2: REVIEW OF LITERATURE:

2.1 PLANTS PROFILES and REVIEW OF LITERATURE:

I. **CAESALPINIA BONDUC LINN.**

![Image of Caesalpinia bonduc plant]

**Fig 2.1: Caesalpinia bonduc L. plant**

**Synonym** - Fever nut

**Botanical Name** - *Caesalpinia bonduc* L.

**Family** - Caesalpiniaceae.

**Vernacular Name:**

The plant is known by various names in different languages as under [101].

- Sanskrit : Putikaranja
- English : Fever nut
- Hindi : Karanju
- Kannada : Gajagakayi
- Marathi : Sagargota
- Tamil : Kazhichikay
- Telugu : Gachcha-kaya
- Gujarati : Kakachia
- Bengali : Nata
CHAPTER-II

All tropical and subtropical regions founds the plant *Caesalpinia* in the form of shrubs and trees. Nearby the species of plant have been available in 150 genera and 2,200 species. The arrangement & shape of the plant leaves are alternate, stipulated and pinnated i.e simple or bipinnated. The racemes, cymes, zygomorphic, spikes, are the parts of flowers of the plant. The *perigynous* are either weak or strong. The each and every flower of a plant contain a sequential order of corolla and calyx and they arranged specifically which have a 5 segments. The buds of the plants are overlapping, petals of plants are definite (i.e., imbricate). The *androecium* of the plant contains stmens in a number of 1-10 either unite or variously. in which in that several are commonly reduced in non functional *staminodes*.

**Genus Caesalpinia**

Trees are arranged by shrubs and woody climbers. The flowers contains red or yellow colour. The Leaves are either pinnated, simple or bipinnated. Racemes, spikes are arranged in the flowers in sequential order. Calyx is present in the buds. Stamens 10, free. Ovary sessile, usually few ovuled. Pod various, sometimes covered with spines.

**Distribution:**

The plant caselpeanea found in the hot region through the india and other countries includes Sri lanka. It also found in the areas like coast of the sea, river etc. It needs altitude of nearabout 2500 feet on the hill. Nearby total 281 species of the plant are distributed in tropical and subtropical regions throughout the world and in that India contain 10 species.

As per the literature these above mentioned ten species are coated the following

**Caesalpinea coriaria:**

This species have different names in different lagues like - Telgue called as Dividivi, Tam- Tividivi, inki maram and in Marathi called as Libidibi.

A small spreading tree, indigenous to South America and West Indies, and introduced into India more than a century ago. It has been grown successfully in different states of India such as in Madras, and is important as a source of tanning material.

**Cultivation of plant:**
The plant is propagated by seeds which are first sown in nursery beds. The seedlings when reached 9 to 15 months old, then plants are transplanted in the field during the rainy season, maintained the distance of 20 to 25 ft. each way. During cultivation the watering is necessary during dry periods for one or two years. The plants thrives best on black cotton soil, and can be grown even on poor sandy soil. The tree begins to bear in the fifth year and attains full bearing capacity in the twentieth years. Flowering and fruiting occur twice a year between in the month of January to February and June to July, the yield being poor in the latter period. The pods are collected carefully, every day, after drop from the tree and dried before storage. When gathered wet, or exposed to moisture, they are liable to damage. A mature tree yields about 300 lb. of pods per annum. The pods (2 – 3 inch. In length, ¾ inch. In width and broad, and 1/8 inch. in thick ) are usually smooth, fleshy, twisted, and it has pale to blackish brown colour. They are rich in tannin. Analysis of sample from different parts available in Madras gave (on moisture-free basis) tannins, 28 – 41; soluble non-tans, 21 – 29; total sugars, 3.2 %, pH. Of standard tan liquor from pods, 3.5 %, colour Lovibond scale.

Caesalpina digyna:

The Caesalpina digyna also known as Vakerimula and distributed in Bengal, Assam, Burma, Ceylon and Andamans. It grows in waste lands and prefers a well-drained sandy soil.

The pods of Caesalpina digyna, known as teri pods, are rich in tannin which is present only in the podcases but not in the seeds. Analyses of pod-cases from Assam and Burma gave : 5 3.8 ot 59.9 ; non-tans, 14.3 to 23.1 %.

The tannins is mostly monodigalloyl glucose. It contains no ellagitannin, and it constitutes a convenient amterial for the preparation of tannic acid. The outer skin of the ripe pods contains a red colouring matter which is extracted along with the tannin in the preparation of tan liquors, thereby vitiating the colour of the latter. For obtaining light coloured extracts, the outer skin should be removed from ripe pods, or only unripe pods used.

Teri pods find use in the tanning industry. They give a light coloured soft leather, the shade of which does not materially alter on exposure to sunlight.
Although the pods are rich in tannin, the high cost of collection and the difficulty in separating the pod cases from seeds, have stood in the way of their commercial exploitation.

The seeds are dark greenish-brown in colour, almost spherical, with a hard shell. Analysis of the kernels gave: moisture contained is 6.0; fat are 25.9; protein 14.8; sugars, 7.8; starch, 41.1; ash contain near about 3.0%. The seeds are used as cattle feed in admixture with pulses.

The root is astringent and is given internally in phthisis, scrofula, and diabetes.

*Caesalpinia nuga:*

The *Caesalpinia nuga* the commonly known as mulutiga and shingri-lota in India. *Caesalpinia nuga* found in Bangal, Assam and along the west coast of India.

The root is uswed for the treatment of diuretic, toxic and useful in the treatment of stone in the bladder. It is reported to be a fish poison.

*Caesalpinia pulcherrima:*

The *Caesalpinia pulcherrima* commonly known as gulutora and ratnagandhi. A large shrub, generally grown in gardens for its showy reddish-yellow flowers. The leaves and bark are emmehagogue, purgative and tonic. The bark of the plant act as an abortifacient. An infusion of the flowers is said to be pectoral and febrifuge. The flowers contain the chemical constituents tannins, a red colouring matter, resins gallic acid, benzoic acid, etc. The fruits are rich in tannins. A red dye has been isolated from the flowers.

*Caesalpinia sappan Linn.*

The *Caesalpinia sappan* Linn. having different names in different languages like in Sanskrut – pattaranjaka, Hindi – bhakam and in Marathi – patang, etc.

The plant are distributed in south India, Bengal, Ceylon, Burma and Malaya. The heartwood of plant which are utilised for the coloring of cotton, silk as well as wool. The plant surface of the wood shown light yellow, but quickly changes to red.

The source of the colouring matter in Caesalpinia sappan is brazilin, soluble in water and alcohol, and crystallizing in colourless silky needles. Make chips like part ofonverted into powder and extracted with warm water and these extract are used for the colouring matter. After fermentation the orange extract is used for the medicinal
purpose. The wood extract used for the producing stram reds and pinks. In plants extract presence of tannina due the which are utilized as a stained for cotton fabrics and bright reddish-orange shade.

The presence of tannins in pod-cases and bark. Which are used for the coloring or dyeing purpose and produced black shades. The leaves contain0.16-0.25% of a pleasant smelling essential oil, containing d-α-phellandrene as the chief constituent. There is also presence of Oscimene in the plant.

The plant wood is very hard and having properties of a shining polish. It is used to a limited extent is making scabbards and walking sticks.

The wood is having astringent properties and decoction is used as a doses of 0.5-2.0 fluid oz. The decoction gives relief in mild cases of dysentery and diarrhoea. Given internally, it is said to be effective in certain skin affections.

It is a large thorny, climgibng shrub, found throughout India and well known as a hedge plabnt. The bark is reported to be used for tnning. The root is purgative.

*Caesalpina crista* :

The *Caesalpina crista* also know as *Caesalpina bonducella*. The Caesalpina bonducella having various names in different languages such as Hindi called as Karanju and in Marath known as Gajaga etc.

This species is most important species out of ten. These plants having number of pharmacological activity shown due the presence of chemical like tannins, glycoside, protins, flavonoids, alkaloids.

Through in the warmed area of the India, a large prickly shrubs are found atvthe coasts of sea, river on the hills of height of up to 2,500 ft. At the hill station the plant is commonly available in the countries such as south India, Burma, Bengal. The growth of plant is as like a hedge plant. The shape of seeds found in the form of globular. The surface of seed is smoothly shiny and it has a grey colour. Its surface is hard. The shell, which is thick and brittle, encloses a yellowish-white, bitter, fatty kernel. The seeds are used as substitute for marbles by children.

Bonduc nut has long enjoyed a reputation in India as a tonic and antipyretic. It was made official in the Pharmacopoeia of India in the year 1868. The boduc leaves
and seeds which are used or appled on external part of body reduced the swelling inflammatory. The leaves and bark are considered emmenagogue, febrifuge and anthelmintic. The oil which is obtained from the seeds is the fixed oil. This fixed oil is used as a emollient and treatment of acne and other problems of skin of face. Thus it act as a cosmetic. It is also used for stopping discharge from the ear.

Investigation on the chemical components of the kernel have failed to reveal the presence of any active principle with marked pharmacological action.

Out of above species I have choosen only Ceasalpinia boduc because, this plant having number of pharmacological properties. Hence, this plant selected for my research work.

Morphology of Caesalpinia bonduc L.

Seed :

The seeds having properties like Antirheumatic, antiperiodic. It is also used as an antidiabetic preparation.

The Leaf and bark :

The leaf and bark are used as Febrifuge. Leaf and bark are having the activity of emmenagogue, anthelmintic.

Root :

The roots are traditionaly used as a diuretic, anticalculus. The roots which contains are alkaloid such as caesalpinine and having a bitter principles such as bonducin, fixed oil, saponins. The seeds powder which shows properties are soluble in water and having hypoglycaemic activity. The water soluble extract of the seeds are also having hypoglycaemic effects in rats. The root powder which are best remedy for treatment of diabetes in Nicobar Islands. The roots of plants are utilised for the treatment of fever as well as diabetes in Himachal Pradesh. According to the literature of homoeopathy, the plant is having good activity for the treatment of chronic fever.

Botanical description:

the climber of the plants are arranged with braches which have grey in colour. They are straight. They armed with both sides hook. The length of the leaves is generally 30-60 cm. And they are bipinnate and containing petioles of small and
prickly. The plant having at the base of the leaf are stipules a pair of reduce pinnaed with furnished a long point. The pinnae present in the plant have a 6-9 pairs in the length of 5 to 7.5 cm. The hooked stipulary is also present in the plant. The Leaflets are glabrous on the above side, wide, membranous, mucronate, elliptic, puberulous beneath which have 6-9 pairs and with the length of 2.0-3.8 cm. and width is about 1.3-2.2 cm.

The flowers are arranged with racemes with dense terminal and at the top portion spicate are present with long peduncles. the flowers are having a 15-25 cm long. The pedicles of flowers have a very small buds and elongated to 5 mm in length and the size of fruits are in 8 mm , the colour of fruit is brown to downy and which are linear, acute, bracts squarrose, reached. The calyx is posses near about 7-9 mm are long and hairy. Base of the Petals having yellow colour which are connected to flattened base, oblanceolate, clothed containing silky white long hairs. The Pods are densely armed with wire like prickles which are short and oblengated and having the length of about 4.5 cm. The colour of the seeds of the plant is dark grey of and length of the seed is 1.3 cm. [7,88].

Most of the plant parts used for the treatment of various diseases i.e bark, leaves, Seeds and roots.

**Uses of plant and their parts :**

**According to Traditional System :**

In Lodhas root powde is used in treatment of constitutional disorders, for treatment of enteral worms a paste of twig with lime water is used; boiling of leaf powder with of long pepper act as a tonic to maintain healthy body; and the seed powder is used for stomach upset and in hurting pain. Mundas used seed oil in facial dysfunction and Santals used it for upset and seed powder for protozoal infection fever. In Katra vale , to cure or to prevent intermittent fever, the plant juice is taken for 2 weeks, once in a after meal.

In Kangra as well as in Himachal Pradesh, the roots of plant measure utilized in intermittent fever and polygenic disorder. In Democratic Socialist Republic of Sri Lanka, the plant is employed in fractures treatment. By mixing crushed seeds or powder of seeds with honey used as an anthelmentic in nursing. In Mauritius.
Within the West Indies, the roast seeds square measure created into a sort of occasional for diabetics. In Jamaica, the bark is employed as a medication and as a neighborhood topical application for prevention or treatment of sores.

It is helpful in skin diseases, medicine disorders, constipation, abdominal lump, piles, ulcer, worms and insane kapha. Leaves square measure helpful in insane kapha, vata, piles, worms and dropsy, laxative; katuvipaka, ushnaveerya, aggravates tyrannid, laghu. The seeds of bonduc tree square measure used as antiperiodic, antipyretic, tonic and medicament. it's conjointly utilized in bronchial asthma and snake-bite. Tender leaves square measure utilized in treatment of the liver diseases. The bark and Leaves are used as a best remedies for anthelmintic. The aqueous extract of root-bark is given orally within the early stage of small-pox.

The plant leaves and plant seeds square act as a poultice to prevent inflammation; leaf as well as bark act as an agent for various properties. Seeds of C. bonduc together with bark of devil tree square measure used to treat fever. The powder of C. bonduc is commonly used as antiprotozoal. it's conjointly given in piles.

By making the paste of seed-kernel mixed with mustard oil is used to cure the diseases of skin and in preventing the ache. In Relative effectiveness of ‘Ayush-64’ and ‘Saptaparnaghana Vati’ of that it's one in all the components, the patients with microfilarial has been reported nearby sixty five.2% and 86.6% severally [65,55].

**Ethnoveterinary usage:**

For the treatment of such diseases like tuberculosis, cough and cold, cardiac diseases, tympanitis, gastric pain, fever, the combine leaves, seeds, and roots are needed.

**The Chemical constituents:**

The root of the plant are present diterpene and furanoditerpene such as caesalpinin; 3 bonducellpins A, B, C, caesaldekarins C, F and G and the α-caesalpin, and caesalpin which are present in the seed kernels. [11,73].

**Steroidal saponins:**

The steroidal saponins such as Diosgenin is present within the root [49].
Fatty acids, hydrocarbons and phytosterols:

The fatty acid, hydrocarbons and phytosterols like octadeca-4-enoic and octadeca - a pair of stearic acid, linolenic acid, palmitic acid, oleic acid, 4-dienoic, sitosterol, lignoceric, oleic and acids, heptacosane and all constituents are available in seed kernel [81].

Isoflavonnes:
Bonducellin is present in kernels of seed [35].

Aminoacids:
essential amino acid and non essential amino acid square measure gift within the seed.

Phenolics:
From leaf extract of plant the constituents, Brazilin and bonducin are isolated. [94].

Pharmacological and therapeutic and activities:

Antidiarrhoal activity:
According to the Iyengar stidies shows that the fruits were most significantly used to treat diarrhoea in mice [43].

Activity against malaria:
The studied the ethanolic extract of the seed-kernels shows significant activity against malaria [81].

Activity against viruses:
As per the research work observed that, the treatment or prevention of Vaccinia virus shown better activity of ethanolic extract of the stem and root are used [78].

Activity against oestrogen:
Powder of seeds of plant were found to be prevent hormonal changes and anti-oestrogenic activity in mice and rabbits as well as to prevent fertility or prevent conception in mice and rats [1].

Activity against filariasis:
To treat filariasis, the ethanolic extract of the seed- kernel of plant is used against Litomosoides carinii for cotton rat [80].
Anti-inflammatory, Analgesic and Antipyretic Properties:

Evaluation of antipyretic and analgesic screening seed kernel extracts of *Caesalpinia bonducella* which are reported the significant activity of ethanolic extract in albino rats or mice. The leaves of *Caesalpinia bonducella* extract in methanol has an effective result in Experimental Animal Models [61,3].

**Antitumor Activity and Antioxidant Status:**

Gupta M, et al. 2006, assessed the anticarcinogenic activity of the leaves of *Caesalpinia bonducella* extract in methanol contains triterpenoids and flavonoids. The from that the antioxidant defence system has been reported. [34].

**Hepatoprotective:**

As per the author of Gupta et al., studied the hepatoprotective and antioxidant activity in paracetamol induced hepatic damage [33].

**Hypoglycaemic and antihyperglycaemic activity:**

Studied to the oral hypoglycemic effect of *Caesalpinia bonducella* and reported that the aqueous extract of *Caesalpinia bonducella* seeds shell when fed orally to rats produced highly useful for blood sugar lowering in glucose loaded, streptozotocin diabetic and alloxan diabetic model [13].

Chakrabarti S, et al. 2005, studied the antidiabetic activity of *Caesalpinia bonducella* Flem. reported that the aqueous and ethanolic extract showed most significant activity of hypoglycemic in chronic diabetic [15].

Moshi MJ, et al. 2000, reported the effect of *Caesalpinia bonducella* seeds on blood glucose in rabbits [62].

**Hypolipidaemic activity:**

In streptozotocin-induced diabetes, the aqueous extract of the seeds of plant shows antihypertriglyceridaemic effects and antihypertriglyceridaemic effects

**Antiinflammatory activity:**

In rats granuloma pouch method and formalin arthritis methods are used to study the effects of anti-inflammatory activity [18].

**Admistration of dosage:**

The powdered of seed given 1-2.5 g
The root powder has given 1-2.5 g
The leaf infusion has administered about 12-22 ml

II. MANGIFERA INDICA LINN.

Fig 2.2: Mangifera indica Linn. Leaves.
Synonym: Mango  
Botanical Name: *Mangifera indica* Linn.  
Family: Anacardiaceae

**Distribution:**

The tree is native from tropical region of Asia. *Mangifera indica* Linn. is a big and the plant are evergreen, which is long living and having 10-45 meter high and strong trunk having heavy crown. Mango is extensively cultivated in south India, north India, and West Bengal & Jammu Kashmir for its foliage yield. The plant is known by various names in different languages as follows [6].

**Vernacular Name:**

<table>
<thead>
<tr>
<th>Language</th>
<th>Name</th>
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<tbody>
<tr>
<td>Sanskrit</td>
<td>Aam, Ambaj.</td>
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<tr>
<td>Hindi</td>
<td>Aam.</td>
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<tr>
<td>Marathi</td>
<td>Aanba.</td>
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<tr>
<td>English</td>
<td>Mango.</td>
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<tr>
<td>Tamil</td>
<td>Manga</td>
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**Botanical description:**

An average tree, 10-45 m high; branches widely spreading. Leaves crowded at the ends of branches, ovate-lanceolate, elliptic, oblong, linear-oblong, acuminate or acute, petiole swollen at the base. Flowers greenish-yellow, odorous, borne in pubescent panicles. Male and female on the same panicle, bracts elliptic, concave. Drupes large, usually 5-15 cm long, fleshy stone compressed, fibrous. Seeds large, compressed, testa paperly; cotyledons plano-convex, often unequal and lobed. Flowers in January-March and lobed.

**Leaves:**

Leaves are spirally arranged on the branches, lanceolate-elliptical, pointed at both ends, the blades mostly up to about 25 cm long and 8-cm wide, some time much larger, redish and thinly flaccid when first formed.

**Flowers:**

Inflorescences means arrangement of flower. The flowers are large terminal panicles of small polygamous, fragrant, yellow to pinkish flowers.
Fruits:

Fruits is a drupe, variously shaped, according to the variety, uniform, 5 to 15 cm long [42].

Origin and Distribution:

Records indicate that mango has been in cultivation on the Indian subcontinent for well over 4,000 years. The plant are native of tropical area of Asian county and which are distributed wherever the climate with sufficiently having warm as well as damp. The plants is now commonly basic in nature in various parts of the tropics and sub-tropics and here and there a component of mature secondary vegetation.

Chemical constituents:

*Mangifera indica* L. are a large evergreen tree; The leaves contained a pentacyclic taraxerol, friedelien, lupeol, triterpene alcohol, indicol, besides taraxone and beta-sitosterol. Leaves which contain free malic, sugars, citric acids and amino acids. The magniferin is chief constituent which are obtained from twigs and leaves.

Ripe mango contains sugars, citric acid, ascorbic acid. The phenolic compounds which are present in fruits such as protocatechach acid; flavonoids, kaempferol and myricetin. The seed kernel which contains glucogallin, gallotannin, alpha-and beta-amyris and several sterols [9,36,54].

The plants having chemical constituents such as, magniferin (1,3,6,7-tetrahydroxanthone-2-glucopyranoside), amino acids, gallotannin, gallic and m-digallic acids, ethylgallate, isoquercetin, and beta-sitosterol common in various parts; (+) and (±)-epicatechin, beta-carotene and alpha xanthophylls; polysaccharides identified as a highly branched arabino like citric acid, ellagic acid, mallic acid and m-trigallic acids, (1→4 linked galactouronum and glucan beta-glucogallin, riboflavin and vitamin are present in fruits; leaves contains citronellal, diterpene, geraniol, limonene, magniferol, magniferone, nerol, nerylacetate, alpha phellandrin, alpha and beta-pinene, tannin etc. protocatechuic acid (also from bark), chinomin, methylchinomin, isochinomin, hyperin; friedelien, lupeol, taraxerol, taraxerone; leucine, tyrosine and valine (leaves, bark); butin, fisetin, (-) - leucocyanidin, 3alpha 27 dihydroxyycycloart-en-26-oic acids and 3beta, 22(R or S)- 3beta, 23(R or S) and 3alpha, hopane-1beta, 3beta, 22-triol (stem bark); alpha and beta-amyris, cycloartanol, friedelan-3beta-ol, magniferonic acid(root-bark); magniferonic
acid(root –bark, resin); hydroxymagniferonic acids, (20S)-dammer -24-ene-3β, 20-diol, erythrodiol and oleanolic aldehyde(resin); ambonic and ambolic acids, isomagniferolic acid (a dimer), 2C-β-D-gluco pyranosyl-3-methoxy-1,6,7-trihydroxyxanthone (homomagniferin), magniferin-3-methyl ether and a new triterpene (indicenol) also reported from the species [29].

The Mangifera indica Linn. plants shown the different pharmacological properties like Antipyretic Activity [66], Antioxidan [74], Antidiabetic [79], Antibacterial [23], C-Glucosylxanthone, Mangiferin [67].

**Therapeutic Uses:**

**Parts used:**

The various parts of the plant such as leaves, bark, seeds, fruits, gum etc. are used for the treatment of various disease.

**Fruits (ripe):**

The fruits are used as stringent, antidyseretic, diaphoretic, diuretic, invigorating, nutritious, laxative, and refreshing; useful in haemorrhage form intestine, lungs, or uterus (unripe) antiscorbutic, astringent and stomachic; beneficial in reysipelas, heat apoplexy and ophthalmia; rind is astringent. The Kernal has been shown anthelmintic and astringent. The powder of seeds or kernel prescribed in asthma, diarrhea, and bleeding piles; the decoction of flower used as diarrhea, chronic dysentery and gleet; the leaves of decoction mixed with honey goven in aphasia. The juice leaves useful in treatment in dysentery. The bark are used as in the treatment for antidiarrhoeal, astringent, useful in haemoptysis and malaena; infusion given in nasal catarrh, leucorrhoe, menorrhagis, bleeding pile. The juice mixed with lime water is most valuable remedy in the treatment of acute gonorrea.

**Traditional Medicinal Uses:**

The Magnifera indica parts uess for treatment for various diseases for the treatment of various diseases in various countries theses are follows-

**India:**

In India the plants parts and plant extracts are used for various purposes. These are the follows-
For treatment of diabetes or hypoglycemia the dried bark decoction is used, thus it act as a hypoglycemic agent. The dried bark extract in water is used orally to the treatment of leucorrhea, bleeding hemorrhoids, and lung hemorrhage. Decoction of stem bark is used to treat menarche. Decoction is taken orally with cow’s milk. Decoction is taken orally of the vapour is inhaled to treat jaundice. It is taken to prevention conception. As a contraceptive, the stem bark of the young mango plant which has not flowered even once constitutes the contraceptive. Fifty grams of fine stem bark power is said to be administered with alcoholic wine for preventing conception. It is said to be effective enough to cause abortion safely up to six months after conception. To remove dandruff, the poeder of dried seed is topically applied on to the head. The extract obtained from the flowers is act as a antidiarroheal purpose and treatment of dysentery. For as a famine food the kernel starch is used. The juice of fresh leaves used for treating inflammation of the eye; it is applied on eyestwice daily. For permanent cure, apply when pus has started oozing. The fruit is used as an astringent, laxative, diaphoretic, diuretic, and cooling agent. The extract of dried leaves in water is used in the treatment of diabetes, diarrhea, and hiccups by giving orally. To prevent tooth decay, the dried leaves are used. Powder or decoction is applied to teeth with finger or brush. For laxative purpose, Anthelmintic property, as a tonic, an aphrodisiac, the aqueous extract of Kernel is used by giving orally. The extract of the dried bark in hot water is used as a tonic, for the treatment of menorrhagia and an astringent. By giving aqueous extract of leaves act as an anti-diarrheal agent, an expectorant, in asthmatic conditions.

**Malaysia:**

In women for menorrhagia, the hot aqueous extract of seed is given orally in Malaysia

**Nepal:**

The water extract of fruit is administered intravaginally to human in hemorrhages from the uterus. In asthmatic patients the hot aqueous extract of seeds is given orally.
Nicaragua:

The Phenolic or water extract of inner bark are applied for externally for treatment of wounds.

Panama:

In the country of Panama the fruit is eaten as a laxative and water extract of leaves is used to treat rheumatism. The leaves decoction is made in 1 liter of water by taking 15-20 leaves and is used for various purposes. In prevention of gum disorders and toothache the leaves of plant are chewed.

Peru:

For the medicinal purpose, the hot water extract of dried fruit in hot water is given as orally.

Rarotonga:

The Fresh fruit rind is eaten as a refreshing tonic.

Senegal:

The extract of dried bark in hot water is administered orally for odontalgia and treatment of mouth sores and act as a mouthwash for toothdecay. The extract is administered orally for an anti-diarrheal purpose and it is also used by applying externally for preventing infections of cutaneous tissues. The aqueous extract obtained from dried leaves is giving orally for the treatment of bronchitis, toothache, angina, and blennorhagia. The extract obtained from oleoresin in hot water is given orally for syphilis.

Sri Lanka:

Bruised bark and leaves of Ervatania dichotoma, bark of Mangifera indica and Ficus glomerata are boiled in coconut oil and applied to abraded skin of ulcers and fistulae as an astringent and antiseptic.

Tanzania:

In Tanzania country to prevent tooth decay the extract of stem bark is administered orally. For the treatment of toothache, the root decoction was given orally for the treatment of malaria.

Tonga:
Infusion of dried leaves is used for syndrome locally called Kita Fa’ ele, consisting of fever, chills, dizziness, and lower abdominal pain presumed to result from insufficient rest during puerperium. Mangifera indica, Diospyros lateriflora, Bischofia javanica, Pittosporum arborescens, and Colubrian asiatica are used in the preparation.

**Zaire:**

Infusion of dried stem bark is taken orally for diarrhea, chest pains, coughs, anemia, urinary tract infections, and diabetes. Externally, the infusion is used for infected wounds and skin diseases and as an oral application for dental caries. Particular care should be taken in using the shoots and flowers, since they may be contaminated with fungal toxins. Mycotoxins are among the most important chemical hazards in the rural countryside.

**Brazil:**
The Decoction of dried bark is used to treat scabies.

**Canary Islands:**

Dried oleo-resin is used for food and also useful the dried bark aqueous extract is administered orally for the treatment of diarrhea. The extract of fresh fruit in hot water is given by oral route for the anthelmintic purpose.

**Curacao:**

The extract of leaves in boiling water or decoction of leaves in hot water is drunk for high blood pressure; three cups a day, three days in succession. Some take the decoction every day.

**Fiji:**
The nasal drop is prepared from the juice of leaves and is inhaled for sinus and freshly collected Kernel is taken orally for treating asthma and dysentery. Fresh leaf juice in coconut oil is used externally for heat rash and burns. The dried bark hot water extract is taken orally for syphilis. Unripe fresh fruit pulp, mixed with curd is used for indigestion and stomachache.

**Guam:**
The fruit has been reported to cause rash called mango dermatitis on human adults.
Haiti:
In the country of Haiti the extract of dried bark in hot water is given by oral route for liver trouble.

**Pharmacological Activities:**

**Allergenic activity:**
For the evaluation allergenic activity used fresh fruit eaten by human adult was active. In male after twenty minutes of eating a mango fruit shows facial rythema, dyspnea, periorbital edema and widespread urticaria. Pulse was 100 beats /min, anaphylaxis and blood pressure 104/72. was shown. It is cured by giving chlorpheniramine malate and hydrocortisone intravenously. Prick testing with mango juice produced a wheal within five minutes. The patient has a history of asthma, eczema, hay fever, and drug allergy. Powder commercial sample of fruits was active on human adults. Previously unexposed patients had reactions.

**Anthelmintic activity:**
For the evaluation of anthelmintic activity the extract of Kernel is used which is obtained by using hot water by using the concentration of 1:50, was active on Haemonchus contortus.

**Antibacterial activity:**
For the screening of antibacterial activity used the dried leaves ethanolic extract which are utilized for the activation of agar plate on Escherichia coli and Staphylococcus aureus. Water extract was active on Actinomycete species and plaque bacteria; For bacterial plaque, commercial dentifrices were tested individually or the combining with the plant extracts. The addition of plant extracts significantly increased the zone of inhibition relative to that of the dentifrices. The extract was active on Bacteroides gingivalis vs two clinical isolates, Pseudomonas schararophila (clinical isolate), Streptococcus salivarius vs five clinical isolate, Streptococcus viridians vs 40 clinical isolates. Water extract taken orally by human adults was active. Fifty patients with chronic suppurative periodontitis were given leaf extracts of Mangifera indica, Camellia sinensis, Muray Koenigii, Ocimum basilicum or Azadirachta. Bacterial populations declined by 50%, and 40 patients showed
improvement. Hot water extract, undiluted on agar plate was inactive on Escherichia coli and Staphylococcus aureus MIC 2.0 mg/ml; Escheriscia coli MIC 3.0 mg/ml; Staphylococcus aureus MIC 2.0 mg/ml; Proteus vulgaris MIC 3.0 mg/ml; Bacillus firmis MIC 30.0 mg/ml; and Pseudomonas aeruginosa MIC 4.0 mg/ml. The dried leaves aqueous water extract which are used for the on agar plate was activation of plate on Sarcina lutea and Staphylococcus aureus. When the dried stem bark alcoholic extracts was inactive in the agar plate at the concentration of 10.0 mg/ml on Escherichia coli, Pseudomonas aeruginosa, Salmonella typhimurium and Streptococcus mutans. The extract was active on Klebsiella pneumonia and Streptococcus aureus MIC 125.0 mcg/ml. The stem bark fraction of tannins was inactive to Citrobacter diversus on agar plate at a dose of 120.0 mg/ml; at a concentration of 145.0 mcg/ml, Staphylococcus aureus is inactive. Escherichia piracoli, Klebsielle pneumonia, and Shigelle flexneri at a concentration of 200.0 mcg/ml. on E.coli the activity was weak at the of 225.0 mcg/ml concentration.

Antifungal activity:

The observation of antifungal activity the author has used the fresh kernel ethanol (95%) extract. The 5.0 mg/ml concentrations are used for the activation of agar plate on Trichophyton mentagrophytes. The aqueous extract of dried leaves were taken to evaluate and check the antifungal activity on the organism Aspergillus niger by spreading the extract on agar plate shows that it was inactive for that organism. The dried stem bark methanol extract was used for the organism Aspergillus niger and Microsporum gypseum at 10.0 mg/ml concentration shows inactivity.

Anti-inflammatory activity.

The alcoholic extract of fresh Kernel is used to evaluate the anti-inflammatory activity at a dose of 50.0 mg/kg is administered by gastric intubation to rats was active vs pedal edemas induced by carrageenin, turpentine, 5-HT,brady-Kinin-etc. pleurisy, granuloma pouch, cotton pellet granuloma, and arthritis induced by adjuvant. The extract shown inactivity against pedal edema which are induced by dext-ran, prostaglandin, and the extract shown weak activity against arthritis induced by formaldehyde.
Antimalarial activity.

For the evaluation of antimalarial used the water extract of bark at a dose of 7.82 gm/kg administered orally to chicken was inactive on Plasmodium gallinaceum.

Antimycobacterial activity.

The extract is used which is obtained from the dried leaves in hot water to check the antimycobacterial activity on Mycobacterium phlei which shown that it was inactive.

Antinematodal activity.

Aqueous extract obtained from dried leaves was shown the activity by using different concentrations on Meloidogyne incognita.

Antitumor activity

The dried aerial extracts was administered to the mice through the intraperitoneally shows inactivity at the concentration of 250 mg/kg.

Antiviral activity.

In cell culture, Ethanollic extract (80%) extract of freeze-dried leaves, at variable dosages was equivocal on Coxsackie B2 virus, measles virus, and Polio virus; inactive on adenovirus, herpes virus type 1, and Semilicke-forest virus vs plaque-inhibition. The dried stem bark of methanolic extract were used in cell culture of 100.0mcg/ml concentration shown weak activity on HIV virus. Undiluted leaf juice was inactive on bean mosaic virus. Reduction of infectiousness was measured.

Antiyeast activity.

For estimation of antiyeast activity used as ethanollic dried leaves extract shows inactivity against Candida albicans in the agar plate. The ethanollic extract of freshly obtained Kernel of the plant is used to check the antiyeast activity on candida albicans and candida lunata by using 5.0 mg/kg concentration in the agar plate. The extract is inactive on Candida albicans and active on Candida lunata. Hot aqueous extract obtained from the dried leaves of the plant shown inactivity on Sacharomayces cerevisiae in the agar plate. The dried methanol extracts is effective at concentration at 10.0 mg/ml, which was applied on agar plate for inactive of Candida albicans.
Ascaricidal activity.

Ascarislumbricoides are active for the alcoholic extract obtained from the dried seeds of the plant.

Cytotoxic activity.

For the screening of cytotoxic activity, the ethanolic and aqueous extract of dried aerial parts is taken of 25.0 mg/ml concentration which shows the inactivity on CA-9KB. Dried stem bark methanol extract used at a of 100.0 mcg/ml concentration, were equivocal for the CA-HS-578-T, CA-mammary-MF-7, CA-mammary-MF-7/ADR, the cell lines of human breast cancer such as MDA-N, T47-D, BT-549, MDA-MB-231, MDA-MB-435, leukemia cell line CCRF-CEM; inactive on RPMI-8226 cells and weakly active on CA-colon-KM12, CA-HCT-15, CA-human-colon COLO-205, CA-human-colon-HCT116, CA-human-nonsmall-cell-lung HOP-62, CA-human-ovarian OVCAR-3, CA-human-ovarian OVCAR-4, CA-human-ovarian OVCAR-5, CA-human-ovarian-SKOV-3, cancer cell line-human CNS-SNB75, human CNS cancer cell line SF-539, human melanoma cell line MALME-3M, human CNS cancer cell line SNB-19, human melanoma cell line SK-MEL-5, human colon cancer cell line SW620, human leukemia cell line MOLT-4, human CNS cancer cell line U251, human colon cancer cell line HCC-2998, human colon cancer cell line HT29, human leukemia cell line HL-60-TB, human melanoma cell line SK-MEL-2, human nonsmall cell lung cancer cell line.
III. *RICINUS COMMUNIS LINN.*

![Image of Ricinus communis plant]

**Fig 2.3: Ricinus communis Plant.**

**Synonym** - Castor Leaves

**Botanical Name** - *Ricinus communis* L.

**Family** - Euphorbiaceae

The plant is having different various name in different languages as follows:

The leaves, roots and seed oil of *Ricinus communis* Linn. (Syn. R. Inermis Jacq. R. Speciosus Burm. R. Spectabilis Bl., Croton spinosis Linn.); belonging to Family Euphorbiaceae, are used as drugs.

The Seed oil consista of fixed oil obtained by cold expression from thye ripe, dried seeds of the plant. The Plants are distributed or cultivated in India.
Vernacular Name:

Sanskrit: Bedanjeer, Arand.
Hindi: Eranda
Marathi: Erandi
English: Castor seed.
Tamil: Ammanakku.

Distribution:

The plants are cultivated in all tropical and sub-tropical countries. In India, the plant is one of the major oil seed crops, as well as the second largest manufacture of seeds over the world. In India the seed production are near about 3,00,000 tonnes per year. In India mostally cultivated in Andhara Pradesh, Gujarat, and Karnataka. In Andhra Pradesh only near about 60% of the total crop in India. About 0.6 million hectares of land in India is under cultivation of castor plant.

*Ricinus communis* Linn. is a large evergreen tree. The plant is mostly cultivated in Karnataka, Andhra Pradesh, Maharashtra and Orissa [8,53].

Botanical description:

Bark:

The bark of *Ricinus communis* Linn. Having the specific characters like bark is soft wood, perennial, bushy, the thin brown bark connected to plant.

Leaves:

The leaves palmately lobed with seven or more serrate lobes, petioles with conspicuous glands;

Flower:

The flowers is showing paniculated racemes with crowded male flowers with the upper half of the inflorescence and the pistillated at the basal half, sometimes a few pistillate flowers at the top also; fruits globes, explosively dehiscent, 3-seeded capsules, when young it is green covered with fleshy prickles;

Seeds:

The plant seed are ablong with soft, hard mottled and other character which are below
CHAPTER-II

REVIEW OF LITERATURE

Description:

- Colour : Pale yellow or colourless liquid
- Odour : Slight and characteristic
- Taste : First it is bland but afterword slightly acrid

The seeds having a viscous and transparent liquid. It is soluble in alcohol, chloroform, ether, gacial acetic acid nad petroleum ether. Insoluble in mineral oil.

Macroscopic:

A tall, glabrous and glaucous, branched shrub. Leaves alternate, long petiolate, stipulate, palmately lobed, lobes 7 or more, serrate. Roots light in weight, gives off profuse branches, yellowish brown colour shows the outer surface which is indicated by wrinkles longitudinally. Odourless, taste, acrid. Fruit, a prickly 3 seeded capsule. Seeds ellipsoidal or ovoid, slightly flattened, 1-2cm in length, and their width is 0.5-1.0 cm. Externally smooth, one side even, bearing one prominent raphe and other side slightly raised. Testa blackish-brown or grayish-brown. Odourless; taste, slightly biter and pungent.

Microscopic:

Root

The root are Secondary cortex composed of tangentially elongated thin walled cells and several contains oil globules, calcium oxalate crystals, simple or compound starch grains. Phloem fibres long, septate, highly thick walled. Xylem occupies major part of the root. Xylem fibres long and thick-walled. Vessels with bordered pits. Uniformly distributed throughout the xylem region.

Leaves

The leaves contains Paracytic type of stomata are present on lower and upper epidermii, moe abundant on the lower side.

Seed

In seeds in which some of the microscopical characters were observed such as Testa thin and brittle. Endosperm white and oily. Oil viscid, pale yellow or almost colour-less, transparent.
CHAPTER-II

REVIEW OF LITERATURE

Chemical constituents:

The major chemical constituent which are present in plant are Lipids such as fixed oil, triglycerides and triricinolein which on hydrolysis it forms ricinoleic acid which is responsible for the purgative and laxatative.

The Minor chemical constituents which are present in plant are fatty acids such as oleic acid, stearic acid, arachidonic acid, palmitic acid, linolic acid, palmitoleic acid etc. and alkaloid like ricinine.

Assay / Analytical Methods:

According to the analysis the plants seeds oil contents -Fatty acid composition of castor oil by gas chromatography study.

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<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
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<tbody>
<tr>
<td>1:6 w/w silicone grease on 40-60 mesh C-22 firebrick 2ft × 0.25 in O.D. copper tubing</td>
<td>1:4.5 (w/w) phthalic Ethylene glycol polyester on 40-60 mesh C-22 firebrick.</td>
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<tr>
<th>Column Temperature :</th>
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<th>Detector current (TCD) :</th>
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Procedure:

Prepare a standard mixture consisting of reference substance of methyl esters of arachidonic acid, palmitic acid, oleic acid, stearic acid, linoleic acid, linolenic acid, ricinoleic acid, palmitoleic acid and dihydroxystearic acids. Prepare the sample by direct methylation using diazomethane in ether. Assign the peaks in the sample chromatogram on the basis of logarithm of emergence time and by comparing with the retention times of those in standard mixture. Determine the areas of the fatty acid
peaks in the sample to calculate the relative weight of various esters with the exception of methyl ricinoleate and methyl dihydroxy sterarte.

Test different proportions (0-100%) of pure methyl ricinoleate and methyl dihydroxystearate on silicone column. Draw a graph with observed and actual percentages on two axis for methyl ricinoleate and methyl dihydroxystearate individually and correct their percentages obtained in the sample chromatogram.

Quantitative Standards:

**Seed oil:**
- Weight per ml : at 25°C 0.945 to 0.965 g
- Acetyl value : Not more than 143
- Acid value : Not more than 2.0
- Iodine value : 82-90 (Iodine monochloride method)
- Refractive index : at 25°C 1.4758 to 1.4798
- Optical rotation : Not less than + 3.5º
- Saponification : 177 to 185º

**Leaves:**
- Ash : Not more than 9.0%
- Acid insoluble : Not more than 1.0%
- Alcoholic extractive value : Not less than 3.0%
- Water extractive value : Less than 9.0%

**Roots:**
- Ash : Not more than 8.0%
- Acid insoluble : Not more than 1.0%
- Ethanol soluble extractive : Less than 3.0%
- Aqueous soluble extractive : Less than 9.0%

**Substitutes / Adulterants:**

Castor oil is sometimes adulterated with blown oils and other unheated oils like groundnut, coconut, sesame, rape, mahua, cottonseed, poppy seed oil and lard.
Pharmacology:

The plants contain Ricinoleic acid and the due to the main chemical constituents i.e ricinolic acid is used for the purpose of laxative, purgative. In which small intestine pancreatic lipases which is responsible of hydrolyse. The ricinoleate which are helps to reduces absorption electrolytes and increases peristaltic movement. Alcoholic extract of leaves of the plant shows that the significant protection against carbon tetrachloride and galactosamine induced damage in rats. Leaves also exhibited significant growth in mammary glands in albino mice. Petroleum ether extract of the drug exhibited anti-inflammatory activity against induced rat paw arthritis.

Further Reported Activities:

- Hepatoprotective, antitympanitic, antitumour, antimicrobial, contraceptive, nematicidal, infertility, antidote for poisonous bites, nitric oxide synthase.

Therapeutic Category:

Stimulant cathartic, lactagogur, antirheumatic.

Parts used:

Roots, leaves, flowers, seeds, oil [10].

Properties and uses:

The castor oil used as cathartic and also used for lubrication. It is also used for preparation of paints, enamel, varnishes, grease, polishes, printing ink, hydraulic and brake spirit.

Industrially, it is used in the production of rigid, semi-rigid foams and urethanes known as elastomers, used for trolley wheels. The castor cake is used as a source of enzyme lipase.

The plants part having different pharmacological properties these are follows-

Roots:

The roots of the plants having sweet taste and acrid. They are having different pharmacological properties such as agstringent, carminative, purgative, diuretic, thermogenic, anthelmintic, emollient, aphrodisiac, expectorant, and depurative. Roots are also useful in gastropathy such as gulma, amadosa, etc. and also they shown the constipations, inflammations, fever, ascites, strangury, bronchitis.
Leaves:

The leaves are having potent activities like - Diuretic, anthelmintic and are useful in burns, nyctalopia, strangury and for bathing and fomentations in vitiated conditions of vata, especially in rheumatid arthritis, urodynia and arthralgia.

Flowers:

The flowers are utilized for the treatment of glandular tumours and the seeds are acrid taste and which are showing the significant activities such as - digestive, cathartic and aphrodisiac. They are useful in dyspepsia and for preparing in poultice to treat arthralgia.

The oil:

The oils which are obtained from the seeds. The seed is having bitter taste, as well as acrid and sweet. It is used for the treatment of the several type of diseases and also useful for the treatment of vata and kapha. The oil are also recommended for the treatment of fever, gulma, colonites, lumbago, coxalgia and coxitis [38,25].

Oil is obtained from seeds and young leaf shows the purgative action. Oil is used in dermatosis and eczema. The plant roots decoction are given administered for the treatment of lumbago and allied diseases.

Bark:

As per the Ayurvedic Pharmacopoeia of India mentioned the decoction of the dried barks and mature root utilized for the treatment of pain in the urinary bladder, lumbago, rheumatism, diseases of the abdomen and inflammations. The fresh leaf is used as the arthritis, pain in the urinary bladder, helminthiasis, dysuria, dysuria. Dried seed powder is used in liver and spleen diseases as well as piles, rheumatism, sciatica, lumbago, constipation and purgative [8,53].

The leaf extracts shown significant activity of Antibacterial analysis [25,14]. The castor oil has evaluated the Antiulcer activity [77]. The leaves are having the Antinociceptive activity [21]. The plant of *Ricinus communis* Linn. Some of the isolated compound which are shown significant activity of liver injury in rats [4].