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Sensory Quality and Proximate Compositions Analysis of Rintis Tea (*Sonneratia Casolaris*)

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Abstract

A study was conducted to formulate a Rintis tea made from Sonneratia Caseolaris leaves. The leaves were picked, cleaned, withered and dried in the dehydrator at 54°C for 24 hours (T1), 48 hours (T2) and 72 hours (T3) before they were analyzed. Four types of tea which consist of i) control tea (C) from the local brand tea, ii) fresh Sonneratia Casolaris leaf that has been dehydrated in for 24 hours (T1), iii) fresh Sonneratia Casolaris leaf that has been dehydrated for 48 hours (T2) and iv) fresh Sonneratia Casolaris leaf that have been dehydrated in dehydrator for 72 hours (T3) were tested for sensory quality and proximate compositions evaluation. Sensory evaluation which includes appearance, aroma, color, tea flavor, astringency, and overall acceptance were noted with a significant difference between the samples. Proximate compositions analysis was also conducted and findings demonstrated that that sample T3 contains the highest moisture level compared to other samples. There were significant differences between all products regarding fat analysis, protein, and carbohydrate. Meanwhile, there is no significant difference regarding moisture analysis and ashes content in all four samples. Sample (T3) was the most acceptable by the consumer due to its better tea flavor than other treatments.

Keywords: Sonneratia Caseolaris, Sensory Quality, Proximate Composition Evaluation.

Introduction

Tea product has become a tasty, refreshing and healthy beverage enjoyed by the world for over thousands of years. It is a caffeinated beverage which has various product brands in the market and people of ages are interested in consuming tea. Lipton and Boh tea product are well known among Malaysian citizen. Tea leaves (Camellia sinensis L.) are the source of the world's most popular beverage and can be processed and fortified with different fruits, flowers, and spices to fulfill specific features desired by the consumer. It is

rich with polyphenols, flavonoids such as flavanols (catechins, procyanidins), flavonols (rutin, quercetin, kaempferol), and phenolic acids (gallic, caffeic). Polyphenolic compounds in tea leaves make up to 30% of green tea, but only 10% of black tea. The major catechins in tea are: (+)-catechin (C), (—)-epicatechin (EC), (—)-gallocatechin (GC), (—)-epicatechin gallate (ECG), (—)-epigallocatechin (EGC), and (—)-epigallocatechin gallate (EGCG) (Gramza et al., 2006; Song, Wang, Zheng, & Huang, 2011). However, the major antioxidant in tea leaves is considered to be EGCG, a catechin compound with eight free hydroxyl groups (OH), which are decisive for its high antioxidant activity (Gramza & Korczak, 2005).

Another essential component is caffeine, which consists of higher amounts of unfermented teas (Gramza- Michałowska, 2014). The green tea fermentation process, however, influences the chemical composition of leaves resulting in other leaf features (red, yellow and black tea) with often similar activity and health benefits. The processing of yellow tea is conducted with the partial fermentation of the collected leaves, and then wilting, rolling and drying.

Tea is known for its wide-ranging health benefits, including antimutagenic and antioxidant properties, prevention for the development of diseases of the cardiovascular and nervous systems, cancer, intensifies concentration, accelerates metabolism, and possesses strong bactericidal and bacteriostatic activity (Gramza & Korczak, 2005; Hajiaghaalipour, Kanthimathi, Sanusi, & Rajarajeswaran, 2015; Kujawska, Ewertowska, Adamska, et al., 2016; Kujawska, Ewertowska, Ignatowicz, et al., 2016. Only the semi-mature leaves will undergo the process of making tea.

Rintis tea product is derived from Sonneratia Caseolaris leaves. Sonneratia Caseolaris or also known as apple mangrove has many benefits for human's health which had never been discovered yet. Sonneratia species reached peak growth and had the highest content of nitrogen and phosphorus, enzymatic activities, including dehydrogenase, cellulase, phosphatase, urease, and ß-glucosidase, except arylsulphatase which increased continuously withstand ages (Yang et al., 2014).

Tea processing is a highly professionalized process, and tea manufacturer always alters the production procedures with a different method of processing to produce a good quality of the tea. Therefore, the quality of the tea usually depends greatly on experience, raw ingredients, and other subjective factors of tea makers. Similar to tea production, tea sensory quality evaluation is also highly professionalized. With years of extensive training, tea evaluators may gain an obvious preference (Buratti et al., 2013) for the complex aroma compositions, rich tastes, or appearances of various green tea (Sinija & Mishara, 2011).

Experimental Details

Research Design

The research was conducted to produce Rintis tea. In this study, the main ingredient used was Sonneratia Casolaris leaves. Sonneratia leaves had gone the same method in processing tea leaves. Sonneratia leaves were dried in the dehydrator for 24 hours, 48 hours and 72 hours. Only the young shoots of Sonneratia leaves were plucked. They were plucked at swamps area located in Hujung Rintis, Perak.

Leaf Processing

The selective Sonneratia leaves were plucked from the tree. Only young shoots were chosen for making the best tea. Then all the leaves were cleaned and place on a net at room temperature to undergo the withering process. After that, the leaves of Sonneratia were dried in a dehydrator at 54˚C for 24, 48 and 72 hours. In this research, four types of tea with different length of drying processing time were produced. Lastly, after the leaves were dried, the leaves were ground before packed in tea bags. Formulations of the Rintis tea are presented in table 1 while the processing steps are shown in Table 1.

Table 1
Rintis Tea Samples

Sample	Duration of dehydration time (Hours)
C	Local brands tea in the market
T1	Fresh *Sonneratia Casolaris* leaves dehydrated for 24 hours
T2	Fresh *Sonneratia Casolaris* leaves dehydrated for 48 hours
T3	Fresh *Sonneratia Casolaris* leaves dehydrated for 72 hours

** C act as Control while T1, T2, and T3 functions as formula modulator*

Dehydration Process

Dehydration is the process of stopping the fermentation process and reduces moisture in the leaves. Sample (C) is a well-known tea product in the market. Tea products in the market have enhanced coloring, flavoring, and contained food additive and permitted preservative to make the tea tastier and accepted by the consumer. Rintis tea prepared in this study has been dried without any additive or preservatives added.

Sensory Evaluation

Sensory evaluation is a qualitative technique in which numerical data are collected to establish lawful and specific relationships between product characteristics and human perception (Lawless & Heymann, 1999). The hedonic test with seven hedonic scales was done by 100 untrained panels which consist of students and workers at Universiti Teknologi MARA, Puncak Alam Campus. The seven scales hedonic test comprised of (7=extremely like; 4=moderate; 1=extremely dislike). The hedonic analysis was done to gauged consumer acceptance in appearance, aroma, color, tea flavor, astringency and overall acceptance of the tea products.

Proximate Compositions Analysis

Ashes Content Determination

5.0 g dry weight of the samples were heated inside a heating saucer using an electric heater Hot-plate Magnetic Stirrer model 34532 brand Snijders until there is no smoke produced. They are then incinerated in muffle burner NEY model 2-252 II Series at the temperature of 550C for a night (AOAC 1990)

Calculation

Total of Ashes (%) = (Weight of ashes (g)/weight of the original sample (g) x 100

Water Content Determination

The water content determination was analyzed using the oven method (AOAC 1990). The water content is determined by heating 5 g wet weight of the samples blended in an oven at the temperature of 105C until the weight of the sample become permanent (overnight). The weight loss is reported as the percentage of water content.

Calculation:

% of water content = {[(wet weight (g) – dry weight (g))]/wet weight (g) x 100

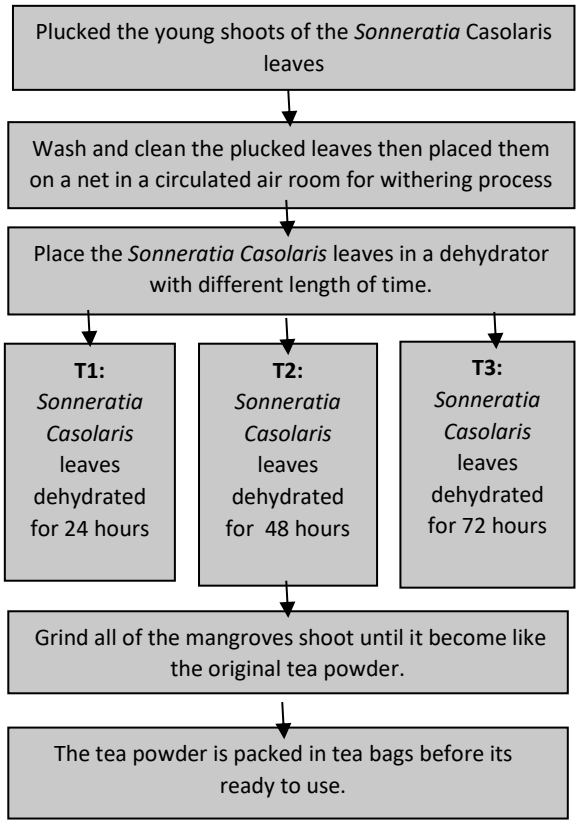

Figure 1: Rintis Tea Processing Flowchart

Fat Content Determination

The Soxhlet Extraction method is used in determining the fat content of the samples (AOAC 1990). The analysis is done using the Soxhlet instrument. The aluminum Soxhlet pitchers must be dried, and the readings of the pitchers' weight (Wa) are taken after they are cooled. 1 g (Wb) of each dried samples is weighted twice, wrapped with the filtering paper and put inside the cone container for Soxhlet extraction. Each pitcher is filled with 50 ml of hexane. The pitchers and the cone container are put on the Soxtec System HTI1043 Extractor Unit (Sweden). The process begins with 20 minutes of boiling, followed by the rinsing process for 35 minutes and finally the evaporation process for about 10 minutes. After the extraction, only the pitcher that contains fat will be dried in an oven at the temperature of 100C for 20 minutes and be cooled down in the drying container. The final weight of each pitcher (Wc) is taken.

Calculation

$$\% \text{ Fat Content} = \frac{Wc - Wa}{Wb} \times 100$$

Where,
Wa = The aluminium pitcher's weight (g)
Wb = Sample's weight (g)
Wc = Pitcher's weight containing fat (g)

Protein Content Determination

The protein content determination is measured based on the Makrojedahl's method (AOAC 1990) using the Tecator Kjeltec system which consists of Tecator 2020 Digester and Kjeltec System 1026 Distilling Unit. 0.5 g of dried samples (dried overnight at the temperature of 60C) is put into the Kjeldahl's tubes, with one tube left empty. Half a spatula of the booster (Su2SO4: K2SO4) and 12ml thick H2SO4 (95-98%) are put into each tube. The digestion takes on 45 minutes at 420C temperature until it changes color to transparent green. The sample was cool down for 15 minutes. 75ml of distilled water is added inside all tubes. Then the distillation, nitration of the empty tube and the samples with the Kjeltec Analyzer are done. The nitration is done slowly with 0.05 M hydrochloric acid until the bolic acid changes to its original color which is pink. The titration readings are taken in counting the protein percentage.

Calculation

$$\% N = 0.1 \times \frac{(\text{sample acid volume}) - (\text{empty tube acid volume})}{\text{Dry sample weight (g)}} \times 14 \times \frac{100}{100}$$

$$\% \text{ Protein} = \%N \times 6.25$$

$$\text{Protein weight (g)} = \frac{\% \text{ protein} \times \text{residue weight (g)}}{100}$$

% Protein = f = 6.25 (meat product, flour, flour product and other food product)
% protein = f = 5.7 (cereal and cereal product)

Carbohydrate Content

The determination of carbohydrate content is done by the subtraction of total % of all nutrients to 100%. The result is determined as the % of carbohydrate content.

Calculation

% carbohydrate = 100% - (% protein + % fat + % water + % coarse fiber + % ashes)

Statistical Analysis

Sensory evaluation data and physicochemical data was evaluated by using the Statistical Analysis System Package (SAS) version 9.4 by conducting Analysis of Variance method (ANOVA) and the Duncan Multiple Range Test to see the significant difference observed that follows the subject studied at the level of confidence 95% ($p<0.05$).

Results and Discussion

Sensory Evaluation

Table 2

Variance of Sensory Evaluation Analysis (mean score n=100) in Four Samples of Rintis Tea

Attributes	C	T1	T2	T3
Appearance	3.93	4.18	4.40	4.34
Aroma	3.61	4.02	3.95	4.05
Colour	3.78	4.10	4.16	4.28
Tea Flavour	3.83	3.20	3.42	3.92
Astringency	3.50	3.43	3.88	3.94
Overall Acceptance	4.28	3.57	3.72	3.97

Control: Local brand tea.
Treatment 1: Fresh Sonneratia Casolaris leaf was dehydrates in dehydrator for 24 hours.
Treatment 2: Fresh Sonneratia Casolaris leaf was dehydrates in dehydrator for 48 hours.
Treatment 3: Fresh Sonneratia Casolaris leaf was dehydrates in dehydrator for 72 hours.

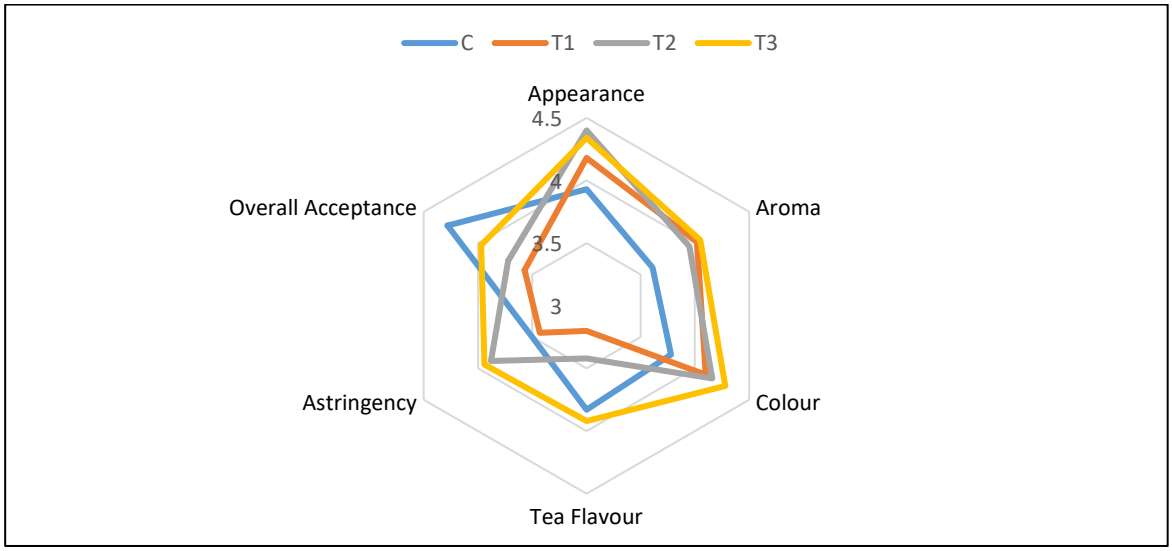

Figure 2: Sensory Evaluation of the Rintis Tea

Appearance Attribute

Appearance is the first specification that determines customers' acceptance over the product. From the analysis, the result of the color attribute shows that there were significant differences ($p < 0.05$) between the four samples. The highest score was stated by the treatment 2 (4.40), followed by treatment 3 (4.34), treatment 1 (4.18) and the lowest was control (3.93).

Aroma Attribute

From the analysis conducted on all of the samples, the result for the color attribute shows that there were significant differences ($p < 0.05$) between the four samples. The highest score was stated by the treatment 3 (4.05), followed by treatment 1 (4.02), treatment 2 (3.95) and the lowest was control (3.61).

Color Attribute

Result for color attribute shows that there were significant differences ($p < 0.05$) between the four samples. The highest score was stated by the treatment 3 (4.28), followed by treatment 2 (4.16), treatment 1 (4.10) and the lowest was control (3.78). The total amount of catechin decreases during the fermentation process resulting in a higher content in yellow tea (Friedman, Levin, Lee, & Kozukue, 2008).

Tea Flavor Attribute

The analysis showed that, the result of the color attribute that there were significant differences ($p < 0.05$) between the four samples. The highest score was stated by the treatment 3 (3.92), followed by control (3.83), treatment 2 (3.42) and the lowest was treatment 1 (3.20).

Astringency Attribute

For the astringent attribute, variation in the astringency ratings could be due to the different salivary flow produced in individual panelists. Panelists who generate a more significant amount of saliva are expected to rate the lower level of astringency intensity (Drobna et al., 2004). The ratings of the control bread could be due to the different perception to astringency by the panelists. From the research conducted, generally, the result for the astringent attribute shows that there were significant differences ($p < 0.05$) between the four samples. The highest score was stated by the treatment 3 (3.94), followed by treatment 2 (3.88), control (3.50) and the lowest was treatment 1 (3.43).

Overall Acceptance Attribute

For the overall acceptance attribute, it was found that there were significant differences ($p < 0.05$) between the four samples. The highest score was stated by the control (4.28), followed by treatment 3 (3.97), treatment 2 (3.72) and the lowest was treatment 1 (3.57).

Proximate Compositions Evaluation

Table 3
Variance of Proximate Compositions Analysis

Proximate Composition	C	T1	T2	T3
Moisture	9.01a	9.05a	9.08a	9.02a
Ashes	5.01a	5.36a	5.20a	5.09a
Fat	3.71b	1.73c	2.35c	5.78a
Protein	17.02b	17.00a	17.20a	16.15c
Carbohydrate	60.02a	66.90a	67.20a	64.52a

C:- Local brand tea .
Treatment 1: Fresh Sonneratia Casolaris leaf was dehydrates in dehydrator for 24 hours.
Treatment 2: Fresh Sonneratia Casolaris leaf was dehydrates in dehydrator for 48 hours.
Treatment 3: Fresh Sonneratia Casolaris leaf was dehydrates in dehydrator for 72 hours.
a-c: different alphabets in the same line that are significantly different (p>0.05

Moisture Content

From the research, there is no significant difference (p>0.05) between C to T3. However, T2 gives a high percentage, which is 9.08, followed by T1, T3 and C with means of 9.05, 9.02, and .01 respectively.

Ashes Content

For its ashes content, there is no significant difference (p>0.05) between these four samples that are C to T3. In this context, T1 gives a high percentage, which is 5.36, followed by T2, T3 and C with means 5.20, 5.09, and 5.01 respectively.

Fat Content

There is a significant difference (p<0.05) in the fat content. However, T3 noted the highest mean percentage that is 5.78 while T1 noted the lowest mean percentage for its fat content that is 1.73.

Protein Content

From the analysis conducted, there is a significant difference (p<0.05) for the protein percentage in all samples. The T2 sample noted the highest mean percentage that is 17.20 while T3 noted the lowest mean percentage for the protein content that is 16.15

Carbohydrate Content

In addition, there is no significant difference (p>0.05) for the carbohydrate content in all four samples. T2 has the highest carbohydrate content with 67.20 followed by T2, T3 and C with means percentage of 66.90, 64.52, and 60.02 respectively.

Conclusions

The conclusion that can be made is the sample T3 had the highest mean score among the other samples regarding the attribute, appearance, aroma, color, flavor tea, astringency, and overall acceptance through a sensory evaluation amongst panelist. As for the proximate compositions analysis, it can be seen that the sample T2 contains the highest moisture and protein level as compared to other samples. There were significant differences of (p<0.05) between all products in terms of the fat analysis, protein, and carbohydrate. Meanwhile, there is no significant difference (p>0.05) concerning the moisture analysis and ashes content in all of the four samples.

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References

Buratti, S., Casiraghi, A., Minghetti, P., Giovanelli, G., 2013. The joint use of electronic nose and electronic tongue for the evaluation of the sensorial properties of green and black tea infusions as related to their chemical composition. Food Nutr. Sci. 4 (6), 605–615.

Drobna, Z., Wismer, W. V., & Goonewardene, L. A. (2004). Selection of an astringency reference standard for the sensory evaluation of black tea. Journal of Sensory Studies, 19, 119–132.

Friedman, M., Levin, C. E., Lee, S. U., & Kozukue, N. (2008). Stability of green tea catechins in commercial tea leaves during storage for 6 months. *Journal of Food Science, 74*(2), H47–H51.

Gramza, A., Khokhar, S., Yoko, S., Gliszczynska-Swiglo, A., Hes, M., & Korczak, J. (2006). Antioxidant activity of tea extracts in lipids and correlation with polyphenol content. *European Journal of Lipid Science and Technology, 108*(4), 351–362.

Gramza, A., & Korczak, J. (2005). Tea constituents (*Camellia sinensis* l.) as antioxidants in lipid systems. *Trends in Food Science and Technology, 16*, 351–358.

Gramza, A., Korczak, J., & Regula, J. (2007). Use of plant extracts in summer and winter season butter oxidative stability improvement. *Asia Pacific Journal of Clinical Nutrition, 16*(Suppl 1), 85–88.

Gramza-Michałowska, A. (2014). Caffeine in tea *Camellia sinensis* – content, absorption, benefits and risks of consumption. *Journal of Nutrition Health and Aging, 18*(2), 143–149.

Gramza-Michałowska, A., & Korczak, J. (2013). Oxygen radical absorbance capacity of selected food products. *Acta Scientiarum Polonorum, Technologia Alimentaria, 12*(2), 175–180.

Hajiaghaalipour, F., Kanthimathi, M. S., Sanusi, J., & Rajarajeswaran, J. (2015). White tea (*Camellia sinensis*) inhibits proliferation of the colon cancer cell line, HT-29, activates caspases and protects DNA of normal cells against oxidative damage. *Food Chemistry, 169*, 401–410.

Kujawska, M., Ewertowska, M., Adamska, T., Ignatowicz, E., Gramza-Michałowska, A., & Jodynis-Liebert, J. (2016a). Protective effect of yellow tea extract on nitrosodiethylamine-induced liver carcinogenesis. *Pharmaceutical Biology, 3*, 1–10. http://dx.doi.org/10.3109/13880209.2015.1137600.

Sinija, V.R., Mishara, H.N., 2011. Fuzzy analysis of sensory data for quality evaluation and ranking of instant green tea powder and granules. Food Bioprocess Technol. 4 (3), 408–416.

Song, L., Wang, X., Zheng, X., & Huang, D. (2011). Polyphenolic antioxidant profiles of yellow camellia. *Food Chemistry, 129*, 351–357.

Yang, Q., Lei, A.P., Li, F.L., Liu, L.N., Zan, Q.J., Shin, P.K.S., Cheung, S.G., Tam, N.F.Y. (2014). Structure and function of soil microbial community in artificially planted *Sonneratia apetala* and *S. caseolaris* forests at different stand ages in Shenzhen Bay, China. Mar. Pollut. Bull. 1.