



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



Review Article

Phytochemical and Pharmacological Insights into *Caesalpinia Bonducella*: A Comprehensive Review

Rohini Jadhav*, Sujata Karande, Rajnandini Kamble, Dr. D. R. Jadage

Womens College of Pharmacy, Peth Vadgaon, Kolhapur.

ARTICLE INFO

Published: 07 May 2025

Keywords:

Caesalpinia Bonducella:
Pharmacological
Investigations, Chemical
Constituents,
Physicochemical
Characteristics, Seeds.

DOI:

10.5281/zenodo.15354236

ABSTRACT


The medicinal plant *Caesalpinia bonducella* L. is a member of the *Caesalpinaceae* family. This prickly shrub is found all across the world, but it is particularly common in tropical areas of India, including Kerala, Sri Lanka and the Andaman and Nicobar Islands. A plant is the mother of all medicines. The plant *C. bonducella* is found throughout India and grows well in warm tropical regions. Deep roots, a woody-hard stem, and compound, glossy, oval-shaped leaves that alternate on either side of the branch characterize this evergreen. Research on medicinal plants is becoming more popular worldwide as a result of the conviction that "green medicine" is less expensive and safer than manufactured drugs. There have been reports of characteristics that include antihelmintic, antiestrogenic, antimalarial, antispasmodic, Ca^{++} antagonistic, antiproliferative, antipsoriatic, antitumor, anxiolytic, larvicidal, immunomodulatory, anti-amyloidogenic, antihyperlipidemic, antipyretic, analgesic, diuretic, antidiabetic, anti-inflammatory, antioxidant, antimicrobial, and antifilarial properties. Trace metal levels were found to be similar to those seen in regularly ingested legume seeds. The oil's high linoleic acid content indicated that it may be used to make paints, varnishes, cosmetics, liquid soaps, soaps, and other items, including biodiesel. We looked into how *C. bonducella* seed oil affected both acute and long-term inflammation. Triterpenoids, alkaloids, flavonoids, glycosides, saponins, and tannins have all been found in *Caesalpinia bonducella* seeds according to phytochemical study. In terms of *Caesalpinia bonducella* (L.) pharmacognostic characteristics, chemical ingredients, a synopsis of its many pharmacological effects, and traditional uses, this review aims to cover the body of existing material.

INTRODUCTION

"Fever nut" is another name for the *Caesalpinia bonducella* L. plant (fig. 1), which is a member of

*Corresponding Author: Rohini Jadhav

Address: Womens College of Pharmacy, Peth Vadgaon, Kolhapur.

Email : rohini20034@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.



the Caesalpiniaceae family. The enormous prickly shrub *C. bonducella* is native to South Ceylon, India, and Burma in particular at the ocean's edge and as much as 2,500 feet in hilly areas. It is known that the shell, seed, and twigs of *C. bonducella* contain alkaloids. (1) In addition to the amazing glycoside bonducin, which is the active chemical, seeds are also known to contain terpenoids and saponins. (2) A mixture of unsaturated acids, stearic, palmitic, oleic, linoceric, linolenic, starch, fatty oil, sucrose, and phytosterols are all known to be present in the shell. The substance of proteins and amino acids varies. (3) Using the extraction procedure, a phytochemical study of *C. bonducella* leaves that

had been powdered was conducted. Additionally, the plant is claimed to possess antioxidant, immunomodulatory, anti-cataract, anti-tumor, anti-ulcer, anti-microbial, anti-atifilaria, and anticonvulsive qualities. The ancient Indian traditional medical system known as Ayurveda mentions the plant *Caesalpinia bonducella* L. The species' name, "*Bonducella*," originates with the Arabic term "*Bonduce*," meaning "little ball" and describing the seed's globular form. In Ayurveda, the medication is known as "*kuberakshi*," which translates to "eyes of Kuba," the Hindu deity of riches, is explained by the seeds' grey color and eyeball-like appearance. (5)



Figure 1. *Caesalpinia bonducella* Linn.



Figure 2. Fresh seed pod of *Caesalpinia*

Bonducella linn



Figure 3. Fresh seed kernels of Bonduc nut.



Figure 4. Fresh seed with a pod of Bonduc nut

❖ Common personas:

Type of Plant: Evergreen-leaved shrub

Tap origins and profound roots
Elliptical Ovate, Bipinnately Compound, Hard
Wooded Stem Type: Alternate Leaf Arrangement
Leafy green in color Surface: lustrous
Sort of Seed: Dicot

Odor: Unique Flavor: Bitter

Elevation of Plant: Moderate (10–20 m)
Plant Feature 15 m at most
The plant utility includes decorative, beach, hillside,
forest, and prickly plants.
Habit of Growth: Shrub Vine Season: Commercial,
Industrial, Medicinal, Flower and Garden (6)

Taxonomic Position:

Phylum: Magnoliophyta

Kingdom: Plantae

Magnoliopsida division

Angiospermae is the class
Placement: Fabales

Family: Caesalpiniaceae/Fabaceae

The species belongs to the genus *Caesalpinia*
Bonducella.

VERNACULAR/REGIONAL NAME Singh and
Raghav state that this plant has been referred to by the
following regional and colloquial names.
Name in Hindi: Sagar Gota, Kantkarej, and
Kantikaranja. In English, the name is: Nicker seed,
Sanskrit names for these items include Prakirnah,
Tirini, Valli, Varini, Vitapakaranja, Name in Urdu:
Akitmakit Name in Persian: Khayahe-i-iblas
Name in Bengali: Nata
Name in Marathi: Gajaga
Names in Kannada: Kirigejjuga, Gajjiga, and
Gajikekayi

Names in Malayalam: Kajanchikkur, Kazhanji,
Kalanci, Ban-karetti, and Kaka-moullou
Name in French: Bois
Name in Telugu: Gaccakayai Multiage
Name in Tamil: Kazharchikkaai, Kalachakra,
Kalichikai, Kazarci, Avil, Kalarciver, Kalarcik
Koluntu, Kalarcipparuppu

❖ **Ayurvedic description:**

Among the guna traits are Lokhu (bright) and Ruksha
(dry) and Taste: tikta (also known as tikshna, or sharp).
(sour), kashaya (alkaline) Veerya (power): Heat
(Ushna) Tridosha is calmed by Dosha.
Vipak: Katu (7)

❖ **Macroscopic Characteristics:**

The Seeds:

The hard-coated, greenish or gray seeds have a slight
compression on one side as a result of the nearby seeds
being squeezed tightly. There are vertical cracks on the
round, black seeds. The testa, which has three layers
and is between 1 and 1.25 millimeters thick, is found to
be separated from the kernels of dried seeds. It displays
the hilum and micropyle closed to each other. Hilum is
usually encircled by a dark area and has a pale residue
to funicle. Micropyle is located close to the edge among
a shadowy area. Its seed coat is a fairly light shade of
blue, ranging from grayish to dull green. (8)

❖ **Microscopic Characteristics:**

The Seeds:

Columnar, vertical luminal cells were arranged in many
layers in the seeds of the *C. bonducella* plant when
viewed under a microscope. Whereas parenchyma cells
are dark, have thick bone walls, and contain starch
grains, columnar palisade cells are powdery. (9)

❖ **Traditional and Modern Uses:**

Styptic, purgative, and anthelmintic, the seed is said to
reduce inflammation and be helpful in treating leprosy,
colic, malaria, hydrocele, and skin conditions. An
external treatment for hydrocele and orchitis is created
in Madras (Chennai) using powdered seeds and castor
oil. (10) When it comes to treating hydrocele, the seeds
are thought to be antilemnorrhagic, anthelmintic,
ferifuge, tonic, and particular. Convulsions and
paralysis are treated using the oil extracted from the
seeds. It is thought that the ground seeds are vesicant in
Guinea. (11) It was discovered that the powdered seeds



had weak antiperiodic effects when given to malaria patients in an equal mixture with pepper powder. They did no good in malignant malaria. When a snake bite occurs, the seeds are ingested after being ground in water. Snake venom cannot be countered by the seeds. Powdered seeds and long peppers combined with honey provide a positive expectorant effect. Burned arecanut and alum-soaked seeds make a wonderful dentifrice for gum boils, spongy gums, etc. Roasted seeds are utilized as an anti-diabetic in the West Indies

❖ Habitat and Habitat:

It is a perennial plant, *C. bonducella* that grows within vines. that can thrive both in open and shaded environments. usually found in the Himalayas up to 1,000 meters above sea level, and on the Indian plains on waste lands or along the ocean. Additionally, outhern, eastern, and western India's deltaic areas are home to it. found in the warmest parts of India, Sri Lanka, and Burma, particularly along the coast.

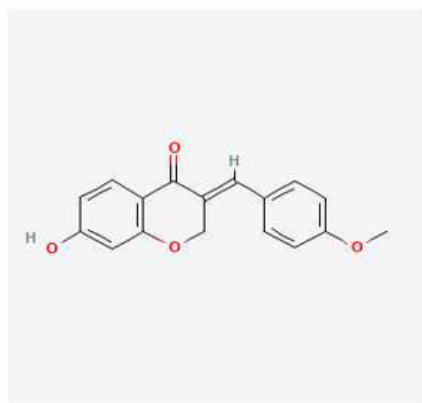
❖ Standardization Parameters:

The following are the standardization parameters for *C. bonducella*: solubility in alcohol, the amount of extractive value in water, ethanol, Taste, color, odor, LOD, total ash value, sulphated ash, water insoluble, acid insoluble, ethyl acetate extractive value, hexane extractive value, and foreign matter (see table 1). (13)

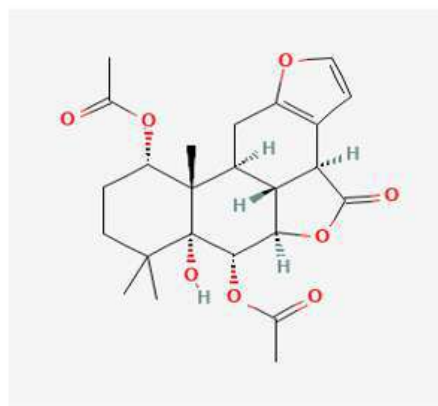
Sr. No.	Parameter	Phytochemical properties
1	Flavor	Astringent
2	color	pale brown
3	Smell	A distinctive scent
4	A foreign issue (%)	0.979
5	Drying-related loss (%)	8.83
6	Total amount of ash (%)	3.37
7	Ash that is insoluble in acid (%)	0.49
8	Dissolvable in Water (%)	1.69
9	Sulfurous ash (%)	4.37
10	Alcohol solubility (%)	26.8
11	Hexane's extraction value (%)	4.3
12	The extract's worth in chloroform (%)	2.58
13	Ethyl acetate's extraction value (%)	0.92
14	worth of ethanol extraction (%)	2.92
15	The importance of water extraction (%)	6.7

❖ Phytochemicals:

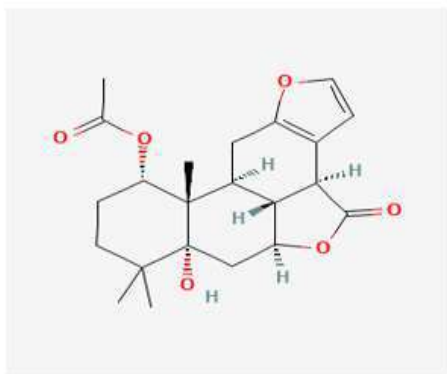
All among the main chemical components are found in the whole *Caesalpinia bonducella* plant, including phenols, fatty acids, hydrocarbons, amino acids, phytosterols, isoflavones, and steroidal saponin. (14)



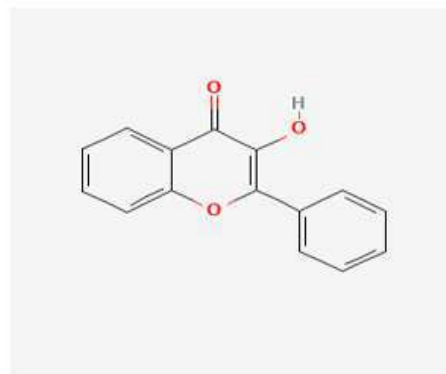
1) Bonducellin



2) caesalpinin D



3) Caesalmin B



4) Flavonol

❖ *Caesalpinia bonducella*'s Anthelmintic Mode of Action:

1. Immobilization and Paralysis of Parasites:

-Neuromuscular Blockade: According to certain research, extracts from *Caesalpinia bonducella* may include substances that cause parasitic worms to experience neuromuscular blockade. This impact paralyzes and immobilizes the worms, facilitating the process of remove them in the body of the host.

The Contractile Device: Flavonoids and alkaloids, two bioactive substances found in *Caesalpinia bonducella*, may disrupt the worms' ability to move and survive inside their host. (15)

2Metabolic Pathway Inhibition:

Energy Metabolism: It has been demonstrated that specific phytochemicals found in *Caesalpinia bonducella* disrupt the helminths' energy metabolism. For example, they might prevent important enzymes from producing energy, including oxidative phosphorylation or glycolysis. Compounds in *Caesalpinia bonducella* have the potential to interfere with parasites' nutritional intake processes, denying them the essential nourishment they require to survive and reproduce (16)

3. Cuticle and internal structure damage:

Physical Disruption: According to certain research, extracts from *Caesalpinia bonducella* may physically harm helminths' internal structures and cuticle, or outer covering. This Reference: 98-106.102 in *Ijppr.Human*, 2024, Vol. 30 (7) Rajani P. Bawane et al *HumanJournals.com/ijppr* harm affects their physiological and structural soundness functioning, in the end resulting toward their ejection or perishment.

Balance Osmotic: *Caesalpinia bonducella* contains substances that might disrupt the parasites' osmotic equilibrium, resulting in cell enlargement or dehydration that could be harmful to their ability to survive. (17)

4. Receptor Binding and Interaction with Surface Receptors:

Caesalpinia bonducella's bioactive substances may interact with certain ion channels or surface receptors found on parasitic worm membranes. Compounds from *Caesalpinia bonducella* can interfere with signaling pathways necessary for the worms' survival and reproduction by attaching to these receptors. (18)

5.Bioactive compounds' synergistic effects:

multi-target effects: The combined effects of a number of *Caesalpinia bonducella* bioactive

compounds are frequently credited with the plant's anthelmintic action. By acting on many molecular targets within the parasites, these substances may increase overall efficacy and lower the risk of resistance development. (19)

❖ Recent Pharmacological Studies:

Numerous pharmacological investigations were inspired by the discovery of a variety of

phytochemicals in different plant components. However, there is still a lack of research and documentation on the plant. More thorough scientific research may uncover a wealth of undiscovered phytochemicals that hold great promise for opening up new directions and methods in the field of clinical treatments. 46 Different plant components have been described as having important qualities in a variety of scholarly books(Refer to Table 3).

Table 3: Novel Medicinal Investigations Into Flowers leaves, Seeds, And S.NO. Uses Of Plant Parts (20)

Sr. No.	Plant part	Uses	References
1	The seeds	Reduces inflammation	21
2	The seeds	The antibacterial	22
3	every component	Immunomodulators	23
4	The seeds	Both antidiabetic and hypoglycemic	24
5	Blooms	Pain reliever	25
6	The leaves	Stress caused by antioxidants	26
7	The seeds	Drugs that treat depression	27
8	The seeds	Antipyretic medication	28
9	The seeds	A remedy for asthma	29
10	The leaves	Protective of the liver	30
11	Young foliage and branches	Anti tumor	31
12	The leaves	Against the feedant	32
13	The seeds	Avoiding diabetes	33
14	The seeds	Antimicrobial and cytotoxic properties	34
15	The leaves	Protective of the kidneys	35
16	The seeds	Low level diabetes	36
17	The seeds	Low level diabetes	36
18	The seeds	Infertility	37
19	The leaves	Pro-apoptotic and antiproliferative	38
20	The leaves	Parasiticides	39
21	The seeds	Antiulcer medication	40
22	The seeds	Antimycobacterial Action	41
23	The seeds	Prevention of cataract	42
24	The leaves	Antidiarrhea	43
25	The seeds	Inhibition of filaria	44
26	The leaves	Contractile action of muscles	45
27	The leaves	Contractile action of muscles	45
28	The seeds	Antiestrogenic action	46
29	The seeds	Diuretic inhibitor	47
30	The leaves	In opposition to tumors	48
31	The seeds	A sedative	49
32	The seeds	anticonvulsant	50

1) Anti-inflammatory activity:

The granuloma pouch and formalin arthritis procedures were used to investigate the anti-inflammatory activity in rats. The extract was found to be effective at a dose of 250 mg/kg in the granuloma pouch model, and it compared favourably to phenylbutazone. The seeds showed 50% inhibitory activity against carrageenan-induced oedema in the rat hind paw when given orally at 1000 mg/kg 24 hours and 1 hour prior to carrageenan injection (IP). The activity was comparable to that of phenylbutazone at a dose of 100 mg/kg (66.67% inhibition) (21).

2)Antimicrobial activity:

Sagar K. and colleagues revealed the antibacterial activities of α -(2-hydroxy-2-methylpropyl)- ω -(2-hydroxy-3-methylbut-2-en-1-yl) polymethylene from *Caesalpinia bonducella* (L.). The antibacterial properties of bondenolide and seed extracts from *Caesalpinia bonduc* (L.) Roxb were reported by Simin K. et al. The antibacterial properties of *Caesalpinia bonduc* (Lin.) Roxb seeds were reported by both in vivo and in vitro, Arif T. et al. (22)

3)Antidiabetic activity:

The antidiabetic properties of *Caesalpinia bonducella* seed extract were evaluated in hyperglycemia produced by alloxan. The extract's antihyperglycemic effect might result from inhibiting the absorption of glucose. The drug may have antidiabetic and antihyperlipidemic properties. Strong hypoglycemic effects were demonstrated by both the ethanolic and aqueous extracts in a model of chronic type 2 diabetes. Insulin production from isolated islets may be increased by both fractions. (33) Kalauni SK et al. have studied the structure-activity relationship and antimalarial characteristics of diterpenes of the

cassane and norcassane classes from *Caesalpinia crista*. Linn T Z, et al. discovered that the diterpenes of the cassane and norcassane classes from Indonesia's *Caesalpinia crista* have antimalarial efficacy against *Plasmodium falciparum* growth. In addition to the known cassane diterpenes, three new cassane furanoditerpenoids (1-3) were discovered using *Caesalpinia bonduc* seed kernels. Excellent antimalarial efficacy was demonstrated by compounds 1-3 against the multidrug-resistant *Plasmodium falciparum* K1 strain. (51).

4)Antibacterial, Antifungal, Antispasmodic activity:

Caesalpinia bonducella possesses antibacterial, antifungal, antispasmodic, and Ca^{++} antagonist qualities, according to Khan HU et al. Saeed MA and Sabir AW discovered that *Caesalpinia bonducella* seeds had antibacterial activity.

5)Antidiarrhoeal activity:

In mice, the fruits were shown to have strong antidiarrheal properties. (43)

6)Antioxidant activity:

Nikhil Kumar and colleagues have demonstrated the antioxidant activity of *Caesalpinia bonducella* seed chloroform extract. Mandal S. et al. assess the methanolic extract of *Caesalpinia crista* leaf's antioxidant and reactive oxygen species scavenging capabilities. Phenolic and flavonoid components may be responsible for the 70% methanol extract of *C. crista* leaves' antioxidant and ROS-scavenger properties. *Caesalpinia bonducella* seeds' ethanolic extract has been shown to exhibit antioxidant activity and a total phenolic content by Shukla S. et al. According to the study's findings, *C. bonducella* shows a great



deal of promise for application as a natural antioxidant. (27)

7) Immunomodulatory activity:

The effects of an aqueous extract of bonduc nut (*Caesalpinia bonducella*) seeds on immunomodulation in vivo are investigated by Shukla S. et al. The in vivo immunomodulatory effects of an aqueous extract of *Caesalpinia bonducella* Fleming seeds were assessed in this study. In Indian traditional medicine, *C. bonducella* is a common herb. This study looked at how the humoral and cell-mediated immune system components in rats were impacted by the aqueous extract from *C. bonducella* seeds. In comparison to the control, the mean hemagglutinating antibody (HA) titer rose by 93.03 \pm 4 and the delayed type hypersensitivity (DTH) changed by 0.56 \pm 0.058 mm following the administration of 400 mg/kg body weight of *C. bonducella* seed extract. According to the study's findings, *C. bonducella* extract shows promise as an immunostimulatory medication. Shukla S. et al. looked at the ethanolic extract of *Caesalpinia bonducella* seeds' immunomodulatory properties. *Caesalpinia bonducella* may have immunomodulatory qualities and be utilized therapeutically to prevent autoimmune illnesses, according to the study's findings. (23)

CONCLUSION:

C. bonducella is a large, evergreen shrub with stiff, woody stems and deep roots. This plant has ovate, complex elliptical leaves that alternate on either side of the branches and have a glossy surface. Several active metabolites found in various areas of *C. bonducella* have been reaffirmed in the study as having the ability to treat a variety of illnesses. Due to the presence of distinct bioactive metabolites, it has also been noted that different plant sections exhibit varying pharmacological

activity. To fully explore all of the opportunities and potential that the rich plant has to offer, however, further scientific study and documentation are needed. In summary, the current study's findings demonstrated that *Caesalpinia bonducella*'s crude ethanolic and aqueous extracts contain quinines, phenolic compounds, proteins, carbohydrates, alkaloids, flavonoids, tannins, and saponins. The proportions of terpenoids, phenolics, lipids and waxes, Q. Alkaloids, and N-oxides were found to be satisfactory. This review compiles the data from recent pharmacological research studies. The plant's seeds, bark, and roots exhibited antibacterial, antihyperlipidemic, antispasmodic, antioxidant, and immunomodulatory properties. *C. bonducella*'s flowers have analgesic properties. *C. bonducella* offers antimalarial properties in its seed kernels and anticancer, antiulcer, and antifilarial properties in its leaves. Even if the plant's wealth of powerful phytochemicals makes it medicinally rich, more research can still be done. This wild plant has a wealth of biomarker compounds with potential medical applications and a variety of pharmacological actions. However, there is still need for study into creating formulations for various illnesses and conditions, which could raise the plant's future industrial value.

REFERENCES

1. Shelar UB. Phytochemical And Pharmacological Study of *Caesalpinia Decapetala* Leaves. MK Infoedutech Private Limited: India. 2022:1-71.
2. Alamgir AN, Alamgir AN. Secondary metabolites: Secondary metabolic products consisting of C and H; C, H, and O; N, S, and P elements; and O/N heterocycles. Therapeutic use of medicinal plants and their extracts: volume 2: phytochemistry and bioactive compounds. 2018:165-309.



3. Tomaszewska-Gras J. Chemical Composition and Structure of Foods. In *Chemical and Functional Properties of Food Components* 2023 May 22 (pp. 13-38). CRC Press.
4. Pandey DD, Jain AP, Kumar A. *Caesalpinia bonducella*: A pharmacological important plant. *Pharma Innov J*. 2018; 7:190.
5. Manikandaselvi S, Vadivel V, Brindha P. *Caesalpinia bonducella* L.: A nutraceutical plant. *Journal of Chemical and Pharmaceutical Research*. 2015;7(12):137-42.
6. Es S. Preliminary Analysis Of Floristic Diversity In Selected Wards Of Cheranelloor Panchayat (Doctoral dissertation, St Teresa's (autonomous), Ernakulam).
7. Nishteswar K. Pharmacological and pharmaceutical principles of ayurvedic drugs: a concurrent appraisal. *Translational Ayurveda*. 2018 Nov 12:53-75.
8. Boesewinkel FD, Bouman F. The seed: structure and function. In *Seed development and germination* 2017 Nov 1 (pp. 1-24). Routledge.
9. Iswarya Ak, Priya Ss, Subbulakshmi C. A Study On The Morphology And Seed Coat Anatomy Of Selected Economically Important Seeds Of Brassicaceae Family.
10. Sultana R, Rahman AM. *Academic Journal of Life Sciences*. *Academic Journal of Life Sciences*. 2017;3(9):52-78.
11. Anubala B. Clinical evaluation of Sirupulladi Ennai (a siddha drug) for the treatment of Neerkana Mantham (URI) in children (Doctoral dissertation, National Institute of Siddha, Chennai).
12. Ravikanth K, Kanaujia A, Thakur D, Sharma A, Gautam B. Nutritional constituents of the plants *Fumaria indica* and *Caesalpinia bonducella*. *Int J Adv Pharm Biol Chem*. 2014; 3:698-702.
13. Bueno PC, Cavaleiro AJ. Physico-Chemical Methods for the Quality Control of Medicinal Plants, Plant Derivatives and Phytomedicines in Brazil. *Brazilian Medicinal Plants* (1st ed., p. 25). CRC Press. <https://doi.org/10.1201/b22296>. 2019 Nov 11.
14. Zanin JL, De Carvalho BA, Salles Martineli P, Dos Santos MH, Lago JH, Sartorelli P, Viegas Jr C, Soares MG. The genus *Caesalpinia* L. (Caesalpiniaceae): phytochemical and pharmacological characteristics. *Molecules*. 2012 Jun 29;17(7):7887-902.
15. McCusker P, Mian MY, Li G, Olp MD, Tiruveedhula VP, Rashid F, Golani LK, Verma RS, Smith BC, Cook JM, Chan JD. Non-sedating benzodiazepines cause paralysis and tissue damage in the parasitic blood fluke *Schistosoma mansoni*. *PLoS Neglected Tropical Diseases*. 2019 Nov 15;13(11):e0007826.
16. Rognstad R. Rate-limiting steps in metabolic pathways. *Journal of Biological Chemistry*. 1979 Mar 25;254(6):1875-8.
17. Domínguez E, Cuartero J, Heredia A. An overview on plant cuticle biomechanics. *Plant Science*. 2011 Aug 1;181(2):77-84.
18. Tardieu M, Epstein RL, Weiner HL. Interaction of viruses with cell surface receptors. *International Review of Cytology*. 1982 Jan 1; 80:27-61.
19. Hosseini-Zare MS, Sarhadi M, Zarei M, Thilagavathi R, Selvam C. Synergistic effects of curcumin and its analogs with other bioactive compounds: A comprehensive review. *European Journal of Medicinal Chemistry*. 2021 Jan 15; 210:113072.
20. Sheikh SA. Ethno-medicinal uses and pharmacological activities of lotus (*Nelumbo nucifera*). *J. Med. Plants Stud*. 2014;2(6):42-6.
21. Opal SM, DePalo VA. Anti-inflammatory cytokines. *Chest*. 2000 Apr 1;117(4):1162-72.
22. Balouiri M, Sadiki M, Ibensouda SK. Methods for in vitro evaluating antimicrobial activity: A



- review. *Journal of pharmaceutical analysis*. 2016 Apr 1;6(2):71-9.
23. Reuman PD. Immunomodulators. *The Pediatric infectious disease journal*. 2001 Oct 1;20(10):995-6.
24. Gupta RK, Kesari AN, Murthy PS, Chandra R, Tandon V, Watal G. Hypoglycemic and antidiabetic effect of ethanolic extract of leaves of *Annona squamosa* L. in experimental animals. *Journal of ethnopharmacology*. 2005 May 13;99(1):75-81.
25. Selbst SM, Clark M. Analgesic use in the emergency department. *Annals of emergency medicine*. 1990 Sep 1;19(9):1010-3.
26. Dundar Y, Aslan R. Antioxidative stress. *Eastern Journal of Medicine*. 2000;5(2):45-7.
27. Feighner JP. Mechanism of action of antidepressant medications. *Journal of Clinical Psychiatry*. 1999 Jan 1;60(4):4-13.
28. Sullivan JE, Farrar HC, Section on Clinical Pharmacology and Therapeutics, Committee on Drugs. Fever and antipyretic use in children. *Pediatrics*. 2011 Mar 1;127(3):e20103852.
29. Gandhi GR, de Sousa Leao GC, da Silva Calisto VK, Vasconcelos AB, Almeida ML, Quintans JD, Barreto E, Narain N, Júnior LJ, Gurgel RQ. Modulation of interleukin expression by medicinal plants and their secondary metabolites: a systematic review on anti-asthmatic and immunopharmacological mechanisms. *Phytomedicine*. 2020 Apr 15;70:153229.
30. Adewusi EA, Afolayan AJ. A review of natural products with hepatoprotective activity. *J Med Plants Res*. 2010 Jul 4;4(13):1318-34.
31. Brana MF, Cacho M, Gradillas A, Pascual-Teresa BD, Ramos A. Intercalators as anticancer drugs. *Current pharmaceutical design*. 2001 Nov 1;7(17):1745-80.
32. Koul O. Phytochemicals and insect control: an antifeedant approach. *Critical reviews in plant sciences*. 2008 May 20;27(1):1-24.
33. Malviya N, Jain S, Malviya SA. Antidiabetic potential of medicinal plants. *Acta pol pharm*. 2010 Mar 1;67(2):113-8.
34. Chuensombat S, Khemaleelakul S, Chattipakorn S, Srisuwan T. Cytotoxic effects and antibacterial efficacy of a 3-antibiotic combination: an in vitro study. *Journal of endodontics*. 2013 Jun 1;39(6):813-9.
35. Talele BD, Mahajan RT, Chopda MZ, Nemade NV. Nephroprotective plants: a review. *Int J Pharm Pharm Sci*. 2012;4(1):8-16.
- Luo Q, Cai Y, Yan J, Sun M, Corke H. Hypoglycemic and hypolipidemic effects and antioxidant activity of fruit extracts from *Lycium barbarum*. *Life sciences*. 2004 Nov 26;76(2):137-49.
36. Daniyal M, Akram M. Antifertility activity of medicinal plants. *Journal of the Chinese Medical Association*. 2015 Jul 1;78(7):382-8.
37. Chor SY, Hui AY, To KF, Chan KK, Go YY, Chan HL, Leung WK, Sung JJ. Anti-proliferative and pro-apoptotic effects of herbal medicine on hepatic stellate cell. *Journal of ethnopharmacology*. 2005 Aug 22;100(1-2):180-6.
38. Waller PJ. Anthelmintic resistance. *Veterinary parasitology*. 1997 Nov 1;72(3-4):391-412.
39. Dharmani P, Palit G. Exploring Indian medicinal plants for antiulcer activity. *Indian journal of pharmacology*. 2006 Mar 1;38(2):95-9.
40. Reddy VM, O'Sullivan JF, Gangadharam PR. Antimycobacterial activities of riminophenazines. *Journal of Antimicrobial Chemotherapy*. 1999 May 1;43(5):615-23.
41. Lu A, Duan P, Xie J, Gao H, Chen M, Gong Y, Li J, Xu H. Recent progress and research trend of anti-cataract pharmacology therapy: a bibliometric analysis and literature review.



European Journal of Pharmacology. 2022 Nov 5; 934:175299.

Mazza P. The use of *Bacillus subtilis* as an antidiarrhoeal microorganism. *Bollettino chimico farmaceutico*. 1994 Jan 1;133(1):3-18.

42. Mathew N, Kalyanasundaram M. Antifilarial agents. *Expert Opinion on Therapeutic Patents*. 2007 Jul 1;17(7):767-89.

43. Hood DA. Invited review: contractile activity-induced mitochondrial biogenesis in skeletal muscle. *Journal of applied physiology*. 2001 Mar 1;90(3):1137-57.

44. Mueller SO. Overview of in vitro tools to assess the estrogenic and antiestrogenic activity of phytoestrogens. *Journal of Chromatography B*. 2002 Sep 25;777(1-2):155-65.

45. Feng YL, Chen H, Tian T, Chen DQ, Zhao YY, Lin RC. Diuretic and anti-diuretic activities of the ethanol and aqueous extracts of *Alismatis rhizoma*. *Journal of Ethnopharmacology*. 2014 Jun 11;154(2):386-90.

46. Murugaiyan G, Saha B. Protumor vs antitumor functions of IL-17. *The Journal of Immunology*. 2009 Oct 1;183(7):4169-75.

47. Altamura AC, Moliterno D, Paletta S, Maffini M, Mauri MC, Bareggi S. Understanding the pharmacokinetics of anxiolytic drugs. *Expert opinion on drug metabolism & toxicology*. 2013 Apr 1;9(4):423-40.

48. Stefan HT, Feuerstein TJ. Novel anticonvulsant drugs. *Pharmacology & therapeutics*. 2007 Jan 1;113(1):165-83.

49. Pan WH, Xu XY, Shi N, Tsang SW, Zhang HJ. Antimalarial activity of plant metabolites. *International Journal of Molecular Sciences*. 2018 May 6;19(5):1382.

50. Okoye TC, Akah PA, Okoli CO, Ezike AC, Mbaaji FN. Antimicrobial and antispasmodic activity of leaf extract and fractions of

Stachytarpheta cayennensis. *Asian Pacific Journal of tropical medicine*. 2010 Mar 1;3(3):189-92.

HOW TO CITE: Rohini Jadhav*, Sujata Karande, Rajnandini Kamble, Dr. D. R. Jadage, *Phytochemical and Pharmacological Insights into *Caesalpinia Bonducella*: A Comprehensive Review*, *Int. J. of Pharm. Sci.*, 2025, Vol 3, Issue 5, 1069-1079 <https://doi.org/10.5281/zenodo.15354236>

