
A REVIEW ON BUTTERFLY PEA: AN EMERGING PLANT WITH APPLICATIONS IN FOOD AND COSMETICS

Mr. Pradip D. Dhangar*¹, Mr. Harshal Shimpi*², Mr. Rohit Newadkar*³,
Mr. Vivek Bhadane*⁴, Mr. Lupesh Desale*⁵, Ms. Neha Jaiswal*⁶

*^{1,2,3,4,5,6}Department Of Pharmacognosy, Ahinsa Institute Of Pharmacy Dondaicha Dist. Dhule, India.

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ABSTRACT

This plant is widely used in traditional medicine because it is rich in biologically active substances. The above-ground and underground parts of this plant are used to treat diabetes, high blood pressure, retinal damage, edema and indigestion. Clitoria ternatea flower extract has been found to have antibacterial, antioxidant, anti-inflammatory, cytotoxic and antidiabetic activities beneficial to human health. Clitoria ternatea flowers are promising candidates for functional food applications due to their broad therapeutic properties and their safety and efficacy. Several primary and secondary plant metabolites have been isolated from Clitoria, including aparagitin, clitorin, triterpenoids, anthocyanins, and steroidal glycosides and flavonols. Ternatea Linn. This article reviews the various pharmacological activities of Clitoria ternatea, including its nootropic, anticonvulsant, antidepressant, anti-anxiety, anti-stress, antioxidant, anti-inflammatory, hyperlipidemic, antidiabetic, analgesic, cytotoxic, antiplatelet, and hepatoprotective properties. The reported activity of Clitoria ternatea makes it a potential source of drug molecules for the treatment of various conditions.

Keywords: Butterfly Pea, Clitoria Ternatea, Butterfly Pea Flowers, Anti-Inflammatory.

I. INTRODUCTION

The butterfly pea or Clitoria ternatea L. is a member of the Fabaceae family. It grows widely in tropical regions, including Southeast Asia. Ayurvedic system of medicine is a well-known and oldest system of medicine being used centuries in India. In this system, plants with medicinal properties are used for various ailments and may be a source of drugs. Medhya drugs prescribed in Ayurvedic system of medicine are a group of herbal drugs used to improve mental abilities. These herbal drugs include the extracts from Clitoria ternatea (CT), Celastrus paniculatus, Acorus calamus, Centella asiatica and Areca catechu. Out of several medicinal plants/herbal drugs mentioned in Ayurveda, Clitoria ternatea is well known Ayurvedic medicine used for the treatment of various diseases. The blue color of Butterfly Pea flowers. This indicates the presence of anthocyanins. Depending on the application, it is used to color food or other objects. The butterfly pea (Clitoria ternatea L.) is one of those plants in which all parts have a beneficial effect on our body. The flowers contain polyacylated anthocyanins and flavonol glycosides called ternatins. These include antioxidants, antidiabetic agents, anti-obesity agents, anti-inflammatory agents, anticancer agents, anti-hyperlipidemic agents, and antiasthmatic agents. It has a positive effect on health. This corresponds to the fact that anthocyanins are easily soluble in water due to their chemical structure. Clitoria ternatea flowers contain a variety of phytochemical compounds, including flavonoids, and most of the color components are anthocyanins. Butterfly pea flowers contain anthocyanins, which are natural antioxidants that slow down the aging process. Prevents skin aging and helps the skin. The blue hue of Clitoria ternatea flowers is often used as a source of natural coloring in the preparation of various dishes. Flowers have health benefits such as antioxidants, anti-diabetic, anti-inflammatory and anti-cancer agents.

PHARMACOGNOCY:-

SYNONYMS:

Clitoria albiflora Mattei, Clitoria bracteata Poir. Clitoria mearnsii De Wild., Clitoria tanganicensis Micheli, Clitoria zanzibarensis Vatke.

BIOLOGICAL SOURCE :- It consist of dried seeds of plant perennial herbaceous belonging into family fabaceae.

FAMILY: Fabaceae. **GENUS:** Clitoria L. **SPECIES:** Clitoria ternatea.

TRADITIONAL USES :- Root was used for the treatment of ascetics, enlargement of the abdominal viscera, sore throat and skin diseases. They were also used as purgative, but because, they cause griping and tenderness, they were not recommended. Root was administered with honey and ghee as a general tonic to children for improving mental faculties, muscular strength and complexion tonics. Roots were also used in epilepsy and insanity. Seeds and leaves were widely used as a brain tonic and to promote memory and intelligence. Juice and flowers were used as an antidote for snake bite. Seeds were used in swollen joints, crushed seeds are taken with cold or boiled water for urinary problems.

CHEMICAL CONSTITUENTS :-

Taraxerol and taraxerone, pentacyclic triterpenoids and flavonol glycoside, 3,5,4'-trihydroxy-7-methoxyflavonol-3-O-β-d-xylopyranosyl- (1,3)-O-β-d-galactopyranosyl (1,6)-O-β-d-glucopyranoside are present in the root of CT . Besides protein and fatty acid content, CT seeds also contain p-hydroxycinnamic acid, β-sitosterol, γ-sitosterol adenosine, flavonol-3-glycoside, ethyl-α-d-galactopyranoside, 3,5,7,4'-tetrahydroxyflavone, 3-rhamnoglucoside, hexacosanol, and an anthoxanthin glucoside. Kelemu et al. reported the presence of antimicrobial and insecticidal protein finotin in the seeds of CT. The flowers of CT contain ternatins A1-3, B1-4, C1-5, D1-3 . The flowers of CT also contain kaempferol, kaempferol 3-neohesperidoside, kaempferol 3-2G-rhamnosylrutinoside, kaempferol 3-rutinoside

Plant parts used: Leaves, seeds, bark, fruits, sprouts and stems were used medicinally

MORPHOLOGY CHARACTERISTICS:-

Pea flowers are about 4 cm long and 3 cm wide and have 5 petals. 2 wings, 2 keels, A banner with a bright yellow sign in the middle. The pea plant is one. Climbing legumes with very thin leaves 2.5–5 cm long and 1.5–3.5 cm long. Each width. It is an evergreen plant with a fibrous root system. Its large nodules can fix nitrogen in a form usable by the plant community. Rhizobia bacteria. Clitoria ternatea is a perennial plant that reproduces by black seeds. It is colorful and the pods are about 7-11 cm long. In the food industry, the root and leaves are used for medicinal and herbal drinks. Training. Butterfly pea powder is the most popular product in the world. Bazaar made of blue pea flowers.

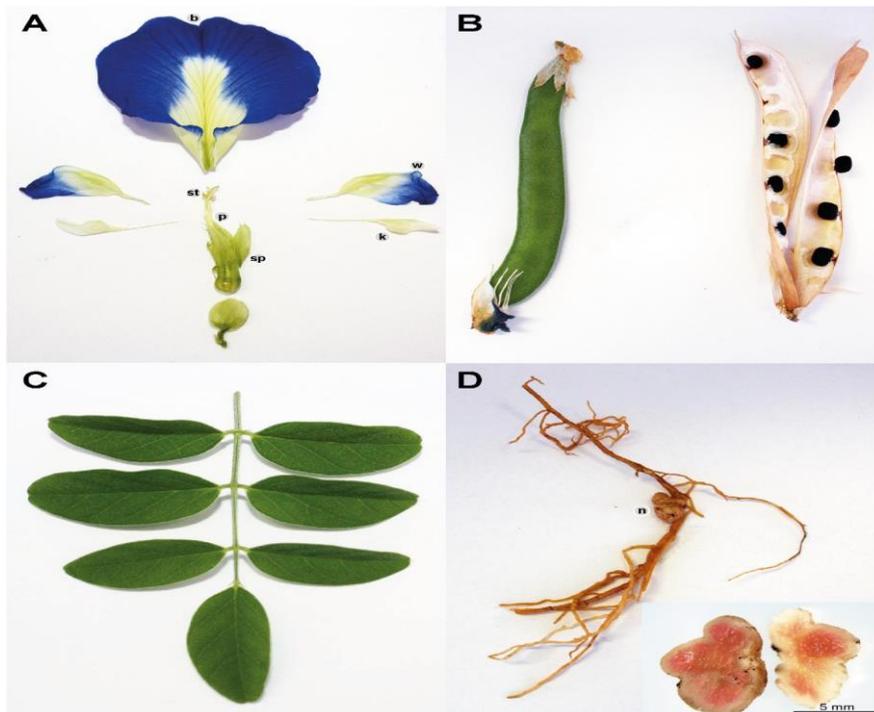


Figure 1: Clitoria ternatea (A) flower, (B) pods, (C) leaves, and (D) roots with nodules. The C. ternatea flower consists of the stamen (st), pistil (p), sepals (sp), and corollae. The corollae consist of five petals: one banner (b), two wings (w) and two keels (k). C. ternatea has pinnate compound leaves, flat and pointed pods and roots that produce nodules (n).

The root and seeds are mainly used in traditional medicine. Young leaves can be used as a garnish. It has health benefits such as promoting and improving digestion. It improves vision, lowers blood pressure and tones the skin Brilliant. It contains several types of bioactive compounds Clitoria ternatea, these anthocyanin compounds, Flavonoids, glycosides, steroids, resins and phenols Their. The physiologically active substances of KT Plant help in this regard. Antidiabetic activity, antioxidant activity, antibacterial activity Activity, anti-inflammatory activity and analgesic activity Clitoria ternatea is rich in anthocyanin compounds. Therefore, it is used as a food coloring in the food industry. Anthocyanins are among the most unstable food dyes. Essentially, stability is dependent on temperature and pH. Other enzyme activity.

Anthocyanin extraction :

Hot water extraction: Petals of fresh blue pea flowers were blended with water in a specific substrate-solvent ratio [1:15 or 1:20 (w/v)] using a commercial blender (Waring MX1100XT11CE, USA), at low speed for 40 s. Next, the blended mixture was placed in a thermostatic water bath set at a specific temperature (40, 50 or 60 °C) for a specific time period (30 or 60 min) while shaking. Then the mixture was vacuum filtered and vacuum-dried at 40 °C for 36 to 48 h. The vacuum-dried extracts were then referred as anthocyanin extracts. Optimum treatment conditions selected from hot water extraction were used for subsequent ultrasound, microwave and pectinase-assisted extractions.

Nutrients in butterfly pea flower:-

Butterfly pea flowers are rich in anthocyanin compounds called ternatins, some of the same types found in superfoods like berries, cherries and red wine.

Additionally, the plant contains several other antioxidants, including

- **Kaempferol:-** This compound has been studied extensively for its cancer-fighting properties. Test-tube studies indicate that it may kill off
- **p-Coumaric acid:-** Some research suggests that p-coumaric acid could have anti-inflammatory, antimicrobial, and antiviral effects, which may help protect against disease
- **Delphinidin-3,5-glucoside:-** According to one study, this antioxidant may help stimulate immune function and cause cell death in colorectal cancer cells.

MEDICINAL ACTIVITY :-

1. **Anti-inflammatory antipyretic and analgesic effects.**
2. **Antioxidant effects**
3. **Antiparasitic and insecticidal effects.**
4. **Antimicrobial effect.**
5. **Anticancer effect.**
6. **Central nervous effect.**
7. **Gastrointestinal effect.**
8. **Hypolipidemic effect.**
9. **Antihistaminic and antiasthmatic effect.**
10. **Immunomodulatory activity.**
11. **Diuretic and anti urolithiasis effect.**
12. **Wound healing effect.**
13. **Anti-ulcer activity.**

BENEFITS :-

1. Improve skin and hair health:-

When applied topically, butterfly bean flower can prevent early signs of skin aging, such as loss of firmness, fine lines, and uneven skin tone and texture. There is evidence that antioxidants such as polyphenols can increase skin hydration and protect against sun damage. Due to its anti-inflammatory properties, it helps to treat rashes, swelling, itching, dermatitis or allergies affecting the skin. Another benefit is butterfly pea's ability to keep your scalp and hair healthy. It is known to help provide extra blood to the hair follicles and reduce inflammation that inhibits hair growth.

2. Supports Glowing Skin:-

Butterfly pea flowers are gaining traction in the skin care community for their ability to support graceful aging as an antioxidant. While some flowers and plants contain ingredients that can irritate the skin, everything from the root of the butterfly pea flower to the flower itself can be used in skin care. One study showed soothing effects on skin problems. However, the main skin benefits come from the antioxidants produced when you drink butterfly pea flower tea.

3. Enhance Skin Health:-

The flavonoids in green tea promote collagen production and help develop and maintain skin elasticity. Regularly drinking a cup of warm green tea cleanses the stomach, liver and kidneys and removes undigested food waste from the system. This in turn cleanses the body from within, deeply brightens dull skin and removes dark spots and uneven skin tone.

4. Promote Hair Growth:-

Blue pea flowers are also great for hair because they contain anthocyanins, compounds known to increase blood circulation in the head, keeping the scalp healthy. It also helps strengthen hair follicles from the inside out.

5. Accelerates graceful aging:-

Throughout our lives, we consume large amounts of oxygen through air, food, and other exposures. This causes free radicals to enter the body, which are actually unpaired electrons. When electrons are unpaired, aging is accelerated and the likelihood of health problems increases. Antioxidants help control and eliminate free radicals from the body. Some recent studies have shown butterfly pea flowers to be a potential addition to skin care products. Of course, the most effective way to reap its benefits is to drink butterfly pea flower tea, which is rich in natural anti-aging plant antioxidants!

6. Rich in antioxidants: -

Historically, butterfly pea tea has been considered a natural remedy for many conditions, including fever, inflammation, arthritis pain caused by collagen breakdown, and diabetes.

Rich in antioxidants, butterfly pea flowers help fight oxidative stress and free radicals, two major causes of aging and disease. This particular compound has been shown to help prevent the growth of cancer cells and can protect the liver, brain, heart, blood vessels and other organs from damage.

7. Promotes Healthy Eyesight:-

Green tea's rich proanthocyanidin complex improves eyesight in a refreshing, tasty and nutritious drink. Due to the anti-inflammatory and analgesic properties of green tea, it has great benefits in reducing the discomfort, redness and swelling associated with common eye infections. By stimulating blood saturated with vital nutrients to move to the photoreceptor cells and complex capillaries in the tissues, green tea effectively preserves the visual organs and structures of the retina, cornea and lens, and preserves the healing symptoms of glaucoma and blurred vision.

8. Helps metabolic function:-

Clitoria ternatea has been shown in animal studies to help lower blood pressure (hypertension) and high cholesterol, support other cardiovascular functions, and stabilize blood sugar levels. Some studies have shown that it can protect against diabetes-related symptoms and insulin resistance due to its ability to avoid oxidative stress.

Like other plants high in antioxidants, butterfly peas may aid in weight loss and prevent obesity due to their overall metabolic benefits, although more research is needed on this topic.

9. Natural antibacterial and immune system boosting effects:-

Butterfly pea flour is believed to have antibacterial and anti-inflammatory effects due to the presence of compounds such as p-coumaric acid and delphinidin glucoside. Drinking this herb and tea can help fight viruses and infections. Another immune-boosting benefit of this herb is its ability to improve respiratory health. It helps treat bronchitis, colds and coughs by clearing mucus and fluid from the lungs and respiratory tract and reducing irritation and inflammation. It is also believed to help manage asthma and allergies. In the Ayurvedic

tradition, Clitoria ternatea flowers were one of the most commonly used ingredients in various formulations for the treatment of respiratory ailments.

10. Cognitive health support:-

Some studies, including in animals, suggest that Clitoria ternatea may increase the level of acetylcholine in the brain, a compound beneficial for concentration, memory and other cognitive tasks. Due to its ability to fight oxidative stress, butterfly pea flour can help support overall mental health, including slowing age-related memory loss and protecting against the effects of anxiety, chronic stress, depression and ADHD.

11. Accelerated Weight Loss:-

Green tea does not contain caffeine and is also free of carbohydrates, fat and cholesterol. Therefore, it is an ideal drink for people following a weight loss diet, as it cleanses the intestines of food waste and impurities and regulates appetite. To reduce premature cravings for junk food, green tea is an excellent herbal drink for optimal weight maintenance.

12. Fights reproductive issues:-

Green tea infusion has been shown to help treat menstrual problems, such as reducing cramps and relieving pain. In men, it is injected to stimulate normal sperm production. The flower is believed to have strong aphrodisiac properties.

13. Improvement of diabetes condition:-

Consuming a cup of a warm refreshing drink a day prevents the increase of blood sugar in people with type 2 diabetes and smoothes the digestive process. Influencing, improving insulin secretion, regulating glucose metabolism, preventing excessive absorption of sugar into body cells during and after fasting. Butterfly pea flower tea is definitely an excellent dietary supplement for a diabetic diet.

14. Provides antioxidant support including:

Butterfly pea flowers are popular worldwide as a functional drink. In Thailand, lemon and honey are mixed and enjoyed as an after-meal snack. According to a 2019 study, consuming butterfly pea flowers in beverages increases the body's antioxidant activity, which can benefit many health functions.

15. Promotes digestion: -

Tea is rich in antioxidants, making it a great drink to add to a detox diet, especially in the summer. Antioxidants protect the body from free radicals. Free radicals are harmful substances that damage healthy cells in the body. Drinking a cup of green tea on an empty stomach once or twice a week can remove accumulated toxins from the body and greatly improve digestion.

II. CONCLUSION

In this article, Clitoria ternatea has been discussed as a promising medicinal plant with a wide range of pharmacological activities that can be used in various medical applications due to its efficacy and safety. Butterfly pea flower (Clitoria ternatea) is a plant used to make a nutrient-rich tea or herbal extract. Native to Southeast Asia, this plant is rich in polyphenols and antioxidants such as anthocyanins, giving it a bright blue color. Benefits include anti-inflammatory and antibacterial properties. Brain, skin and eye protection; ease of digestion; Supports respiratory and metabolic functions. CT has been reported to have nootropic, antistress, anxiolytic, antidepressant, sedative, antipyretic, anti-inflammatory, analgesic, and antidiabetic properties.

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