



A perspective view of pharmacognostical and pharmacological view on *croton bonplandianum* baill

S. Dhanalakshmi*, R. Meenakshi Sundaram.

Department of Pharmacognosy, GRT Institute of Pharmaceutical Education and Research, Tiruttani.

Article History:

Abstract



Received on: 03 Sep 2024
Revised on: 07 Oct 2024
Accepted on: 11 Nov 2024

Keywords:

Croton bonplandianum,
Species of Tulsi,
Flowers of India,
Phytochemistry,
Pharmacological activity

Traditional remedies still account for around eighty per cent of health care need worldwide, with plant-based medicines playing a significant role. A significant percentage of drugs and numerous synthetic analogs derived from medicinal plants are used in modern therapeutic research. A growing confidence in natural remedies has contributed to the acceptance of herbal medicine. There are conflicting theories regarding herbal medicines' effects on the physiology and mental function of humans. As a result of negative criticism and increased reports of toxicity, evaluative data should be generated to standardize Ayurvedic formulations using advanced techniques. It is crucial to perform a comprehensive phytochemical analysis of herbal preparations, both qualitatively and quantitatively, in order to determine their composition and safety. Its taxonomy, phytochemistry, traditional uses, and pharmacological properties have been extensively studied, including *C. bonplandianum* Baill, commonly known as Boycott Tulsi or Wilderness Tulsi. The purpose of this review is to provide detailed information on these aspects of *C. bonplandianum* Baill, in order to highlight its potential pharmacological properties and its significance in traditional medicine.

*Corresponding Author

Name: Dr. S. Dhanalakshmi
Phone: +91 9710899623
Email: dhanadinesh2011@gmail.com

Journal Home Page: www.grtjest.com

 <https://doi.org/10.26452/grtjest.v2i2.36>



Production and hosted by
GRT College of Education
© 2024 | All rights reserved

Introduction: (flowers of India)

Tamil: Reilpoondu; Common Name": Ban Thulasi

A wild croton plant called *C.bonplandianum* is also named as Jungle Thulasi or Ban Thulasi. These particular foliage crotons thrive in the wild, unlike the more common foliage crotons. In fact, it is commonly referred to as Jungle Tulsi or Ban Tulsi because of its leaves and flower cymes resembling those of Tulsi. A tiny room is a typical growing environment for this

plant. An annual herb known as Jungle Tulsi, Ban Tulsi typically grows to a height of one to two feet. Its lance-shaped leaves are arranged alternately and have toothed margins, measuring around 3-5 cm. Branches end in white racemes that are 3-8 cm long, borne at the ends of the plant. Several long stamens protrude from the center of each flower. It has five sepals and five petals. Approximately 5 mm in length, Ban Tulsi's fruit looks like a warty oblong capsule. There is a widespread cultivation of Ban Tulsi in rural areas of Malaya. As well as being a source of fuel and a detergent, the plant can be used for numerous purposes. In addition to being used as fuel, Ban Tulsi stems and branches can also be used as food. In about five to six days, the ash collected from burning is stored in a bottle. Cotton clothing is then washed using this detergent created from ash dissolved in warm water. Rural communities in Malda, West Bengal, are well supplied with ban tulsi, which can be used as a fuel and detergent.

It is found on wastelands and by roadsides throughout India. From September to December, it usually blooms and bears fruit. Traditionally, this plant has been used to treat liver ailments, skin conditions such as ringworm infections, and swellings of the body. As a result of its alterative and cholagogue properties, the bark and roots of *C.bonplandianum* are able to promote overall health and stimulate bile flow. [4]

This was used for treating wounds, burns, venereal sores, and cholera. In addition to treating jaundice, internal abscesses, abdominal dropsy, as well as constipation, the seeds can also be used to treat jaundice. Alkaloids and terpenoids are among the secondary metabolites found in Croton genus. [5] Many Croton species, including *C.bonplandianum*, contain toxic components called phorbol esters. According to phytochemical analyses of *C.bonplandianum*,

rutin is its main constituent, along with compounds such as crotsearinine, crotasparine, and their methyl derivatives. Indian wastelands and roadside areas are commonly home to this plant.

Pharmacological activity:

There are many therapeutic applications for the components of the plant in traditional medicine. It has hepatoprotective effects, reduces swelling in the body, treats skin diseases and ringworm infections, has antihypertensive properties, antioxidant properties, wound healing abilities, antifungal and antimicrobial actions, is an anti-diabetic agent, is an anticancer, antitumor agent, and treats acute constipation, abdominal dropsies, and internal abscesses. Also, it has nematocidal, anticoronary, anti-inflammatory, larvicidal, and anti-helminthic properties; it is also anti-fertility, anti-spasmodic, anti-septic, anti-dotes, pain killer, insect repellents. As well as treating cholera, boils, bowel complaints, chickenpox, diarrhea, dysentery, optic disorders, cough and cold, convulsions, hepatic complications, malaria, sprains, rheumatism. It is traditional to use it for these conditions [6].

Pharmacognostical character





Figure 1: *Croton bonplandianum*

Synonyms:

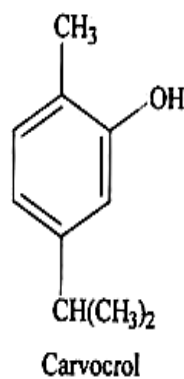
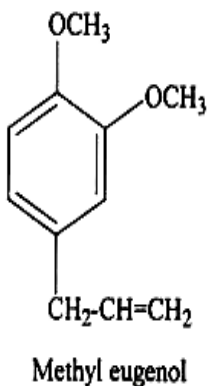
Kali-Tulsi, Sacred basil, Veranda [10]

Biological source

Among the species of *Ocimum* genus, tulsi refers to the both dried and fresh leaf of *O.sanctum* L. (Holy Basil) as well as *O.basilicum* L. (Sweet Basil).

Family: Labiatae

Chemical constituents: Mainly contains volatile oils - 0.8 per cent (Caryophyllene, eugenol, eugenol methyl ether, nerol, α -selinene, terpinene-4-ol-decylaldehyde, α , β -pinene, camphor and carvacrol; cineole, linalool)



Pharmacognostical character:

1. *Ocimum sanctum* (Green type leaves)

Opposite, exstipulate, petiolate are descriptive terms used to characterize a specific type of plant. These terms refer to a plant that lacks stipulates (exstipulate), has leaves arranged in opposite pairs along the stem (opposite), and possesses leaves with petioles. There are approximately 5-6 cm of length and 2.6 to 3.2 cm of width to the leaves, with their shape being elliptical to ovoid or oblong. Leaves are pubescent (covered with fine hairs). A slender, thin structure called the petiole attaches the leaf to the stem, measuring around 2.6 to 3.1 cm long. Adaxial grooves are found on the upper side of the petiole as well as pubescent tissue.

It has, bluntly serrate margin, entire or irregularly undulated; acute or obtuse apex; bright green adaxial surface; pale green with prominent veins having abaxial surface; pinnate venation (Reticulat)[11]

2. *Ocimum sanctum* (Purple types leaves)

Plants have a slender petiole that measures about 3.6 cm in length. The adaxial groove is narrow and inconspicuous, and it is less pubescent. There is a purplish tinge to the green color of the petiole. Leaf blades range in size from five to eight centimeters in length and from two to three centimeters wide. Leaves have narrow or distant serrations on their margins.

Five to seven pairs of parallel lateral veins form a pinnate reticulate pattern. The apex of the leaf is acute or obtuse on the upper side (adaxial side). There are few hairs along the veins of the leaves, and the surface of the leaves is almost glabrous.

There is a pungent taste and a strong aromatic scent to the leaf. Pinnately reticulate venation is evident on both the upper and lower surfaces of the leaf. A dull green color appears on the leaf's upper surface (adaxial side).

- It has Aromatic odour, pungent taste

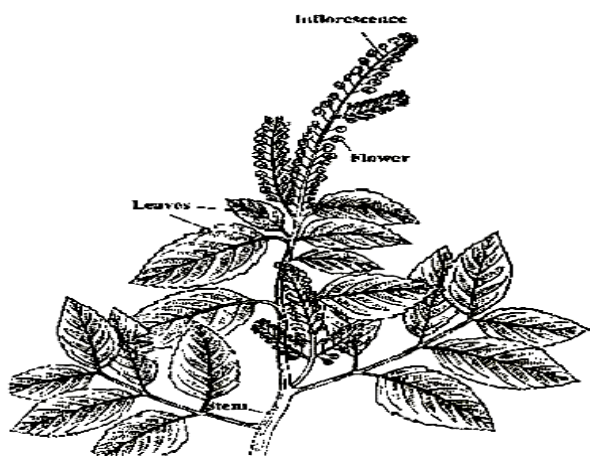


Figure 2 *Ocimum sanctum*

Review on *Croton bonplandianum*

A study was conducted to investigate the presence of secondary metabolites and antimicrobial properties in the leaves of *C. bonplandianum*. Phytochemical analysis was carried out on leaf extracts to determine the composition of bioactive compounds. The analysis revealed the presence of various secondary metabolites, including alkaloids, flavonoids, saponins, steroids, resins, and phenols in the leaves of *C. bonplandianum*. Additionally, the antimicrobial properties of the leaf extracts were evaluated, although further details regarding the specific findings or outcomes of the antimicrobial testing were not provided. (M.V. Jeeshna, Journal of Life Science, Vol. 3; 2011)

The antimicrobial activity of *C. macrostachyus* stem bark extracts against various human pathogenic bacteria was investigated. The stem bark extracts were tested for their ability to inhibit the growth of these bacteria. The results demonstrated significant antimicrobial activity, suggesting that *C. macrostachyus* could be a potential source of antimicrobial agents for combating bacterial infections. Infectious diseases like typhoid and measles are traditionally treated with the leaves and roots of *C. macrostachyus*. Stem bark, however, has not been studied specifically for its

antimicrobial properties. (Jackie K, Journal of Pathogen, 2016)

It has been confirmed for the first time in India that *C. cucurbitarum* infects *C. bonplandianus*, causing twig blight disease. This marks the first report of Ban Tulsi (*C. bonplandianus*) being affected by twig blight disease caused by *C. cucurbitarum* (Berk. & Ravenel) Thaxt. (Siddhartha Das, Journal of Plant Protection Research, Vol. 57 (4); 441-446; 2017)

C. bonplandianum possesses hepatoprotective, anti-inflammatory, antioxidant, antimicrobial, and anti-tumor properties. The plant components have applications in traditional medicine, treating conditions such as swellings, constipation, skin diseases, hypertension, diabetes, abscesses, and fertility problems. Traditionally, it has been used to treat ailments such as eye infections, cholera, epilepsy, boils, diarrhea, jaundice, liver problems, scurvy, coughs, sprains, malaria, and rheumatism. (Tanmay Ghosh, European Journal of Medicinal Plants, 22(4); 1-10; 2018)

In a study, the fresh latex of *C. bonplandianum* demonstrated the highest inhibitory activity against *E. coli* (32 mm) and *E. faecalis* (30 mm). The aqueous and ethanol extracts of the latex exhibited the highest inhibitory activity against *E. aerogenes* (26 mm) compared to other solvent extracts. This study reported the antibacterial activity of *C. bonplandianum* against bacterial isolates from infected wounds. (Vivekanandadasan Vennila, Microbiology Research Journal International, Vol. 5, Issue 1; September 2014)

The antibacterial efficacy of cotton fabric treated with *C. bonplandianum* plant extract was evaluated. The material obtained immediately after treatment and after various washing cycles was assessed for its antibacterial activity against both gram-positive and gram-negative pathogenic strains.

The results demonstrated the significant antimicrobial efficacy of *C. bonplandianum* sap and treated cotton fabric, which remains effective even after five washes. (Goutam Bar, Current Trends in Fashion Technology & Textile Engineering, 2020; 7(1); 555703)

The antibacterial activity of alkaloid extract and isolated compounds from *C. bonplandianum* was evaluated. The study findings indicate that the extract's antibacterial activity is primarily attributed to the presence of sparsiflorine. While sparsiflorine may not match the efficacy of clinically used antimicrobial drugs, it holds potential as a lead compound for the development of novel antibacterial substances. (A. Burgo, Revista Brasileira de Plantas Mediciniais, Vol. 17, no. 4, supl. 2; Botucatu 2015)

C. bonplandianum holds potential for developing drugs and medicines targeting bacterial activities. The plant has been found to contain diverse phytochemical constituents, including alkaloids, saponins, tannins, phenolic compounds, thiamine, and ascorbic acid, as evidenced by studies conducted on its leaves. (Tanmay Ghosh, International Journal of Pure & Applied Bioscience, Vol. 6 (1); 1494-1503; 2018)

The effectiveness of *C. bonplandianum* in wound healing may be attributed to the presence of rutin, an active chemical compound, and antioxidant enzymes, providing support for its traditional use. The study evaluated *C. bonplandianum* leaf extract for wound healing and in vitro antioxidant activities in rats. (S. Divya, Global Journal of Pharmacology, Vol. 5(3); 159-163; 2011)

Ethanol extraction yields the highest concentration of inhibitory compounds from *C. bonplandianum* leaves. Further analysis reveals the presence of two active constituents, potentially related to abscisic or

phaseic acid. This study focused on the phytotoxic effects of *C. bonplandianum* on associated weeds. (Datta, S.C., Sinha-Roy, S.P., Plant Ecology, Vol. 30; 157-163; 1975)

Inflorescence segments of *C. bonplandianum* display different characteristic peak patterns in their spectral FTIR lines. A debate was held over whether peaks should be correlated with functional groups present. This study highlighted the phytochemical and ecological importance of *C. bonplandianum*. (Muhammed S.A. Abbasi et al., Asian Journal of Research in Botany, Vol. 4(2); 26-32; 2020)

During fruit maturation, nectar glands on female flowers of *C. bonplandianum* become active and reach their peak just before the fruits split. This unique maturation pattern strengthens mutualism in seed dispersal. (K.N. Ganesigah et al., Oecologia, October 1988; Vol. 77(1); 130-134)

Chemical analysis revealed the presence of carbohydrate, amino acid, protein, tannins, flavonoids, anthocyanins, quinones, glycosides, and phenols in aqueous, methanol, and chloroform extracts of *C. bonplandianum*. Chloroform extracts lack terpenoids and coumarins, while aqueous and methanol extracts contain them. Only chloroform extract contains alkaloids. This study evaluated the phytochemical and pharmacological properties of leaves from *A. Indica* L. and *C. bonplandianum*. (Satya Prasad M et al., Mintage Journal of Pharmaceutical & Medical Sciences, Vol. 2(1); 2016; 121-129)

Research on *C. bonplandianum*, *E. hirta*, and *P. fraternus* was conducted, focusing on taxonomy, ethnobotany, and antimicrobial activity. (Singh B et al., Journal of Advances in Development Research, Vol. 2(1); 2011; 21-29)

The leaf extract of *C. bonplandianus* was organized with the aid of methanol and fractionated using chloroform, n-hexane, and

ethyl acetate. Extracts and fractions of the extracts have been studied for their antioxidant activity and anti-hyperglycemic activity. Additionally, the leaf extract was subjected to GC-MS analysis. The study found a correlation between polyphenol content and the anti-hyperglycemic and antioxidant properties of *C. bonplandianus*. (Umadharshini et al., Iranian Journal of Basic Medical Sciences, December 2017; Vol. 20(12); 1390-1397).

Discussion:

Scientific project work and formulation always targeted towards the thrust of human need is largely accepted and responsible for the quality of life in the present situation. Natural origin of a country plays major role in existence even before and origin of humanism. In this present work, a review was carried out to study the pharmacological activity of traditional herb *C. bonplandianum*. The selected herb has potential source like anti-inflammatory, anticancer, anti-microbial, nematocidal, anti-coronary, wound healing, hepatoprotective activities. Based on the present review, a characterized isolation analysis the drug mechanism is the further research work needed in future [30].

Conclusion:

This review study provides evidence for the use of extracts from *C. bonplandianum* species, especially phytoconstituents, as antimicrobial candidates against several human pathogens. Nano formulations are lacking now since they have more pharmacological activity.

Ethical Approval

No ethical approval was necessary for this study.

Author Contribution

All authors made substantial contributions to the conception, design, acquisition, analysis,

or interpretation of data for the work. They were involved in drafting the manuscript or revising it critically for important intellectual content. All authors gave final approval of the version to be published and agreed to be accountable for all aspects of the work, ensuring its accuracy and integrity.

Funding Support: The Author declares that there is no funding.

Conflict of Interest: The Author declares that there is no conflict of interest.

REFERENCES

- [1] Sriwastava NK, Shreedhara CS, Aswatha RHN. Standardization of ajmodadichurna, a polyherbal formulation. *Pharmacognosy Res.* 2010;2:98-101.
- [2] Qureshi S, Diab AA, Al-Anazi FA, AlHassan MI, Qureshi MF, Qureshi VF, et al. Negative aspects of the beneficial herbs: An over view. *J Herb Med Toxicol.* 2012;6:1-14.
- [3] Saper BR, Kales NS, Paquin J, Burns JM, Eisenberg MD, Davis BR, et al. Heavy metal content of Ayurvedic herbal medicine products. *JAMA.* 2004;292(23) 2868-2873.
- [4] Chopra RN, Nayyar SL, Chopra IC. Glossary of Indian medicinal plants. National Glossary of Indian medicinal plants. New Delhi; 1956.
- [5] Reddy KR. Folk medicines from Chittoor District Andrapradesh, used in treatment of jaundice. *Pharmaceutical Biol.* 1995;26: 137-140.
- [6] Finney DJ. In *Probit Analysis*. Cambridge University Press, London. 1971;68-78.
- [7] Nishanta R, Harris CS, Towers GHN. Antimicrobial activity of plants collected from serpentine outcrops in Sri Lanka. *Pharmaceutical Biology.* 2002;40(3):235-244.

- [8] Ramesh VM, Hilda A, Manjula VK. Fungitoxic effect of leaf extract of *Croton sparciflorus* on Phytopathic fungi. *Acta BotanicaIndia*. 1995;23:63-66.
- [9] Mandal SC, Dewanjee S, Parimala Devi B, Boominathan R, Mazundar R, MazundarA. Evaluation of antifungal properties of methanolic extracts of some medicinal plants of eastern India, Ninth international congress of the International Society of Ethnobiology. Abstracts for second poster session (15 September 2009) 2004.
- [10] Das AJ, Dutta BK, Sharma GD. *IndianTraditional Knowledge*. 2008;7(3):446-454.
- [11] Chandel KPS, Shukla G, Sharma N. Biodiversity in medicinal and aromatic plants in India. National Bureau of Plant Genetic Resources, New Delhi; 1996.
- [12] Vennila V, Udayakumar R. Antibacterial activity of *C. bonplandianum* (Bail.) against some bacterial isolates from infected wounds. *BMRJ* - 2015;5(1):83-93.
- [13] Molly Meri Robinson *Classifications, Terminology and Standards*, WHO, Geneva: Xiaorui Zhang *Traditional Medicines, WHO traditional medicines: global situation, issues and challenges*. 3rd Edition; 2011, p. 2-9.
- [14] Essawi T, Srour M. Screening of some Palestinian medicinal plants for antibacterial activity. *J Ethnopharmacology* 2000; 70 : 343-349.
- [15] Jeeshna MV et al., Phytochemical Constituents and Antimicrobial Studies of the Exotic Plant Species, *C. bonplandianum* Baill, *Journal of Life science*, Volume 3, 2011 , Pg.no:102-113.
- [16] Jackie K et al., Antimicrobial Activity of *Croton macrostachyus* Stem Bark Extracts against Several Human Pathogenic Bacteria, *Journal of Pathogen*, Volume 2016 , Pg.no: 333-342.
- [17] Siddhartha D et al., First report of twig blight of ban tulsi (*Croton bonplandianus* Bail.) caused by *Choanephora cucurbitarum* (Berk. & Ravenel) Thaxt. in India., *Journal of Plant Protection Research*, Vol. 57, No. 4: 441-446, 2017
- [18] Tanmay Ghosh et al., A Review on Traditional and Pharmacological Uses of *C. bonplandianum* with Special Reference to Phytochemical Aspect., *European Journal of Medicinal Plants*.,22(4): 1-10, 2018
- [19] Vivekanandadasan Vennila et al., Antibacterial Activity of *C. bonplandianum* (Bail.) Against Some Bacterial Isolates from Infected Wounds., *Microbiology research journal international*, volume 5, Issue 1, sep, 2014, Pg.no:256-263
- [20] Goutam B et al., Antibacterial Efficiency of *C. bonplandianum* Plant Extract Treated Cotton Fabric, *current trends in Fashion technology and Textile engineering*2020; 7(1): 555-703
- [21] Burgo A et al., Antibacterial activity of the alkaloid extract and isolated compounds from *C. bonplandianum* Baill., *Revista Brasileira de Plantas Medicinai*., vol.17 no.4 supl.2 Botucatu 2015.,Pg.no: 225-231
- [22] Tanmay G et al., Evaluation of the Phytochemical Investigation and Antimicrobial Efficacy of Different Extract of Leaves of *C. bonplandianum* Against Some Pathogenic Bacteria *Salmonella enterica* ser. typhi and *Staphylococcus haemolyticus*.,

- International journal. Pure and Applied Bioscience. 6 (1): 1494-1503 (2018).
- [23] Divya S et al., Wound Healing and In Vitro Antioxidant Activities of *C. bonplandianum* Leaf Extract in Rats, Global Journal of Pharmacology 5 (3): 2011, Pg.no:159-163.
- [24] Datta, S.C., Sinha-Roy, S.P et al., Phytotoxic effects of *C. bonplandianum* Baill. on weedy associates, Plant Ecol 30,1975,Pg.no: 157-163.
- [25] Muhammad S. A. Abbasi et al., Ecological and Phytochemical Significance of *C. bonplandianum* (Baill), Asian Journal of Research in Botany 4(2): 2020, Pg.no:26-32.
- [26] K.N.Ganesigah et al., Evolution of a unique seed maturity pattern in *C. bonplandianum* Baill strengthens ant-plant mutualism for seed dispersal, Oecologia 01 Oct 1988, 77(1):Pg.no: 130-134
- [27] Satya prasad. M et al., Phytochemical And Pharmacological Evaluation Of Euphorbiaceae Family Plant Leaves- *Acalypha Indica* L., *C. bonplandianum* Baill, Mintage Journal of Pharmaceutical and Medical science, 2 (1) 2016 : Pg.no:121-129
- [28] Singh B et al., Taxonomy, Ethnobotany and Antimicrobial Activity of *C. bonplandianum*, *Euphorbia* and *Phyllanthus fraternus* , Journal of Advances in Developmental Research 2 (1) 2011 ,Pg.no: 21-29
- [29] Uma D et al., Anti-hyperglycemic and antioxidant potential of *Croton bonplandianus*. Bail fractions in correlation with polyphenol content, Iran Journal of Basic Medical science, 2017 Dec; 20(12):Pg.no:1390-1397
- [30] Gordana M, Bogdanka A, Dragica T, Milena L, Brankica D. Antibiotic Susceptibility Of *Salmonella* Spp.: A Comparison Of Two Surveys With A 5 Years Interval. Journal of IMAB - Annual Proceeding (Scientific Papers) 2012; 18:1. 216 -219.
- [31] Pandey, B.P. A textbook of Botany: Angiosperms, Taxonomy, Anatomy, Embryology (including tissue culture) and Economic Botany, S Chand & Co., Ltd., Ram Nagar, New Delhi; 2006, p. 89.
- [32] Etukudo I. Ethnobotany: Conventional and Traditional Uses of Plants. The Verdict Press, Uyo; 2003, p.142
- [33] Gill, LS. Taxonomy of Flowering Plants. Africana- FEP Publishers Limited, Nigeria; 1988, p. 338.
- [34] Vasishta, PC. Taxonomy of Angiosperms 2nd edition, R. Chand & Co., New Delhi; 1974.

Copyright: This is an open access article distributed under the terms of the Creative Commons Attribution-Noncommercial- Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.



**GRT JOURNAL OF EDUCATION,
SCIENCE AND TECHNOLOGY**

© 2024 GRT College of Education