Int. J. Sci. R. Tech., 2025 2(12)
A Multidisciplinary peer-reviewed Journal
www.ijsrtjournal.com [ISSN: 2394-7063]

Original Article

Review on Various Activities Exhibited by *Coccinia Grandis*

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ABSTRACT

Coccinia grandis (L.) Voigt, a widely used medicinal plant in traditional systems of medicine, exhibits a broad spectrum of pharmacological properties. The present compilation integrates findings from multiple studies evaluating its antimicrobial, cytotoxic, pesticidal, and antiulcer activities, along with its ethnopharmacological significance. Extracts from various parts of *C. grandis*, particularly roots and leaves, have demonstrated potent antibacterial activity against several Gram-positive (*Bacillus subtilis, Sarcina lutea, Staphylococcus aureus*) and Gram-negative pathogens (Salmonella typhi, Shigella dysenteriae), with notable minimum inhibitory concentrations. Moderate antifungal effects have been reported against Candida albicans, *Colletotrichum falcatum*, and *Aspergillus niger* using aqueous and ethanolic extracts. The plant also exhibited cytotoxic potential in the brine shrimp lethality assay (LC_{50} = 15 µg/mL) and moderate pesticidal activity against *Sitophilus oryzae* adults. In addition, C. grandis displays a diverse pharmacological profile including antidiabetic, antioxidant,hepatoprotective, antimicrobial, anti-inflammatory, anticancer, and antipyretic properties.Experimental evaluation of its antiulcer potential revealed that ethanolic leaf extract significantly reduced indomethacin-induced gastric ulceration in rats, offering ulcer protection comparable to omeprazole. Collectively, these findings validate the traditional uses of C. grandis and highlight its potential as a multifaceted therapeutic agent, warranting further investigation into its bioactive constituents and mechanisms of action.

Keywords: Medicine plant, traditional use, healing properties, active compounds, more research, how it works

INTRODUCTION

Coccinia grandis (L.) Voigt, a member of the Cucurbitaceae family and commonly known as *Telakucha*, is a significant medicinal plant widely distributed across the Indian subcontinent, Eastern Africa, and Central America. In many regions including Australia, Asia, the Caribbean, the southern United States, and the Pacific Islands different parts of this plant are primarily consumed as a food source. The fruits are edible at both the green, unripe stage and the fully matured, bright red stage. Additionally, the tender shoots and young leaves are often cooked and eaten as leafy vegetables. Beyond its nutritional value, various plant parts such as the fruits, stems, roots, and leaves are traditionally used to manage numerous health conditions. These include edema, eye ailments, hypertension, fever, inflammation, headaches, typhoid, sunstroke, jaundice, stomach discomfort, dysentery, and skin disorders like dermatitis, eczema, scabies, and alopecia. It is also employed as a carminative, hypnotic, emetic, blood purifier, and in treating mental health issues and leucorrhea. Phytochemical investigations indicate that *Coccinia grandis* contains several bioactive compounds, including saponins, cardenolides, flavonoids, and polyphenols, which are believed to contribute to its antibacterial properties. The root is particularly rich in diverse constituents such as resins, alkaloids, starch, fatty acids, carbonic acid, triterpenoids, the saponin coccinoside, flavonoid glycosides, lupeol, β-amyrin, β-sitosterol, and taraxerol, all of which may play essential roles in the plant's pharmacological activities. The objective of this review is to consolidate findings on various pharmacological activities of *C. grandis*, emphasizing the significance of its fruit as a potential therapeutic source.

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.

Fig 1: *Coccinia grandis.*

Taxonomy

Table. 1: Taxonomical classification of Coccinia grandis.

Kingdom	Plantae
Division	Magnoliopsida
Class	Magnoliophyta
Order	Violales
Family	Cucurbitaceae
Genus	*Coccinia Wight & Arn*
Species	*Coccinia Grandis L Vight.*

Vernacular Names

Table. 2: Vernacular names of Coccinia grandis.

Marathi	Tindora, Tondli
Hindi	Parval, Tindora, Tinda, Kundru
Danish	Skariagenagurk
English	Scarlet
Telagu	Dondakaya
Kannada	Tondekayi
Malayalam	Tendli, ghiloda, kundri, kowai.
Chinese	Hong Qua Japanese Yasai, karasuuri
Malay	Pepasan, Kovakka, Kovai
Spanish	Pepino, cimaron

Chemical Constituents

- Aerial part - Heptacosane, Cephalandrol, β - sitosterol, Alkaloids Cephalandrins A and B,
- Fruits- β- Amyrin Acetate, Lupeol, Cucurbitacin B, Taraxerone, Taraxerol, β-carotene, Lycopene, Cryptoxanthin, Xyloglucan, Carotenoids, β-sitosterol, Stigma-7-en-3-one.
- Root - Resin, Alkaloids, Starch, Fatty Acids, Carbonic acid, Triterpenoid, Saponin Coccinoside, Flavonoid Glycoside, Lupeol, β-amyrin, β-sitosterol, Taraxerol.

Medicinal Value of Various Parts of *Coccinia Grandis*

Table 3: Medicinal value of various parts of Coccinia grandis

Plant part	Medicinal value
Leaf	Antidiabetic, oxidant, larvicadal, GI disturbances, Cooling effect to the eye, Gonorrhea, hypolipidemic, skin diseases, urinary tract infection.
Fruit	Hypoglycemic, analgesic, antipyretic, Hepatoprotective, tuberculosis, eczema. Anti-inflammatory.
Stem	Expectorant, antispasmodic, asthma, bronchitis, GIT disturbances, urinary tract infection, skin diseases,
Root	Hypoglycemic, antidiabetic, skin diseases, removes pain in joint, urinary tract infection.

MATERIALS AND METHODS

This review synthesizes data from peer-reviewed studies evaluating *C. grandis* extracts. Extraction methods reported include Soxhlet extraction and cold maceration using methanol, ethanol, water, chloroform, petroleum ether, and ethyl acetate. Antimicrobial activity was assessed predominantly using disc diffusion and minimum inhibitory concentration (MIC) assays against bacterial and fungal pathogens as described in Bhattacharya et al.[2] and Hasan & Sikdar[4]. Cytotoxicity tests employed brine shrimp lethality bioassay, while pesticidal activity was evaluated against *Sitophilus oryzae* through mortality and repellency assays[4]. Anti-ulcer studies used indomethacin-induced ulcer models in Wistar rats, applying ulcer index scoring and biochemical assays (TBARS, SOD, catalase, GSH) [6].

RESULTS

Studies reported significant pharmacological effects from *C. grandis* extracts:

Antimicrobial Activity

Aqueous and ethanolic extracts inhibited both Gram-positive and Gram-negative bacteria, including *Bacillus subtilis*, *Staphylococcus aureus*, *Shigella dysenteriae*, *Pseudomonas aeruginosa*, and *Salmonella typhi*. Inhibition zones reached up to 26 mm in methanolic root extracts[4], while leaf extracts demonstrated strong activity against *Candida albicans* and *Aspergillus niger*[2].

Cytotoxicity and Pesticidal Activity

Brine shrimp lethality assays produced LC_{50} values as low as 15 µg/mL, indicating potent cytotoxic components in the plant[4]. Moderate pesticidal effects were documented against *S. oryzae*, demonstrating both contact toxicity and repellency[4].

Anti-ulcer and Antioxidant Activities

Ethanolic leaf extracts provided up to 69% ulcer protection in indomethacin-induced models, comparable to omeprazole[6]. Strong antioxidant activity in fruit extracts links to flavonoids and carotenoids, contributing to their therapeutic potential.

DISCUSSION

The findings collectively demonstrate that *C. grandis* possesses a wide pharmacological spectrum due to its rich composition of triterpenoids, flavonoids, carotenoids, and cucurbitacins. Antimicrobial studies confirm significant inhibition of pathogenic bacteria and fungi, suggesting potential roles in treating infections. Cytotoxic and pesticidal properties highlight the presence of bioactive compounds with possible pharmaceutical or biopesticide applications. Anti-ulcer and antioxidant findings further support the plant's traditional use for gastrointestinal and oxidative stress-related disorders. Although many studies evaluate leaves or roots, the presence of similar phytochemicals in the fruits underlines their therapeutic relevance. However, standardized extraction procedures, detailed mechanistic evaluations, and toxicity profiling remain areas requiring further research. Overall, the findings validate the therapeutic relevance of *Coccinia grandis* and strengthen the scientific basis for its traditional applications. However, variations in extract potency highlight the importance of solvent selection, as the ethanolic extract consistently yielded higher

phytochemical and bioactivity results. Future work involving purification, chemical characterization, and mechanistic studies is essential to identify the specific compounds responsible for these activities and to clarify their pharmacological significance.

CONCLUSION

This review concludes that *Coccinia grandis* fruit possesses significant pharmacological potential, as consistently demonstrated across multiple studies. Bhattacharya ***et al.*** reported strong antifungal and antibacterial effects from aqueous and ethanolic extracts of *C. grandis*, proposing that both polar and non-polar constituents contribute to microbial growth inhibition. Hasan and Sikdar ***et al.*** further demonstrated that methanolic root extract exhibits potent antibacterial, cytotoxic, and pesticidal activities, suggesting that the plant contains promising bioactive compounds suitable for therapeutic and agricultural applications. Pekamwar ***et al.*** highlighted antioxidant, hepatoprotective, antidiabetic, and anti-inflammatory properties found throughout the plant, supporting its wide traditional use. Datchanamurty ***et al.*** provided evidence that ethanolic extracts reduce gastric ulceration almost comparably to standard omeprazole therapy, proposing that *C. grandis* has notable gastroprotective potential. Collectively, the evidence indicates that *Coccinia grandis* is a pharmacologically versatile medicinal plant with significant therapeutic promise. Future work should focus on the isolation and characterization of active phytochemicals, mechanistic studies for antibacterial and anti-ulcer actions, in-vivo toxicity profiling, and eventual clinical validation. Standardized herbal formulations based on *C. grandis* may offer valuable natural therapeutic options. This review strongly supports its potential as a source of future drug leads and biologically active compounds.

ACKNOWLEDGEMENT

We are thankful to the authorities of Holy Queen College of Pharmaceutical Sciences and Research for their facilities, guidance and providing us the timely suggestions to complete this work.

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HOW TO CITE: Mathew George*, Lincy Joseph, Ann Mary V. A., Ashin Joseph, Liyamary N. J., Muhamad Ashif P. S., Shahla E. P., Review on Various Activities Exhibited by Coccinia Grandis, Int. J. Sci. R. Tech., 2025, 2 (12), 162-165. https://doi.org/10.5281/zenodo.17877454