

Acceptability Of Papaya (Carica L.) And Malungay (Moringa Oleifera L.) Lactation Cookies

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1. Introduction

Papaya (Carica L.) is a tropical fruit and adding it to your diet can be extremely beneficial for you. It is a rich source of Vitamin A, Vitamin C, Vitamin E, Vitamin K, Folate, and Pantothenic acid. It also contains Magnesium, Potassium, and Calcium.

A study published in The Journal of Nutrition in 2001 showed that lactating women who consumed pureed papaya (Carica L.) had higher levels of vitamin A in their breast milk. Papaya (Carica L.) is safe to consume during the final trimester and after giving birth. Papaya (Carica L.) is a rich source of essential vitamins and minerals, it is highly recommended for nursing mothers.

Green Papaya (Carica L.) i.e. unripe papaya is popular as a galactagogue across Asia. It is a super food that can boost the quantity and quality of your breast milk. Thus, papaya is a must-have for lactating moms.

Papaya (Carica L.) offers the following health benefits:

- The fruit is a low-calorie food offering just 39 calories/100 g. It contains no cholesterol. If you binge on a bowl of papaya, it can keep your tummy full without adding empty calories. It can help you with your postnatal weight management.
- It is one of the richest fruit sources of Vitamin C. It can help increase the pace of your recovery from childbirth and also boost the immunity of your little one. Eat it every day to keep infections, illnesses, cough and flu at bay.

- It is a good source of potassium as it offers 257 mg of the essential mineral per 100 g. It can help balance the electrolyte levels, regulate your blood pressure, boost your energy, improve your heart health, and enhance the functioning of your muscles.
- The fruit has a soft flesh that contains a good amount of soluble dietary fiber. A regular intake of Papaya can work wonders for your digestive system as it can enhance your bowel movement and keep constipation at bay.
- Papaya is a storehouse of Vitamin A. It can help improve your vision, fight night blindness, prevent aging and protect against macular degeneration.
- It is a rich source of β -carotene, lutein, and cryptoxanthin. These anti-oxidants can help eliminate free radicals, protect against oxidative stress and prevent cancer

Another widely grown plant in the Philippines, malunggay moringa is easily available for consumption. Most of the mothers will greatly benefit from moringa as it is a cheap and good source of calcium, iron and phosphorus.

Studies have confirmed how breastfeeding provides various benefits to both mothers and their babies, including fostering emotional bonding and improving brain development and immune functions during the child's growth.

"In cases where mothers cannot readily produce breastmilk after childbirth, Pro-Lacta can be an efficient food supplement that can help produce breastmilk. Apart from this, mothers will notice that their child will grow up to be smart, healthy and active for his/her age," said Robert Domingo, product manager of Pro-Lacta (Malunggay) capsules.

This popular plants are available in vegetable markets and can be seen and grow anywhere in the area of Daanbantayan, Cebu, Philippines all year round.

Filipinos loves to eat cookies as Manila Cookie Story launched in October 2018 to disrupt the country's evolving pasalubong (souvenir) scene. Everything about the brand--from the flavors to the packaging—is inspired by the Philippines. And why cookies? As their founder say, cookies make everyone happy. Cookies come in different shapes.

Therefore, this research work aimed to formulate a new kind of cookie that will inspire everyone especially the lactating moms. Lactation cookies with the special ingredient of papaya (*Carica L.*) and malunggay. This study be consider for its lactation content and the purpose that could help lactating mothers boost their milk for their infants.

1.1 Review of Literature

Papaya (*Carica papaya* L.) As indicated by Silva, J. D., et., al. (2017)., Papaya (*Carica papaya* L.) is a mainstream and financially significant natural product tree of tropical and subtropical nations. The natural product is devoured worldwide as new leafy foods a vegetable or utilized as prepared items. This audit centers principally around two viewpoints. First and foremost, on propels in vitro strategies for engendering, including tissue culture and micro propagation, and besides on how these advances have encouraged upgrades in papaya hereditary change. A record of the dietary and nourishing synthesis of papaya, how these differ with culture strategies, and auxiliary metabolites, both useful and destructive, and those having restorative applications, are examined. An outline of papaya post-reap is given, while 'synseed' innovation and cryopreservation are additionally covered. This is the main exhaustive survey on papaya that endeavors to coordinate such countless parts of this financially and socially significant organic product tree that ought to demonstrate important for experts engaged with both examination and trade.

Results show that ferulic, p-coumaric, and caffeic acids are the most plentiful acids in papaya skin. The most bountiful carotenoids in mash are lycopene, β -cryptoxanthin, and β -carotene. Nutrient C substance were higher in the mash than in the skin, showing an increment of 233.7% in RS4 regarding RS1. Then again, centralizations of phenolic mixtures, carotenoids, and nutrient C were exceptionally related with the cell reinforcement limit estimated by DPPH, TEAC, and ORAC. Results demonstrate that the utilization of aged papaya is better due their higher centralizations of bioactive mixtures, which can add to improve human wellbeing. Apparently, this is the primary report on "Maradol" papaya that assesses the impact of RS on the progressions of the main phytochemical compounds. This data can be valuable in deciding the conceivable job of the distinguished mixtures that can partake in the avoidance of various wellbeing issues. Further investigations are expected to assess the biodisponibility of phytochemicals present in papaya, in the wake of being devoured new or handled (Sancho, L. E. G. G., Yahia, E. M., & González-Aguilar, G. A. (2011).

Papaya (*Carica* L.) is usually known for its food and dietary benefits all through the world. The therapeutic properties of papaya leafy foods parts of the plant are likewise notable in conventional arrangement of medication. Since, each piece of papaya tree has monetary worth, it is developed on business scale. During the most recent couple of many years extensive advancement has been accomplished with respect to the organic action and therapeutic use of papaya and now it is considered as important nutraceutical natural product plant.



Figure 1 Papaya fruit and seeds (Saeed, F., et.al., 2014).

It very well may be picked as a wellspring of papain for the improvement of different modern and drug items for different illnesses. In the current survey healthy benefit of the leafy foods properties of its different parts have been talked about to give aggregate data on this multipurpose business natural product crop (Krishna, K. L., Paridhavi, M., & Patel, J. A. (2008).

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There is an impact of giving papaya (*Carica L.*) leaf juice for nursing moms who work on expanding levels of the chemical prolactin and baby weight in Tangerang. Papaya (*Carica L.*) leaf juice can be a galactagogue for moms who experience issues with a limited quantity of breastmilk (Silva, J. D., et.al., 2007).

According to Kharisma, Y., (2020, August), the study of the "Effects of aqueous extract of unripe papaya (*Carica papaya L.*) on mice milk production it was concluded that aqueous extract

of unripe papaya increases weight gain and growth of mice better than in the negative control and has an effect comparable to luteotropin preparation.

Bosom milk contains all the essential supplements for a child in the initial a half year after birth. By the by, inclusion of restrictive breastfeeding in Indonesia is still low and unpredictable. View of deficient bosom milk is one of the reasons for the disappointment of select breastfeeding. Another factor for the most well-known reason for disappointment of selective breastfeeding before a half year is that bosom milk has not come out factor or milk creation isn't sufficient. One of the approaches to help mother increment the milk supply is by urging her to attempt neighborhood galactogogues. Galactogogues are any food, drink, or exceptional spice accepted to help inception, to keep up, and to support discharge of bosom milk. Papaya leaves contain quercetin intensifies that can initiate the prolactin chemical receptors, accordingly expanding milk creation (Setyono, F. S., Adi, A. C., & Ismawati, R. (2016).

The best strategy in lessening the severe oteworthy portion however satisfactory taste of carica papaya leaf treats was 40%. Two bits of 25g carica papaya departs treats can be burned-through as galactogogue.taste of papaya (*Carica L.*) leaf treats was by bubbling in 60°C for 10 minutes. Saponin content in the treats could be kept up by 60°C for 70 minutes heating (Wijayanti, K.,et. Al., 2019).

Malunggay (***Moringa oleifera L.***). It may be cocluded that the noodles subbed by *Moringa oleifera* can build the profitability of bosom milk of female rodents. For this situation, the sautéed handling strategy has given the most noteworthy lactagogum impact. A few things that can be created identified with the consequence of this examination are as per the following: The utilization of *Moringa oleifera* leaves for the culinary of breastfeeding moms actually needs an application to every day dish to make it reasonably consumable. What's more, it additionally needs further socialization of *Moringa olieifera* identified with the fantasy of individuals towards such staple (Kiranawati, T. M., & Nurjanah, N. (2014).

Malunggay (*Moringa oleifera L.*) leaves increment the volume of breastmilk created by moms of preterm babies on baby blues days 3 to 5. We consequently suggest its standard use among moms of preterm newborn children to enlarge lactation, accordingly guaranteeing a sufficient inventory of breastmilk in the populace that needs it the most (Estrella, M., et.,al. 2000).

Malunggay (*Moringa oleifer L.*) flour is one of food stuffs utilized during the time spent making dried noodles as an improvement of food stuff which consequently can upgrade the profitability of mother bosom milk. In Indonesia, noodles for the taste, reasonableness and satiation have been turning into a most loved nourishment for different backgrounds began from youngsters to seniors. Having high sugar content, noodles, rather than rice, at that point are utilized as the starch sources (Chandra. S., et.al., 2019).

It tends to be presumed that the noodles subbed by *Moringa oleifera* leaves powder can build the efficiency of bosom milk in lactating moms. A few things that can be created identified with the consequence of this examination are as per the following: The utilization of *Moringa oleifera* leaves for the culinary of bosom taking care of moms actually needs an application to every day dish to make it reasonably consumable. Furthermore, it additionally needs further socialization of *Moringa oleifera* identified with the fantasy of individuals towards such staple. Expanded degrees of prolactin (fundamental for the creation of bosom milk) and huge degrees of weight acquire among their infants when they took moringa leaves following conceiving an offspring. Different examinations show expanded degrees of milk creation in the wake of taking moringa (Chandra. S., et. Al., 2019).

Malunggay (*Moringa Oleifera* L.) leaf is a food that can build the creation of bosom milk. The outcomes appeared organization of *Moringa* powder can build milk creation holding mice altogether. Beginning portion 0.042 mg/g body weight fundamentally rodents parent can make milk emission expanded holding white mouse and rodent little guys weight expanded with the portion given (Wistar, W.F. 2013).

1.2 Objectives

The study generally aimed to determine the degree of acceptability of papaya (*Carica* L.) and malunggay (*Moringa oleifera* L.) lactation cookies, specifically, to:

1. Develop papaya (*Carica* L.) and malunggay (*Moringa oleifera* L.) lactation cookies;
2. Evaluate the degree of the acceptability of papaya (*Carica* L.) and malunggay (*Moringa oleifera* L.) lactation cookies in terms of the attributes of color, flavor, odor, and texture;
3. Determine the significant mean difference on the different formulations toward the acceptability level of papaya (*Carica* L.) and malunggay (*Moringa oleifera* L.) lactation cookies.

2. Methods and Materials

2.1 Research Design

The study utilized the experimental method of research employing the laboratory techniques and procedures. This method developed a new product and to know the acceptance to the respondent with regards to appearance, color, texture, smell, and taste. Further, it evaluated the impact of the new papaya (*Carica* L.) and malunggay (*Moringa oleifera* L.) lactation cookies to the public.

The treatment formulation was based on the basic ingredients and procedures of cookies as to appearance, color, texture, smell and taste. Formulation 1 6.25 grams malunggay (*Moringa oleifera* L.) powder to 32 grams unripe papaya (*Carica* L.) puree + basic ingredients, Formulation 2 12.5 malunggay (*Moringa oleifera* L.) powder to 65.6 unripe papaya (*Carica* L.) puree + basic ingredients, Formulation 3 18.75 grams malunggay (*Moringa oleifera* L.) powder to 98.4 grams unripe papaya (*Carica* L.) puree + basic ingredients.

2.2 Respondents Sampling Technique

There were 45 respondents of the study who were composed of 30 students from the Hospitality Management and 15 teachers from the Bachelor of Science in Hospitality Management and Bachelor of Science in Technology and Livelihood Education of Cebu Technological University Daanbantayan Campus. The samples were subjected to sensory evaluation and testing by using the Nine-Point Hedonic Scale Rating and Five-Point Likert Scale. Score sheets were used to evaluate the sensory attributes. The result of the evaluation was collected, tabulated, analyzed, and interpreted statistically.

2.3 Instrument and Data Collection Technique

2.3.1 Instrument. The sensory evaluation sheet is used as the instrument in gathering the data. The samples are subjected to sensory evaluation by the respondents. The purpose of the instrument is to ensure which treatment formulation is the most acceptable formulation of papaya (*Carica* L.) and malunggay (*Moringa oleifera* L.) lactation cookies.

2.3.2 Data collection technique. The technique utilized in data collection was the **sensory analysis**. Establishing the composition of papaya (*Carica* L.) and malunggay (*Moringa oleifera* L.) aimed to know or determine the effects on it as an ingredients as lactation cookies and measure the quality that might desire by the consumer. Quality is the combination of those attributes that distinguish individual units of the cookies and have significance in determining that acceptability of the product. It referred to those attributes that will make the cookies acceptable to the respondents.

2.4 Data analysis

The data analysis or statistical treatment was applied on the data gathered from the sensory evaluation of respondents as product evaluators by means of:

1. Average weighted mean--was used to determine its general description. It was an average in which each quality to be average is assigned a weight.

2. ANOVA (Analysis of Variance)--was computed to determine the significant difference between the different formulations.

The data would be scored following the non-parametric scale and score with specifications verbal description. The Nine-Point Hedonic Scale was used as follows: 9-Like Extremely, 8-Like Very Much, 7-Like Moderately, 6-Like Slightly, 5-Neither Like or Dislike, 4-Dislike Slightly, 3-Dislike Moderately, 2-Dislike Very Much, 1-Dislike Extremely. While for the Five-Point Likert Scale was used to score the sensory attributes of the products.

2.5 Ethical Considerations

The study adhered to the National Ethical Guidelines 21017 for research involving human participants and Data Privacy Act of 2012. Inclusion criteria include women/men aged 18-65, students and teachers in CTU Daanbantayan Campus. Exclusion criteria include: development of papaya and malunggay (*Moringa oleifera* L.) cookies in terms of appearance, color, texture, smell and taste. Prospective participants will be informed through coordination with the Barangay representatives who have contacts with the beneficiaries and respondents. The research participants will be given full discretion to participate or not. For the data collection, the researchers will conduct a face-to-face physical interview with strict observance to the minimum health protocols such proper wearing of mask and face shield and maintaining social distance.

2.6 Data management

The researchers strictly adhered to the ethical standards and data privacy law. Data management is guaranteed secured by using tight security measure of storing, encoding, coding, accessing, and sharing. Raw data will be kept by the project leader. Only the researchers shall have the access to these raw data. The encoding and coding process will also be done by the researchers themselves. Access to the completed research files will be restricted to the funding agency and to the target publisher for monitoring and validation purposes, and if for a valid reason, other researchers would like to make a secondary data analysis, they can make a request to the office of research upon the consent of the researchers.

3.. Results and Discussion

The investigation on the acceptability of papaya (*Carica* L.) and malunggay (*moringa oleifera* L.) lactation cookies was accomplished according to the specified objectives. The researchers did well in the development of the said

Table 1. Degree of Acceptability of Papaya (Carica L.) and Malunggay (Moringa Oleifera L.) Lactation Cookies and Significant Mean Difference on the Sensory Evaluations as Perceived by the Panelists--Trial 1

Attribut es	Formulations						F value	P value	Interpre tation
	31		32		33				
	M1	SD1	M2	SD2	M3	SD3			
Color	3.8889	0.7454	3.8444	0.7372	3.2889	0.895	7.9415 2	0.000554	Reject the null
Flavor	4.0667	0.7804	3.9333	0.58	4	0.9045	0.3402 1	0.712246	Failed to reject the null
Odor	3.8222	0.8605	3.4667	0.7261	3.2	0.7862	6.9759	0.001318	Reject the null
Texture	4.1778	0.8059	3.9333	0.58	3.7778	0.7946	3.3941 3	0.036526	Reject the null

Legend:M1, M2, M3 = Mean; SD1,SD2,SD3 = Standard Deviation

papaya (*Carica L.*) and malunggay (*moringa oleifera l.*) lactation cookies, according to the procedure in three different trials. They submitted the formulated food product to the 45 sensory evaluators for sensory evaluation and testing of the attributes by using the adopted instruments, as the score sheets. The data gathered were collected, tabulated, analyzed, and interpreted statistically. This was done to meet the objectives of evaluating the degree of the acceptability of papaya (*Carica L.*) and malunggay (*Moringa oleifera L.*) lactation cookies as to the attributes of color, flavor, odor, and texture and determine the significant mean difference on the different formulations toward the acceptability level of papaya (*Carica L.*) and malunggay (*Moringa oleifera L.*) lactation cookies.

The degree of the acceptability of papaya (*Carica L.*) and malunggay (*Moringa oleifera L.*) lactation cookies as associated with the attributes of color, flavor, odor, and texture and the significant mean difference on the different formulations toward the acceptability level of papaya

(Carica L.) and malunggay (*Moringa oleifera* L.) lactation cookies could be seen herein, in three trials, in three different formulations.

Table 2. Degree of Acceptability of Papaya (*Carica L.*) and Malunggay (*Moringa Oleifera L.*) Lactation Cookies and Significant Mean Difference on the Sensory Evaluations as Perceived by the Panelists--Trial 2

Attributes	Formulations						F value	P value	Interpretation
	51		52		53				
	M1	SD1	M2	SD2	M3	SD3			
Color	4	0.7977	4.1111	0.6475	3.4222	0.9883	9.08648	0.00020 1	Reject the null
Flavor	3.533 3	0.5878	4.3111	0.6333	4.0444	0.7965	15.2728 6	0.00001	Reject the null
Odor	3.488 9	1.0362	3.7111	0.9914	3.0667	0.9863	4.77559	0.00994 5	Reject the null
Texture	3.644 4	0.6794	4.3556	0.6451	3.9333	0.8634	10.6372 1	0.00005 2	Reject the null

Legend: M1, M2, M3 = Mean; SD1,SD2,SD3 = Standard Deviation

As to Color, in Trial 1, the average weighted mean was 3.6741. In Trial 2, the average weighted mean was 3.8444. Finally, in Trial 3, the average weighted mean was 3.9629. Altogether, for the attribute of color, as to acceptability, the general average weighted mean was 3.8271, described as Light green, fourth level. With reference to the significant mean difference in the three trials of three formulations per trial for the Color attribute, there was a Rejection of the null in all three Trials 3; revealing that there was a significant difference in the three formulations in all of the three trials.

As per the Flavor, in Trial 1, the average weighted mean was 3.9910. In Trial 2, the average weighted mean was 3.9629. Lastly, in Trial 3, the average weighted mean was 3.8593. As a whole, for the attribute of flavor, as to acceptability, the general average weighted mean was

3.9377, described as Very palatable, fourth level. Concerning the significant mean difference in the three trials of three formulations per trial for the Flavor attribute, there was a Failed rejection of the null in Trial 1 but Rejected in the majority as to Trials 2 and 3; showing that there was a significant difference in the majority, two out of three formulations, in all of the three trials.

Table 3. Degree of Acceptability of Papaya (Carica L.) and Malungay (Moringa Oleifera L.) Lactation Cookies and Significant Mean Difference on the Sensory Evaluations as Perceived by the Panelists--Trial 3

Attributes	Formulations						F value	P value	Interpretation
	51		52		53				
	M1	SD1	M2	SD2	M3	SD3			
Color	3.933 3	0.780 4	4.1333	0.6606	3.8222	1.0931	1.49775	0.22740 9	Reject the null
Flavor	3.488 9	0.786 9	4.1556	0.7372	3.9333	0.809	8.56031	0.00031 9	Reject the null
Odor	3.422 2	0.965	4.0444	0.9034	3.2444	0.9331	9.09877	0.00019 9	Reject the null
Texture	3.688 9	0.900 1	4.1556	0.8779	3.9778	0.9167	3.09303	0.48667	Reject the null

Legend: M1, M2, M3 = Mean; SD1,SD2,SD3 = Standard Deviation

Color	5	Brownish green	4.24-5.00
	4	Light green	3.43-4.23
	3	Green	2.62-3.42
	2	Brown	1.81-2.61
	1	Dark green	1.00-1.80

Flavor 5	5	Highly palatable	4.24-5.00
	4	Very palatable	3.43-4.23
	3	Moderately palatable	2.62-3.42

	2	Less palatable	1.81-2.61
	1	Not palatable	1.00-1.80
Odor	5	Recognizable	4.24-5.00
	4	Slight	3.43-4.23
	3	Moderate	2.62-3.42
	2	Strong	1.81-2.61
	1	Pungent	1.00-1.80
Texture	5	Extremely chewy	4.24-5.00
	4	Moderately chewy	3.43-4.23
	3	Slight chewy	2.62-3.42
	2	Recognizable	1.81-2.61
	1	Absent	1.00-1.80

On Odor, in Trial 1, the average weighted mean was 3.0000. For Trial 2, the average weighted mean was 3.2614. With respect to Trial 3, the average weighted mean was 3.5703. In totality, the general average weighted mean was 4.2772, categorized as Recognizable. As regard the significant mean difference in the three trials of three formulations per trial for the Odor attribute, there was a **Rejection of the null in all three Trials 3**; reflecting that there was a significant difference in the three formulations in all of the three trials.

About Texture, regarding that of Trial 1, the average weighted mean was 3.9630. As to that of Trial 2, the average weighted mean was 3.9778. Concerning Trial 3, the average weighted mean was 3.9048. For all of the whole trials, the general average weighted mean was 3.9485, categorized as Moderately chewy. Pertaining the significant mean difference in the three trials, of three formulations for that of the Odor attribute, there was a Rejection of the null in all three Trials 3; manifesting that there was a significant difference in the three formulations in all of the three trials.

To summarize, the degree of acceptability of papaya (*Carica L.*) and malungay (*moringa oleifera l.*) lactation cookies, as to attributes of color, flavor, odor, and texture, would be as follows: Color would be described as Light green, with the general average weighted mean of 3.8271; Flavor was Very palatable, with the general average weighted mean of 3.9377; Odor was Recognizable, with the general average weighted mean as 4.2772; and Texture was Moderately chewy, with the general average weighted mean of 3.9485. On the significant mean difference on the different formulations toward the acceptability level of papaya (*Carica L.*) and malunggay (*Moringa oleifera L.*) lactation cookies, it could be stated that generally, there was a significant mean difference in the three formulations all throughout the three trials.

The degree of the acceptability of papaya (*Carica L.*) and malunggay (*Moringa oleifera L.*) lactation cookies as associated with the attributes of color, flavor, odor, and texture would be considered as very acceptable, as all the four attributes were categorized in the fourth level, as that of Color, Flavor, and Texture, and even at the fifth level, that of being Odor. As to the significant mean difference on the different formulations toward the acceptability level of papaya (*Carica L.*) and malunggay (*Moringa oleifera L.*) lactation cookies, the adopting public of the food production technology, through the facilitating of the researchers, would have to be very keen on choosing the most accepted formulation for catering to the consuming public.

4.. Conclusion and Recommendation

The results in the research gave a significant information on the inventive food creation, particularly, on privately acquired farming items, as the papaya (*Carica L.*) and malunggay (*Moringa oleifera L.*) lactation cookies. The level of acceptance of the papaya (*Carica L.*) and malunggay (*Moringa oleifera L.*) lactation cookies as to color, flavor, odor, and texture, reflected favor among the purchasers, as this was seen to be at the high plane of acceptability, as all the four attributes were categorized in the fourth level and even higher, as that of Color, Flavor, and Texture, in the fourth and at the fifth level, that of being Odor. For these agreeableness depiction on the four attributes, as being Light green in Color, Very palatable in Flavor, Recognizable in Odor, and Moderately chewy in Texture, this innovative food of papaya (*Carica L.*) and malunggay (*Moringa oleifera L.*) lactation cookies, could be a source of nutritious food for the lactating mothers and be contributing for the monetary gain in the existence of individuals locally. It is along these lines, that the recommendation hinges upon, to have the innovative food product be disseminated for food production through a broad local area on community extension programs in the college district, with the researchers-specialists as the lead.

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