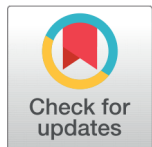


## RESEARCH ARTICLE



## Acceptability of Organic Beverage Product: A Breakthrough

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### Abstract

**Objectives:** This study aims to produce beverage products composed of local ingredients found in the Municipality of Concepcion, Iloilo, Philippines in terms of color, odor, flavor, texture, and general acceptability. **Methods:** This study was a developmental research design. The main ingredients were *Strombus canarium* meat, *Moringa oleifera* leaves, *Annona muricata* leaves, powdered *Curcuma longa*, and *Cymbopogon*. The filtered liquid was boiled together with the rest of the ingredients. The 45 respondents composed of women, vendors, and students evaluated the beverages using modified survey questionnaires. Mean, standard deviation (SD), and ANOVA was the statistical analysis. The Least Significant Difference (LSD) was utilized for post-hoc comparison. To ensure the correctness of the data, SPSS was utilized. **Findings:** The responses of the 45 participants about the organic juice product in terms of color, odor, flavor, texture, and general acceptability were all "Highly Acceptable" with the general mean scores of 4.86, 4.57, 4.77, 4.73, and 4.73, respectively. The beverage was highly acceptable based on the respondents. This implies the tastiness of the respondents on the proposed products commands acceptability. The visual presentation of the products dictates the reactions of the participants to accept the innovation. The results further revealed that in terms of color there was a significant difference but as to odor, flavor, texture, and general acceptability there was no significant difference. However, the beverage product must be submitted to the Department of Science and Technology, Bureau of Food and Drugs (BFAD), and Bureau of Fisheries and Aquatic Resources for more tests and studies for safer consumption. **Novelty:** During this pandemic, healthy beverages are a must. To boost the immune system, healthy living is one basic requirement to fight against COVID 19 infections. The health benefits from the five resources have great potentials during these crying times. Thus, academic communities are encouraged to be innovative and creative just like creating juices to help the government combat the rapid spread of the virus.

**Keywords:** Marine resources; herbal plants; juice; nutritional values; health benefits

## 1 Introduction

Juice drink is a staple food during mealtime. There are many brands of juices in the market. Taste and colors are the common characteristics both children and adults are attracted to juices. Hence, the product became a popular choice of beverage due to its fruity mixtures. Moreover, fruits are everywhere and linked to a lessened risk of chronic degenerative diseases such as cancer and cardiovascular disorders. Thus, fruit juices can be considered natural functional foods. Furthermore, their nutritional value can provide other components with potential health benefits such as fiber, vitamins, minerals, and antioxidants phytochemicals<sup>(1)</sup>. Many juices contain Vitamin C that can cure the immune system, In the current context, nutrition, and dietary nutrient intake is important to fight back against the Corona Virus<sup>(2)</sup>.

Fruit juices comprise of essential physical, chemical, organoleptic, and nutritional characteristics of the fruit(s)<sup>(3)</sup>. Fruit and vegetable are important to good health. A study about juice pineapple (*Ananas comosus*), carrot (*Droucus carota*), and orange (*Citrus sinensis*) showed an acceptability score of 8 due to their dietary requirement of beta carotene to the consumer<sup>(4)</sup>. The beverage energy intake for pre-school children was 17% but decreased by 3% caloric consumption for school-age and adolescents. School-age children and adolescents' milk intake is remarkably lower compared to pre-school children. They preferred sweetened beverages like chocolate-based, fruits juice, soft drinks, coffee and tea, and alcoholic drinks<sup>(5)</sup>. But the Philippine government passed a bill increasing the tax 16.6 to 20.6% of all sweetened beverages<sup>(6)</sup>. This is to discourage Filipinos from patronizing sweetened products.

These beverages in the market are in the form of powdered and fresh juices. Fruit beverages would not need any preservative if properly thermally processed and packaged. However, some fruit drinks and beverages may contain certain approved preservatives to attain an even more extended shelf life after opening. Synthetic preservatives such as benzoates and sorbates have been the most commonly utilized by the fruit beverage industry<sup>(7)</sup>. These chemicals are effective for preventing fungal spoilage. Furthermore, monitoring of the amount used benzoates and sorbates in the process of food products regardless of kinds needs are required. Because too many of these chemicals also have carcinogenic effects on humans.

In this pandemic, food-purchasing attitudes are important. People start to rediscover home cooking, and staple foodstuffs are in demand. Due to the lock-downs, the closure of malls and big supermarkets, many are now supporting small, local retailers and online food shopping<sup>(8)</sup>. All countries' health, quality of life, and economics are greatly affected by the current pandemic. Food and beverages are sectors manufacturing disrupted by uncertain events<sup>(9)</sup>. Thus, making new strategies is very crucial in this pandemic.

The landscape of the food industry improved differently from the traditional concepts to technology-based ideas and productions. For instance, the beverage products are in Polyethylene Terephthalate (PET) bottles, with no sugar, and organic ingredients. These ideas have gained a positive impact and value on the consumer<sup>(10)</sup>. Nowadays, companies are into environmentally friendly packaging and health benefits concepts. Also, natural products are in demand in the market. These trends are perceived as healthier compared to processed foods<sup>(11)</sup>. Thus, humans are now conscious about what they buy and eat. They often checked labels about ingredients and nutritional values. This is one of the motivations on the part of the researcher to explore the study.

The Philippines have manufactured different local beverages. A study showed steady growth of the beverage industry in the country. However, the rising cost of raw materials didn't stop the company but instead shifted to more naturally healthy beverages. The effect of additives, preservatives, and other ingredients on our health are common problems that lead to more affordably priced products and naturally healthy beverages<sup>(12)</sup>. The country also imports juices from other countries.

Based on the product test results, Calamansi-based mock-tail with Camote leaf extract was viable for introducing the market. Moreover, the general quality of the product was acceptable and satisfied the expectations of the intended consumers based on the recipe formulated. Therefore, the study recommends producing and distributing non-alcoholic products at Central Philippines State University to substitute for soft drinks. The impacts on the consumers' health while utilizing the natural and organic resources for agricultural development are part of the government's overall campaign to achieve food and staple sufficiency and veer away from preservative-based food products<sup>(13)</sup>. Many studies proved spices and herbs are vital to combat viral infections. For instance, tulsi drops, vitamin C, and chyawanprash are used by many to boost the immune system. Spices are believed to help cure corona virus and other viral infections<sup>(14)</sup>. In addition, the participants of the study revealed immune-boosting drinks, honey, and garlic help strengthen immunity during a pandemic. Health practices like the use of supplements, medicinal plants, and immune-boosting drinks during a pandemic crisis should be considered by health policymakers<sup>(15)</sup>. Concentrated orange juices have soared by almost 25% in the market during the pandemic. Orange is a source of vitamin C and helps boost the immune system despite no evidence of the effectiveness of vitamin C against the virus<sup>(16)</sup>.

In this study, the researcher focused on producing organic beverage products using local resources such as marine and herbal plants. Raw materials quality is a factor for a good beverage<sup>(17)</sup>. Food and agriculture are the guaranteed security during this pandemic<sup>(18)</sup>. Five (5) main ingredients are jumped shell (*Strombus canarium*) meat, (*Moringa oleifera*) malunggay, (*Annona*

*muricata*) soursop, (*Cymbopogon citratus*) lemongrass, and (*Curcuma longa*) turmeric powder; hence, this study was formulated.

Marine gastropods mollusk like the *Strombus cabarium* has a lot of uses for the local community. This type of shell is used for economical food commodities in Asia Like in Indonesia. Commonly called dog conch is delicious and nutritious food<sup>(19)</sup>. The family of conches has several nutritional values. For Chinese medicine, the conch shell helps treat menopause. In addition, drinking two spoons of water stored in the conch overnight aided in indigestion and stomach pain<sup>(20)</sup>.

*Moringa* (Malunggay) leaves are rich in minerals, vitamins, and essential phytochemicals, and are used to treat malnutrition. Jump shell was abundantly found in the area and are not given attention by the shell collectors. Furthermore, the leaves also help augment breast milk in lactating mothers. *Moringa* has been dubbed a "Miracle tree" due to its medicinal and nutritional values<sup>(21)</sup>. Malunggay *Moringa oleifera* leaves help in micro-nutrient deficiency<sup>(22)</sup>. Soursop leaves have several bioactive compounds. Making the leaves as tea increases the compound activity<sup>(23)</sup>. Turmeric as tea is already in the market for the past decades. Turmeric is a spice recognized for its medicinal properties and culinary uses. Turmeric is known as the major source of polyphenol curcumin has a therapeutic aid in the management of oxidative and inflammatory conditions, metabolic syndrome, arthritis, anxiety, and hyperlipidemia. Curcumin major constituent of turmeric combined with other agents offers multiple health benefits like curcumin and black pepper showed increased bio availability by 2000% and is safe for human and animal consumption. Studies on humans showed no toxic effects. They are nonmutagenic and are safe in pregnancy in animals<sup>(24)</sup> <sup>(25)</sup>.

Furthermore, there were no studies conducted mixing shells with herbal plants as beverages. This study aims to determine the sensory attributes and general acceptability of gastropod (*Strombus canarium*) malunggay (*Moringa oleifera*), soursop (*Annona muricata*), (*Cymbopogon citratus*) lemongrass, and turmeric (*Curcuma longa*), as beverage products.

## 2 Materials and Methods

### 2.1 Research Design

The developmental design was utilized in this study. It involved a single variable of three treatment groups to determine the acceptability sensory evaluation of the organic beverage.

### 2.2 Respondents

The panel of tasters was trained respondents were women, food handlers, and students. The researcher used random to select the participants. In each category, the researcher identified fifteen (15) participants per category for a total of 45 respondents.

### 2.3 Instrument

This research employed Analysis of Variance (ANOVA) using the Five Point Hedonic Scale providing a Score sheet with 5 is the highest, followed by 4, 3, 2, and 1 in obtaining the respondents' evaluation of the sensory preference such as color, odor, flavor, texture, and general acceptability of the organic beverage. The score sheet was the basis on the Hedonic Score Sheet. In getting the sensory qualities, the Likert Scale corresponds to participants' perceptions of the organic beverage.

### 2.4 Tools and Instruments

The researcher utilized tools and equipment found at the laboratory of the Hotel and Restaurant Management Department of Northern Iloilo Polytechnic State College (NIPSC), Concepcion Campus, Iloilo, Philippines. The tools and equipment were a casserole, gas stove, mixing bowl, measuring cups, spatula, glass containers, kitchen scissors, sifters, knife, cheesecloth, blender, and weighing scales.

### 2.5 Procedures

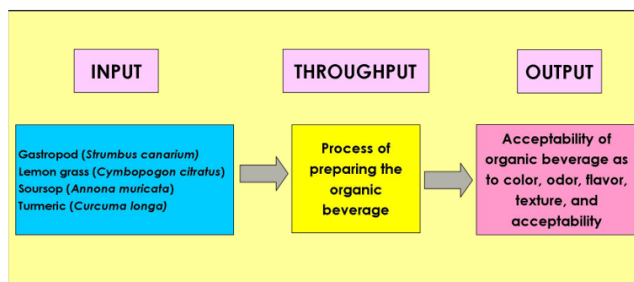
All the tools and equipment used in this research were sterilized to avoid contamination from foreign particles and microbes. The researcher gathered raw materials such as jump shell meat, malunggay, and soursop leaves, turmeric powdered, and lemongrass. The different ingredients are abundant and readily available in Barangay Lo-ong in the Municipality of Concepcion. The raw materials were cleaned, air-dried, and peeled properly. Then, the raw materials were sliced into small pieces, minced, shredded, blended, and thoroughly mixed. The liquid mixture was poured from one container into another without disturbing the sediment wrung using cheesecloth to separate the solid materials.

The raw materials were drained and air-dried. The ingredients were cleaned, dried, and peeled properly. Then, measured and weighed. The raw materials were sliced into small pieces, minced, shredded, blended, and mixed well.

**Table 1. The proportion of the ingredients in preparing the organic beverage**

Ingredients	Measurement
Malunggay (leaves)	66.6 grams
Soursop (Leaves)	33.3 grams
Jump shell meat	33.3 grams
Turmeric (powder)	33.3 grams
Lemongrass	33.3 grams
Water	49.95 grams
Sugar	49.95 grams

The filtered liquid was placed in a casserole for boiling using a gas stove and stirred slowly and constantly while pouring the sugar. Continuous stirring of the liquid in one direction stroke to minimize the production of bubbles. Boiling follows from thirty minutes to one (30-1) hour, to produce a light green and light orange color of beverage product. Cooling of the product takes place for two to three (2-3) hours. The finished product was bottled and labeled. The researcher was able to come up with the specific measurement of the mixture through trial and error testing and tasting experimental research study. Figure 1 shows the schematic diagram of the flow process of beverage preparation.



**Fig 1.** Schematic diagram of the flow process of the beverage preparation

### Statistical Analysis

Mean, standard deviation, and ANOVA were the statistical tools used in this study. To ensure the correctness of data, Statistical Package for Social Sciences SPSS was utilized. The significant difference was computed using the Least Significance Difference (LSD). Thus, a post-hoc comparison was utilized.

### 3 Results and Discussion

Table 2 shows the mean scores of the respondents as to color.

**Table 2. Mean response of the three sets of respondents as to color**

Respondents	N	Std. Deviation	Mean	Description
Women	15	0.10	4.77	”Highly Acceptable”
Students	15	0.13	4.87	”Highly Acceptable”
Food Handlers	15	0.05	4.93	”Highly Acceptable”
Total	45	0.12	4.86	”Highly Acceptable”

4.20 - 5.00 (Highly Acceptable); 3.42-4.19 (Moderately Acceptable); 2.61- 3.41 (Acceptable); 1.81 - 2.60 (Moderately Not Acceptable); 1.00 - 1.80(Highly Not Acceptable).

The results of the study in terms of color odor have a mean score between ”Highly Acceptable” regardless of respondents’ categories. A high level of acceptability dictates the agreed palatability of the respondents when it comes to color. This implies that the respondents agreed that visualization dictates the acceptability of certain products. A critical part of the adequacy and

palatability of food and drinks depends on their presentation<sup>(26)</sup>. The color of the products is always vital to the consumers. In beverage products, color is essential. Virtually, the first glance of consumers dictates how the juices will taste and the nutritional attributes. Colors measure the quality of the juice. This revealed the ripeness of fruit, oxidation, and also potential contamination<sup>(27)</sup>. The soursop leaves tea has a color of reddish-yellow<sup>(23)</sup>. Thus, this contributes to the color of the beverage.

Table 3 represents the mean response of the three sets of respondents as to odor.

**Table 3. Mean response of the three sets of respondents as to odor**

Respondents	N	Std. Deviation	Mean	Description
Women	15	0.27	4.47	"Highly Acceptable"
Students	15	0.34	4.53	"Highly Acceptable"
Food Handlers	15	0.29	4.70	"Highly Acceptable"
Total	45	0.31	4.57	"Highly Acceptable"

Also, the responses of 45 respondents as to odor in the three replicates showed a mean score between "Highly Acceptable". The smells of the juice show favorable preference among the respondents from the three categories. The effect of lemongrass as one of the ingredient produces a pleasant aroma and are acceptable to the panel of tasters and testers. Specifically, that one ingredient is the lemongrass, it has a fresh smell<sup>(28)</sup>.

Table 4 shows the mean response of the three sets of respondents as to flavor.

**Table 4. Mean response of the three sets of respondents as to flavor**

Respondents	N	Std. Deviation	Mean	Description
Women	15	0.22	4.80	"Highly Acceptable"
Students	15	0.37	4.70	"Highly Acceptable"
Food Handlers	15	0.29	4.80	"Highly Acceptable"
Total	45	0.30	4.77	"Highly Acceptable"

In aspects of flavor, all treatments were perceived by the respondents as sweet and sour got the weighted means between "Highly Acceptable". It was revealed that all respondents like very much the flavor of the three treatments.

The use of lemongrass gives a sharp lemon flavor<sup>(28)</sup> to the organic juice. Water quality is significant in every beverage. Water is linked with organoleptic and chemical properties<sup>(17)</sup>. The proportion of water used in the study help in the quality of flavor of the beverage.

Table 5 reveals the mean response of the three sets of respondents as to texture.

**Table 5. Mean response of the three sets of respondents as to texture**

Respondents	N	Std. Deviation	Mean	Description
Women	15	0.21	4.77	"Highly Acceptable"
Students	15	0.37	4.70	"Highly Acceptable"
Food Handlers	15	0.26	4.73	"Highly Acceptable"
Total	45	0.28	4.73	"Highly Acceptable"

The data disclosed that all replications had the same texture which was perceived by the respondents as "Highly Acceptable". As to the respondents' category, women got the highest rating of 4.77.

The success of food and drinks depends on the relationship between sensory profile and consumer acceptability. These factors are crucial for the success of the products<sup>(29)</sup>. Commonly, new products undergo investigation between sensory attributes and consumer acceptability to determine the most characteristics that affect the liking of the products like the beverages.

Food quality is important but organoleptic characteristics are due to physiological changes and microbiological<sup>(17)</sup>.

Table 6 exhibits the mean response of the three sets of respondents as to general acceptability.

In terms of general acceptability, the mean scores of all respondents' categories have an average of 4.73 with a description of "Highly Acceptable." This study is highly acceptable, feasible, marketable, and nutritious. Thence, the innovation has a great potential for marketing and health benefits.

Table 7 illustrates the ANOVA results in the level of acceptability of the three sets of respondents as to different parameters.

An analysis of variance (ANOVA) showed that there was a significant difference in the acceptability level of the three sets of respondents as to color  $F(2,42) = 11.083, p = .000$ . Post hoc comparison using Least Significant Difference LSD revealed that

**Table 6. Mean response of the three sets of respondents as to general acceptability**

Respondents	N	Std. Deviation	Mean	Description
Women	15	0.21	4.77	”Highly Acceptable”
Students	15	0.37	4.70	”Highly Acceptable”
Food Handlers	15	0.26	4.73	”Highly Acceptable”
Total	45	0.28	4.73	”Highly Acceptable”

**Table 7. ANOVA results in the Level of Acceptability of the three sets of respondents as to different parameters**

Parameters	df	F	Sig	Decision
Color	(2,42)	11.083	.000	Reject Hypothesis
Odor	(2,42)	2.353	.107	Accept Hypothesis
Flavor	(2,42)	0.553	.58	Accept Hypothesis
Texture	(2,42)	0.202	.818	Accept Hypothesis
General Acceptability	(2,42)	0.202	.818	Accept Hypothesis

\* p<0.05 significant @ 5% alpha level

all three means were significantly different from each other as to color. Food Handlers had a significantly higher mean of levels (M = 4.93) than did the women (M = 4.77), and students (M = 4.87). Women received significantly acceptability levels than did the students.

Results showed that the computed F value revealed that there was no significant difference based on the responses of the panel of evaluators. The table further revealed using ANOVA showed that there was no significant difference in the level of the three sets of respondents as to odor  $F(2,42) = 2.353$ ,  $p = .107$ ; flavor  $F(2,42) = 0.553$ ,  $p = .58$ ; and to both texture and general acceptability,  $F(2,42) = 0.202$ ,  $p = .818$ .

The product contains no preservatives which are not dangerous to human health. There is no risk to population health. All ingredients are organic. For instance, one component is the jump shell meat. These marine resources often feed on brown seaweeds that contain fucoidan. This sulfated polysaccharide has therapeutic influences on aquatic organisms, humans, livestock, and poultry<sup>(30)</sup>. Hence, this newly introduced beverage product has medicinal importance and nutritional value.

Also, a study on Brazilian native flora showed rich in bioactive compounds. These plants are sources of antioxidants phenolics, flavonoids, polysaccharides, vitamin C, and terpenes<sup>(31)</sup>.

In the study of soursop fruit pulp as a beverage, results revealed no significant difference in terms of color and appearance. Furthermore, the results on the flavor, sourness and general acceptability showed there was a significant difference<sup>(32)</sup>.

## 4 Conclusion

The results of the study showed the great potential of the different local ingredients as organic beverage products. Indigenous people and even our forefathers use all these ingredients composed in the organic beverage product, utilized by them as herbal medicine and food. All the raw materials combined have a nutrient content that is beneficial to the human body; above all, it boosts the body's immune system. Findings showed that the organic beverage is highly acceptable as to color, odor, texture, and general acceptability. All the five (5) ingredients are already at consumption by humans as food and beverage for decades. Nutritional values and nutrients have been proven available in products enhanced with soursop, malunggay, turmeric, and lemongrass. Coronavirus caused contagious pneumonia; thus, boosting one's immune system is a key solution. Together with various sectors, the academe plays a significant role to help the national government find solutions to combat the exponential increase of infected Filipinos by the virus. Food products with nutritional values and health benefits are the trends during this crisis. Healthy beverages are a must. Thus, the level of acceptability of the product was the strict implementation of R. A. 8550, an act providing for the development, management, and conservation of fisheries and aquatic integrating all laws pertaining thereto and for other purposes. Also, the nutritional values have been proven effective. Also R.A. 10611, an act to strengthen the food safety regulatory system in the country to protect consumer health and facilitate market access of local food and food product.

## 5 Recommendation

The researcher is encouraged to further conduct more trials using different measurements of the main ingredients. The recommendation is to ensure to identify the best proportion to create the beverage product. Also, the researcher may submit the organic beverage for further laboratory tests for shelf life, nutritional values, and health benefits at the Department of Science and Technology (DOST), Bureau of Food and Drugs (BFAD), and Bureau of Fisheries and Aquatic Resources to ensure human consumption. Furthermore, upon the release of the tests and proving it has positive health benefits, the school administration may provide financial assistants for mass products. And, adopt the results for extension programs to train the local community to increase economic benefits and livelihood activities. The college should tie up to the local government unit (LGU) and stakeholders for effective and fast technology transfer. The same study was conducted with different raw materials measurements.

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