INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: https://www.ijpsjournal.com

OPEN ACCESS

Review Article

Clitoria ternatea Flower and ITS Bioactive Compounds;Potential Use as Microencapsulation Ingredient for Functional Food

Pratiksha Pandit[1*], Sneha Jankar[2], Shreya Tondlikar[3], Snehal Jadhav[4], Saurabh Patara[5], Aditi Bangar[6]

[1,2,3,4,5] Research Scholar,Siddhi's institute Of Pahramcy, Nandgaon,Murbad,Thane-421401,Maharashtra,India.
[6] Assist Professor,Dept.Of Pharmaceutical Chemistry,Siddhi's Institute Of Pharmacy,Nandgaon,Murbad,421401 Maharashtra,India.

ARTICLE INFO

Published: 7 Nov 2026
Keywords:
Clitoria ternatea, Gokarna flower, phytoconstituents, anthocyanins, antioxidant activity, microencapsulation, stability, pharmaceutical formulations
DOI:
10.5281/zenodo.24034675

ABSTRACT

Clitoria ternatea Linn., commonly known as Gokarna or Butterfly Pea, is a medicinal plant belonging to the Fabaceae family. Its flowers are rich in natural bioactive compounds such as anthocyanins, ternatins, flavonoids and phenolic compounds. These compounds are known for their antioxidant potential and are being studied for their possible applications in food, cosmetics and pharmaceutical formulations. This review focuses on the phytochemical constituents, extraction methods and biological activities of Gokarna flower. It also discusses microencapsulation as a technique to protect sensitive compounds from heat, light and other environmental factors. The stability of these compounds depends on conditions such as temperature, pH, light exposure and storage. Gokarna flower also shows potential as a natural blue food colourant and an ingredient in functional food products. Furthermore, its possible use in herbal formulations and novel drug delivery systems offers opportunities for future pharmaceutical research. However, further studies are required to improve formulation stability, standardize extracts and establish safety and therapeutic benefits. Overall, Gokarna flower is a promising natural source of bioactive compounds with potential applications in pharmaceutical and nutraceutical development.

INTRODUCTION

Clitoria ternatea Linn., commonly known as Gokarna, Butterfly Pea or Blue Pea, is a medicinal plant belonging to the family Fabaceae. It is a perennial climbing herb widely grown as an ornamental plant and traditionally used in Ayurvedic medicine. Its flowers are also used as

***Corresponding Author:** Pratiksha Pandit
Address: Research Scholar,Siddhi's institute Of Pahramcy, Nandgaon,Murbad,Thane-421401,Maharashtra,India
Email ✉: pratikshapandit014@gmail.com
Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

natural colourants in foods and beverages due to their attractive blue colour [1,2,3].

The flower of Clitoria ternatea contains several bioactive phytoconstituents, including anthocyanins, flavonoids and other phenolic compounds. Ternatins are the major characteristic anthocyanin pigments responsible for the blue colour of the flower. Other reported flavonoids include glycosides of kaempferol, quercetin and myricetin [1,2,4]. These compounds have attracted scientific interest because of their potential antioxidant properties and possible applications in food, pharmaceutical and cosmetic products [1,3].

Various studies have investigated the biological activities of Clitoria ternatea flower extracts, including antioxidant, antimicrobial, anti- inflammatory and antidiabetic activities. The extraction of bioactive compounds can be influenced by the extraction solvent, temperature, time and method used. Maceration and ultrasound-assisted extraction have been studied as methods to improve the recovery of phytochemicals from the flower [2,4].

Anthocyanins extracted from Gokarna flowers have also been investigated for their stability under different pH, temperature and storage conditions. Their potential use as natural blue colourants and in functional foods has encouraged further research [1]. However, additional studies are needed to improve extract standardization, establish safety profiles, evaluate formulation stability and determine the clinical relevance of the reported pharmacological activities [3,5]. Therefore, this review aims to summarize the botanical characteristics, phytochemical constituents, extraction methods, pharmacological activities and potential applications of Clitoria ternatea flower. It also highlights research gaps and future opportunities for the development of standardized herbal formulations

2. Phytochemical Constituents of Gokarna Flower (Clitoria ternatea)

Gokarna flower (Clitoria ternatea Linn.) is a rich source of natural bioactive compounds that contribute to its characteristic blue colour and biological properties. The major phytochemical constituents reported in the flower include anthocyanins, ternatins, flavonoids and other phenolic compounds. These compounds have gained scientific attention because of their potential antioxidant activity and possible applications in pharmaceutical formulations, cosmetics and natural food colouring. Their composition and quantity may vary depending on the extraction method, solvent and plant material used [1,2].

2.1 Anthocyanins

Anthocyanins are naturally occurring, water-soluble pigments found in many flowers, fruits and vegetables. In Gokarna flowers, they are responsible for the attractive blue colour of the petals. These pigments belong to the flavonoid group and have been widely studied for their ability to scavenge free radicals in laboratory experiments. Their colour can change according to the pH of the surrounding medium, making them useful for research on natural colourants and pH-sensitive materials. Anthocyanins from Gokarna flowers are being explored for applications in food products, functional ingredients and intelligent packaging [1].

2.2 Ternatins

Ternatins are the characteristic anthocyanin pigments present in the petals of Clitoria ternatea. Chemically, they are polyacylated derivatives of delphinidin glycosides. Their distinctive molecular structure contributes to the intense blue colour of the flower and helps improve pigment stability under certain conditions. Researchers have investigated ternatins for their antioxidant potential and suitability as natural blue colouring agents. However, light exposure and environmental conditions can affect their stability, which Makes further formulation and stability studies important [1,2].

2.3 Flavonoids

Flavonoids are naturally occurring plant compounds belonging to the polyphenol family. Various flavonol glycosides have been reported in Gokarna flowers, including derivatives of kaempferol, quercetin and myricetin. These compounds are of interest because of their potential antioxidant and other biological activities. Flavonoids may help protect biological systems against oxidative stress in experimental models. Their identification and estimation are therefore important

parts of phytochemical screening and the standardization of Gokarna flower extracts [2,6].

2.4 Phenolic Compounds

Phenolic compounds are another important group of phytochemicals found in Gokarna flower extracts. They contain one or more phenolic groups and contribute to the overall antioxidant potential of the plant. The total phenolic content of an extract can be estimated using methods such as the Folin– Ciocalteu assay. Studies have shown that the extraction solvent and processing method can influence the amount of phenolic compounds recovered from the flowers. For this reason, further research on extraction optimization, characterization and quality control may help in developing consistent herbal extracts [2,7].

3. Bioactive Compounds of Gokarna Flower (Clitoria ternatea)

3.1 Anthocyanins

Anthocyanins are naturally occurring, water-soluble pigments found in

Gokarna flower petals. They belong to the flavonoid group and are mainly responsible for the flower's attractive blue colour. These pigments have been studied for their antioxidant potential and their ability to act as natural colourants. Their colour and stability can change depending on pH, temperature and light exposure. Therefore, anthocyanins are important in research on natural pigments, functional foods and formulation development [1].

3.2 Ternatins

Ternatins are a group of blue anthocyanin pigments found particularly in the petals of Clitoria ternatea. They are acylated derivatives of delphinidin glycosides and contribute to the intense blue colour of the flower. Their chemical structure helps maintain the pigment's colour under certain conditions. Research has identified several ternatin types, including A, B, C and D series. These compounds are of interest for natural colourant development and studies of pigment stability [8].

Reference [8]: Clitoria ternatea Flower and Its Bioactive Compounds: Potential Use as Microencapsulated Ingredient for Functional Foods. Applied Sciences. 2023;13 (4):2134.

3.3 Flavonoids

Flavonoids are plant-derived polyphenolic compounds that contribute to the biological properties of Gokarna flower extracts. Studies have identified flavonol glycosides derived from kaempferol, quercetin and myricetin in the flower. These compounds have been investigated for antioxidant and other biological activities in laboratory studies. Their identification and measurement are useful for understanding the chemical composition of the flower and developing standardized extracts [2].

3.4 Phenolic Compounds

Phenolic compounds are naturally occurring plant constituents that include several groups of molecules, such as phenolic acids and flavonoids. Research on Clitoria ternatea flower extracts has measured total phenolic content and investigated their antioxidant properties using laboratory assays, including DPPH and FRAP. The results indicate that phenolic-rich extracts can show free-radical-scavenging and reducing activities under experimental conditions. Further work is needed to identify individual compounds and establish their contribution to the observed effects [9].

4. Extraction Methods of Gokarna Flower (Clitoria ternatea)

Extraction is an important process used to separate bioactive compounds from Gokarna flowers using suitable solvents. It helps researchers obtain phytochemicals such as anthocyanins, ternatins, flavonoids and phenolic compounds for further analysis. The type of solvent, temperature, extraction time and method can affect the quantity and quality of the extracted compounds [2].

4.1 Maceration

Maceration is a simple and commonly used extraction method in which dried, powdered Gokarna flowers are soaked in a suitable solvent, such as water, ethanol or aqueous ethanol, for a specific period. During this process, the solvent penetrates the plant material and dissolves some of its bioactive constituents. The

mixture is then filtered to obtain the extract. This method is easy to perform and requires basic laboratory equipment, but it can take several hours or days [2].

4.2 Ultrasound-Assisted Extraction (UAE)

Ultrasound-assisted extraction uses high-frequency sound waves to improve the release of bioactive compounds from plant tissues into the solvent. The sound waves produce cavitation, which helps disrupt plant cells and promotes the transfer of phytochemicals into the solvent. Research on Gokarna flowers has found that this method can improve the extraction of phenolic compounds and flavonoids while reducing extraction time under suitable conditions [10].

4.3 Microwave-Assisted Extraction (MAE)

Microwave-assisted extraction uses microwave energy to heat the solvent and plant material. This heating helps release bioactive compounds from the flower tissues into the solvent. The method has been investigated for extracting anthocyanin pigments from Gokarna flowers and can offer shorter processing times than conventional heating. However, temperature and extraction conditions must be controlled to avoid degradation of heat- sensitive compounds [2,11].

4.4 Solvent Extraction

Solvent extraction involves using a suitable liquid to dissolve and recover specific phytochemicals from Gokarna flowers. Water, ethanol and aqueous ethanol are commonly investigated for extracting polar compounds, including anthocyanins and phenolics. The solvent selected influences the type and amount of compounds obtained. For pharmaceutical research, ethanol-water mixtures may be useful when preparing extracts for further phytochemical analysis [11].

4.5 Importance of Extraction Methods

The selection of an appropriate extraction method is essential for obtaining a good-quality Gokarna flower extract. Conventional methods such as maceration are simple and accessible, whereas ultrasound- and microwave- assisted methods may offer advantages in extraction efficiency and processing time. The final method should be selected based on the target compound, extract yield, stability, solvent safety and intended formulation [2,10].

5. Microencapsulation Technology

Microencapsulation is a technique in which bioactive compounds are surrounded by a protective coating or trapped within a suitable material. In Gokarna flower (Clitoria ternatea), this technique can be used to protect sensitive compounds, especially anthocyanins and ternatins, from environmental factors such as heat, light, oxygen and moisture. It may also improve storage stability, handling and controlled release of the encapsulated ingredients [8,12].

1. **Freeze drying:** The extract and coating material are frozen, and water is removed under vacuum. Because the process uses low temperatures during drying, it can help preserve heat-sensitive compounds, although it is generally more time-consuming and expensive.
2. **Ionic gelation:** The extract is incorporated into a suitable polymer solution, such as alginate, and exposed to appropriate ions to form gel particles. This method may be useful when developing encapsulated ingredients under relatively mild conditions.

These techniques are widely studied for protecting anthocyanins and other sensitive plant compounds; the best method depends on the extract, coating material and intended application [12,13].

5.1 Wall Materials Used

Wall materials provide a protective layer around the active compounds. Commonly studied materials include:

- Maltodextrin: Helps form a dry powder and protect pigments during processing.
- Gum arabic: Helps stabilize the encapsulation system.
- Gelatin: A protein-based material that can form a protective matrix. • Alginate: A polysaccharide used to prepare gel-based encapsulated particles.

The selection of wall material can influence encapsulation efficiency, colour retention, stability and release of the active compounds [8,13].

5.2. Advantages of Microencapsulation

- Protects sensitive phytochemicals from environmental damage.
- May improve the stability and shelf life of Gokarna flower extract.
- Helps convert liquid extracts into easier-to-handle powders.
- Can reduce unwanted interactions with other ingredients.
- May help control the release of bioactive compounds.

6.Applications and Future Scope

Microencapsulated Gokarna flower extract may be investigated for use in herbal formulations, nutraceuticals, natural colourants and functional food products. Future research can compare different coating materials and encapsulation techniques, measure encapsulation efficiency, and assess antioxidant activity and stability during storage. Further pharmaceutical and safety studies are required before therapeutic benefits can be established. DPPH, ABTS and ferric-reducing assays. Research has also shown that the anthocyanin-rich fraction may have stronger antioxidant activity than crude flower extracts. Therefore, Gokarna flower has potential as a natural antioxidant ingredient in food and pharmaceutical formulations. Further studies are needed to confirm its effects in humans [8,12,13].

7. MECHANISM OF ANTIOXIDANT

1. **Free radical scavenging:** Gokarna flower extract can neutralize free radicals and reduce their harmful effects through its antioxidant compounds [16].
2. **Protection against oxidation:** Phenolic compounds and flavonoids present in Gokarna flower contribute to antioxidant activity and may help reduce oxidative damage [9].
3. **Natural antioxidant source:** Due to its antioxidant properties, Gokarna flower has potential for use in functional foods and nutraceutical formulations [2].

8.Stability of Bioactive Compounds in Gokarna Flower (Clitoria ternatea)

The bioactive compounds in Gokarna flower, especially anthocyanins called ternatins, are affected by temperature, pH, light and storage conditions. These factors can change the flower extract's colour, antioxidant activity and overall quality. Although ternatins show good stability under certain conditions, proper handling and storage are important to preserve their properties [1,17].

1. Effect of Temperature

High temperatures can gradually break down anthocyanins and reduce the colour intensity of Gokarna flower extract. Research has shown that degradation increases as temperature rises, while lower-temperature storage helps preserve the pigments. Therefore, excessive heating should be avoided when preparing and storing Gokarna flower extracts [1,17].

2. Effect of pH

The pH of the surrounding medium affects the colour and stability of Gokarna flower anthocyanins. The extract may appear red or pink under strongly acidic conditions, blue or violet at suitable pH levels, and greenish under alkaline conditions. Studies have also found that ternatins can show good stability near neutral pH, although the outcome depends on the specific conditions [17,18].

3. Effect of Light

Exposure to direct light can speed up the degradation of anthocyanins and cause a loss of colour. Research on butterfly pea flower extracts found better pigment retention when samples were protected from light. Hence, storing the extract in light-protective containers may help maintain its quality [1,18].

4. Effect of Storage Conditions

Storage temperature and packaging play an important role in preserving Gokarna flower bioactive compounds. Refrigeration can help maintain anthocyanin stability for longer periods, whereas exposure to higher temperatures and light may accelerate degradation. Microencapsulation is another promising approach that

can improve pigment retention and antioxidant stability during storage [17,19].

9.Application of Gokarna Flower in Functional Foods

Gokarna flower (Clitoria ternatea) is gaining attention in the food industry because it contains natural blue pigments called ternatins, along with flavonoids and other phenolic compounds. These compounds give the flower its attractive colour and contribute to its antioxidant activity. Therefore, Gokarna flower extract has potential for use as a natural food colourant and functional ingredient in different food products [20,21].

1. Natural Food Colourant

Gokarna flower extract can be used as a natural blue colourant instead of some synthetic food colours. Its colour may change with pH, producing blue, violet or other shades. Research has demonstrated its use for colouring rice and traditional desserts. Its stability during processing and storage must be considered when developing food products [20,21].

2. Uses in Functional Food Products

Beverages: Used in herbal teas, refreshing drinks and functional drink powders to provide natural colour and antioxidant compounds [2].

Dairy products: Butterfly pea flower anthocyanins have been studied as natural colourants in yoghurt and fermented milk [22].

Bakery products: The extract has potential for use in cakes, muffins and bread to improve their appearance with natural colour [21,23].

Rice and desserts: The flower extract can give blue colour to cooked rice, jellies and traditional sweets [20,23].

Functional food development: Its phenolic compounds and antioxidant activity make it a promising ingredient for developing foods with additional functional properties. However, further studies are needed to confirm specific health benefits in humans [2,24].

10.Future Scope of Gokarna Flower (Clitoria ternatea) in Pharmaceutical formulations

Gokarna flower contains bioactive compounds, particularly ternatins (anthocyanins), flavonoids and other phenolic compounds. These constituents make it a promising candidate for future pharmaceutical research. However, most evidence is still based on laboratory and animal studies, so further research is required before its therapeutic applications can be established. [24,25]

1. Development of Pharmaceutical Formulations

Gokarna flower extract could be investigated for use in different dosage forms, such as herbal tablets, capsules, gels, creams and topical preparations. Researchers can study suitable excipients, extract concentrations, drug release and formulation performance to develop stable and effective products. For example, a 2024 study investigated Clitoria ternatea-based silver nanoparticles incorporated into nanogel systems for wound-healing applications [25,26].

2. Improvement of Stability

Bioactive compounds, especially anthocyanins, can degrade under certain temperature, light and storage conditions. Future research can focus on improving their stability through microencapsulation, suitable coating materials, optimized drying methods and protective packaging. These approaches may help preserve colour and antioxidant activity during storage [12,24].

3. Development of Novel Drug Delivery Systems

Future studies can explore nanocarriers, nanoparticles, hydrogels and other advanced drug delivery systems containing standardized Gokarna flower extracts or selected bioactive compounds. These systems may improve dispersion, protect sensitive compounds and help deliver them to the intended site. Their actual effects on drug release, absorption and therapeutic activity must be experimentally confirmed [12,26].

4. Pharmacological and Therapeutic Research

Further studies can investigate the antioxidant, anti-inflammatory, antimicrobial and other reported biological activities of Gokarna flower. Researchers should identify the compounds responsible for these effects

and evaluate their effectiveness using suitable laboratory, animal and clinical studies. [24,25]

5. Safety, Bioavailability and Standardization

Future research should establish the appropriate dose, toxicity profile, absorption, metabolism and possible interactions with other medicines. Standardized extraction procedures and quality-control tests are also needed to ensure consistent composition and quality between batches [24,25].

6. Further Research Opportunities

Develop stable herbal formulations with reproducible quality.

Compare extraction techniques to improve the yield of selected bioactive compounds.

Investigate topical formulations for skin-related applications.

Study long-term stability, shelf life and packaging requirements. Conduct well-designed clinical trials to assess safety and potential health **benefits**.

These research areas could support the development of reliable pharmaceutical and nutraceutical products from Gokarna flower, provided their benefits and safety are demonstrated through appropriate studies [24,25].

CONCLUSION

Gokarna flower (Clitoria ternatea) is a promising medicinal plant containing several bioactive compounds, including anthocyanins (ternatins), flavonoids and phenolic compounds. These constituents contribute to its natural blue colour and reported antioxidant and other biological activities. The flower also has potential applications in natural food colouring, functional foods and pharmaceutical formulations.

However, the stability of its bioactive compounds can be affected by temperature, pH, light and storage conditions. Techniques such as microencapsulation and suitable packaging may help improve stability and preserve its properties. Further research is required to standardize extraction methods, develop effective formulations and establish safety, bioavailability and therapeutic benefits through clinical studies. Overall, Gokarna flower represents a valuable subject for future research in pharmaceutical and nutraceutical development.

REFERENCES

1. Vidana Gamage GC, Lim YY, Choo WS. Anthocyanins from Clitoria ternatea flower: biosynthesis, extraction, stability, antioxidant activity, and applications. Frontiers in Plant Science. 2021;12:792303. https://doi.org/10.3389/fpls.2021.792303
2. Jeyaraj EJ, Lim YY, Choo WS. Extraction methods of butterfly pea (Clitoria ternatea) flower and biological activities of its phytochemicals. Journal of Food Science and Technology. 2021;58 (6):2054–2067. https://doi.org/10.1007/s13197-02004745-3
3. Sahu D, Sahu JK, Kumar V, Tamrakar SK. Phytochemicals and medicinal uses of Clitoria ternatea. International Journal of Plant & Soil Science. 2023;35 (18):942–951. https://doi.org/10.9734/ijpss/2023/v35i183405
4. Mukherjee PK, Kumar V, Kumar NS, Heinrich M. The Ayurvedic medicine Clitoria ternatea—from traditional use to scientific assessment. Journal of Ethnopharmacology. 2008;120 (3):291–301. https://doi.org/10.1016/j.jep.2008.09.009
5. The multifaceted Clitoria ternatea (Aparajita): a review of its phytochemistry, medicinal uses and commercial applications. European Journal of Medicinal Plants. 2024;35 (6):1229.
6. Kuswandari F, Sinaga E, Nurbaiti, Husni A. Analysis of total phenols, total flavonoids and anthocyanin levels in blue pea flowers (Clitoria ternatea L.). Journal of Tropical Biodiversity. 2022;2 (3).
7. Thuy NM, et al. Identification of anthocyanin compounds in butterfly pea flowers (Clitoria ternatea L.) by ultra-performance liquid chromatography/ultraviolet coupled to mass spectrometry. Molecules. 2021;26 (15):4539.
8. Multisona RR, Shirodkar S, Arnold M, Gramza-Michałowska A. Clitoria ternatea flower and its bioactive compounds: potential use as

microencapsulated ingredient for functional foods. Applied Sciences. 2023;13 (4):2134.

9. Li C, Tang W, Chen S, et al. Phytochemical properties and in vitro biological activities of phenolic compounds from flower of Clitoria ternatea L. Molecules. 2022;27 (19):6336. https://doi.org/10.3390/molecules27196336
10. Mehmood A, et al. Impact of ultrasound and conventional extraction techniques on bioactive compounds and biological activities of blue butterfly pea flower (Clitoria ternatea L.). Ultrasonics Sonochemistry. 2019;58:104639.
11. Effect of organic solvents and water extraction on the phytochemical profile and antioxidant activity of Clitoria ternatea flowers. ACS Food Science & Technology. 2021;1 (9):1567–1577.
12. Microencapsulation of anthocyanins—critical review of techniques and wall materials. Applied Sciences. 2021;11 (9):3936. https://doi.org/10.3390/app11093936
13. Nano/microencapsulation of anthocyanins: a systematic review and meta-analysis. Food Research International. 2020;132:109077.
14. Sivaprabha J, Supriya J, Sumathi S, Padma PR, Nirmaladevi R, Radha P. A study on the levels of nonenzymic antioxidants in the leaves and flowers of Clitoria ternatea. Ancient Science of Life. 2008;27 (4):28–32. https://pmc.ncbi.nlm.nih.gov/articles/PMC3330867/
15. Chayaratanasin P, et al. Effects of different solvents on total phenolic and total anthocyanin contents of Clitoria ternatea L. petal and their anticholesterol oxidation capabilities. International Journal of Food Science & Technology. 2019;54 (2):424– 431. https://doi.org/10.1111/ijfs.13953
16. Chayaratanasin P, et al. Inhibitory effect of Clitoria ternatea flower petal extract on fructose-induced protein glycation and oxidation-dependent damages to albumin in vitro. BMC Complementary and Alternative Medicine. 2015.
17. Escher GB, Wen M, Zhang L, Rosso ND, Granato D. Phenolic composition by UHPLC-Q-TOF-MS/MS and stability of anthocyanins from Clitoria ternatea L. (butterfly pea) blue petals. Food Chemistry. 2020;331:127341. https://doi.org/10.1016/j.foodchem.2020.127341
18. Spectral characteristic, storage stability and antioxidant properties of anthocyanin extracts from flowers of butterfly pea (Clitoria ternatea L.). Molecules. 2021;26 (22):7000. https://doi.org/10.3390/molecules26227000
19. Enhancing the stability of butterfly pea flower (Clitoria ternatea) extract by waterin-oil-in-water encapsulation with changes in pH and during storage. Tropical Journal of Natural Product Research. 2026;10 (4):40. https://doi.org/10.26538/tjnpr/v10i4.40
20. Maneechot O, Hahor W, Thongprajukaew K, Nuntapong N, Bubaka S. A natural blue colorant from butterfly pea (Clitoria ternatea) petals for traditional rice cooking. Journal of Food Science and Technology. 2023;60:2255–2264. https://doi.org/10.1007/s13197-023-05752-w
21. Angriani L. Potensi ekstrak bunga telang (Clitoria ternatea) sebagai pewarna alami lokal pada berbagai industri pangan. Canrea Journal: Food Technology, Nutritions, and Culinary Journal. 2019;2 (1):32–37. https://doi.org/10.20956/canrea.v2i1.120
22. Application of anthocyanins from blue pea flower in yoghurt and fermented milk: an alternate natural blue colour to spirulina. International Journal of Gastronomy and Food Science. 2024;37:100957. https://doi.org/10.1016/j.ijgfs.2024.100957
23. Comparative evaluation of anthocyanin pigment yield and its attributes from butterfly pea (Clitoria ternatea L.) flowers as prospective food colorant using different extraction methods. Future Foods. 2022;6:100199. https://doi.org/10.1016/j.fufo.2022.100199
24. Clitoria ternatea: perspectives on its application in foods and potential health benefits. Plants. 2025;14 (21):3322. https://doi.org/10.3390/plants14213322
25. Karak PK, Das SK. Clitoria ternatea as a phytopharmacological resource: plant metabolites,

mechanistic evidence, translational prospects, and safety considerations. Frontiers in Pharmacology. 2026. https://doi.org/10.3389/fphar.2026.1922024

26. Jain R, Singh R, Badhwar R, Gupta T, Popli H. Development and optimization of Clitoria ternatea synthesized silver nanoparticles and its application to nanogel systems for wound healing. Drug Development and Industrial Pharmacy. 2024;50 (3):181–191. https://doi.org/10.1080/03639045.2024.2308043

HOW TO CITE: Pratiksha Pandit, Sneha Jankar, Shreya Tondlikar, Snehal Jadhav, Saurabh Patara, Aditi Bangar, *Clitoria Ternatea* Flower and ITS Bioactive Compounds;Potential Use as Microencapsulation Ingredient for Functional Food, Int. J. of Pharm. Sci., 2026, Vol 4, Issue 11, 1575-1583. https://doi.org/10.5281/zenodo.24034675