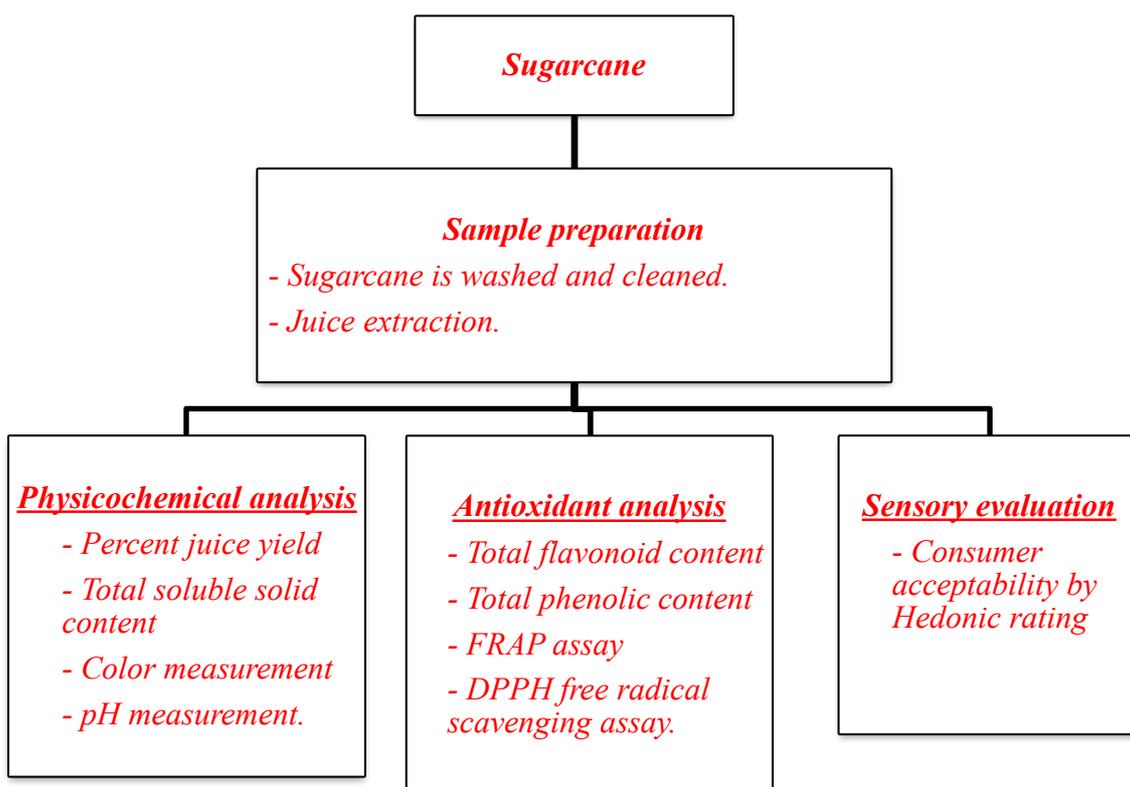
**4.2. Sugarcane juice**

*Sugarcane juice is commonly consumed as a refreshing drink in the tropical countries. It*

### 4.3. Deterioration of sugarcane juice

*Due to its high sugar content, sugarcane juice deteriorates at a faster rate. Sugar serves as the energy source for the microbial growth and speed up the multiplication of microorganisms. Poor sanitary condition during harvesting and handling of sugarcane might cause contamination of microorganisms.....*

### 5.0 Conceptual framework:



### 6.0 Target Research Questions:

1. *What is the effect of pasteurisation treatment on ..... of the sugarcane juice?*
2. *How does pasteurisation treatment affect the antioxidant properties of the sugarcane juice?*
3. *What is the effect of pasteurisation treatment on consumer acceptability of sugarcane juice in term of sensory characteristics?*

## 7.0 Objective:

**General:** *To study the effect of pasteurisation treatment on physicochemical properties, antioxidant capacity and consumer acceptability of sugarcane juice.*

**Specific:**

- 1. To explore how pasteurisation treatment can affect the acceptability of consumers on the sugarcane juice.*
- 2. To explore the difference between yellow stem and black stem sugarcane juice in term of their physicochemical properties and antioxidant capacity.*

## 10.0 Research design

### a) Sample preparation

*Sugarcane is washed and cleaned. Then, sugarcane is crushed using roller power crusher. The extracted juice is then filtered with muslin cloth. Half of the extracted juice is kept for the sensory test. Meanwhile, another half of the juice is subjected to pasteurisation treatment. First, the juice is added with..... Then, the a juice is pasteurised in the water bath at 75°C for 10 minutes. After that.....*

### Sample testing

*Four different conditions of samples are prepared prior the sensory test. Around 16ml of each sample is poured into a white paper cup. Each paper cup is coded with three random digits. A sensory evaluation form is prepared for panelist to fill in. Panelists are required to read and follow the instructions stated in the form before testing the sample. Each of the panelists are required to evaluate each sample for five attributes: color, aroma, taste, flavor and overall acceptability by using the seven-point hedonic rating scale.*

## 11.0 Study area

*Sensory test will be conducted in the sensory lab of School of Industrial Technology. Sensory lab comprises preparation area, serving area, panelist training area and testing area. The sensory lab is fully air-conditioned. In the testing area, there are six individual testing booths.*

### Study population:

*The study population is only the students who are the potential customers to buy sugarcane juice or consume sugarcane juice. Students are recruited from USM main campus only.*

**12.0 Subject criteria:***a) Inclusion criteria*

- *Students from USM main campus*
- *Consume sugarcane juice*
- *In healthy condition*

*b) Exclusion criteria*

- *Trained panelists*
- *Biased to sugarcane juice*
- *Having food allergies*

*Persons who are interested to participate will be screened before selected as panelists. They are required to answer a questionnaire regarding their willingness to participate, likeliness towards sugarcane juice, availabilities for sensory test and freedom from food allergies.*

**13.0 Sample size estimation:**

*Sample size for the sensory test is 52 panelists according to the similar study in a journal referred (de Andrade et al., 2014).*

**14.0 Sampling method and subject recruitment:**

*Sampling method used is voluntary response sampling. This method is suitable to be used in this research as we focused on the consumers' responds towards different varieties of sugarcane juice. Therefore, only people who are volunteer are interested in the topic of study.*

*Students are recruited by the announcement on the notice board outside the sensory lab and through social media.*

**Research tool:**

*Research tools include sugarcane juice that are prepared from this study.*

*Four conditions of sugarcane juice are used:*

- i. Pasteurised yellow stem sugarcane juice.*
- ii. Unpasteurised yellow stem sugarcane juice.*
- iii. ....*
- iv. ....*

**Questionnaire is used as screening test to select panelists.**

Consumer acceptability is determined by using affective test: Seven-point hedonic rating test (Singh-Ackbarali & Maharaj, 2014; Vaclavik & Christian, 2014). Attributes involved are color, taste, flavor, aroma and overall acceptability. A sensory evaluation form is provided to each panelist during the sensory test.

**15.0 Data collection method:**

Sensory test will be conducted in two separate days, from 3pm-5pm. Each panellist have to spend around 15 minutes for sample evaluation. Each panelist is only required to select one session for the sensory test.

**Sample storage:**

In this research, four different conditions of sugarcane juices are prepared: pasteurised yellow and black stem sugarcane juice and unpasteurised yellow and black stem sugarcane juice. They are stored in the refrigerator at 4°C in bottles. Samples are taken out right before the sensory test is conducted.

**Sample preparation prior sensory test:**

A set of master sheet for four samples is prepared by obtaining three digit numbers from random table. Then, about 16ml of four different condition samples are poured into four separated white paper cups and each is labelled according to the master sheet and arranged accordingly on the food tray together with a piece of tissue paper, an empty paper cup, a cup filled with plain water for rinsing and a pen. At the same time, an evaluation form is attached when serving to the panelist.

**During sensory test:**

Panelists are asked to sit in individual testing booth. Once they are ready to take the test, the samples will be given to them. No limitation of time is allocated during the sensory test. Panelists are required to follow the instructions as written in the evaluation form. After testing the sample, they have to answer the questions in the evaluation form. No interaction is allowed among the panelists to prevent any bias in the result.

**Post-sensory test:**

After panelists left the booth, food tray will be collected back to the food preparation area. The remaining samples and plain water will be disposed into the sink and the paper cups are disposed into the bin. The evaluation form will be collected and data will be analysed later.

**16.0 Data analysis:**

*Data will be entered and analysed using SPSS version 16. One-way analysis of variance ANOVA is performed with pasteurisation treatment and sugarcane varieties as factors and  $P < 0.05$  is taken as indicator of statistical differences between the means.*

**17.0 Ethical consideration:****1. Subject vulnerability**

*The subject is a panelist under my research project. However, the student will be given full freedom to participate or not in this study. The data will be independent and will not be used for any achievement assessment and decision related to work.*

**2. Declaration of absence of conflict of interest**

*No conflict of interest.*

**3. Privacy and confidentiality**

*All forms are anonymous and will be entered into SPSS software. Only research team members can access the data. Data will be presented as grouped data and will not identify the responders individually.*

**4. Community sensitivities and benefits**

*Community sensitivities - not relevant*

*This study will benefit the community by introducing the pasteurised sugarcane juice to the market.*

**5. Honorarium and incentives**

*Sweets or chocolates will be given to all participants.*

**20.0 Reference:****E.g.:**

*Bucheli, C. S., & Robinson, S. P. (1994). Contribution of enzymic browning to color in sugarcane juice. *Journal of Agricultural and Food Chemistry*, 42(2), 257-261.*

*CG, S., & JS, P. (1994). Effect of Heat Treatment on the Quality of Sugarcane Juice. *Indian Food Packer*, 48, 51-54.*