

"Development and Acceptability Assessment of Blue Pea Butterfly Drink: A Study on Formulation and Nutritional Properties."

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Abstract: This study focuses on the development of a functional beverage combining blueberry juice with *Clitoria ternatea* (blue pea flower). The research evaluates its acceptability, shelf life, nutritional composition, and sensory characteristics. The blue pea flower, known for its high anthocyanin content and health benefits, was incorporated into blueberry juice at different concentrations to determine the most suitable formulation. Sensory parameters such as appearance, color, texture, flavor, and taste were analyzed by a semi-trained panel. Additionally, nutrient profiling, microbial stability assessment, and cost analysis were conducted to ensure the product's affordability and stability. The results indicate that the formulated Blue Pea Butterfly Drink is a nutritious and cost-effective functional beverage with potent antioxidant properties, making it a promising addition to the market. Sensory evaluation identified Sample D as the most preferred formulation in terms of overall acceptability.

Keywords: Blue pea flower, antioxidant, anti-inflammatory, anti-carcinogenic

I. INTRODUCTION

Clitoria ternatea L. (commonly known as Butterfly Pea) is a traditional Ayurvedic medicinal plant with various therapeutic properties, including memory enhancement, stress reduction, anxiolytic, antidepressant, anticonvulsant, and sedative effects. Rich in secondary metabolites such as triterpenoids, flavonol glycosides, anthocyanins, and steroids, its extracts exhibit antimicrobial, anti-inflammatory, analgesic, diuretic, antidiabetic, and blood platelet aggregation-inhibiting properties. Scientific research has substantiated its benefits, making it an attractive ingredient for functional food and beverages.

The Blue Pea Butterfly plant is widely valued in traditional medicine and modern research for its health-enhancing properties. Rich in anthocyanins (particularly ternatins), it provides strong antioxidant effects, reduces inflammation, and enhances cognitive function. Research suggests potential benefits in memory improvement, inflammation reduction, and blood sugar regulation. Furthermore, its vibrant blue pigment serves as a natural alternative to synthetic food colorants. This study evaluates consumer preference for standard and formulated Blue Pea Butterfly beverages by incorporating it into blueberry juice. The research aims to identify the optimal formulation that balances taste, appearance, and health benefits while assessing cost-effectiveness to increase its appeal among adults and adolescents.

The study explores the "Formulation, Standardization and nutrient analysis of blue pea butterfly (*clitoria*) incorporated in blueberry juice". The key objectives of the research include:

1. To assess the acceptability of the standard and formulated blue pea butterfly drink
2. To formulate blue pea butterfly incorporated into blueberry juice
3. To evaluate the best proportion of blue pea butterfly incorporated into blueberry juice
4. To analyse the cost of the standard and formulated detox drink

II. METHODOLOGY

The present study entitled "Formulation, Standardization and nutrient analysis of blue pea butterfly (*clitoria*) incorporated in blueberry juice" is

The study focused on the formulation, standardization, and nutrient analysis of blue pea butterfly (*Clitoria ternatea*) incorporated into blueberry juice. The methodology involved selecting high-quality ingredients, processing blue pea extract, and developing various formulation ratios. Sensory evaluation was conducted using a trained panel to assess attributes like appearance, taste, and flavor. The most acceptable formulation was selected based on sensory scores.

Nutrient analysis determined the product's nutritional value, while shelf-life evaluation included microbial and sensory testing at intervals. Cost analysis compared the formulated product with the standard. Statistical tools were used to analyze the data, and the final product was popularized among target consumers.

2.1 SELECTION OF INGREDIENT

Clitoria ternatea L., commonly known as "blue pea," is an underutilized plant with therapeutic employments and a few detailed wellbeing benefits. In any case, Scientifically validated value-added products from blue pea flowers are limited."Despite the price difference, the Blue Pea Butterfly drink provides significant health benefits, making it a cost-effective alternative to the standard product."consolidating blue pea blossom extricate . Dried blue pea bloom extricate were extricated utilizing reaction surface technique with shifting flower-to-water proportions, temperature, and time. A beverage was formulated using blue pea flower extract, Stevia extract, and lime, and the most suitable formulation was selected through sensory tests.". The beverage's utilitarian properties, counting antioxidant action and glycaemic administrative properties, were assessed. The ideal extraction conditions were 5 g blue pea bloom extricate of per liter of water at 59.6°C for 37 minutes. The chosen detailing appeared tall shopper inclination, antioxidant action, and rack stability..(3)

2.2 PROCESSING OF BLUE PEA BUTTERFLY

To extract *Clitoria ternatea* (blue pea butterfly) extract scientifically, immerse the flowers in water at 80°C for 10 minutes to initiate the extraction process. Subsequently, further enhance the quality of the extract by boiling it at 60°C for 30 minutes. This method optimizes the extraction and preserves the bioactive compounds of the plant.

2.3 SELECTION OF PRODUCT

A beverage covers a wide range of palate-pleasing liquids that include tea, coffee, juices, mocktails, cocktails, soft drinks, and alcoholic drinks. These drinks are prepared and enjoyed globally leading to the amalgamation of thousands of types that are consumed all over the globe. Any liquid that is consumable, especially one other than water like tea, coffee, beer, and milk is termed as a drinkand, usually, the price of a meal includes the cost of beverages as well. Purple butterfly pea flowers are infused in food products to make and serve dishes like the Melayu Nasi Keruba blue rice dish. The blue pea butterfly petals are also used to bolt a blue color. Butterfly Blue tea is said to have the flavor of a good green tea and has a deep wooden taste. One of our newest products is Blue Pea Green Tea. We have infused blue pea flowers and orange zest into green tea. Its tasting notes are fresh and citrus with a smooth finish. To end off a long day, enjoy an ice-cold glass of relaxation or mix it into a linguistically delicious cocktail!

2.4 FORMULATION AND STANDARDIZATION OF BLUE PEA BUTTERFLY

In this study, a detox beverage was formulated using *Clitoria ternatea* (blue pea butterfly) flower extract and blueberry (*Vaccinium corymbosum*) juice. Both ingredients were sourced from certified suppliers, cleaned, and sorted. *Clitoria ternatea* flowers were extracted by soaking in water at 80°C for 10 minutes, followed by a thermal treatment at 60°C for 25 minutes to enhance yield and preserve bioactive compounds. The final product was created in four different formulations, as detailed in the table 1 below:

Table 1 Variation Levels of Blue Pea Butterfly-Incorporated Blueberry juice

Product	Blueberry juice	Blue Pea butterfly
Standard	100%	0%
Sample A	75%	25%
Sample B	50%	50%
Sample C	25%	75%
Sample D	0%	100%

2.5 SENSORY ANALYSIS

At RVS College of Arts and Science, Coimbatore, the formulated blue pea butterfly drink was carefully assessed for each of its quality attributes—flavour, appearance, taste, and consistency, plus overall acceptability—by all 30 semi-trained panel members using a five-point hedonic scale. The variation that earned the most elevated scores throughout the sensory evaluation was selected. It was chosen to undergo supplemental nutrients along with microbial analysis.

2.6 NUTRIENT ANALYSIS

The Blue pea butterfly drink was developed and underwent nutrient analysis whichincludes anthocyanin and vitamin A using the standard test protocols of AOAC method.

The Blue pea butterfly drink was found to be rich in anthocyanin and vitamin A. Hence 100ml of Blue pea butterfly drink has more health benefits in our body. The anthocyanin helps in Antioxidant and anti-inflammatory, Brain boost, Improves eyesight, Beautify skin and Strengthen hair

2.7 STATISTICAL ANALYSIS

The study results were presented as percentages, along with the mean and standard deviation. Data analysis was conducted using SPSS version 20 statistical software

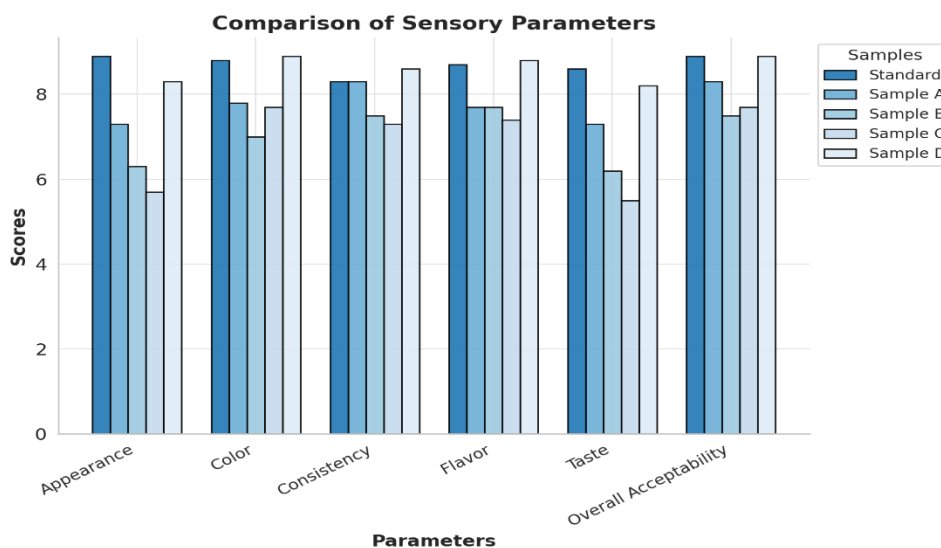
III. RESULTS AND DISCUSSION

The findings of the current study titled "**Formulation, Standardization, and Quality Evaluation of Blue Pea Butterfly Incorporated with Blueberry Juice**" are presented under the following sections.

3.1 SENSORY EVALUATION

Table 2– Sensory evaluation

Parameters	Variation				
	Standard	Sample A	Sample B	Sample C	Sample D
Appearance	8.9±0.30	7.3±1.23	6.3±1.60	5.7±2.01	8.3±0.66
Color	8.8±0.37	7.8±1.03	7.0±0.73	7.7±1.07	8.9±0.30
Consistency	8.3±0.37	8.3±0.37	7.5±1.27	7.3±1.23	8.6±0.49
Flavor	8.7±0.52	7.7±0.58	7.7±0.79	7.4±1.04	8.8±0.37
Taste	8.6±0.43	7.3±1.24	6.2±1.57	5.5±1.99	8.2±0.63
Overall acceptability	8.9±0.30	8.3±0.37	7.5±1.27	7.7±1.07	8.9±0.30



The mean sensory scores for the overall acceptability obtained through sensory evaluation of standard Bluepeabutterfly juice and varying proportions of blue berry juice incorporated Bluepeabutterfly juice with the help of score card. It is cleared that among the prepared products, **Sample D** had the highest mean score in all the criteria when compared to other samples like sample A, B, and D. So it can be concluded that **Sample D** as the best product and subjected to further analysis.

3.2 NUTRIENT ANALYSIS OF THE STANDARD AND SELECTED PRODUCT

Along with evaluating new techniques for food production and identifying the sources of problems with unacceptable quality, nutrient content analysis is a vital consideration in inventing and perfecting new products. Sufficient preliminary evaluation of a food supply depends on proper analytical methods for food components, food ingredients, and food products. The assay used to create the data must thoroughly evaluate the analysis of interest, irrespective of the final application of nutrition information—be it consumer education through food labeling or databases for research on nutrients and deficiency diseases. Table 3 below shows the nutrient analysis of the normal and chosen product blue pea butterfly mixed with blueberry juice.

Table 3 NUTRIENT ANALYSIS OF THE STANDARD AND SELECTED PRODUCT BLUE PEA BUTTERFLY INCORPORATED WITH BLUE BERRY JUICE

S.no	Nutrient	Standard	Sample D
1	Anthocyanin	3mg	7.5mg
2	Vitamin a	0.0048mg	0.15mg

3.3 MICROBIAL ANALYSIS

Microbiological examination is pivotal for deciding the security and quality of nourishment. The entire plate tally was conducted for the created blue pea butterfly drink. The drink samples were put away in holders, and the whole plate tally was assessed on day 1, day 3, and day 5. The soundness of the item was evaluated through microbial examination. The full plate check was analyzed first and after 3 and 5 days (capacity period at room temperature). The tests were put away in a holder, and without any included preservatives, no bacterial development was recognized after 5 days In this manner, the item was considered secure for utilization. Based on these outcomes, we can conclude that the recently created blue pea butterfly drink is secure for utilization when put away appropriately

Table 4 - Microbial analysis report

Name of the food	Detox Drink (Clitoria)
Type of food product	Level III
Ingredients added	Refer recipe chart
Color of the sample	Blue
Texture	Liquid
Cooked/uncooked	Fully cooked
Sample received on	2 days interval
Analysis subjected	Shelf-life analysis for Bacteriological Load

Name of the Product	No of days	Indicator Test Result (CFU / gram) and Interpretation/ Standard Plate Count			
		G	M/S	US	PH
Detox Drink (Clitoria)	Day 1	✓	-	-	-
	Day 3	✓	-	-	-
	Day 5	✓	-	-	-
	Remark	On the 2 nd & 5 th day after sampling contamination was not found in sample A and B after incubation. Day 1 to 5 was free from plate count.			
Organism identified	No Bacterial growth was observed upto 5 th day sampling. Normal lab contaminations were observed due to internal Parameters				
A	Standard				
B	Sample				

Good= **G**; Satisfactory = **S**; Marginal = **M**; Unsatisfactory = **US**; Potentially Hazardous = **P**

3.4 COST ANALYSIS FOR STANDARD AND SELECTED PRODUCT

The cost of Blueberry juice is Rs. 80/- per 100ml, compared to the standard product, which costs Rs. 20/- per 100ml."Despite the price difference, the Blue Pea Butterfly drink provides significant health benefits, making it a cost-effective alternative to the standard product."

Table 5- Cost analysis for blue pea butterfly incorporated with blue berry juice

S. No	Product	Cost per sample
1	Standard	80
2	Sample	20

IV. CONCLUSION

The research found that participants received the introduction of the blue pea butterfly drink at a higher anthocyanin's as well as vitamin A dosage per serving positively. This product does not deteriorate microbiologically for 7 days when stored in a bottle and is lower in cost than the standard product

ACKNOWLEDGEMENT

The authors are grateful to PSG College of arts & science for library facilities and food laboratories for the smooth contact of the study

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