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Acceptability of Theobroma Cacao as an Alternative Tea

Ralph Christian Isaiah G. Corton, Karylle M. Jordan, Jesh Ashley I. Suarez, Uriah Zane M. Gesalan, Czarina Joy Carlet, Anamarie G. Valdez MAT*

Sultan Kudarat State University, ACCESS, EJC Montilla, Tacurong City, the Philippines
*Correspondence: E-mail: karyllejordan@sksu.edu.ph, ralphchristianisaiahcorton@sksu.edu.ph, anamarievaldez@sksu.edu.ph

ABSTRACTS

This study aimed to discover the acceptability of Theobroma Cacao as an alternative tea in terms of taste, color, aroma, and texture. Then, was evaluated by the respondents according to how they liked the tea. To produce Theobroma Cacao tea, we used an experimental research design and a quantitative-descriptive approach. In the experimental design, we used a one-way ANOVA with 2-factor experiments, namely: different kinds of sweetener or flavoring (honey) as factor A and different Cacao powder amounts as factor B. There were fifteen (15) respondents who participated during the conduct of the study. The materials that we used to make the tea are two (2) cacao fruit, honey or any sweetener, a basin or flat surface to dry the seeds, gloves to avoid contaminating the cacao, a knife, chopping board, mortar, pestle, and sifter. The respondents were randomly chosen in Sultan Kudarat province. Specifically, friends or relatives near the homes of we. In terms of taste, color, aroma, and texture, treatment 2 was more acceptable (according to the 8 point-hedonic scales) because of its right amount of Cacao powder, and the participants felt the taste of natural Cacao, became more aromatic, it has a nice color, and balanced amount of sweetener to fight the bitterness of the Cacao. Among the treatments used in the study, treatment 2 was the best treatment used as an alternative cacao tea. This was followed by treatment 3 and then treatment 1.

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1. INTRODUCTION

In the study of Rincón-Barón *et al*. (2021) Cocoa (Theobroma cacao L.), the primary material of chocolate, belongs to the class Magnoliopsida, order Malvales, family Malvaceae, genus Theobroma, and species Cacao, and is the most cultivated fruit of the genus given the value and significance of the seeds. The cocoa tree is native to tropical America's rainforest regions, where it can still be found in the wild from Peru to Mexico (Phillips-Mora *et al*., 2007). Cacao fructus was first mentioned in botanical literature by Charles de L'Ecluse. Linneu named it Theobroma fructus later (1737). However, the same Linneu proposed the particular name of Theobroma cacao in 1753, which is still in use today.

A significant cash crop in the tropics is cocoa (Theobroma cacao L.). It is renowned across the world for the beans used to make chocolate. Although cocoa is native to the Amazon and has been used there for 2000 years, it is still used daily as a staple food. The cacao tree's seed is known as cocoa. The high-fat content of the seed is used to make cocoa butter, which is then utilized to make chocolate. The most common knowledge about cocoa is that it is a powdered powder used to make chocolate. Commercial cocoa is mostly produced from cocoa beans. The four intermediate products made from cocoa are chocolate, cocoa butter, cocoa powder, and cocoa liquor (Sarkar *et al*., 2012).

According to Yu Jin (n.d) new generation of growers and artisanal chocolatiers has emerged in Southeast Asia, a region that is vying for superior cocoa and chocolate. To be sure, the region has long grown cocoa. Theobroma cacao, sometimes known as the cacao tree, was introduced to Southeast Asia in the 18th century by European invaders, like many other former colonies. Large tracts of land in these nations were converted into cacao fields to satiate the European chocolate appetite at the time thanks to the Dutch in Indonesia, the British in Malaysia, and the Spanish in the Philippines.

Cacao was originally cultivated outside of the Americas in the Philippines when it was a Spanish territory. In 1660, a Spanish galleon transported a single cocoa plant from Mexico to the Philippines. It was intended as a gift for Camarines Norte priest Bartolome Brabo. The majority of the chocolate consumed in Asia may have originated from this plant. Because the cocoa tree originated in the Philippines and then spread to Indonesia and Malaysia (Wickramasuriya & Dunwell, 2018). According to the Department of Agriculture Philippines (n.d), Farmers in the Philippines grow three types of cultivars. The cultivars are Criollo, Forastero, and Trinitario, with the Criollo being the most treasured, uncommon, and expensive. It can be found only in Central and South America. The earliest cacao seed sown in the Philippines is said to have been the Criollo type transported by the Acapulco-Manila Galleon Trade in 1670. Criollo cacao accounts for only 5% of total cacao production worldwide. This type is difficult to grow due to its susceptibility to pests and illnesses. The beans range in color from white to pale pink and are noted for being of higher quality, less bitter, and more flavorful. Criollo, also known as the "Prince of Cocoas," is a high-quality cocoa component. The most flexible and extensively grown cocoa type is the Forastero, which is native to the Amazon basin. It is farmed predominantly in Africa, Ecuador, and Brazil, and accounts for around 80% of global cocoa production. It is significantly tougher, disease-resistant, and more productive. Beans are purple and are usually used to enhance the flavor of chocolate. They are typically mixed with good cocoas due to their harsh taste. Trinitario, a cross between Criollo and Forastero, combines the hardiness and yield of Forastero with the exquisite flavor of Criollo. It is the most widely available fine flavor chocolate found in all countries where Criollo cocoa was grown, including Southeast Asia and the Philippines.

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We were motivated to conduct this study to develop cacao tea and determine its acceptability and locality.

2. METHODS

2.1. Research design

We used the experimental research design and a quantitative-descriptive approach and One-way ANOVA with three (3) treatments.

2.2. Respondents of the study

The main participants of this study will be 15 people who are aged 25-60 and must be an inhabitant of Sultan Kudarat, Philippines. This criterion will be the respondents who will evaluate the quality of the cacao powder tea in the 4 by taste, aroma, color, and texture.

2.3. Gathering of cacao

The cacao will be harvested from farms or bought from supermarkets or public markets. We will ensure that the fruit will not be over-ripe, raw, or any signs of insect infestation of the fruit, it will be excluded. The cacao fruit will be chosen in their mature stages.

2.4. Cacao tea procedures

After gathering the cacao, these are the next procedures to produce cacao tea:

(i) Bean Removal The cacao seeds are extracted from the pod with the pulp extracted.
(ii) Bean fermentation Cacao beans are set out in the sun to dry for 5-7 days
(iii) Roasting Cacao beans will be roasted for 30 minutes.
(iv) Peeling The outer shell of the cacao bean will be peeled.
(v) Grinding The cacao will go through a grinder.
(vi) Hardening Mix the cacao powder with a small amount of water to let it harden.
(vii) Chopping The hardened cacao mixture will be chopped into fine pieces.
(viii) Pounded into powder the finely chopped hardened cacao is going to be pounded with a mortar and pestle to form a powder.
(ix) Sifting The powder will run through a sift to avoid getting big chunks of cacao powder.
(x) Powder insertion the powder will be inserted inside a tea bag.
(xi) For the assembly, the cacao powder will be put in a mug with warm or hot water with the teabag. After about 5 minutes or when the powder extracts all of its flavors. Sweeteners and additives will be added like sugar or lemon. After assembling the cacao tea, the tea will be ready for consumption.
(xii) Collecting the data, we will collect the data by giving out the Cacao tea to our chosen participants. After we analyze and observe the cacao tea, we will interview them using the survey questionnaires.

2.5. Statistical analysis

The data gathered will be analyzed using One-way ANOVA. The one-way analysis of variance (ANOVA) is used to see if there are any statistically significant differences in the means of three or more independent (unrelated) groups. The one-way ANOVA compares the means of the groups in question and determines whether any of them are statistically significantly different from one another.

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3. RESULTS AND DISCUSSION

According to the study by Zhang (2020), taste is a key aspect in determining tea quality. Sweet and umami flavors are often well-accepted by customers, whereas bitter and astringent tastes are generally disliked, although they are necessary for giving complex sensory experiences. **Table 1** present the taste evaluations of the three treatments with "Like moderately" verbal description based on the mean interpretation. **Table 1** presents the taste evaluation of the three (3) treatments. Based on **Table 1**, Treatments 2 and 3 have the highest mean, with 5.7333. Followed by Treatment 1 with a mean of 5.4. Treatment 1 had the highest SD of 1.404, then Treatment 3 with an SD of 1.387, and Treatment 2 with the lowest SD of 1.1. According to the mean interpretations of the three treatments, it had been shown that the three (3) treatments in terms of taste were proved to be "liked moderately". The three treatments proved to be acceptable. They could become an alternative tea. According to an article on cacaoteaco.com, Cacao tea can be a healthy alternative to coffee and chocolate.

Table 1. Summary of Taste by respondents.

Treatments	Mean	SD	Verbal Description
T1	5.400	1.404	Like moderately
T2	5.733	1.100	Like moderately
T3	5.733	1.387	Like moderately

Aroma is another essential criterion in evaluating tea quality. Aromas are produced by four main pathways: carotenoids as precursors, lipids as precursors, glycosides as precursors, and the Maillard reaction pathway. To the best of our knowledge, no previous research has offered details on the mechanisms of tea scent generation. As a result, in this study, we examine the key aromas beginning with the production process and ending with biological and chemical mechanisms (Ho *et al*., 2015). The appearance of the three formulations was determined using the 8-point hedonic scale, **Table 2** presents the aroma evaluation of the three treatments with "Like very much" based on Verbal Description based on mean interpretation. In **Table 2** regarding aroma, Treatment 1 had the highest mean with 6.4, followed by Treatment 2 with 6., and then followed by treatment 3 with 6.2. Considering the means of **Table 2**, the three formulations proved that it was appealing to smell.

Table 2. Summary of Aroma by respondents.

Treatments	Mean	SD	Verbal Description
T1	6.4	1.403	Like very much
T2	6.333	1.175	Like very much
T3	6.2	1.207	Like very much

Food texture is a catch-all phrase for sensory sensations derived from visual, auditory, and tactile stimuli. The experience of food texture has a significant impact on customers' liking and preference for a food product (Wilkinson *et al*., 2000). **Table 3** discusses the texture of the three treatments. As shown in **Table 3**, The three treatments were rated differently. Treatment 3 with the highest mean was rated Like very much. Treatment 2 with a mean of 5.733 was rated Like Moderately. Then, Treatment 1 with the lowest mean of 5.467 and was rated was liked slightly. Although, the three (3) treatments were rated differently. The result shows that the three in terms of texture were still acceptable.

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Color is the most significant aspect of any food's appearance, especially when it is directly related to other food-quality features, such as the changes that occur during fruit ripening or the decrease in color quality when food spoils or becomes stale. Every raw food and the manufactured product have an acceptable color appearance range that is determined by elements such as the consumer's and the nature of the surroundings at the time of assessment, as well as the structure and pigmentation of the food itself. Color specifications alone, however, are insufficient to describe the food look. The color quality of the illumination, in terms of intensity, color temperature, and fidelity, as well as the nature of the product's structure, all have an impact on the look. A thorough specification of appearance requires the distribution of surface reflectance, the nature of internally dispersed light, and the product's coloring. **Table 4** presents the Color/Appearance of the three treatments. The three treatments were rated with a “Like slightly” and “Like moderately” based on the mean interpretation. Treatment 3 had the highest mean with 5.667, which was then followed by Treatment 2 with a mean of 5.6. Lastly, Treatment 1 with the lowest mean of 5.33. With the mean of the three formulations, it had been proved that the color of Treatment 1 was slightly liked. On the other hand, the mean of treatments 2 and 3 was rated as liked moderately in terms of color/appearance

Table 3. Summary of Texture by respondents.

Treatments	Mean	SD	Verbal Description
T1	5.467	1.407	Like Slightly
T2	5.733	1.100	Like Moderately
T3	6.200	0.862	Like very much

Table 4. Summary of Color/Appearance by respondents**.**

Treatments	Mean	SD	Verbal Description
T1	5.467	1.407	Like Slightly
T2	5.733	1.100	Like Moderately
T3	6.200	0.862	Like very much

Table 5 illustrates the results which were evaluated if there is a significant difference between the groups. The results revealed whether there is a significant difference between all the results or none with the attributes of three treatments with the Level of significance at 5%, the value of the p-value calculated is 0.693724145. This implies that there is no significant difference between all groups. Further explained that the null hypothesis was accepted for the means are not significantly different in all treatments.

Table 5. ANOVA.

Source of Variation	SS	*df*	*MS*	*F*	*P-Value*	*Decision*
Between Groups	0.70	2	0.35	0.36	0.69372	Accept null hypothesis
Within Groups	39.85	42	0.94			
Total	40.55	44				

4. CONCLUSION

Based on the findings, the following conclusions are drawn. For taste, Formulation 2 (2 ½ Tablespoons of Cacao powder placed inside a tea bag and 2 ½ Tablespoons of sweeteners)

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was the preferred formulation among the 10 participants. For aroma, Formulations 2 and 3 were preferred by 11 participants. For color, Formulation 3 was preferred by 10 participants. For texture, Formulation 3 was most preferred by 9 participants. The sweetener that was most preferred by the respondents was Honey. According to our participants (beforehand), the cacao tea was bitter. Adding honey not only enhanced its taste but also removed the bitterness.

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6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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