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A Review On: Pharmacological Activities Of Calitropis Gigintea

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Abstract:-

The plant Calotropis procera (Aiton) Dryand, which is a member of the Apocynaceae family, is sometimes referred to as Rubber Bush and Apple of Sodom. It is often known as "Rui" in Marathi and "Mudar" in Hindi. (Pakistan and India). It is well recognized that the bark and leaves have anti-cancer, analgesic, antipyretic, neuromuscular blocking, purgative, and anti-hyperglycemic properties as well as the ability to heal wounds. Triterpenoids, flavonoids, cardiac glycosides, cardenolides, anthocyanins, α-amyrin, β-amyrin, lupeol, β-sitosterol, flavanols, mudarine, resins, a potent bacteriolytic enzyme called calactin, a nontoxic proteolytic enzyme called calotropin, and a wax were found in the heartwood of Calotropis procera, according to the phytochemistry of the plant. The pharmacological properties of Calotropis procera are the main topic of this review.

Keywords: pharmacological actions, wound healing, anti-hyperglycemic impact, and Calotropis procera

INTRODUCTION :-

The plant is distributed throughout India. It is popularly known as arka in Hindi. India being a tropical country is blessed with the best natural resources and ancient knowledge for its judicious utilization. However, to make these remedies acceptable to modern medicine, there is a need to scientifically evaluate them to identify the active principles and understand the pharmacological action Humankind first utilized material found in the environment on an empirical basis to cure various ailments. Natural products from plants and animals traditionally have provided the pharmaceutical industry with one of its important sources of lead compounds in search of new drugs and medicines .[1]Generally involved to as giant milk weed, C. gigantea is a wasteland weed. Born in Bangladesh, Burma, China, India, Indonesia, Malaysia, Pakistan, Philippines, Thailand, and Sri Lanka, this factory is native to those countries. The factory features clusters of waxy blooms that are either lavender or white in color, a milky stem, and round, light green leaves. In India's traditional medical system, C. gigantea is extensively available and employed for a variety of medicinal operations. One The blooms of C. gigantea have most lately been scientifically reported to have a number of remedial rates, including analgesic, antibacterial, and cytotoxic action. Anti-diarrheal,anti-Candida, antibacterial, and antioxidant parcels have been proved for leaves and certain other factory factors treatments for a wide range of illnesses due to their enormous ability to cure numerous health conditions.[2] The main pharmaceutical corporations have made plants their main source for novel pharmaceuticals, and they are now performing intensive research on plant materials to bring new drugs to the medical field. Numerous biologically active chemical groups, including as cardenolides, steroids, tannins, glycosides, phenols, terpenoids, sugars, flavonoids, alkaloids, and saponins, are present in Calotropis procera, according to a literature review.[3]

(Figure 1,2,3 are show in below plant, seed leaves of calitropis gigantea)

Description:-

Botanical name -Calotropis gigantea Linn.

family :-Asclepiadaceae

synonym[4]

Hindi name:- Madar, Ag, Akan Ark

Sanskrit name:- Aditya, Arka, Mandara

Marathi:- Lal Akand

Kannada: Ekka

Manipuri: Angkot

Tamil: Erukku

Telungu: Jilledi puvvu

Gujrati name :- aakando [5]

Used parts:- include latex, stem bark, roots, leaves, latex, stem bark, and flower

Geographical source:- Originating in Asia and South-East Asia, Calotropis gigantea has been imported as a decorative herb to the Pacific Islands, Australia, Central and Northern South America, and Africa. Its prevalence is unknown, though, and it most likely exists in other nations as well.[6]

TAXONOMICAL CLASSIFICATION :-

1. Subkingdom: Tracheations
2. Class: Dicotyledon's
3. Subclass: Asteriidae
4. Family: Apocynaceae
5. Subfamily: Asclepiadaceae
6. Genus: Calotropis
7. Species: Calotropis gigantea

Chemical constituent:-

Numerous types of chemicals, including flavonoids, tannins, cholesterol, saponins, cardiac glycosides, anthocyanins, resins, triterpinoids, alkaloids, and proteolytic enzymes in latex, have been found in phytochemical research on Calotropis. Terpenes, multiflorenol, and cyclisadol are found in flowers.

Leaves:

-Amyrin, amyrin acetate, ß-sitosterol, urosolic acid, cardenolides, calotropin, and calotropagenin are the primary components found in leaves.

Latex

Caoutchouc, calotropin, calotoxin 0.15%, calactin 0.15%, uscharin 0.45%, trypsin, voruscharin, uzarigenin, syriogenin, and proceroside are all present in the latex. Blossom

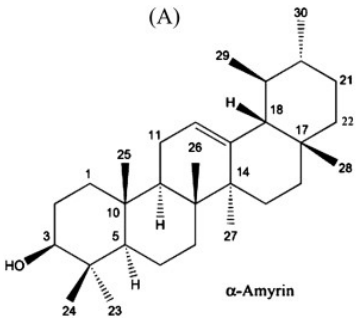
The flavonoids, polysaccharides containing D-arabinose, glucose, glucose-glucosamine, and L-rhamnose, sterol, calactin, calotoxin, calotropagenin, and calotropin are all present in the flower. Enzymes 3-proteinase and calotropain (protease) are also found in flowers.

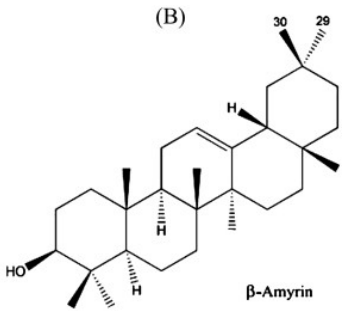
Lupeol, uscharin, proceroside, proceragenin (cardenolide), syriogenin, taraxast-20(30)-en-3-(4-methyl-3-pentenoate), 3-thiazoline cardenolide, gigantin, giganteol, isogiganteol, uscharidin, uscharin, a-calotropeol, 3- epimoretenol, alactuceryl acetate, and a-lactuceryl isovalerate are additional chemical constituents of C. gigantea flowers.

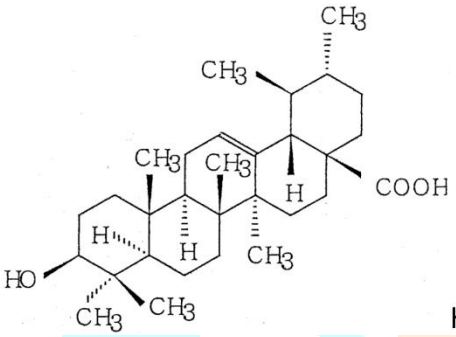
Bark:-

Calotropis bark found on its roots[7]

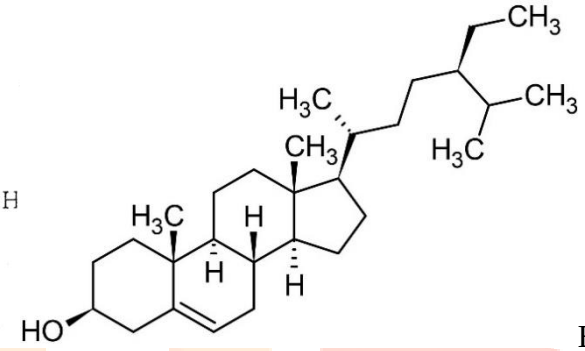
Chemical Structure



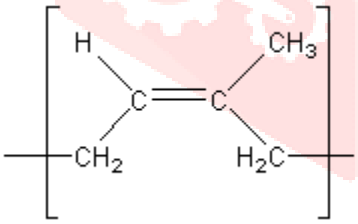




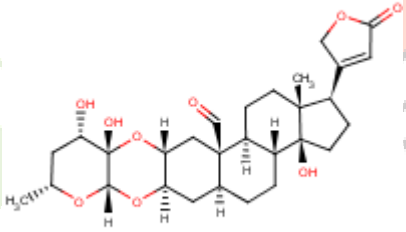
urosolic acid



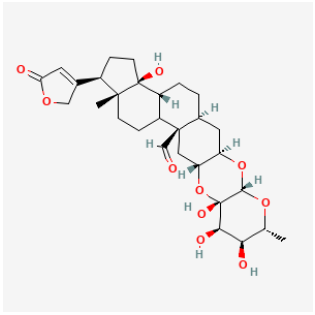
Betasitosterol



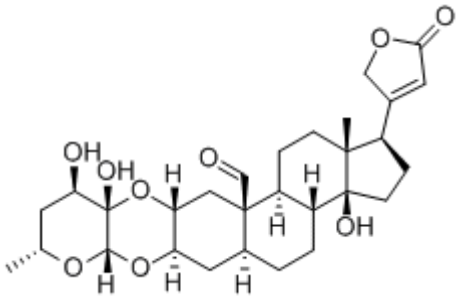
Caoutchouc



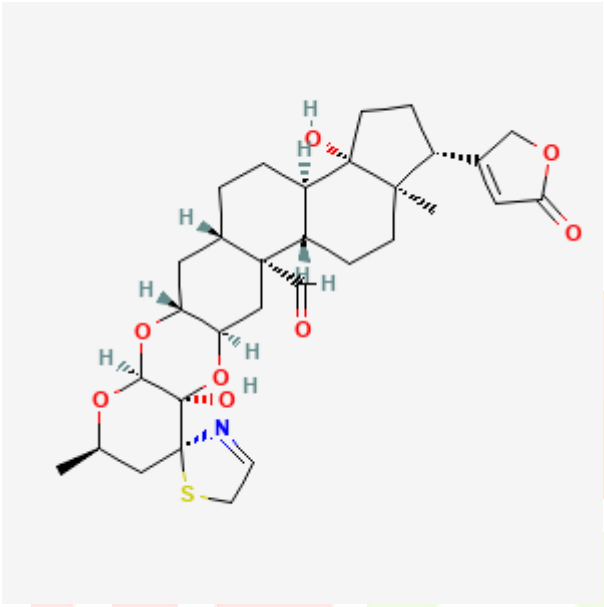
calotropin



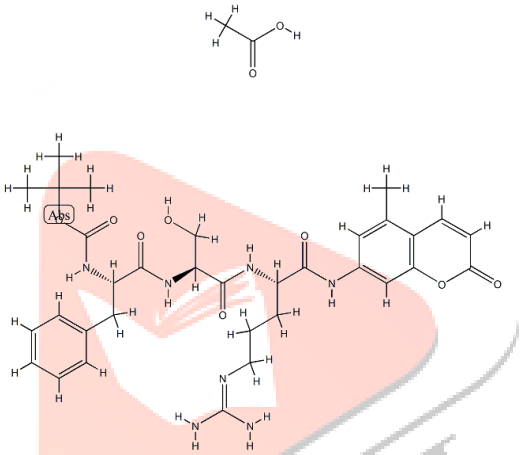
Calotoxin



calactin



Uscharin



tryptan

MICROSCOPIC CHARACTERISTICS :-

The following are the features of different Calotropis components under the microscope:-The epidermis, or stem

(I)Epidermis :- is the outermost layer of uniform cells with a thick cuticle. Epidermis is nearly entirely covered in unicellular and multicellular hairs. Compactly arranged, the cells range in shape from barrel to rectangular.

(II) Cortex: Collenchymatous (thickened corners) layers forming a few below the epidermis. In these cells, there might also be a few chloroplasts. The remaining cortex is parenchymatous. There are lots of intercellular gaps.

III) Endodermis: This layer of differentiated cells creates a ring with waves around the vascular tissue, separating the cortex from the tissues underneath it.

The ells are grouped neatly and have a barrel-shaped, rectangular form. It lacks the typical casparian thickness. But starch grains—also known as starch sheaths—are present.

(IV) Pericycle: It has present in polygonal shape[8]

PHARMACOLOGICAL PROFILE :-

(figure 4 are shown in below pharmacological activities of calitropis gigantea linn)

1. **Hepatoprotective effect:-**

The hepatoprotective effects of an ethanolic extract (50 %) of Calotropis gigantea R. Br. (Asclepiadaceae) stems at doses of 250 and 500 mg kg-1 were investigated in male Wistar rats that had liver damage caused by carbon tetrachloride (2 mL kg-1 twice a week). The common medication silymarin was compared with the preventive effect of C. gigantea extract. Aspartate amino transferase (AST), alanine amino transferase (ALT), glutathione (GSH), lipid peroxide (LPO), superoxide dismutase (SOD), glutathione peroxidase (GPx), and catalase (CAT) were among the biochemical markers that were assessed. [9,10]

2.Wound healing activity :-

The complicated process of wound healing involves a number of phases, such as granulation of cells collagen maturation, collogenization, and scar formation. These are distinct, continuous wound healing mechanisms that operate independently of one another. There have been reports of prohealing properties in Calotropis gigantea. Calotropis gigantea promotes the tissue formation process and raises the concentration of collagen, both of which aid in the healing of wounds. Calotropis gigantea raises hydroxyproline levels, which aid in collagen formation even more. Calotropis gigantea Latex exhibits remarkable wound-healing properties.

According to early phytochemical investigations, the plant's triterpinoids, tannins, and alkaloids are what cause the wound-healing processes. In comparative investigation using framycetin sulphate cream (1% w/w), the reduction in wound area[11]

3.Antioxidant activity

Calotropis procera dry latex (DL), which has strong anti-inflammatory properties, was tested for its ability to prevent hyperglycemia and act as an antioxidant in rats with diabetes caused by alloxan. Hepatic glycogen content increased and blood glucose decreased in a dose-dependent manner when DL was taken orally once a day at doses of 100 and 400 mg/kg. In addition, DL stopped the diabetic rats from losing weight and reduced their daily water intake to levels similar to those of healthy rats. In addition, DL decreased the levels of thiobarbituric acid-reactive substances (TBARS) in rats with alloxan-induced diabetes while increasing the hepatic levels of endogenous antioxidants such as glutathione, catalase, and superoxide dismutase (SOD). The effectiveness of DL as an anti-diabetic and antioxidant agent was in level with other drugs.[12]

4.Insecticidal activity

Different Calotropis gigantea extracts and extraction fractions demonstrated insecticidal effectiveness as well as repellent toxicity to adults and larvae of different T. castanium species of insects. Kovendan et al. (2012) identified T. castaneum. [13]

5. Antipyretic activity :-

In animal models, aspirin-like antipyretic efficacy was demonstrated by the ethanolic extract of the aerial parts, the aqueous extract of the flowers, and the aqueous solution of the dry latex of C. promethea [14]

6.Anti diarrhoea activity

The anti-diarrheal properties of Calotropis procera dry latex (DL), a strong anti-inflammatory agent, were assessed. Similar to atropine and phenylbutazone (PBZ), a single oral dosage of DL (500 mg/kg) prevented diarrhea in 80% of rats given castor oil treatment and resulted in a considerable reduction in the frequency and intensity of diarrhea. We assessed its impact on intestinal transit, castor oil-induced intestinal fluid accumulation (enteropoling), and electrolyte concentration in intestinal fluid in order to comprehend the mechanism behind its anti-diarrheal effects. Intestinal transit decreased in animals treated with dry latex (by 27%–37%) when compared to animals fed with normal or castor oil. Dry latex considerably reduced castor oil-induced enteropooling, in contrast to atropine. Nevertheless, it had no effect on the intestinal fluid's electrolyte concentration.[15]

7.Anti Inflametory activity

Rat paw oedema generated by carrageenin-kaolin for acute inflammation and cotton pellet granuloma, an adjuvant-induced arthritis model for chronic inflammation were used to assess the anti-inflammatory effects. Yeast-induced pyresis was used to test the antipyretic activity. The analgesic effect was achieved in mice by using the phenylquinone-induced writhing approach. The test substances showed varying degrees of anti-inflammatory effect, with peak action occurring after two hours.

Alkaloid fraction has a relatively strong anti-inflammatory effect at first. The alkaloid fraction of Calotropis gigantea's residual anti-inflammatory effect implies either a higher malic enzyme of a filarial worm Setariadigitata: certain characteristics and outcomes of medications and plant extracts.[16]

8.ANTI MICROBIAL ACTIVITY

C. procera leaf extracts were tested for their antibacterial activity, and the latex extract of the plant showed an inhibitory impact on Candida albicans . A newly discovered cardenolide of C. procera, 7B, 14B-dihydroxy5-card-20(22) enolide (proceragenin), was assessed for its antibacterial activity and found to be effective against Pseudomonas pseudomallei, a melioidosis causing bacterium.

The studied organisms' ability to develop was entirely suppressed by every leaf extract component. A pathogenic fungus called Candida albicans as well as two of the examined bacteria, Staphylococcus aureus and Pseudomonas aeruginosa, were used to assess the antibiotic activity of C. procera .

Five bacteria were used to test the antibacterial properties of ethanol, aqueous, and chloroform extracts of C. procera's leaves and latex. These bacteria included Escherichia coli, S. aureus [17,18,19]

9.Procoagulant activity

The processes promoting blood clotting (coagulation) are referred to as procoagulant activity. This action, which includes platelets and coagulation factors among other components, is essential for haltingbleeding.

A particular subset of activated platelets known as procoagulant platelets is essential to this procedure. These platelets exhibit phosphatidylserine on their surface when they are activated, which aids in the

localization and acceleration of the production of thrombin, an essential enzyme in the coagulation cascade. 2. As a result, a stable fibrin clot forms, essentially halting the bleeding. [20]

10.Analgesic activity

Calotropis gigantea flower extract (alcoholic) was given orally and tested for analgesic effects in mice using chemical and thermal models. At dosages of 250 and 500 mg/kg, respectively, there was an inhibition of 20.97% and 43.0% in the number of writhes in the acetic acid-induced writhing test. The paw licking period was prolonged when using the hot plate approach.

After 30 minutes after dose administration, the analgesic impact was seen, and it peaked after 90 minutes.[21,22]

11.Cytotoxic activity

According to reports, Calotropis gigantea is an anticancer shrub. The plant that contains cytotoxic cardiac glycosides. According to Bhat and Sharma (2013), cardiac glycosides, or calactin, typically cause growth suppression in neoplastic cells by causing damage to the DNA of leukemia cells in breast cancer.Cardinolides and calcotroposides A exhibit anticancer properties. In vivo cancer-induced problems have been reported to be improved by the active ingredients (anhydrosophoradiol-3-acetate) isolated from Calotropis gigantea flowers [23,24]

12.Antibacterial activity

Using the agar well diffusion method, the antibacterial activity of the ethanolic extract of C. gigantea latex was assessed.Using a sterile swab, the inocula containing the corresponding tested bacteria were uniformly seeded onto 90mm Petri dishes containing 20 ml of cooled, melted MH agar medium. This was done to achieve complete plate coverage and a consistent, thick lawn of growth after incubation. A sterile cork borer was used to help dig wells in the medium. In sterile distilled water, a stock solution containing 2.5 mg/ml of the latex extract was made. In sterile distilled water, dilutions of the stock solution containing 50, 100, 150, 200, and 250 mg were also made. Each dilution was applied to its corresponding well with 100 µl using a a clean pipette.Just 100 µl of sterile distilled water were added to the control wells. In order to allow the extract to diffuse into the agar, the plates were left at room temperature for one hour. All of the plates were then incubated for 18 to 24 hours at 37°C. The plates were checked for evidence of microbial

growth after incubation. The identification of bacterial growth inhibition as thediameter of the well-encircling inhibitory zones. Chloramphenicol(30 µg/ml) served as the reference point. Every test was conducted.presented in three separate copies**.** [25]

CHEMICAL TEST OF CALITROPIS GIGINTEA

Using conventional techniques, several chemical tests were run on the concentrated extract of a chosen plant to identify various phytoconstituents.

1 Alkaloid test :-

After dissolving the crude extract in 2 milliliters of 1% HCl, it was gently heated. Reagents from Wagner and Meyers were added to the mixture. The ensuing precipitate's turbidity was interpreted as evidence of the alkaloids' presence.[26]

2.Examine the flavonoid :-

After combining the crude extract with 10 milliliters of distilled water, 1 milliliter of concentrated sulfuric acid was added to half of the aqueous filtrate solution, along with 5 milliliters of diluted ammonia solution. A yellow hue indicates the presence of flavonoids. [27]

3.Terpenoid test:-

After adding and thoroughly mixing 3 mL of concentrated H2SO4 and 2 mL of chloroform to the crude extract, a suitable sample extract was obtained. The presence of terpenoids resulted in the formation of a reddish brown tint[28]

4. **Conduct a saponin test**

In a test tube, 5 mL of distilled water was combined with crude extract, and the mixture was vigorously agitated. the development of steady foam, which suggests saponins are present. [29]

5. **Carbohydrate Test**

Fehling A and Fehling B reagents were combined in an equal volume of 2 mL. After adding these ingredients to crude extract, it is slowly cooked. A brick-red precipitate that forms on the test tube's bottom suggests the presence of reducing agents. [30]

6.**Tannin Test**

A water bath was used to combine the crude extract and water. After the mixture was filtered, the filtrate was mixed with ferric chloride. The presence of tannins is indicated by a dark green solution. [31]

Marketed product of calitropus gigantea:

Tincture:- (Figure 5 are shown in below marketed tincture of calitropis gigantea)

mother tincture of Calitropus gigintea is used to treat respiratory and skin infections.Pain and Inflammation: stomach issue: meteorology condition fever nausea Leprosy and syphilis

powder:- (Figure 6 are shown in below marketed powder of calitropis gigantea)

calitropus gigantea powder is used for induce vomiting as well as purgation. Astringent action

Oil:- :- (Figure 7 are shown in below marketed oil of calitropis gigantea)

Calitropus gigantea oil is used Treat skin disease ,cure foot blister,cure diarrhoea, treat toothache ,pain relief

USES:-

- The therapeutic qualities of this plant vary depending on which section you use.
- The plant's latex is used to cause purging in addition to vomiting.
- The herb's astringent properties make it useful in the treatment of numerous skin conditions.
- It is also useful in treating ascites, a condition in which there can be significant abdominal distension from the buildup of fluid in the abdominal region.
- Its vata-pacifying qualities aid in the relief of bloating, flatulence, and abdominal distension brought on by poor food digestion.The body responds to Arka's anti-inflammatory properties.
- Its natural cleansing and astringent effect aids in the healing of skin and spleen diseases, wounds, and itching.
- Due to its potent purgative action, arka aids in the cleansing of the bowels.[32]

- The flower was described as sweet-bitter, anthelmintic, analgesic, astringent, and beneficial for rat bites, tumors, inflammations, and Kapha. The flowers have been traditionally used as a digestive, stomachic, and tonic for conditions like asthma, catarrh, and appetite loss. [33]
- Calotropis gigantea aerial portions have been shown to have antidiarrheal properties. [34]
- Latex of Calotropis gigantea investigated for procoagulating activity related with fibrinolytic activity [35]
- Calotropis gigantea roots that have been dried and peeled have an alcoholic extract that has both CNS and contraceptive properties [36]
- The water-soluble fraction and aerial portions of Calotropis gigantea whole aqueous extract were assessed for their immunomodulatory, anti-inflammatory, anticancer, and antimitotic properties. [37]
- Stem alcoholic extract has hepatoprotective properties [38]

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IMAGES:-


Figure 1: calitropis gigantea plant [39,40]


Fig 2:- Seeds of calitropis gigantea [41,42]


Fig3:- Leaves and flower of calitropis gigantea [43,44]

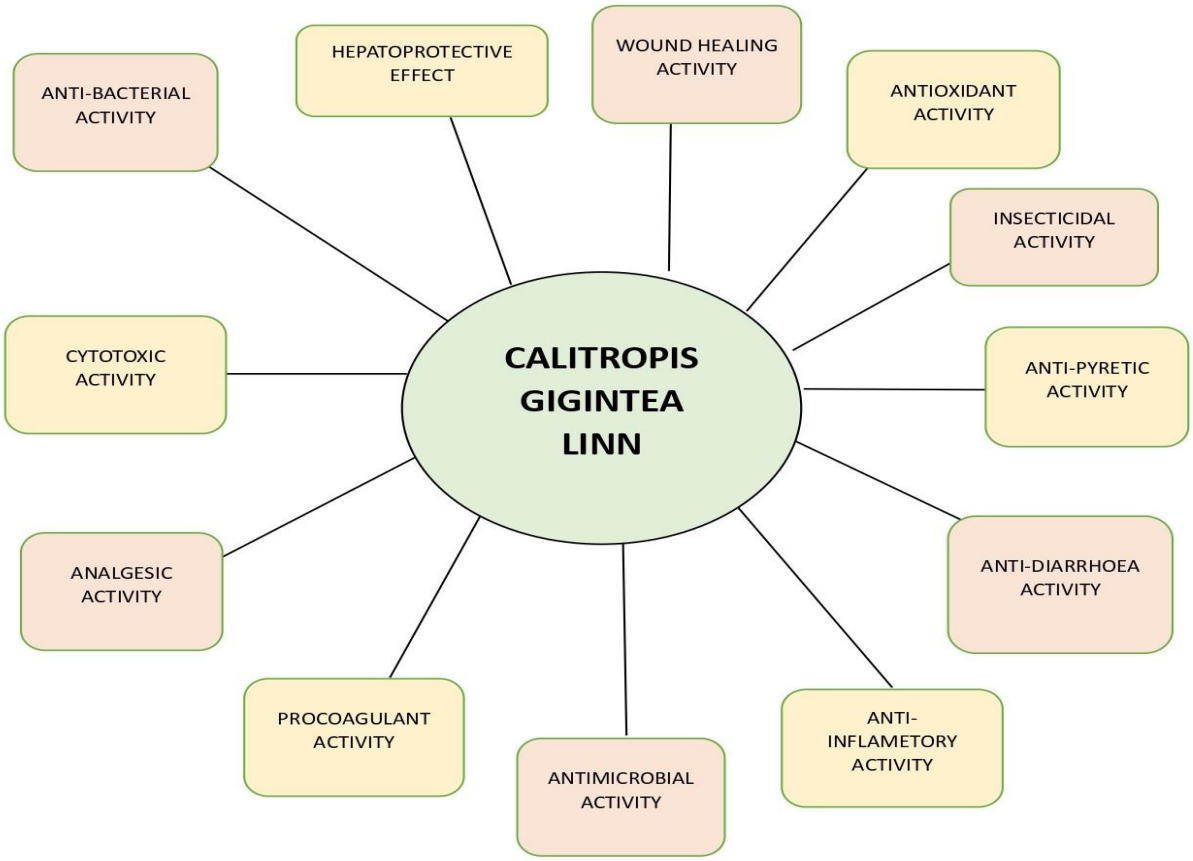

Table :-1

Figure:- 4 [45,46]

Figure:-5 [47,48]

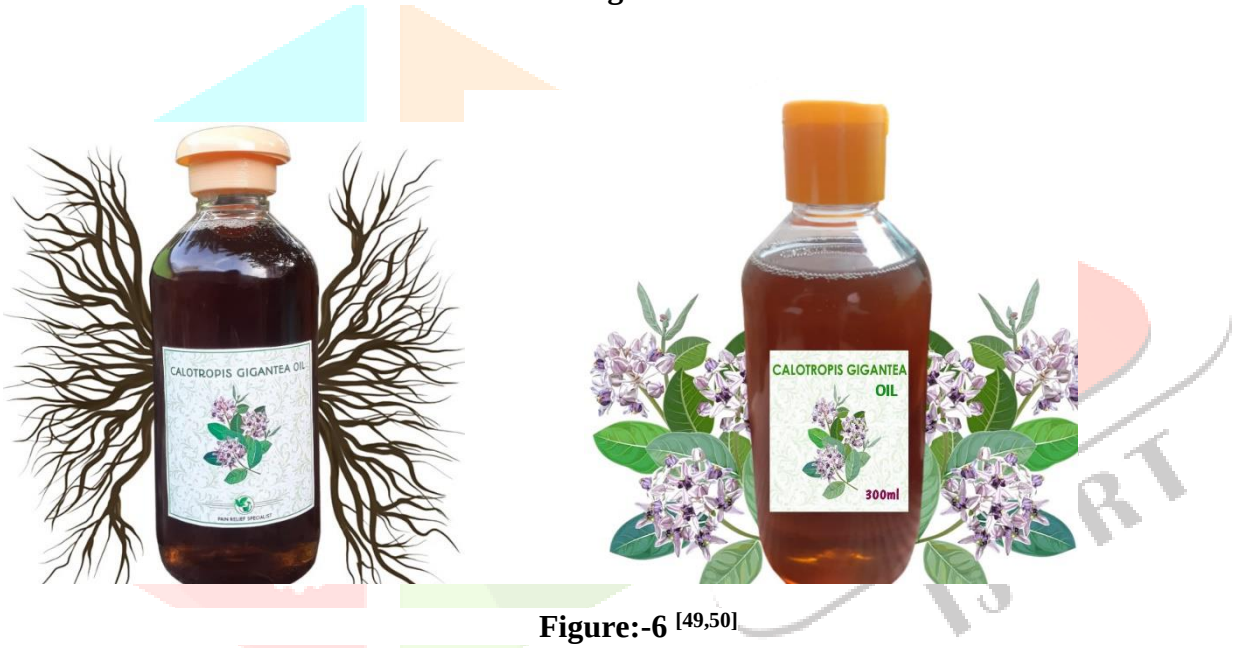

Figure:-6 [49,50]