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# *Coccinia Grandis* a Potential Herb in Traditional Use and Recent Established Biological Activities with New Prospectives - A Review

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## Abstract

In our human era different plants are used from different family which are medicinally used. Traditional remedies the medicines are used with various plants which contains large number of pharmacological values and plenty of bioactive compounds. Different parts like seeds, bark, roots, leaves, fruits used in folk medicine. Different disease like wound healing, diabetes, stomach pain, fever like several diseases uses the plant parts in traditionally. *Coccinia grandis* have long been used traditionally in treatments in native area like north-central East Africa and also in Indo-Malayan region. Not only the medicinal purposes it also used in food in several countries like Asia , Australia, the Pacific Islands, the Caribbean, and southern United States, and West Bengal also. This review represented an overview of *Coccinia grandis* traditional and recently established biological activities and new prospectives.

**Keywords:** *Coccinia grandis*, Pharmacological values, Traditional Herb, Bioactive compounds.

## Introduction

Different herbal plants have long used as medicine in our traditional medicine and ethnopharmacology. Naturally plant have been used for their natural products which is isolated and contains wide range of medicinal activities. Moreover, 2500 plant species have been used in India for their medicinal value (1). According to our recent research WHO (World Health Organization), 80% of the human population still believe in herbal medicine for their primary healthcare. Herbal medicine only used for preliminary medications from plant preparation for the therapy. *Coccinia grandis belongs* to the Cucurbitaceae family (2). It has represented 70000n plant species have been used for human medicinal purpose. Moreover, 2500 plants have been used in India for their medicinal value (3) Plant parts of these type of like roots, leaves and fruits also used for

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medicinal properties. In this review we studied about *Coccinia grandis* used as a herbal medicine for therapeutic activity.

*Coccinia grandis* well known as tindola, scarlet, or ivy ground is known herbal plant. In India specially on eastern regions side by side Orissa, Jharkhand, Chhattisgarh, Madhya Pradesh, Gujarat, Maharastra and Andhra Pradesh not only found in these countries but also cover southeast region of Madras area (4)(5).The *C. grandis* are valuable for their nutritional value. it also rich in β-carotene, vitamin A and good source of protein, fibre, plenty of calcium (6)(7).

The main importance of these herb these have traditionally medicinal functions. It has promise as a good micronutrient. Micronutrients which comprise such as vitamin, minerals which are very important in our daily life for our health.

## Taxnomy

**Kingdom-** Plantae

**Order-** Cucurbitales

**Family-** Cucurbitaceae

**Genus-** *Coccinia*

**Species-** *C. grandis*

## Traditional Importance

*C. grandis* is a one best herbal medicine which is classified in tradition an in ancient practice. It is utilized for our regular life treatment. The whole plant use for the treatment of different symptoms. In Khammam district of Telangana and also in Orissa region also in Tamil Nadu region areas most of the people use leaf juice for different treatments like rheumatic pains, ulcers, diabetes, bronchitis, jaundice. Leaf paste was employed for pile by tribes of Western ghats (8).

Mysore of Karnataka district and Kalrayan hills, Eastern Ghats Tamil Nadu area people used the fresh raw fruits used for ulcers. In Orissa region fruits also used for stomach pain also for swelling for children. In West Bengal Bankura region people used root extract and also leaf extract digestive and ophthalmic areas and gonorrhoea. Mainly the leaves used for diabetes in Assam, Uttar Pradesh, Maharashtra and Sri Lanka areas (9) (10) (11).

Whole plant used in Bangladesh, Malayali tribes and tribals of Buldhana in Maharashtra area whole plant part used diabetes, lack of appetite, vomiting, wound healing, burns, itching, jaundice, leprosy diabetes, aphrodisiac. The root extract also used for diabetes basically in Sri Lanka area (12) (13) (14) (15).

## Bioactive Compounds

*C. grandis* have different number of bioactive compounds. The bioactive substances that have been isolated from different plant sections include a wide range of chemical groups. Methanolic leaf and aqueous fruit extracts contained alkaloids such as 1-tert-Butyl-5,6,7-trimethoxyisoquinolene and luteolin. However, ethyl acetate fruit extract contained (S)-Norlaudanosoline, Trachelogenin, Senecionine, Cathinone, Camptothecin, and (6S)-Hydroxyhyoscyamine (16) (17).

Ethyl acetate callus extract and petroleum ether callus and leaf extracts, were used to extract alkanes such as tritetracontane, heptacosane, and others. An alkyl ether known as octadecane,1-(ethenyloxy), was found in the leaf extract of petroleum ether. A variety of extracts, including methanolic fruit extracts, ethyl acetate leaf extracts, and petroleum ether callus, included fatty acids, including Pentadecanoic acid and Octadecanoic acid among others (18) (19) (20).

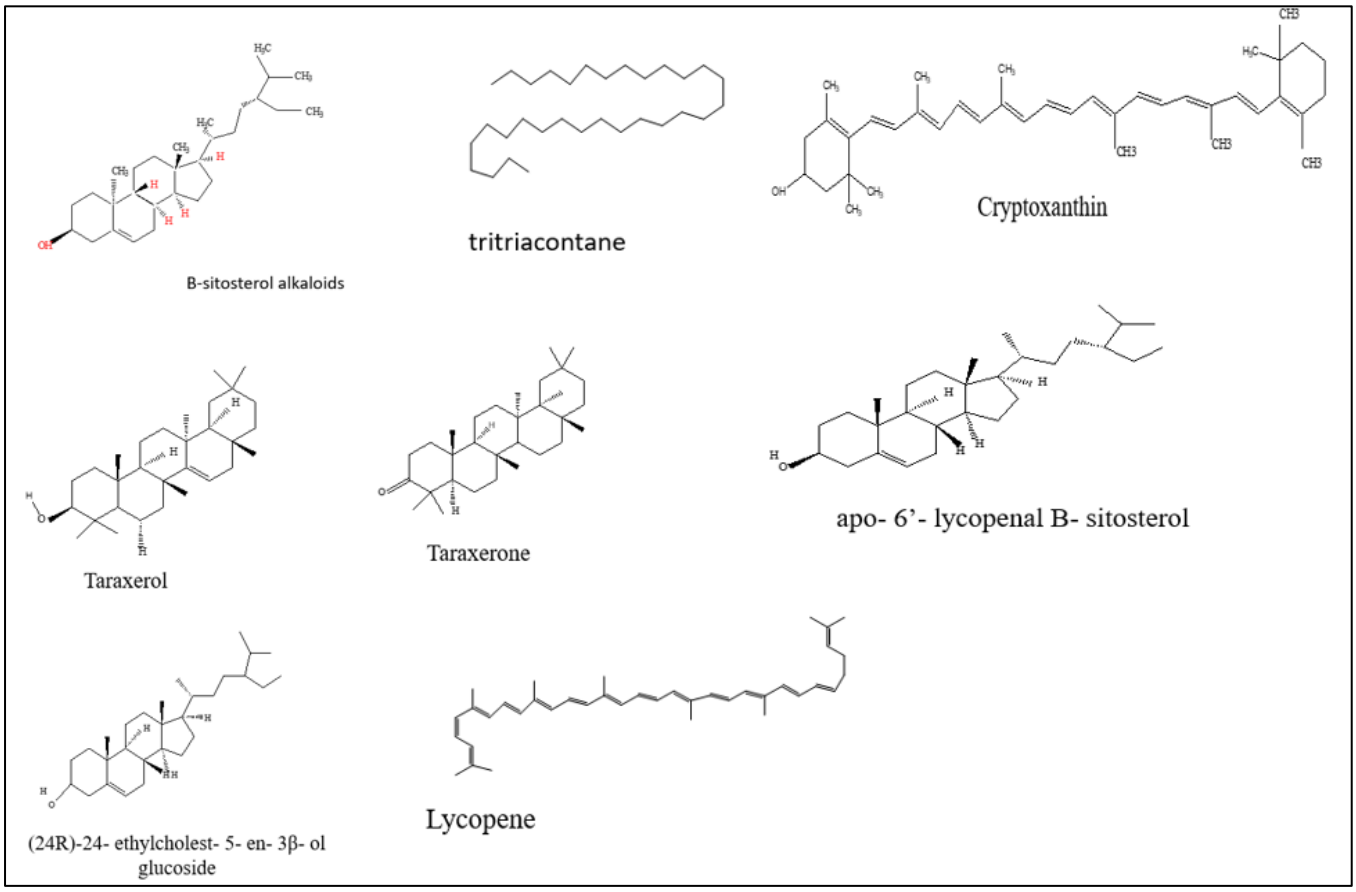


**Figure 1:** Some active phytoconstituents present in *c.grandis*

positive bacteria, including *Salmonella typhi, Escherichia coli, Pseudomonas aeruginosa, Proteus mirabilis, Bacillus cereus, and Shigella boydii.* In comparison to hexane and water extracts, ethanol and also ethyl acetate extracts of stems are more effective against as gram-positive and gram-negative (26). When it comes to combating both gram-positive and gram-negative bacteria, leaf hexane extract works better than water extract. While ethyl acetate or hexane extracts from stem are more effective against Salmonella typhi and *Pseudomonas aeruginosa* (7 mm zone of inhibition), *Staphylococcus pyogenes*, Salmonella typhi, and *Pseudomonas aeruginosa* (7 mm zone of inhibition), ethanol extracts of stem are more effective against *Pseudomonas aeruginosa* (9 mm zone of inhibition). Water extract is more efficient against Shigella boydii (11 mm zone of inhibition) than leaf ethanol extract is against Salmonella typhi and *Pseudomonas aeruginosa* (8 mm zone of inhibition) (27) (28).

**Anti-Ulcer Activity**

Tests were conducted on *C. grandis* leaf extract (2 g/kg), aqueous extract used (2 g/kg), and powder (0.5-2 g/kg) to determine antiulcer properties in albino Wistar rats. Famotidine (20 mg/kg bw) in 1% salt was the normal medication, while aspirin (200 mg/kg bw) was used to compare. While there was no discernible decrease in ulcers in the water extract, there was a considerable decrease in the powdered leaf and methanol extract (19). Another study examined the anti-ulcer properties of ethanolic extract, aqueous extract, complete aqueous extracts of *C. grandis* (Linn.) leaves at 200 and 400 mg/kg. Using a ligated ulcer model created by PYlorus, the anti-ulcer efficacy of the three extracts was investigated in rats (29) (30) (31). The usual medication used was omeprazole (2 mg/kg). The 400 mg/kg ethanolic extract exhibited similar to that of regular omeprazole (32).

**Anti-Inflammatory Activities**

Rats were used to test the anti-inflammatory properties of the fresh leaves of *C. grandis* aqueous extract at different doses by inducing paw edema with carrageenan levels. The tail flick model and the yeast-induced hyperpyrexia were used to assess the analgesic and antipyretic qualities, respectively (33). The extract's ceiling

effect was noted in the pre-treatment carrageenan test at 50 mg/kg. A dose-dependent on anti-inflammatory effect was reported in the 25–300 mg/kg dosing range in post-treatment experiments. At 50 mg/kg, the impact was comparable to that of diclofenac (20 mg/kg), but it became noticeably more prominent at higher doses. All dosages of the extract was significantly reduced the hyperpyrexia in the rats, with the highest impact occurring at 300 mg/kg, which is equivalent to paracetamol. In summary, our study has demonstrated that *C. grandis* possesses anti-inflammatory, antipyretic and analgesic properties; hence, the plant's traditional uses have been validated (34) (35).

**Anti-Tissue Activity**

The Guinea pigs as test subjects, the anti-tissue action of methanol extract of *C. grandis* fruits at two different concentrations as (2.5% and 5% w/v) was measured by counting the number of cough episodes caused by aerosols containing citric acid and sulphurr dioxide. Similar to the usual medication (codeine phosphate), the extract significantly reduced coughing in a manner that is dependent on the dose. As a result, while fruit extract may function through the central nervous system, the precise mode of action is still being investigated. The results in this study, indicate that *C. grandis* fruit extract had strong anti-tissue action during early screening, supporting the traditional belief that the plant was used to treat coughs in traditional medicine (36) (37).

**Anti-helminthic activity**

*C. grandis* fruits antihelminthic efficacy using different solvent petroleum ether, ethyl acetate, methanol, and water extracts were examined. For antihelminthic efficacy, two different extract concentrations (25 and 50 mg/mL) were utilised. The antihelminthic action of worms was tested using *Pheretima posthuma*. By measuring the amount of time, it takes for *Pheretima posthuma* worms to paralyse (P) and die (D), *C. indica's* anthelmintic activity is verified. The amount of time was expressed in minutes (38) (39)

**Anti-Hyperlipidemic Activity**

In a dyslipidemic hamster model, the ethanol extract of *C. grandis* (L.) Voigt significantly reduced cholesterol and triglycerides (40). To test its antidyslipidemic potential, ethanolic extract was separated into water-soluble, n-butanol, and chloroform get fractions (250 mg/kg bw). Fenofibrate, a standard medication, was administered at a dose of 108 mg/kg. Male golden Syrian hamsters (*Mesocricetus auratus*), weighing between 110 and 120 g at 12 weeks of age, were employed(41) . Significant lipid-lowering activity was observed in the chloroform fraction, which was followed by an increase in the ratio of total cholesterol to high density lipoprotein cholesterol. Repeated column chromatography was used to isolate a polyprenol compound from the chloroform soluble fraction, which serves as the active component. This compound was identified as C60-polyprenol. The first substance to be isolated from this plant was polypernol. After being separated from the chloroform fraction, the polyprenols demonstrated antidyslipidemic properties. Significant lipid-lowering activity was observed in the chloroform fraction, which was followed by an increase in the ratio of total cholesterol to high density lipoprotein cholesterol. Repeated column chromatography was used to isolate a polyprenol compound from the chloroform soluble fraction, which serves as the active component. This compound was identified as C60-polyprenol. The first substance to be separated from this plant was polypernol. Polyprenols, which were separated from the chloroform fraction, demonstrated (42).

**Anticancer Activity**

Fruit of *C. grandis*, cucurbitacin B has been shown to downregulate both c-Myc and hTERT expression, inhibiting telomerase activity in many breast cancer cell and causing both apoptosis and cell cycle arrest in G2/M. The most significant growth suppression was seen in the ER-negative breast cancer cell line SK-BR-3 (Kumari et al., 2016). Pure Cucurbitacin B's IC50 values against the cancer cell lines SKBR-3, HBL-100, and MCF-7 were 3.29 g/mL, 32.77 g/mL, and 63.07 $\mu$g/mL, respectively. In vitro, research using intraperitoneal injections of ethanol extract of leaves at dosages of 200 and 400 mg/kg for ten days extended the life expectancy of rats with tumours generated by Ehrlich Ascites Carcinoma cells by approximately 30% and 97%,

respectively. *C. grandis* demonstrated anticancer activity equivalent to that of the reference drug (Vinblast) by significantly lowering the viable cell count while raising the nonviable cell count (43). According to a study, *C. grandis* extract can alter a number of pathways that are crucial to oncogenesis, including NF-κB, ERK1/2, IL-6/JAK/STAT3, p38, and MAPK signalling cascades. THP-1 cell proliferation can be markedly inhibited by exposure to pair 50 mg/mL and 100 mg/mL of *C. grandis* extract. The way that *C. grandis* antitumor activity works (44).

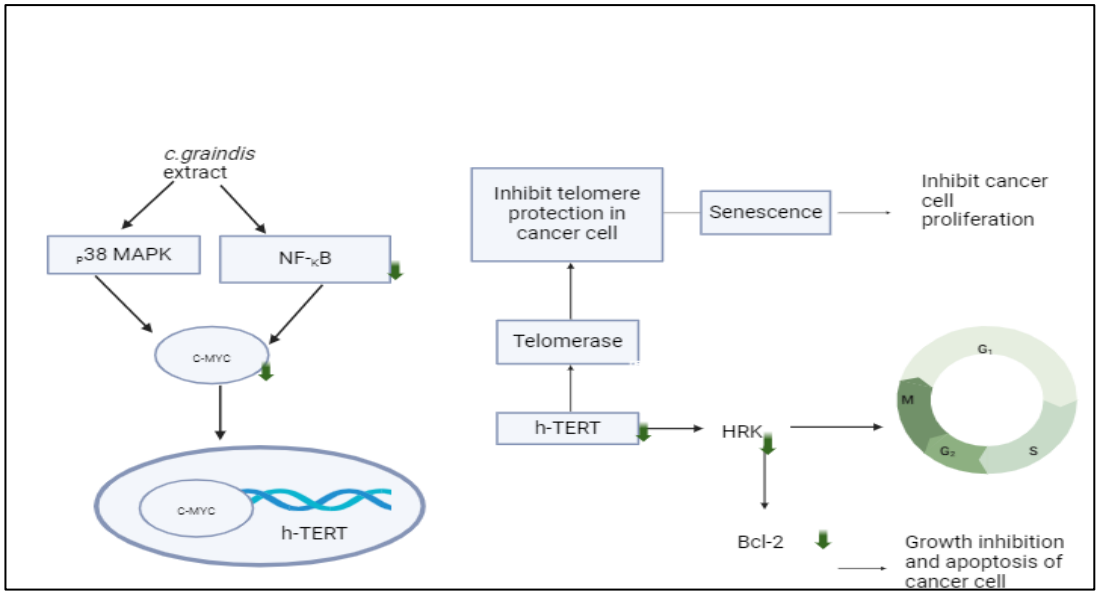


**Figure 2:** Anticancer mechanism of *c.grandis*

## Antipyretic Activity

Antipyretics are drugs that lower body temperature (45). According to Aggarwal et al., the methanolic extract of *C. grandis* leaves significantly reduces fever, reaching a level that is comparable to the prescription medication. In research, a In a dose-dependent manner, a methanolic extract of C. grandis leaves effectively reduced yeast-induced pyrexia (50 mg/kg to 200 mg/kg). When compared to the other tested doses, the 100 mg/kg dose shown a considerable reduction ($P < 0.01$), making it the most effective. Additionally, it was discovered that the extract's efficacy was equivalent to that of the prescribed medication rats. In a different investigation, the yeast-induced hyperpyrexia method was used to assess the antipyretic effect of the fresh leaves of *C. grandis* aqueous extract (CIAE) in rats(46) . At 200 and 300 mg/kg bw, there a substantial ($P < 0.05$) antipyretic effect that was similar to that of paracetamol. When the CIAE was administered, the normal rats' body temperature did not drop.

## Immunomodulatory Effect

Immunomodulatory drugs have the ability to either activate or inhibit the immune system, which may help the body fight against infections, cancer, and other illnesses. In a recent study, a crude extract of C. grandis shown immunomodulatory effects on multiple pathways of human monocytic THP-1 cells, including migration, phagocytosis, apoptosis, inflammatory cytokine secretion, and proliferation. After phorbol-12-myristate 13-acetate treatment, lipopolysaccharide (LPS) with or without C. grandis extract at 50 g/mL or 100 g/mL concentrations was administered. The differentiation of THP-1 cells into macrophages resulted in a significant downregulation of molecular signaling pathways (p38 MAPK, ERK1/2, NF-κB, Cyclin D, BCL2, ERK1, NF-κB, p-NF-κB, p-IκBα, and p-p38) and protein expression (BAX, ERK5, Cyclin D, BCL2, ERK1, NF-κB, p-NF-κB, p-IκBα, and p-p38) (47).

**Antinociceptive Activity**

Leaf extract of *C. grandis* extract of methanol shows a significant role and dose dependent which decreases the in acetic acid and writhing's in mice. And also, fresh fruits juice are showed result on mice 200 mg/kg for 30 minutes, and the powder significantly reduced writhing in rats by up to 35.47%, which was nearly identical to the usual pharmacological activity of brufen (48).

## Discussion

In the review explaining on *C. grandis* traditional uses and different pharmacological activities are reported. Several researches are researched on the plant and shows that plant different party mainly leaves extracts are used for their different biological activities. Other parts of the trees are used in natural uses and also in synthetic medications. In traditionally it stands out a key of natural application in 1st stage. And the leaves mainly used for antidiabetic activities and nowadays it proved it with mechanism. And other parts research in some diseases but not proved with their mechanism till now.

## Conclusion

In conclusion, *C. grandis* is an herbal medicine, has been possess different biological activities, like antidiabetic, anti-ulcer, anti-inflammatory activities. Different traditional remedies have a new source for the develop different therapeutic agents. Over years different biological substances derived from *C. grandis*. In this review provide the profiling of C. *grandis* biological activities in different state. As expected, other derived compounds will continue their different significant advances and play crucial role in human life.

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