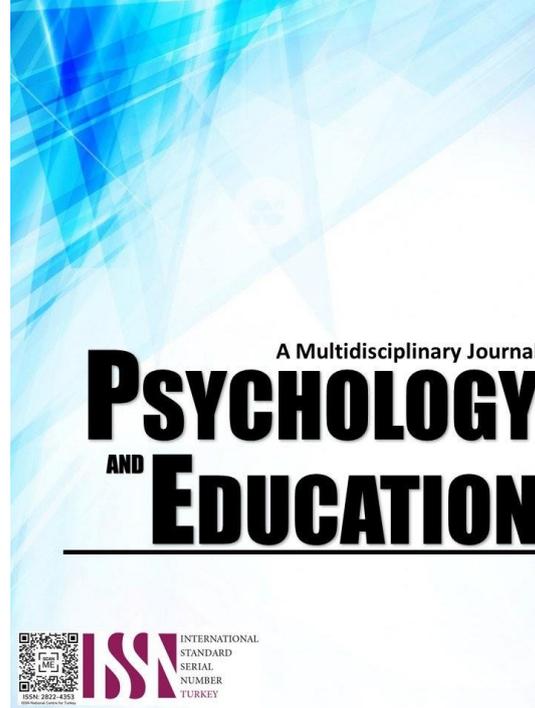


# ACCEPTABILITY AND MARKETABILITY OF LIPOTE VINEGAR



**PSYCHOLOGY AND EDUCATION: A MULTIDISCIPLINARY JOURNAL**

2023

Volume: 13

Pages: 930-938

Document ID: 2023PEMJ1221

DOI: 10.5281/zenodo.8375458

Manuscript Accepted: 2023-22-9

## Acceptability and Marketability of Lipote Vinegar

Rhyca Mae C. San Juan\*

*For affiliations and correspondence, see the last page.*

### Abstract

This study aimed to determine the acceptability and marketability of Lipote Vinegar in the groups of vinegar sellers, street food vendors, and cook/housewife-respondents of Barbara Villas 1, Barangay Silangan, San Mateo, Rizal during the academic year 2022-2023. This study used an experimental method of research which involved 90 respondents who were selected through purposive sampling. It was found out that the three groups of respondents evaluated the level of acceptability of Lipote vinegar in terms of appearance, flavor, aroma, and texture as Extremely Agreeable (EA) with the grand weighted mean of 8.52 for the vinegar seller respondents, 8.49 for the street food vendor-respondents and 8.11 for the cook or housewife-respondents. In addition, the vinegar seller and the street food vendors' respondents evaluated the level of marketability of the Lipote vinegar as Very Highly Potential (VHP) with grand weighted mean of 4.72 for the group of vinegar sellers and 4.62 for the group of street food vendors in terms of supply availability, consumer demand, sustainability and profitability, while the group of the cooks/housewives evaluated the level of Lipote Vinegar as Highly Potential (HP) with a grand weighted mean of 4.33. Comments and suggestions were provided by the respondents to further improve the product.

**Keywords:** *acceptability, marketability, vinegar*

### Introduction

The production of vinegar in the Philippines is really in demand because of abundant tropical fruits in our country since fermentation is an easy process but it takes a long time to produce. Having those fruits, many researchers tried to make vinegar out of fruit extract because it is said in other studies that vinegar does a lot of benefits. In this study, the researcher used lipote fruit as the main ingredient in making vinegar. After lipote vinegar was processed, different spices were added like the chili, black pepper, garlic, and onion. The lipote fruit is full of vitamin C. It has antioxidants which can be used to lower blood pressure, cholesterol, and diabetes. It is also good for cough.

According to Edgie Polistico, a blogger of Philippine Food Illustrated (<https://pinoyfoodillustrated.blogspot.com/2017/08/lipote.html>), Lipote with a scientific name of *Syzygium polycephaloides*, is a species of Java plum. It's a fruit tree that's endemic in the Philippines, found in Bicol, Quezon Province and in a few locations in southern Luzon, such as Metro Manila, Batangas, Laguna, Marinduque, and Eastern Visayas, which includes Samar. Lipote is a small to medium-sized tree with a trunk diameter of up to 75 centimeters and a height of up to 14 meters. The branches are inclined winged, and the leaves are alternating, oblong, 6-20 cm long, 4-7 cm wide, with 14-16 pairs of secondary veins. The flowers of the Lipote are white in color, many and in branches. Fruits are round, fleshy, dark red to black

fruits that resemble duhat but are rounder. The fruits grow in tight clusters, with each fruit measuring around 20 mm in diameter and darkening as it ripens. The ripest fruit is black or very dark in color, with a dry but pleasant acid flavor. It is consumed both ripe and raw.

According to Dr. Roberto Coronel, a ripe lipote fruit has an edible portion of 83 percent that consists of (per 100 g) water content of 83.4 g, a calories content multiply to 1000 of 77 for energy, a protein content of 0.7 g, with a fat of 2.5 g, including 12.9 g of carbohydrates, a 1.7 g content of crude fiber, with a 93 mg of calcium, and phosphorus content of 22 mg, an iron content of 0.2 mg, with 50 µg β-carotene, with a total of 10 µg for Vitamin A, 0.01 mg thiamin content, 0.02 mg of riboflavin, 0.3 mg of niacin, and with 16 mg of ascorbic acid content.

The fruit has a thinner skin that controls its marketability when fresh and ripe. Lipote is popularly used to make pickles, fruit preservations, jellies, jams, and sometimes beverages. It is also beneficial in wine production. In an effort to demonstrate the potential of lipote as a raw material for food processing, Cavite State University (CaVSU) developed methods for processing lipote into jams, jellies, and juice similar to those developed for duhat and guava. The fruits of lipote can be eaten fresh or processed or can be cooked. The ripe Lipote fruit has a high content of Vitamin C. The lipote juice ferments into wine. In some places like Quezon Province, Lipote can be mixed with lambanog. Lipote wine, lipote jelly and lipote concentrate are available in Lucban and General

Nakar. These places are in Quezon Province. A jelly made of lipote is also used as a raw material in the preparation of cakes, specifically Lipote cheesecake.

Lipote, like several native trees, is becoming increasingly scarce in its natural habitat, emphasizing the importance of conservation efforts. The most effective technique for agriculture aims to raise awareness of its usefulness as a very nutritious dietary source. The consumption increases as the currency appreciates, resulting in its spread throughout the nations as well. Once businesses study the economic potential of lipote in its processed form, it may find its way into markets both locally and internationally. Lipote fruit is commonly used to make wine in the provinces, particularly in Quezon Province. There, people typically flavor their lambanog with lipote fruit and let it ferment for only a few weeks. The study was carried out by the researcher in order to raise awareness among the public about several fruits with numerous health advantages that may be used to develop fresh and inventive food products.

### Research Questions

The purpose of this study is to utilize and determine the level of acceptability of lipote fruit as the main ingredient in making vinegar, and its marketability to the groups of vinegar sellers, cooks or housewives and street food vendors from Barbara Villas 1, Barangay Silangan, San Mateo Rizal. Specifically, the study seeks answers to the following questions:

1. How can vinegar be produced from lipote fruit?
2. How do the 30 vinegar sellers, 30 housewives or cooks, and 30 street food vendors in Barbara Villas 1, Barangay Silangan, San Mateo Rizal evaluate the level of acceptability of lipote vinegar in terms of the following criteria:
  - 2.1 Appearance;
  - 2.2 Aroma;
  - 2.3 Flavor; and
  - 2.4 Texture?
3. Are there significant differences in the evaluation of the three groups of respondents on the acceptability of lipote vinegar in terms of the criteria?
4. How do the three groups of respondents evaluate the marketability of lipote vinegar in terms of the following dimensions?
  - 4.1 Supply Availability;
  - 4.2 Consumer Demand;
  - 4.3 Sustainability; and
  - 4.4 Profitability?
5. Are there significant differences in the evaluation of the three groups of respondents on the marketability of

lipote vinegar in terms of the given criteria?

6. What are the physicochemical properties of lipote vinegar in terms of:
  - 6.1 PH;
  - 6.2 Fats;
  - 6.3 Protein Content; and
  - 6.4 Shelf Life?
7. What are the comments and suggestions offered by the respondents to further improve the product?

### Literature Review

According to the article "What Are Vinegar's Physical and Chemical Properties?" written by Staff Writer and published in reference.com (April 2020), states that vinegar is essentially an aqueous solution of acetic acid and water. It goes through a number of procedures, including acid and alcohol fermentation, to return to its native state. The type and quantity of minerals, vitamins, fiber, and organic compounds employed in the manufacturing of vinegar affect its attributes, particularly its physical qualities. Slight changes in color, acidity, and nutritional value are caused by these components. One of vinegar's fundamental chemical characteristics is its chemical formula. Since vinegar is essentially a diluted solution of acetic acid, the term "chemical formula" refers to the chemical make-up of this acid.

Consequently, according to an article written by Godinez (2020) entitled "Native Trees with Health and Medicinal Benefits that you can Plant in the Backyard" published in gmanetwork.com, the fruit of *syzygium polycephaloides*, also known as lipote, is high in vitamin C. It also contains antioxidants and can help with high blood pressure, cholesterol, diabetes, and coughing.

An article entitled "Lipote Fruit Tree" by Berto (2020) published in The Philippines Today stated by Dr. Domingo Madulid that a lipote has been listed in the Philippines as a rare and going extinct fruit tree and shrub. Berto says that most of the people know of duhat that blooms and fruits in the summer. It is so common that many people believe it is indigenous to the Philippines, but it is not. Lipote, on the other hand, is a summertime staple in Isabela, Quezon, and Palawan. Lipote is not considered an endangered species despite being endemic to the Philippines. Dr. Domingo Madulid's list of "Rare and Vanishing Fruit Trees and Shrubs in the Philippines" includes it.

In addition, in an article published in AgriBusiness by BD (2019) entitled: "Lipote: The Munchy Bunch" that

according to Dr. Roberto Coronel, the ripe lipote fruit has an edible portion that is 83 percent of the fruit and has the following nutritional values per 100 grams: 83.4 grams of water, 77 calories, 0.7 grams of protein, 2.5 grams of fat, 12.9 grams of carbohydrates, 1.7 grams of crude fiber, 93 mg of calcium, 22 mg of phosphorus, 0.2 mg of iron, 50 grams of  $\beta$ -carotene, 10 grams of total vitamin A, 0.

Also, according to the blog of Roxas (2017) entitled: Lipote Red Wine with Sea Salt (Naga City) published in mybicolblog.wordpress.com. Frances Roxas had a chance to showcase a lot of local products in Bicol, one of this is the Lipote Wine that made by Yulaik Wine Products located along Universal Road in Triangulo, Naga City. The Lipote has three types namely, Lipote Red wine, Lipote Red Wine with Sea Salt and Guyabano White Wine. As per Frances the Guyabano White Wine has unpleasant aftertaste which resembles bitter medicine or unripe fruit. While the Lipote Red wine was pleasantly tangy and sweet like baligang fruit. Lastly, the Red the Lipote Red wine with sea salt which was the best taste among others.

Meanwhile, Quintana, et. al (2021) conducted a study entitled Biotechnological Processes in Fruit Vinegar Production. In this study, other than grape vinegar, researchers also look into how technical and biotechnological procedures affect the manufacture of other fruit vinegars. A crucial step for the final product's quality is the preparation and manufacture of juice for the elaboration of vinegar by numerous processes, the most popular of which are crushing or pressing. The different conditions and methods of alcoholic and acetic fermentation have a significant impact on the final characteristics of the vinegar produced.

Moreover, according to the study of Illano, et. al (2021) entitled "Antioxidant properties of lipote (*Syzygium polycephaloides* (C.B. Rob.) Merr.) flesh and seeds as affected by maturity and processing method" cited, the berries of the lipote tree (*Syzygium polycephaloides* (C. B. Rob.) Merr) have the potential to be transformed into useful meals. The findings indicated that maturation and processing have a significant impact on the antioxidant activity and concentration of fresh lipote meat and seeds.

Moreso, on the study of Estacio et. al (2020) entitled Acute Oral Toxicity Test of Selected Philippine Indigenous Berries as Potential Food supplements published on Current Developments in Nutrition, the salient findings and conclusions of the study were shown using ICR mice, it has been demonstrated that

various quantities of freeze-dried "bignay," "lipote," and "duhat" are non-toxic and have a strong potential for being turned into dietary supplements and nutraceuticals.

Lastly, another study by Altez, et.al (2017) entitled "Utilization and Evaluation of Apple Cider and Guyabano as the Main Ingredients in Making Vinegar" aimed to evaluate the utilized apple cider and guyabano vinegar in terms of appearance, aroma, flavor and texture. Here, the researchers and developers used apple cider vinegar as their "mother liquor" particularly the BRAGG brand which was used to combine with Guyabano vinegar. Their study was evaluated by teenagers, young adults and middle/late adults.

## Methodology

This study utilized experimental method of research in attaining its objectives. This has been defined by two authors in various ways.

According to Formplus (2020) an experimental research method comprises modifying and applying one or more independent variables to one or more dependent variables in order to assess the impact of the former on the latter. The effect of independent variables on dependent variables is frequently observed and recorded throughout time to assist researchers in reaching a logical conclusion about the link between these two variable types.

## Participants of the Study

The sources of data in this study were chosen purposively by the researcher which was consisted of three groups of respondents, the 30 vinegar sellers, 30 cooks or housewives, and 30 street food vendors around Barbara Villas 1, Silangan, San Mateo Rizal.

## Instruments of the Study

This study used survey questionnaires in gathering data from the vinegar sellers, cooks or housewives and street food vendors to evaluate the level of acceptability and marketability of Lipote Vinegar. The validation of the survey questionnaire was done by the five experts from the Food and Services Management, four Language Experts, and two TESDA assessors.



**Procedures**

The researcher prepared the survey questionnaires to begin her data gathering procedure. She sought the assistance of the Research Development Office as regards the guidelines and practices in conducting research. She likewise asked for permission to conduct the study and agreed to the Research Services Agreement, which included Consent to Participate in Research Study Form that would be attached to the survey questionnaire for validation. Thereafter, she approached ten experts to confirm the validity of her survey questionnaires which eventually lead her to revise the same write assistance of her adviser. The validation of survey questionnaire was administered by the researcher to the vinegar sellers, street food vendors and cooks or housewives that chosen purposively. It was likewise the researcher who personally distributed the administered questionnaires to the groups of respondents. After administering and collecting the survey questionnaires, the researcher gathered, tabulated, analyzed, and interpreted the data using the relevant statistical methods for the research topic.

**Ethical Considerations**

Ethical considerations are necessary for research projects because all those involved have moral and legal rights. The researcher ensured that respondents' privacy was not violated without appropriate authorization and consent. The researcher did not cause any physical or emotional harm to those who took part in the study, and all information received from the reviewers was acknowledged and presented accurately.

**Results and Discussion**

This section presents the findings according to the study's research questions.

**Evaluation of the Three Groups of Respondents on the Level of Acceptability of Lipote Vinegar**

Table 1. Respondents' Evaluation on the Level of Acceptability of Lipote Vinegar Regarding its Appearance

Indicators	Vinegar Seller		Street Food Vendors		Cook/ Housewife	
	WM	VI	WM	VI	WM	VI
1. The lipote vinegar is attractive in color.	8.40	VA	8.37	VA	7.73	VA
2. It has a unique color.	8.70	EA	8.63	EA	7.97	VA
3. It has a cloudy look.	8.53	EA	8.63	EA	7.77	VA
4. It has a red-violet color.	8.60	EA	8.83	EA	8.13	VA
Overall Weighted Mean	8.56	EA	8.62	EA	7.90	VA

It can be seen in table 4 that the evaluation of the vinegar sellers and street food vendors respondents on the acceptability of lipote vinegar is Extremely Agreeable (EA) as seen in their general weighted mean of 8.56 for vinegar sellers and 8.62 for street food vendors respectively, while the cook/housewife respondents rated the same item as 7.90 with verbal interpretation of Very Agreeable (VA) in terms of appearance.

The findings implied that the three groups of respondents accepted the appearance of Lipote Vinegar.

Table 2. Respondents' Evaluation on the Level of Acceptability of Lipote Vinegar Regarding its Flavor

Indicators	Vinegar Seller		Street Food Vendors		Cook/ Housewife	
	WM	VI	WM	VI	WM	VI
1. The lipote vinegar has a balanced sour taste.	8.10	VA	8.20	VA	7.67	VA
2. It has a natural flavor from the lipote fruit.	8.47	VA	8.33	VA	8.37	VA
3. It has no after-taste.	8.67	EA	8.53	EA	8.43	VA
4. It has a well-blended taste.	8.37	VA	8.50	EA	8.20	VA
Overall Weighted Mean	8.40	VA	8.39	VA	8.17	VA

It could be seen that the evaluation of the three groups of respondents on the level of acceptability of Lipote Vinegar is Very Agreeable (VA) as seen in their overall weighted mean of 8.40 for vinegar sellers, 8.39 for street food vendors and 8.17 for the cook/housewife respondents in terms of flavor.

The findings implied that the flavor of Lipote Vinegar is accepted by the three groups of respondents because it has no after-taste and has a well-blended and balanced sour taste.



Table 3. Respondents' Evaluation on the Level of Acceptability of Lipote Vinegar Regarding its Aroma

Indicators	Vinegar Seller		Street Food Vendors		Cook/ Housewife	
	WM	VI	WM	VI	WM	VI
1. The lipote vinegar has a sour aroma.	8.17	VA	8.10	VA	8.00	VA
2. It has a distinct smell of vinegar.	8.43	VA	8.37	VA	8.13	VA
3. It has an inviting smell.	8.57	EA	8.50	EA	8.27	VA
4. It has a well-blended aroma.	8.63	EA	8.43	VA	8.33	VA
Overall Weighted Mean	8.45	VA	8.35	VA	8.18	VA

The table shows that the evaluation of the three groups of respondents on the level of acceptability of lipote vinegar is Very Agreeable (VA) as seen in their overall weighted mean of 8.45 for vinegar sellers, 8.35 for street food vendors and 8.18 for cook/housewife respondents in terms of aroma.

These findings implied that the three groups of respondents accepted the aroma of Lipote Vinegar because of its inviting smell and has a well-blended aroma.

Table 4. Respondents' Evaluation on the Level of Acceptability of Lipote Vinegar Regarding its Texture

Indicators	Vinegar Seller		Street Food Vendors		Cook/ Housewife	
	WM	VI	WM	VI	WM	VI
1. The lipote vinegar free from residue/ sediments.	8.57	EA	8.30	VA	7.93	VA
2. It has a flowy texture.	8.60	EA	8.70	EA	8.33	VA
3. It has a soothing texture.	8.70	EA	8.67	EA	8.17	VA
4. It is concentrated.	8.77	EA	8.63	EA	8.23	VA
Overall Weighted Mean	8.66	EA	8.58	EA	8.17	VA

It can be gleaned from the table that the vinegar sellers and street food vendors' evaluation of the acceptability of lipote vinegar in terms of texture is Extremely Agreeable (EA) as seen in the overall weighted mean of 8.66 for the former and 8.58 for the latter. While the cook/housewife respondents evaluated the same item as 8.17 with the verbal interpretation of Very Agreeable (VA).

The findings implied that the respondents agreed that the Lipote Vinegar has flowy and soothing texture, and it is concentrated.

### Significant Differences in the Evaluation of the Three Groups of Respondents on the Level of Acceptability of Lipote Vinegar

Table 5. Analysis of Variance of Respondents' Evaluations on the Level of Acceptability of Lipote Vinegar as to Appearance

Source of Variation	df	SS	MS	F <sub>computed</sub> Value	F <sub>critical</sub> Value	Decision	Interpretation
Between Groups	2	9.50	4.75	5.94	3.10	Reject the H <sub>0</sub>	Significant
Within Groups	87	69.63	0.80				

The computed F value of 5.94 is above the critical F value of 3.10 with 2 and 87 degrees of freedom as displayed in Table 9. At a 5% level of significance, the statistical decision is to reject the null hypothesis. Thus, there are significant differences among the evaluations of the three groups of respondents on the level of acceptability of lipote vinegar in regard to appearance.

Table 6. Analysis of Variance of Respondents' Evaluations on the Level of Acceptability of Lipote Vinegar as to Flavor

Source of Variation	df	SS	MS	F <sub>computed</sub> Value	F <sub>critical</sub> Value	Decision	Interpretation
Between Groups	2	1.05	0.53	1.88	3.10	Do not Reject	Not Significant
Within Groups	87	24.33	0.28				

It can be viewed in the table that the computed F value of 1.88 is lower than the critical F value of 3.10. Hence, this leads that the null hypothesis cannot be rejected. This shows that there are no significant differences among the evaluations of the three groups of respondents on the level of acceptability of lipote vinegar in regard to flavor.

This means that the vinegar sellers, housewives/cooks, and street food vendors have different views on the acceptability of lipote vinegar in terms of flavor.

Table 7. Analysis of Variance of Respondents' Evaluations on the Level of Acceptability of Lipote Vinegar as to Aroma

Source of Variation	df	SS	MS	F <sub>computed</sub> Value	F <sub>critical</sub> Value	Decision	Interpretation
Between Groups	2	1.09	0.54	1.33	3.10	Do not Reject	Not Significant
Within Groups	87	35.62	0.41				



The table depicted that the computed F value of 1.33 is less than the critical F value of 3.10. As a result, the statistical decision is to fail to reject the null hypothesis. At a 5% level of significance, this suggests that there are no significant differences among the evaluations of the three groups of respondents on the level of acceptability of lipote vinegar with regard to aroma.

This implies that the three groups of respondents agreed and has the same evaluation on the acceptability of lipote vinegar in terms of aroma.

Table 8. Analysis of Variance of Respondents' Evaluations on the Level of Acceptability of Lipote Vinegar as to Texture

Source of Variation	df	SS	MS	F <sub>computed</sub> Value	F <sub>critical</sub> Value	Decision	Interpretation
Between Groups	2	4.15	2.08	5.56	3.10	Reject the H0	Significant
Within Groups	87	32.50	0.37				

Analysis to the table shows that the computed F value of 5.56 is greater than the critical F value of 3.10. Therefore, the statistical decision is to reject the null hypothesis at a 5% level of significance. This concludes that there are significant differences among the evaluations of the three groups of respondents on the level of acceptability of lipote vinegar in regard to texture.

**Evaluation of the Three Groups of Respondents on the Level of Marketability of Lipote Vinegar**

Table 9. Respondents' Evaluations on the Level of Marketability of Lipote Vinegar with respect to Supply Availability

Indicators	Vinegar Seller		Street Food Vendors		Cook/Housewife	
	WM	VI	WM	VI	WM	VI
1. All the ingredients are available all year round.	4.03	HP	3.90	HP	3.47	MP
2. The raw materials can obtain easily.	4.13	HP	4.03	HP	3.67	HP
3. The ingredients are affordable.	4.73	VHP	4.40	HP	4.17	HP
4. The raw materials for the product are locally available.	4.93	VHP	4.77	VHP	4.60	VHP
Overall Weighted Mean	4.46	HP	4.28	HP	3.98	HP

The table presents that the three groups of respondents evaluated the Lipote vinegar in terms of its supply

availability as Highly Potential (HP) with an overall weighted mean of 4.46, 4.28, and 3.98 respectively.

The results imply that the supply availability of Lipote vinegar has a high potential because the raw materials are locally available, and the ingredients are affordable

Table 10. Respondents' Evaluations on the Level of Marketability of Lipote Vinegar with respect to Consumer Demand

Indicators	Vinegar Seller		Street Food Vendors		Cook/Housewife	
	WM	VI	WM	VI	WM	VI
1. The product can meet the demand of the consumers.	4.63	VHP	4.33	HP	4.10	HP
2. It can satisfy the needs of the consumer because of its nutritive value.	4.77	VHP	4.57	VHP	4.33	HP
3. It can be sold at lower price compared to commercially sold vinegar.	4.70	VHP	4.57	VHP	4.30	HP
4. The raw materials used can give the consumers health benefits.	4.90	VHP	4.73	VHP	4.43	HP
Overall Weighted Mean	4.75	VHP	4.55	VHP	4.29	HP

It can be observed in the table that the vinegar sellers and street food vendors' respondents evaluated the level of marketability of the Lipote vinegar in terms of consumer demand as Very Highly Potential (VHP) with an overall weighted mean of 4.75 for the vinegar sellers and 4.55 for the street food vendors' respondents. While the cooks/housewives evaluated the level of marketability of the Lipote vinegar in terms of consumer demands as Highly Potential (HP) with an overall weighted mean of 4.29 respectively.

These findings imply that the consumer demand of Lipote vinegar can satisfy the needs of the consumer because of its nutritional value.

Table 11. Respondents' Evaluations on the Level of Marketability of Lipote Vinegar with respect to Sustainability

Indicators	Vinegar Seller		Street Food Vendors		Cook/Housewife	
	WM	VI	WM	VI	WM	VI
1. The product is safe for consumption.	4.83	VHP	4.87	VHP	4.67	VHP
2. It can be stored for months without spoilage.	4.87	VHP	4.83	VHP	4.77	VHP
3. It needs less effort in the production.	4.83	VHP	4.80	VHP	4.47	HP
4. It can contribute to the growth of the vinegar making industries.	4.93	VHP	4.80	VHP	4.53	VHP
Overall Weighted Mean	4.87	VHP	4.83	VHP	4.61	VHP



It can be observed in the table that the three groups of respondents evaluated the level of marketability of the Lipote Vinegar in terms of its sustainability as Very Highly Potential (VHP) with an overall weighted mean rating of 4.87, 4.83, and 4.61 respectively.

With the data gathered, it implies that the Lipote vinegar can contribute to the growth of the vinegar making industries and safe for the consumption. It can be also stored for months without spoilage.

Table 12. Respondents' Evaluations on the Level of Marketability of Lipote Vinegar with respect to Profitability

Indicators	Vinegar Seller		Street Food Vendors		Cook/ Housewife	
	WM	VI	WM	VI	WM	VI
1. The viability of lipote vinegar is very high.	4.73	VHP	4.83	VHP	4.53	VHP
2. Its return of investment is achievable.	4.77	VHP	4.83	VHP	4.43	HP
3. Its return of investment is time bound.	4.77	VHP	4.83	VHP	4.37	HP
4. The profit from selling lipote vinegar is enough to sustain a livelihood.	4.83	VHP	4.83	VHP	4.40	HP
Overall Weighted Mean	4.78	VHP	4.83	VHP	4.43	HP

As presented in the table, the Vinegar Seller and Street Food Vendors' respondents evaluated the level of marketability of Lipote Vinegar in terms of its profitability as Very Highly Potential (VHP) with an overall weighted mean of 4.78 for the vinegar sellers and 4.83 for the street food vendors' respondents. While the cooks/housewives evaluated the level of marketability of the Lipote vinegar in terms of its profitability as Highly Potential (HP) with an overall weighted mean of 4.43. It could mean that the viability of Lipote Vinegar is very high.

**Significant Differences in the Evaluation of the Three Groups of Respondents on the Level of Marketability of Lipote Vinegar**

Table 13. Analysis of Variance of Respondents' Evaluations on the Level of Marketability of Lipote Vinegar as to Supply Availability

Source of Variation	df	SS	MS	F <sub>computed</sub> Value	F <sub>critical</sub> Value	Decision	Interpretation
Between Groups	2	3.57	1.79	9.88	3.10	Reject the H <sub>0</sub>	Significant
Within Groups	87	15.72	0.18				

As reflected in the table, the computed F value of 9.88 is higher than the critical F value of 3.10. At a 5% level of significance, this means that the null hypothesis should be rejected. Therefore, there are significant differences among the evaluations of the three groups of respondents on the level of marketability of Lipote vinegar pertaining to supply availability.

Table 14. Analysis of Variance of Respondents' Evaluations on the Level of Marketability of Lipote Vinegar as to Supply Consumer Demand

Source of Variation	df	SS	MS	F <sub>computed</sub> Value	F <sub>critical</sub> Value	Decision	Interpretation
Between Groups	2	3.17	1.58	8.32	3.10	Reject the H <sub>0</sub>	Significant
Within Groups	87	16.56	0.19				

Based on the table, the computed F value of 8.32 is more than the critical F value of 3.10. Thus, the statistical decision is to reject the null hypothesis at a 5% level of significance. Consequently, there are significant differences among the evaluations of the three groups of respondents on the level of marketability of Lipote vinegar pertaining to consumer demand.

Table 15. Analysis of Variance of Respondents' Evaluations on the Level of Marketability of Lipote Vinegar as to Supply Sustainability

Source of Variation	df	SS	MS	F <sub>computed</sub> Value	F <sub>critical</sub> Value	Decision	Interpretation
Between Groups	2	1.15	0.58	2.96	3.10	Do not reject the H <sub>0</sub>	Not Significant
Within Groups	87	16.95	0.19				

It can be viewed in the table that the computed F value of 2.96 is less than the critical F value of 3.10. At a 5% level of significance, this means that the null hypothesis cannot be rejected. Therefore, there are no significant differences among the evaluations of the three groups of respondents on the level of marketability of Lipote vinegar pertaining to sustainability.

Table 16. *Analysis of Variance of Respondents' Evaluations on the Level of Marketability of Lipote Vinegar as to Supply Profitability*

Source of Variation	df	SS	MS	$F_{\text{computed Value}}$	$F_{\text{critical Value}}$	Decision	Interpretation
Between Groups	2	2.80	1.40	5.86	3.10	Reject the $H_0$	Significant
Within Groups	87	21.45	0.25				

As described in the table, the computed F value of 5.68 is greater than the critical F value of 3.10. Hence, the statistical decision is to reject the null hypothesis. At a 5% significance level, this suggests that there are significant differences among the evaluations of the three groups of respondents on the level of marketability of Lipote vinegar pertaining to profitability.

### Physicochemical Properties of Lipote Vinegar

Table 17. *Summary of Physicochemical Analysis of Lipote Vinegar in pH, Fats and Protein*

Analyte per 100g	Sample Description	Reference Method	Result	Remarks
pH@25°C	Lipote Vinegar	AOAC 981.12 (Modified)	3.01	Acidic
		Acid Hydrolysis (Soxhlet)	3.01	
Total Fat, g	Lipote Vinegar	Automated Kjeldahl Method	0.050 0.048	Low Fat
Protein (N x 6.25), g			0.136 0.133	High Protein

The Lipote Vinegar has pH content with a mean value of 3.01 per 100 grams, according to the AOAC 981.12 (Modified) method. This implies that the Lipote vinegar is in the normal pH level and thus the low pH level of Lipote vinegar indicates acidic property. The acidic characteristic of the Lipote vinegar may be used as a preservative for both domestic use and in the industry.

The Lipote Vinegar contains 0.050 g and 0.048 g per 100 g through Acid Hydrolysis (Soxhlet) method. This implies that presence of total fat in Lipote vinegar may produce rancidity caused by the oxidation of unsaturated fatty acids.

The Lipote vinegar contained an average of 0.134 g, i.e., 0.134%. This implies that Lipote vinegar may produce amino acids as a result of microbial decomposition of proteins.

Like other condiments, vinegar has an expiration date but no best before date. This means that vinegar can still be used safely after its best before date. Lipote vinegar may be kept for a very long period and gets better with additional preservation.

### Comments and Suggestions Offered by the Respondents to Further Improve the Product

The comments of the respondents to further improve the lipote vinegar included: a) The Lipote Vinegar is unrivaled in terms of flavor, texture, and aroma. It has a natural flavor and provides additional health benefits; b) It is a good product which can be a good substitute to the regular vinegar we are familiar with in the market. It has the same use as the usual vinegar we all know about; and c) The Lipote Vinegar is sweet and sour and it can compete with other known vinegars such as the apple-cider vinegar, cane vinegar, etc. It tastes like a grape-flavored vinegar. It has an interesting color unlike the common vinegar.

Meanwhile, their suggestions were: a) The taste of the Lipote Vinegar resembles fruit wine but sourer in taste. The ingredient of the produced product is better than the commercialized ingredients of other famous brands of vinegar; b) To obtain the raw materials to meet the high demand of consumers, the producer must partner with local farmers to help them produce high volumes; c) If you will produce the product, you have to produce an abundant supply of lipote vinegar since the raw materials are seasonal.

### Conclusion

Based on the findings of the study, the following are the conclusions drawn: (1) The Lipote Vinegar is Extremely Acceptable by the vinegar sellers, street food vendors cook or housewives in terms of appearance, aroma, flavor, and texture. (2) The Lipote Vinegar has higher potential in terms of marketability based on the evaluation of the vinegar sellers and street food vendors. However, the produced product can still be improved to meet the level of standard of the cook or housewife respondents. (3) In terms of physicochemical analysis, the Lipote vinegar is in normal pH level which indicates its acidic property. The presence of total fat in Lipote vinegar may produce rancidity caused by the oxidation of unsaturated fatty acids. Lipote vinegar may produce amino acids because of microbial decomposition of proteins.



Based on the formulated conclusions of this study, the following recommendations are hereby forwarded: (1) The College may consider supporting the researcher's Lipote vinegar making for a potential research grant from the Department of Science and Technology. (2) The local government should promote Lipote vinegar in the local market. (3) Future researchers might look at the health benefits of manufacturing vinegar from various fruits in the future. (4) Future researchers can conduct further study for product development in terms of its nutrient contents and physicochemical value. (5) Potential consumers and entrepreneurs are encouraged to prepare different fruit vinegars and become a source of income.

## References

Altez, S. et.al, 2017. Utilization and Evaluation of Apple Cider and Guyabano as the Main Ingredients in Making Vinegar. Marikina Polytechnic College.

Berto, 2020. Lipote Fruit Tree. The Philippines Today. Date Retrieved: March 17, 2022, from <https://thephilippinestoday.com/lipote-fruit-tree/>.

Estacio, et.al. 2020. Acute Oral Toxicity Test of Selected Philippine

Indigenous Berries as Potential Food Supplements. Current Developments in Nutrition. Retrieved Date July 30, 2021, from [https://doi.org/10.1093/cdn/nzaa050\\_007](https://doi.org/10.1093/cdn/nzaa050_007).

Godinez, 2020. Native Trees with Health and Medicinal Benefits that you can Plant in the Backyard. GMA Entertainment- Celebrity Life. Date Retrieved: March 17, 2022, from <https://www.gmanetwork.com/entertainment/celebritylife/health/71224/native-trees-with-health-and-medicinal-benefits-that-you-can-plant-in-the-backyard/story>.

Illano, et.al. 2020. Antioxidant properties of Philippine Bignay (*Antidesma bunius* (Linn.) Spreng cv. 'Common') flesh and seeds as affected by fruit maturity and heat treatment. Research Gate from <https://www.researchgate.net/publication/343594517>.

Quintana, et.al. 2021. Biotechnological Processes in Fruit Vinegar Production. National Library of Medicine. Date Retrieved: July 30, 2021, from <https://pubmed.ncbi.nlm.nih.gov/33925896/>.

Roxas, Frances, 2017. Lipote Red Wine with Sea Salt (Naga City). My Bicol Blog. Date Retrieved: March 17, 2022 from <https://mybicolblog.wordpress.com/2017/07/09/lipote-red-wine-with-sea-salt-naga-city/>.

## Affiliations and Corresponding Information

**Rhyca Mae C. San Juan**

Marikina Polytechnic Collge – Philippines