

Development of Herbal Blue Tea from Mixture of *Clitoria Ternatea* L. flower's and *Zingiber Officinale* Powder by using Drying Method and Phytochemical Analysis of Prepared Product

Prashasti¹, Priyanka Shankar²

¹ Student, Department of Food and Nutrition, School of Home Science, Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow, India

² Assistant Professor, Department of Food and Nutrition, School of Home Science, Babasaheb Ambedkar University (A Central University), Lucknow, India

Abstract: The purpose of this study is to produce *Clitoria ternate* L. which is butterfly pea flower in powder form. *Clitoria ternate* L. flower are used for the treatment of snake bite and scorpion sting, and it also improves heart and brain health and has anti - diabetic and anti - cancer effects. Butterfly pea is also known traditionally as a food colouring that gives it its blue colour. With the addition of ginger in it give the benefits as antioxidants, antibacterial, anti - inflammatory, anti - diabetic, anti - cancer, and immunomodulatory properties. The process of making herbal tea is carried out by a drying process using a Tray dryer with the aim of improving the quality and quality of the herbal tea. The method used is with a variation of the drying time of 2 hours; 2.5 hours; 3 hours; and 3.5 hours at a constant temperature of 600C and addition of ginger powder 1% total weight of 1 gram per tea bag. So, in the present study the analysis carried out is in the form of organoleptic test such as the colour, taste, texture, aroma, and overall acceptability of herbal blue tea.

Keywords: *Clitoria ternate* L. flower Proximate analysis, Phytochemical analysis

Highlights

- 1) To standardized the effect of drying time and ginger concentration (%) in production of herbal tea from *Clitoria ternatea* L. (Aparajita).
- 2) To conduct phytochemical analysis

1. Introduction

Clitoria ternate L. which is commonly known as Aparajita flower and are also known as the blue pea flower. It is an herbaceous plant belonging to the Fabaceae family. There are around 58 global species belonging to genus *Clitoria*, which originated from the tropical equatorial Asia, and later was distributed widely in South and Central America, East and West Indies, Africa, Australia. It is an attractive blue or white flower, depending on the colours of the petals. Aparajita plant is a very beautiful herbaceous plant and mostly used in Ayurveda to cure many diseases. As it having lots of antioxidant elements property in the blue part so, it has a very soothing impact on the circulatory, nervous, anxiety, stress to constipation and psychological systems of the body.

Ginger (*Zingiber officinale* Rosc.) belongs to the family Zingiberaceae. It originated in Southeast Asia and was later used as a spice and condiment to flavour food in many countries. Apart from this, ginger is also used in traditional herbal medicine as it has a great potential for treating several ailments, including degenerative diseases like - arthritis and rheumatism, digestive disorders (indigestion, constipation and ulcers), cardiovascular diseases like - atherosclerosis and hypertension, also vomiting, diabetes and cancer. It has anti - inflammatory and antioxidant properties that regulate the aging process and the antibacterial potential that may help treat infectious diseases.

The *Clitoria* trifoliolate flowers are each 4 cm long and nearly 3 cm wide, with 5 petals attached to the calyx and corolla of blue pea flowers, consisting of 2 wings, 2 keels and 1 banner with a bright yellow marking in the center.

The global market for butterfly pea flower tea is examined across five major regions: Asia - Pacific, Europe, North America, Latin America, and the Middle East & Africa.

According to the MRFR research report, North America led the global pea flower tea market with the largest share of over 35% in 2020. This region is likely to maintain its leading position in the global market over the forecast period. The US is a major growth driver for the regional market. A major factor driving the growth surge in the regional market is the increase in cases of stress and anxiety in the region.

This flower can be used in insect bites, skin diseases, asthma, burning sensation, ascites, inflammation, leucoderma, leprosy, hemicrania, amentia and pulmonary tuberculosis. It is also commonly called as "Shankpushpi" in the Sanskrit language where it is reported to be a good "Medhya" (brain tonic). The major phytochemical constituents found in *Clitoria ternatea* are the penta cyclic triterpenoids such as taraxerol and taraxerone, ternatins, flavonoids, saponins, carbohydrates, proteins, and resins. *Clitoria ternatea* has been evaluated for its medicinal

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properties and shows promising effects as having antioxidant, antidiabetic and hepato protective activities (Manju Lata Zingare, A. Ansari, 2013).

Clitoria ternatea tea is made with five flower petals (1.0 g) that are Dissolved in 250 ml boiling water Consuming *C. ternatea* tea routinely is good for the thin phlegm in asthmatics, and can improve human health due to its non - caffeinated property (Kusuma 2019).

Clitoria ternatea L. can used as food colouring and in traditional medicines for disorder such as anasarca and ascites (Oguis, Pham et al., 2009).

Colour of blue pea flower anthocyanin extract also changes with pH. At pH lower than 3.2 the red colour exists, from pH 3.2 to 5.2 the colour changes from violet to blue, from pH 5.2 until pH 8.2 light blue colour exists and from pH 8.2 to pH 10.2 the colour changes from light blue to dark green colour (Buchweitz et al., 2012).

Polyacylated derivatives of delphinidin 3, 3', 5' - triglucoside, named as "ternatins" and are the major anthocyanins present in blue pea flower and its extract has been used in desserts and beverages in southeast asian countries such as Malaysia and Thailand (Pasukamonset, Leong et al., 2017).

Food colourants are classified as artificial and natural based on their origin. Artificial food colours are chemicals which originate from coal tar derivatives, and most of them contain an azo group (Linn et al., 2018).

The antioxidant activity of yoghurts prepared with 10% (v/v) blue pea flower anthocyanin extracts. Five different types of milk (liquid skim milk, ultra - heat treated (UHT) milk, pasteurised milk, UHT milk with skim milk, and pasteurised milk with skim milk) were used to prepare the yoghurt. The antioxidant activity of yoghurt samples coloured with blue pea flower anthocyanins was significantly higher compared to the control samples and yoghurts prepared with skim milk showed the highest antioxidant activity (437.04 ppm measured by DPPH radical scavenging activity calculated using a standard linear equation with the butylated hydroxytoluene (BHT) as a standard curve). These studies evidently showed that the antioxidant activity of food increases when anthocyanins from blue pea flowers are used as a food colourant (Sutakwa et al., 2021).

There was no significant difference in the antioxidant activity of the blue pea flower anthocyanin extracts obtained from water extraction and 50% ethanol extraction measured using DPPH and ferric reducing antioxidant power (FRAP) assays. This study suggests that the blue pea flower anthocyanins can be extracted using distilled water and used as a natural blue colouring agent with high antioxidant activity. Therefore, when extracting anthocyanins from blue pea flowers for food applications, hot water extraction with short extraction time is preferred (Jeyaraj et al., 2021).

Author Considering artificial blue colours, Brilliant Blue FCF (E133, FD&C Blue No.1) and Indigo Carmine/Indigotine (E132, FD&C blue No.2) are approved as food colours in the European Union and the United States. Patent Blue V (E131) is authorized as a food additive

in the European Union (Directive 94/36/EC; US Food and Drug Administration (FDA, 2015). Artificial blue colourants are used in various types of food. A study done in the Iranian market found that Brilliant blue colourant was commonly found in edible ices, jelly, fruit drink powder, chocolate/ice cream powder, soft drink, syrup, and candy (Dilrukshi et al., 2019).

Blue colour anthocyanins are generally found in blue colour flowers and fruits. *Clitoria ternatea* flower is one anthocyanin source containing stable blue colour poly acylated anthocyanins (VidanaGamage et al., 2021).

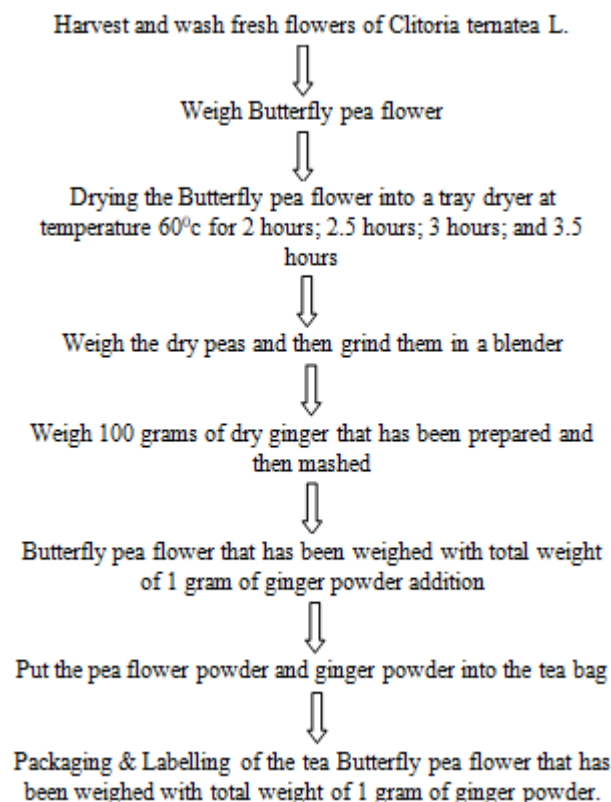
2. Materials

The blue pea flower (*Clitoria ternatea*) used in this study and purchased from the local market.

3. Method

Clitoria ternatea L. flowers were taken. The flowers were washed with the help of tap running water then rewashed with distilled water. After washing, the flowers were put on the aluminium foil for air dryers and then flowers petal were kept in Dehydrator at 60°C for 4 - 5 hours for extra water content removes from the leaves. After 4 hours flowers were taken out from dehydrator. Fine grinded powder of flowers was made with the help of Mortar and pestle. Then add dry ginger that has been prepared and mashed it with Butterfly pea flower that has been weighed with total weight of 1 gram of ginger powder addition then Put the pea flower powder and ginger powder together.

Flow chart of Production of Herbal Tea



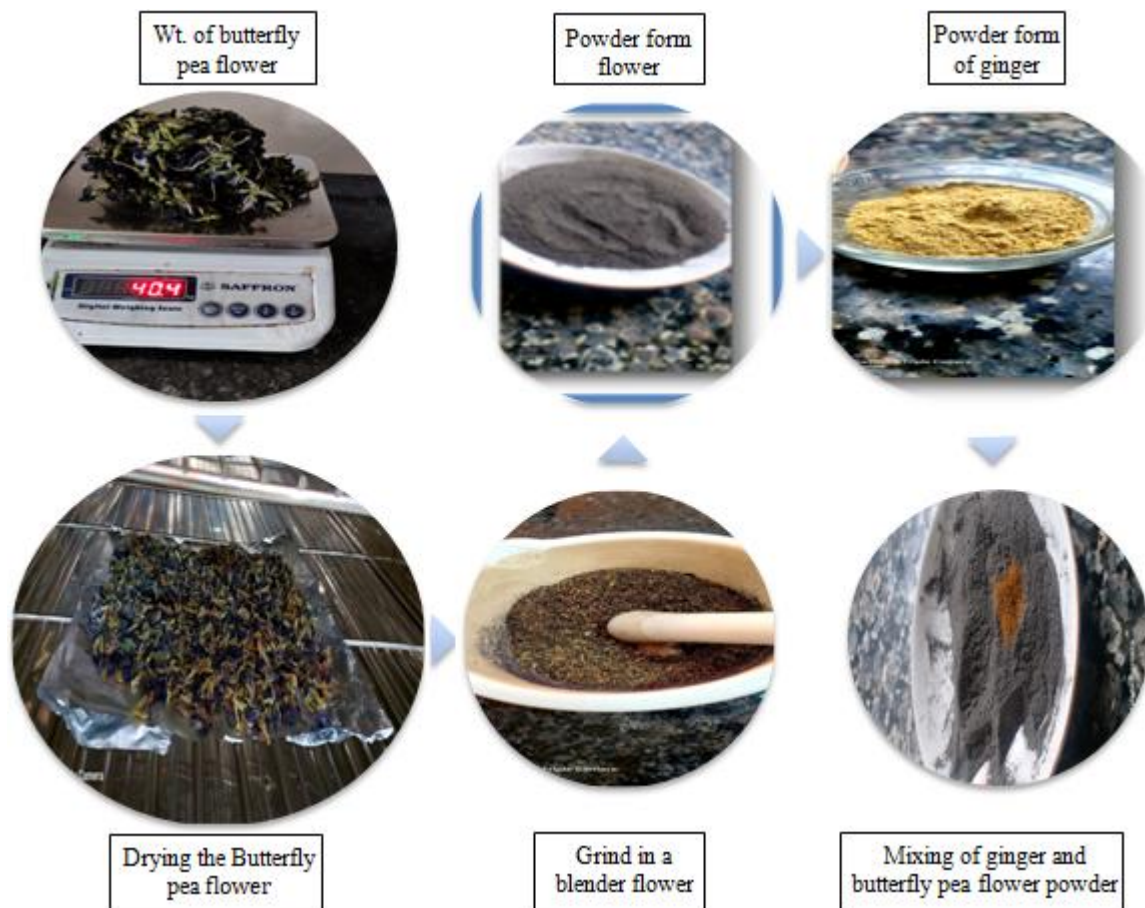


Figure 1: Development of Herbal Blue Tea

4. Chemical

Distilled water, Ethanol, Dilute HCl solution, Hager's reagent, Drangendroff's reagent, wagner's reagent, Ammonical chloroform, Chloroform, Concentrated sulphuric acid, Glacial acetic acid, Ferric chloride, Acetic anhydride, Sulphuric acid, Ethyl acetate, 1% aluminium chloride solution

5. Method

5.1 Sample preparation

Clitoria ternatea L. flowers were taken and washed with the help of tap running water then rewashed with distilled water. After washing, the flowers were put on the aluminium foil for air dryers (Fig.2) and then kept in Dehydrator at 600°C for 4 - 5 hours for extra water content removes from the leaves grinded powder of flowers was made with the help of Mortar and pestle. Then, the powdered flowers samples were stored for extraction



Figure 2: Flowers petal in Dehydrator

5.2 Preparation of flower extracts

The powdered plant parts were Soxhlet extracted with ethanol. The extract, on removal of solvent in vacuum, gave a dark greenish brown semisolid residue. The powdered material or the extracts of the flower were used for the study.

Qualitative analysis –It comprised of tests for the presence of Alkaloids, Tannins, Glycosides, Resins, Steroids, Saponins, Flavonoids.

a) Test for Alkaloids:

About 0.5 gm of ethanol extract was taken in a test tube and was diluted and homogenized with 10 ml distilled water, dissolved in 20 ml dilute HCl solution and clarified by

filtration. The filtrate was tested with Dragendroff's Wagner's and Hager's reagent. The treated solution was observed for precipitation of white or creamy colour.

- **Hager's Reagent Test** - Crude extract was mixed with 2ml of **Hager's reagent** followed by 1 ml of dil. HCl. It gives light yellow colour.
Yellow coloured precipitate indicates the presence of alkaloids.
- **Dragendroff's Reagent Test** - Crude extract was mixed with 2ml of **Dragendroff's reagent** followed by 1 ml of dil. HCl.
Orange coloured precipitate indicates the presence of alkaloids.
- **Wagner's Reagent Test** - Crude extract was mixed with 2ml of **Wagner's reagent** followed by 1 ml of dil. HCl. It gives light yellow colour.
Reddish brown coloured precipitate indicates the presence of alkaloids.

b) Test for Tannins

Five grams of the ground powder was extracted with 10 ml ammonical chloroform and 5 ml chloroform. The mixture was filtered and the filtrate was shaken with 10 drops of 0.5 M sulphuric acid. Creamish white precipitate was observed for the presence of tannins.

c) Test for Glycosides

About 0.5 gm of ethanol extract was taken in a test tube and 1 ml glacial acetic acid containing traces of ferric chloride was added to it. To this solution, 1 ml concentrated sulphuric acid was added and observed for the formation of reddish brown colour at the junction of the two layers and the upper layer turned bluish green in the presence of glycosides.

d) Test for Resins

For the tests concerning the presence of Resins, 0.5 gm of methanol extract was taken in a test tube and 5 ml of distilled water was added to it and observed for turbidity which indicates the presence of Resins.

e) Test for Steroids

About 0.5 gm of ethanol extract was taken in a test tube and 2 ml of acetic anhydride was added to it and 2 ml of sulphuric acid was added by the sides of the test tube and observed for the colour change to violet or blue green

f) Test for Saponins:

About 0.5 gm of ethanol extract was taken in a test tube and 5 ml distilled water was added to it. The solution was shaken vigorously and observed for persistent froth. The frothing was mixed with 3 drops of olive oil and shaken vigorously after which it was observed for the formation of an emulsion.

g) Test for Flavonoids:

About 0.5 gm of extract was introduced into 10 ml of ethyl acetate in a test tube and heated in boiling water for 1 min. The mixture was then filtered. About 4 ml of the filtrate was shaken with 1 ml 1% aluminium chloride solution and incubated for 10 min. Formation of yellow colour in the presence of 1 ml dilute ammonia solution indicated the presence of flavonoids.

6. Result and Discussion

The food industry has recently made an effort to launch newer functional products which are enriched with nutrients and other bio active compounds. Herbal blue tea is a trendy tea that appeals to a large group of people, including health-conscious individuals.

Researchers and food companies are becoming more interested in developing herbal blue tea that contains different types of nutrients, like - calcium, vitamins and polyphenols like flavonoids, phenolic acids, alkaloids, terpenoids, and coumarins also don't have any sugar added as a result of the rising demand for healthier drinks from health-conscious consumers. The need for herbal drinks has been on the rise in recent decades. Currently, the focus is on the development of products with health claims on the label, which can result in value-added products for manufacturers. Herbal tea is a common item in many countries' human diets, and customers generally like them because of their nutritional benefits, sensory qualities, long shelf life, and ease. The goal of this project is to create an enriched functional drink and to learn how the additional ingredients affected the phytochemical and sensory features. The most typical criteria were employed to create tea with characteristics close to those found in commercial references. This herbal tea reduces the risk of heart diseases, eye problems and to make a health claim on the package.

To reach a conclusion the acquired results are further discussed in subsections.

Phytochemical analysis of *Clitoria ternatea* L. flower powder extracts

The following table is showing the phytochemical analysis of *Clitoria ternatea* Linn extract with respect to ethanol extract

6.1 Test of alkaloids of *Clitoria ternatea* L. flower powder extracts

Phytochemical tests were performed for the presence of alkaloids in Butterfly pea flower in which all tests found Positive, Negative in Ethanol extract.

Table 1: Test of alkaloids - Methanol extract

S. No.	Constituent	Test	Ethanol extract
1.	Alkaloids	Hager's Test	Present
2.	Alkaloids	Dragendroff's Test	Absent
3.	Alkaloids	Wagner's Test	Present

Test of other secondary metabolites of *Clitoria ternatea* L. extracts

Tests were performed for the presence of Saponins, flavonoids, tannin and phenol, cardiac glycosidase, terpenoid and phlobatanins in *Clitoria ternatea* L. (blue pea) flowers.

Table2: Phytochemical test in extract of Blue pea flower

S. No.	Test	Ethanol
1.	Saponin	Present
2.	Tannin	Absent
3.	Flavonoids	Present
4.	Glycosidase	Absent
5.	Terpenoid	Absent
6.	Steroids	Absent
7.	Resin	Present

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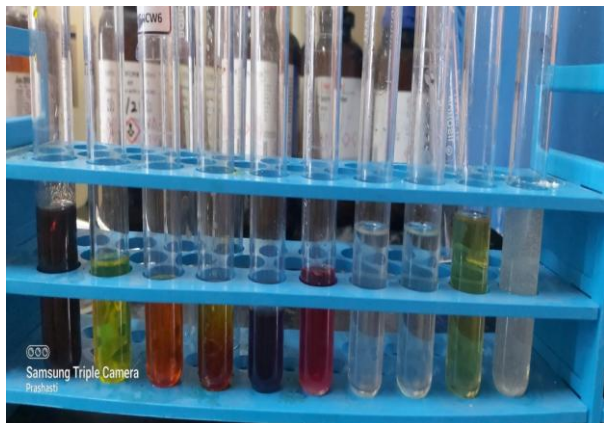


Figure 1 and 2: Different confirmatory test for Phytochemical

7. Summary and Conclusion

The production of tea enriched with blue pea flower powder can be considered as an alternative way to incorporate in health promoting health benefit into human nutrition. It has been widely used in both medicinal supplements and food ingredients and in processed food. Blue pea tea.

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