

A Review: Manilkara Hexandra (Roxb) Dubard.

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Abstract- The main aim of this review paper is to give whole information about Manilkara Hexandra (Roxb) Dubard. used as a Khirni or Rayon in the most maximum of the tropical area's of India. The plant consist of important phytoconstituents along with protobasic acid, 16-alphasipnasterol, beta-sitosterol, its beta D-glucoside, quercitol, quercetin and its dihydroderivatives, ursolic acid. the whole plant is employed as astringent, refrigerant, aphrodisiac, alexipharmic, stomachic, anthelmintic, for reliving fever, flatulence, colic, dyspepsia, helminthiasis, hyperdipsia, burning sensation. All those compounds claimed with own new pharmacological properties such as antioxidant, antiulcer, anti-inflammatory, antidiuretic, anthelmintic activity and so on. The fruit of this tree is suitable for eating. also available in markets and the bark is used for curing fever, flatulence, stomach disorder etc.

Keywords: Manilkara Hexandra, Rayan/khirni, *sapotaceae*, pharmacognosy, anthelmintic.

Introduction-

Manilkara Hexandra (Roxb). It also known as Khirni. The plant's fruits are one of the most delicious. Gujarat has a lot of underappreciated fruits. It is commonly referred to as "Rayan 1". Fever, jaundice, helminthiasis, flatulence, stomach disorders, and other ailments are treated with stem. The seeds are being examined for their pharmacognosy, however there are no reports on the plant's stem bark. As a result, the current research was done in order to set forth the pharmacopoeial requirements for the stem bark.^{[1][2]} The bark is grayish and rough. The wood is hard, durable, and heavy the density is variously reported as ranging from about 0.83 to 1.08 tonnes per cubic metre, partly depending on the degree of drying. It is used for heavy structural work, gate posts, and big beams.^[3]



Fig.1 Plant of Manilkara Hexandra
Scientific Classification-

Kingdom-Plantae

Clade:Tracheophytes

Clade:Angiosperms

Clade:Eudicots

Clade:Asterids

Family:*sapotaceae*

Genus:Manilkara

Species:Manilkara Hexandra

Common Name- obtuse-leaved mimusops. The Caylon Iron^[3]

Vernacular Name:^[3]

- English-Obtuse leave mimusops

- Hindi-Khirni
- Kannada-Bakula
 - Tamil-palai
- Telugu-Nimuni pala
- Oria-khiri khirrookuli
- Sanskrit-Vakula

Origin and distribution -Manilkara Hexandra is a tree species belonging to the Sapoteae tribe of the Sapotaceae family. It is found throughout much of south Asia (China: Hainan and southern Guangxi provinces; Indian subcontinent: Bangladesh, India, and Sri Lanka, Indo-China, Cambodia, Myanmar, Thailand, and Vietnam) Gujarat, Rajasthan, Madhya Pradesh, Andhra Pradesh, Kerala, and Maharashtra are among the states where it is prevalent. It's also grown in Malaya, primarily in gardens.^[3]

Seeds: Type: berry with one seed, though two seeds are occasionally encountered; oblique to oval in shape, compacted with a gleaming sheen the presence of a teste with an extended hilum; Cotyledons have thick and meaty endosperm are papery and have significant reticulate venation, and are thin and papery. radicle and plumule are short; odour is mild. features; harsh taste; reddish brown colour.

Leaves: Shape: elliptic

type: alternate

apex: glabrous emargination

Taste-bitter

Stem Bark: Longitudinal and quilled in shape

surface: the outer surface is dark brown to grey in appearance.rough, scaly, mosses and lichens.



Fig. 2 Leaves of Manilkara Hexandra.

Macroscopic characteristic-The organoleptic characteristics are as follows: Medium- to large-sized glabrous environment evergreen tree, 15-20 m tall; stem: elliptic-obovate or elliptic-obovate, 5-15 cm by 2.5-5 cm towards the end, oblong, coriaceous, rounded or emarginated above the apex, dark green and polished, bright green Both sides of the main nerves 12-20 are glabrous underneath. axillary, white light yellow little bloom odorous, solitary or in groups of two to six blooms; petioles, pairs 1.25 cm long, with a glabrous channel above it; Fascicules 6-13 mm length, glabrous or nearly glabrous pedicels Milky fruit, ovoid or ellipsoid berries When two 1.25 cm green seeds are planted occasionally, The fruit is reddish-yellow when unripe and green when ripe.^[8]

Fruit-An oblong, ellipsoid berry, slightly curved; seed solitary. Fruiting February onwards.

Field tips -Bark grey, smooth, often with conical degenerate branchlets.

Leaf Arrangement-Alternate-spiral

Leaf Type-Simple

Leaf Shape-Broadly ovate

Leaf Apex-Obtuse-emarginate

Leaf Base-Cuneate-rounded

Leaf Margin-Entire



Fig.3 Flowers and Fruits of Manilkara Hexandra

Microscopic characteristic –

Transverse hand cut pieces of authenticated samples were obtained and stained with appropriate stains to make them permanent. Occulum and stage micrometres were used to measure cell contents such as starch grains, fibres, capillaries, calcium oxalate crystals, stone cells, and so on. The photos were shot with a Motic microscope.^[6-10]

Phytochemistry -

7, 9-di-tert-butyl-1-oxaspiro deca-6, 9-diene-2, 8-dione was a novel chemical found by GCMS. The Antibacterial activity was observed in the isolated compound. It has a high zone of inhibition, ranging from 30 to 50 percent. a concentration of 150 g/ml. The isolated flavonoid is thought to behave a lot of meaning, and it's employed in a lot of things. As key components, pharmacological applications in the medication distribution system. Catechin was found to be a powerful antioxidant. It is active and exhibits distinct biological characteristics. It also functions as a metal chelating agent.^[13] Fruits and Vegetables The plant's seeds contain phenolic chemicals. quercetin and dihydro quercetin are two types of quercetin. Benzaldehyde derivatives are being used for the first. The presence of the plant has been reported.^{[15][16]} One of which is 3,4-dihydroxybenzaldehyde is a chemical compound. at

a concentration of 500g/ml it was active against streptococcus aureus (zone of inhibition of epidermidis (250 g/ml level; zone 21.5 0.70 mm) and another compound, methylpcoumarate, were found to be active against Streptococcus epidermidis (zone 21.5 0.70 mm) and another compound. methylpcoumarate, was found to be active against Streptococcus epidermidis (zone 21.5 0.7022 1.41 mm of inhibition). Because these substances are so important in the environment, skin infection therapy

Three bidesmosidic saponins were isolated and purified from the seeds of an Egyptian plant containing protobassic acid and 16oxoglutarate. As aglycones, a hydroxyprotobassic acid showed substantial anti-inflammatory, antioxidant, and antimutagenic properties. cytotoxic properties. Rayan's fruits and seeds were. The total phenolic and flavonoid content was determined. As gallic acid, quercetin, and kaempferol were found as major phenolic components. quercetin, gallic acid, and vanillic acid are all found in fruits. from the seeds and were thoroughly examined.^[18] The seeds also have a fatty oil content of 16 percent. Saponin is 1% of the total. Taraxerol, a triterpene ketone, alpha and beta-amyrin, cinnamates, alpha-sinasterol, and cinnamates were found in all components. quercitol, beta-sitosterol, and its beta-D-glucoside ursolic acid 1, quercetin and its dihydroderivatives 9-18.^[17]

Table.1-Phytochemicals present in different parts of Manilkara Hexandra^[17,20]

Parts of Plant	Phytochemical components
Leaves	Terpenes hydrocarbon, Taraxerol, Hentriacontane, Triterpene ketone, Cinnamic acid, Quercitol, 4-methyl benzaldehyde
Flowers	Ethyl nicotinate, D-Quercitol
fruit	Ursolic acid, α -amyrin acetates, β -amyrin acetates, Tetra-hydroxy alcohol, monohydroxy monocarboxylic acid, α -spinasterol,
Root	Quercitol, α -amyrin cinnamates, β -amyrin cinnamate, Cinnamic acid, Taraxerol, α -spinasterol, β -D-glucosid

Bark	Taraxeryl acetate, α -amyrin cinnamate, α -spinasterol, Triterpenoid acid, Triterpenoid saponin: 1 β , 2 α , 3 β , 19 α -tetrahydroxyursolic
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Pharmacological activity -

Antihelmentic activity -Antihelminthic activity of Manilkara Hexandra leaf extracts, including Ethanolic extract, pet. Ether extract, alcoholic extract are prepared. This extract were keep for 7 days .healthy earthworms are used .the sample extract wercompare with the standred drug piperazine citrate. And time of death and time of paralysis were recorded.

Antibacterial Activity -Antibacterial activity of Manilkara Hexandra leaf extracts, including methanolic and hydroalcoholic extracts, in a herbal gel. A variety of carbopol 934 concentrations were tested. Escherichia coli, Enterobacter aerogenes Proteus mirabilis, E. coli, Klebsiella pneumoniae, and Proteus vulgaris, to be precise. Other factors like as homogeneity, colour, pH, and spreadability were also considered. The results revealed that a formulation comprising 1% gelling agent 2.5 percent of the extract was found to be more stable 19. Another study discovered that the isolated flavonoid 7, 9-di-tert-butyl-1-oxaspiro. At concentrations ranging from 30-150 g/ml, (4.5) deca-6, 9-diene-2, 8-dione possesses bactericidal activity. Patel K et al. looked into the antibacterial properties of The plant's seed extract was made using a microwave-assisted extraction process. The research exhibites bactericidal activity against Streptococcus mutans with a minimum bactericidal concentration concentration in the 600-900 g/MI range. ^{[22][23]}

Antifertility Activity: The crude drug's seeds were tested for antifertility properties. Using male albino rats, it was discovered that the sperm count was significantly reduced of the animals. ^[24]

Antimicrobial Activity:- The antimicrobial activity of many plant leaf extracts, such as Against gram-positive bacteria, gram-negative bacteria, moulds, and yeast, petroleum ether, acetone, and methanol have been tested. The game At doses of 250 and 500 g/disc, an agar disc diffusion method was used. Antimicrobial efficacy was highest in the methanolic extract. Aqueous extracts of Euphorbia thymifolia aerial parts .The antibacterial activity of Manilkara Hexandra was tested using the well diffusion method on six distinct bacteria. Streptococcus mutans, Bacillus subtilis, Klebsiella pneumoniae, Proteus mirabilis, Streptococcus mutans, Streptococcus mutans, Streptococcus mutans, Streptococcus mutans, Streptococcus mutans Salmonella bongori and Enterococcus faecalis, as well as two fungi, Candida albicans and Candida glabrata, were found. Aspergillus niger is a fungus found in the United States. Manilkara Hexandra extract was found to be extremely when compared. This is a significant difference. plant extract of thymifolia A new study has added Methanol extract was discovered among all the extracts. to demonstrate the highest level of antibacterial activity and methyl-p-coumarate and 3, 4-dimethylp-coumarate are plant chemicals isolated from dried leaves and flowers. dihydroxybenzaldehyde is said to be active. Streptococcus aureus and Streptococcus epidermidis 26 NIDDM was delivered into overnight starved rats with streptozotocin (60 mg/kg, i.p.). The extract dose was given once only during the trial dose for twenty-one days, during which time it was discovered that there is a significant decrease in biochemical factors such as cholesterol levels in the blood, LDL, HDL, and triglycerides. ^[26]

Antiulcer Activity:- The plant's ethyl acetate extract was tested for its ability to treat gastric ulcers. ethanol, ethanol-indomethacin, and pylorus ligated stomach ulcer models were used. It has been successful. The extract was found to drastically reduce lipid peroxidation in treated animals, as well as the increase in vascular permeability is inhibited. Furthermore, it has been discovered that pre-treatment with When taken orally, ethyl acetate extract enhances mucus production and glycoprotein levels. intraperitoneal, due to a rise in mucin content and the TC:PR ratio, respectively. ^[27]

Antidiabetic Activity: -The ethanolic bark extract has been shown to have anti-diabetic properties. Diabetes models in rats caused by streptozotocin. Streptozotocin (60 mg/kg, i.p.) was used to introduce NIDDM into overnight starved rats. Throughout the extract dose was administered as a single dose for twenty-one days in the trial, and it was discovered that biological indicators such as cholesterol levels in the blood have significantly decreased, triglycerides, HDL, and LDL 28 triglycerides. ^[28]

Antioxidant Activity:- Methanolic extracts of fruits and seeds of the FRAP, DPPH RSA, ABTS RSA, HRSA, and other assays were used to assess the plant. It has been discovered that fruits are a good source of vitamin C. When compared to seeds, antioxidants revealed the existence of phenolic components such as gallic acid. The richest sources of antioxidant property include quercetin, kaempferol, and vanillic acid .Another study found signs of antioxidant activity. DPPH, Fe³⁺-reducing power assay activity of different fractions of Manilkara Hexandra leaf extract .there are 30 pharmacological activities. ^[29]

Medicinal uses-Koli tribe members utilised stem decoction to treat diarrhoea, fever, and stomach infections. The astringent properties of bark and roots were well-known. Property to make the honey, powdered seeds were combined with honey. Redness in the eyes should be treated as soon as possible. It works as a febrifuge. antileprotic, anthelmintic. The powdered bark and root were fed to diarrhoea in children should be avoided. ^[30] Tumors were treated with a poultice made from the leaves.

Epilepsy: 20 mL gland juice from the specified plant's stem, 500 milligrammes Piper longum Honey (20 g) is administered twice day for two weeks. months. Cloasma is a skin condition caused by the application of a leaf paste locally. with fresh milk of the specified plant usefulness. Dentalgia: Apply latex from the plant mentioned. as necessary.

Menorrhagia: powdered fried leaves of the mentioned Two times a day, 10-20 g of water is administered. few times a day.

Scorpion sting: Seed paste applied locally. the herb is useful for relieving pain. Acne vulgaris, black spots, and other skin conditions face: Applying a paste made from the plant's unripe fruit on the face is quite useful. Useful for boosting body weight and treating penile erectile dysfunction. Two times a day, 10 drops of plant seed oil, 10 g sugar candy, and 15 g cream of milk are provided. oligogalactia, **memory loss:** the fruits of the Plants are given 100 g twice a day .^[31]

Therapeutic uses-

The bark is used as an astringent, a refrigerant, and a tonic. aphrodisiac, alexipharmic, stomachic, antihelmintic; used to treat fever, flatulence, colic, dyspepsia, helminthiasis, hyperdipsia, and burning. The fruits are cooling, aphrodisiac, and aphrodisiac. appetiser, galactagogue, emollient, tonic, anorexia, dyspepsia, nervous weakness, bronchitis, spermatorrhea, consumption, hallucinations and insanity agent. It can be used to treat a variety of disorders, including colic dyspepsia and hyperdyspepsia. Sugar, proteins, lipids, and carbohydrates are all present in the fruits. carbohydrates, a trace amount of calcium, iron, and phosphorus, as well as vitamins A, B, and C respectively.^[30] Many more properties and activities of the company will be supported as a result of this complete assessment. Plants, in turn, play a vital role in laying the groundwork for future research. While After gathering data on the plant, it was discovered that the genus Manilkara is home to a variety of species. Many other pharmacological qualities have a lot of potential, which has to be explored in the recent years.^[31]

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