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Review Article

AN ETHNO-PHYTOCHEMICAL AND PHARMACOLOGICAL REVIEW ON NOVEL INDIAN MEDICINAL PLANTS USED IN HERBAL FORMULATIONS

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ABSTRACT

More number of different biologically active and therapeutic potential phytochemicals are drown from plant kingdom. The utilization of those natural substances for human aliments as well as animals begins from time immortal. Till date almost 3000 different medicinal plants in Indian sub continent has found to great potential in the emerging field of herbal medicines. More specific information about plant source as medicine had been mentioned in our old golden heritagious ayurvedic literatures and also other alternate system of medicine. Numerous number of phyto compounds were characterized from plants which are now using in modern herbal pharmacy for the treatment of many diseases. Well authenticated medical plants may play an important role in the management of different clinical problems especially in developing countries. The present paper reveals the literature up to date review on ethno-phyto medicinal research outcome and uses with pharmacological screening of every plant part of this three medicinal plants, i.e *Cassia Auriculata Linn*, *Cinnamomum tamala*, *Ficus benghalensis* used for the treatment of various ailments in human civilization as well as used in folk medicine as a remedy in various reported herbal formulations. The name and parts of the plant studied, the spectrum of activity, and methods used are discussed in this review paper.

Keywords: Medicinal Plants, Ethno medical Use, Phytochemistry, Pharmacological Screening.

INTRODUCTION

Over the centuries, the use of medicinal herbs has become an important part of daily life despite the progress in modern medical and pharmaceuticals research. Approximately 3000 plants species are known to have medicinal properties in India [1]. The Rigveda (3700 B.C) mentions the use of medicinal plants. Our traditional systems of medicines, viz., Ayurveda, Yunani, Siddha and Homeopathy etc. use herbs for treatment. It is estimated that 40% of the world populations depends directly on plant based medicine for their health care [2]. According to WHO more than one million people rely on herbal medicines to some extents and also listed 21,000 plants for medicinal uses around the world. India has rich medicinal plant flora of some 25,000 species of these 150 species is commercially used for extracting medicines or drug formulation. In India, the use of medicinal herbs is as old as 1500 BC, underline the medical culture of India both folk traditions as well as codified knowledge system is a deep understandings of the medicinal value of the plants starting with the references in the Atharveda. We have textual evidence of a tradition of use of medicinal plants that is more than 3000 years old. Over the last few years, researchers have aimed at identifying and validating plants derived substances for the treatment of various diseases. Interestingly, it is estimated that more than 25% of modern medicines are directly or indirectly derived from plants. In this context, it worth mentioning that Indian plants are considered a vast source of several pharmacologically active principles and compounds that are commonly used in home remedies against multiple ailments[3,4]. Indian medicinal plants are widely used by all sections of the population and it has been estimated that over 7500 species of plants are used by several ethnic communities.

The focus of this review is to provide information's on the phytochemicals, ethno medicinal uses and pharmacological activities of three medicinal plants (*Cassia Auriculata Linn*, *Cinnamomum tamala*, *Ficus benghalensis*) commonly used in Indian traditional medicine. These plants are known to contain various active principles of therapeutic value and to possess biological activity against a number of diseases. No comprehensive accounts on together of these plants are available as a review. NCBI (Pubmed) and Medbioworld databases were used for the collection of pharmacological activities. As well as, ethnomedicinal information was extracted from the book on Dictionary of Indian Folk Medicine and Ethnobotany and some related publications which are published on the ethnobotanical aspects. The medicinal properties and plant characteristics were collected from the published books on Indian Medicinal Plants and Indian Materia Medica.

1. CINNAMOMUM TAMALA

Fig. 1: *Cinnamomum tamala*

Cinnamomum tamala Fr. Nees.,(Fig 1) belonging to family Lauraceae, is also known as Indian Cassia, Indian cassia bark, Tamala cassia and the leaves are commonly called as bay leaves or Tejpat (Trade name Tamalpatra). Lauraceae is an economically important family consisting mostly of trees or tree-like shrubs. The genus *Cinnamomum* is represented by about 350 species worldwide.

Vernacular names:		**Taxonomic Classification:**	
Sanskrit:	Tamalpatra	Kingdom:	Plantae
HIndiani:	Tejpatta	Subkingdom:	Tracheobionta
Assamese:	Tejpat	Division:	Magnoliophyta
Marathi:	Tamalpatra	Class:	Magnoliopsida
Tamil:	Talishappattiri	Subclass:	Magnoliidae
Malayalam:	Tamalapatram	Order:	Laurales
Telugu:	Talisapatri,	Family:	Lauraceae
Kannada:	Patraka	Genus:	Cinnamomum Schaeff
Bengali:	Tejpat	Species:	*Cinnamomum tamala* (Buch.-Ham.) T. Nees & Eberm.

1.1 Ethno medicinal review:

It is used in Indian system of traditional medicines since long time. The leaves of this tree have a clove like taste and a faintly paper like odor [5]. Leaves and bark have aromatic, astringent, stimulant and carminative qualities and used in rheumatism, colic, diarrhea, nausea and vomiting. Ancient literature has revealed that in the first century A.D., dried leaves and bark of this plant were prescribed for fever, anemia and body odor. Its seeds were crushed and mixed with honey or sugar and administered to children for dysentery or cough [6]**.** The leaves of *C. tamala* have been used extensively as spice in the food Industry because of its special aroma and pepper like odor [7]. It is also used in Industries as fragrance component in soaps, detergents, cosmetics and perfumes, and toothpastes. It is used as food, fodder, medicine, and timber in Uttarakhand Himalayan region [8]. Parts of *C. Tamala* are used in many Ayurvedic preparations e.g. Sudarshan choorna and Chandraprabhavati. The leaves extract are used as clarifiers in dyeing procedures with myrobalans or kamala. Traditionally green dye has been extracted from its leaves [9].

1.2 Phyto-chemical Review:

The major constituents (Fig 2) of the leaf essential oils of these species contain furanosesquiterpenoids as principal constituents. Furanogermenone (59.5%) was found to be the major compound in the leaf essential oil is β- caryophyllene (6.6%), sabinene (4.8%), germacrene D (4.6%) and curcumenol (2.3%). The leaf oil was characterized by a high content of sesquiterpenoids (96.8%), dominated mainly by furanosesquiterpenoids (79.3%) viz. furanodienone (46.6%), curzerenone (17.6%), furanodiene (1.8%) and curzerene (1.2%). Cinnamon *leaf* oil contains a variety of constituents including eugenol and cinnamaldehyde, which is a local mucous and dermal membrane irritant [10]. Analysis of a steam distilled volatile oil from cinnamon fruit stalks yielded 27 compounds with cinnamyl acetate (36.59%) and caryophyllene (22.36%) being the major components [11]. Apart from that, Leaf oil or Tejpat oil mainly contains α-lenalool (60.73%), α-pinene (10.54%), β-pinene (10.42 %), limonene (3.21%) and camphene (3.06%). Eugenol and cinnamaldehyde were found in minute quantity [12], β-caryophyllene (25.3%), linalool (13.4%), caryophyllene oxide (10.3%), p-cymene, geraniol etc. Benzaldehyde, 1,8-cineole, Salicylaldehyde, γ-terpinene, acetophenone, cis-sabinene hydrate, trans-sabinene hydrate, 3-phenyl propanala, Pinocarvone, borneol, 2-methylbenzofuran, tepinen-4-ol, p-cymen-8-ol, α-terpineol, cinnamaldehyde, carvone, cinnamaldehyde, bornyl acetate, cinnamyl alcohol, hydrocinnamyl acetate, cinnamyl acetate, β-caryophyllene, cinnamic acid, coumarin, cinnamyl acetate, α-humulene, nerolidol, spathulenol, β-copaen-4a –ol, Monoterpenoid Hydrocarbons, Oxygenated Monoterpenes, Sesquiterpens Hydrocarbons, Oxygenated Sesquiterpens, Phenylpropanoids also reported in some extent quantity [13, 14]. Minor compounds included α - humulene, α - muurolene. The volatile oil of the buds contains more monoterpene and sesquiterpene compounds than oils from the flowers and fruits, whereas the concentration of *trans* – cinnamyl acetate is much higher in the volatile oils from flowers and fruit than from the buds. A study of cinnamon essential oil *Indica*ted that the major constituent was *trans* - cinnamaldehyde (41.3%) [15]. Outer bark on distillation yields an essential oil similar to cinnamon oil with 70-85% cinnamaldehyde. Root contains oil which has eugenol, safrole, benzaldehyde and terpine [16].

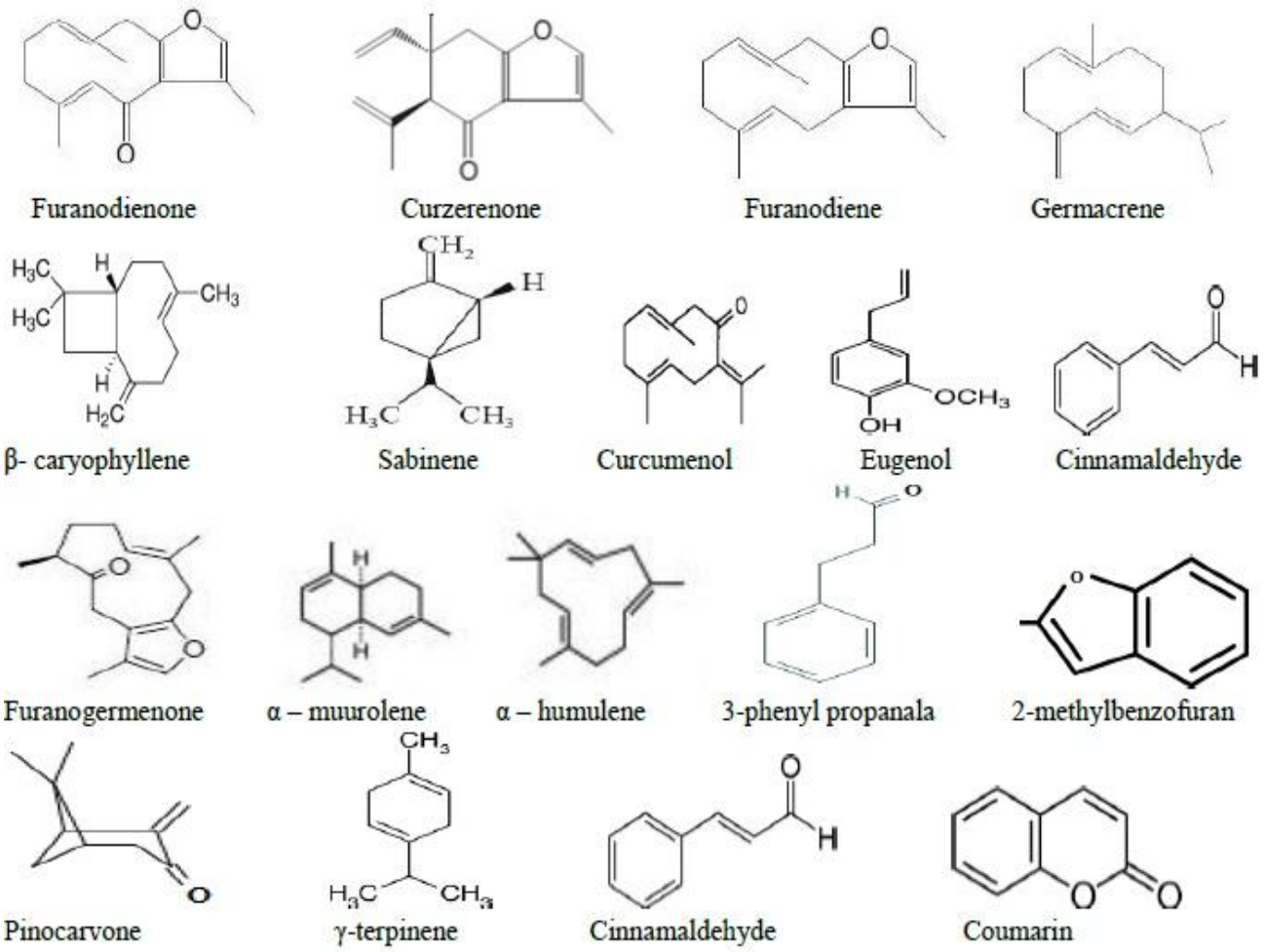


Fig. 2: Phyto-chemicals in *Cinnamomum tamala.*

1.3 Pharmacological Review:

Pharmacological activity	Plant Parts	Extract used	Screening models	Reference
	Bark	Methanol and water	Amylase inhibition assay	Roux GF *et al.*,(2008)[17]
Antidiabetic activity	Leaves	extract Methanol extract. Ethanol extract	Stz-Treated Diabetic Rats	Usha C. *et al.*, (2010) [18] Shradha Bisht *et al.*, (2011) [19] Rahul Gupta *et al.*, (2009) [20], Palanisamy P *et al.*, (2011) [21]
	Stem- bark	Alcohol extract	Agar well diffusion assay	Prabu seenivasan S. *et al.*, (2006) [22]
Antibacterial activity	Leaves	Alcohol extract	Disc Diffusion Assay (DDA)	Jamiuddin A. *et al.*, (2013) [23]
Antioxidant activity	Oil and oleoresin	Pet. ether, chloroform,	Peroxide, *p*- anisidine, Thiobarbituric acid and total carbonyl value.	Osawa T *et al.*, (1983) [24] Miller NJ *et al.*, (1997) [25]
	Whole plant	ethyl acetate methanol/ n-butanol Methanol extract	Linoleic acid system and Scavenging effect on DPPH DPPH• radical scavenging,	Durre Shahwar *et al.*, (2010) [26], Palanisamy. P *et al.*, (2011) [21] Devi. SL *et al.*,(2007) [27]
	Leaves	Methanol extract	phosphomolybdate and ferric thiocyanate (FTC) methods Free radical scavenging activity (FRSA), CAT, SOD, Glutathione peroxydase. Rat brain synaptosomes	
Anti-ulcer activity	Leaves	Hydro alcoholic extract	Chemical, stress, and physically Induced ulcers	Lima ZP *et al.*, (2010) [28]
	Leaves	Volatile oil	Inverted Petri-plate method,	Vardar Unlu G *et al.*, (2003) [29]
Antimicrobial activity	Leaves	Volatile oil	Food poisoned method	Manindra Mohan *et al.*, (2012) [30]
	Leaves	Ethanol extract	Micro dilution methods Disc diffusion assay	Hemayet *et al.*, (2012) [31]
Anthelmintic activity	Leaves	Methanol extract		Jamiuddin A. *et al* (2013) [23]
Cytotoxic activity	Leaves	Methanol extract	Brine shrimp lethality bioassay	Jamiuddin A. *et al*, (2013) [23]
	Leaves	Acetone and ethanol extracts	Ehrlich Ascites Carcinoma (EAC) in mice	Hemayet. *et al.*, (2012) [31]. Manmeet S Saluja *et al.,* (2010) [32]
Anti-inflammatory activity	Leaves	Ethanol extract Methanol extract	Carrageenan and histamine-Induced rat paw edema test	Hemayet Hossain *et al.,* (2008) [31], Gambhire MN *et al.*, (2009) [33], Thamizhselvam *et al.*,(2012) [34]
Acaricidal activity	Leaves and bark	Aqueous extracts		G.V. Manjunatha R. *et al.*,(2009) [35]
		Acetone, Methanol,		Ritu Singh *et al.*, (2013) [36]
Anti fungal activity	Fruits Leaf oil	Benzene, Ethyl acetate and Chloroform	MIC and MFC MIC	Bhawana Srivastava *et al.*, (2011) [37]
Antihyperlipidemic activity	Leaves	Aqueous and ethanol extracts	Serum total cholesterol, triglyceride HDL-C	V. Dhulasavant *et al.*, (2010) [38]
Analgesic activity	Leaves	Methanol extract	Hot plate method, acetic acid Induced writhing movement and tail flick test.	Thamizhselvam *et al.*, (2012) [34]
Antipyretic activity	Leaves	Methanol extract	Brewer's yeast.	Thamizhselvam *et al.*,(2012) [34]
Antidiarrhoeal activity	Leaves	Ethanol extract	Castor oil Induced diarrhea in mice	Hemayet, *et al.*,(2012) [39] Chandana V. Rao *et al.*,(2008) [40]. Rao CV *et al.,* (2008) [41]
Antiaflatoxigenic Activity	Leaf oil		Aflatoxin B_1 secretion by the toxigenic strain (SK 3NSt) of *A. flavus*	Bhawana Srivastava *et al*, (2011) [37]
Lipid Lowering Activity	Leaves	Methanol extract	Lipid profile test	Al-Mamun R *et al.*, (2011) [42]
Gastroprotective activity	Leaves		Experimental gastric ulcers in rats	Eswaran MB *et al.,* (2010) [43]

Fig. 3: ***Cassia auriculata***

Vernacular name:		**Taxonomic Classification:**	
English:	Tanner's Cassia	Kingdom:	Plantae
Hindi:	Tarwar	Subkingdom:	Tracheobionta
Marathi:	Tarwad	Superdivision:	Spermatophyta
Kannada:	Tangedi	Division:	Magnoliophyta
Telugu:	Tagedu	Class:	Magnoliopsida
Tamil:	Avaram	Subclass:	Rosidae
Gujarati:	Awala	Order:	Fabales
Malayalam:	Avaram	Family:	Fabaceae
Genus:	Cassia L		
Species:	*Cassia auriculata* L.		

2. CASSIA AURICULATA LINN

Cassia auriculata (Fig 3) commonly known as tanner's cassia is a shrub belonging to the Fabaceae family. The shrub is especially famous for its attractive yellow flowers which are used in the treatment of skin disorders and body odor.

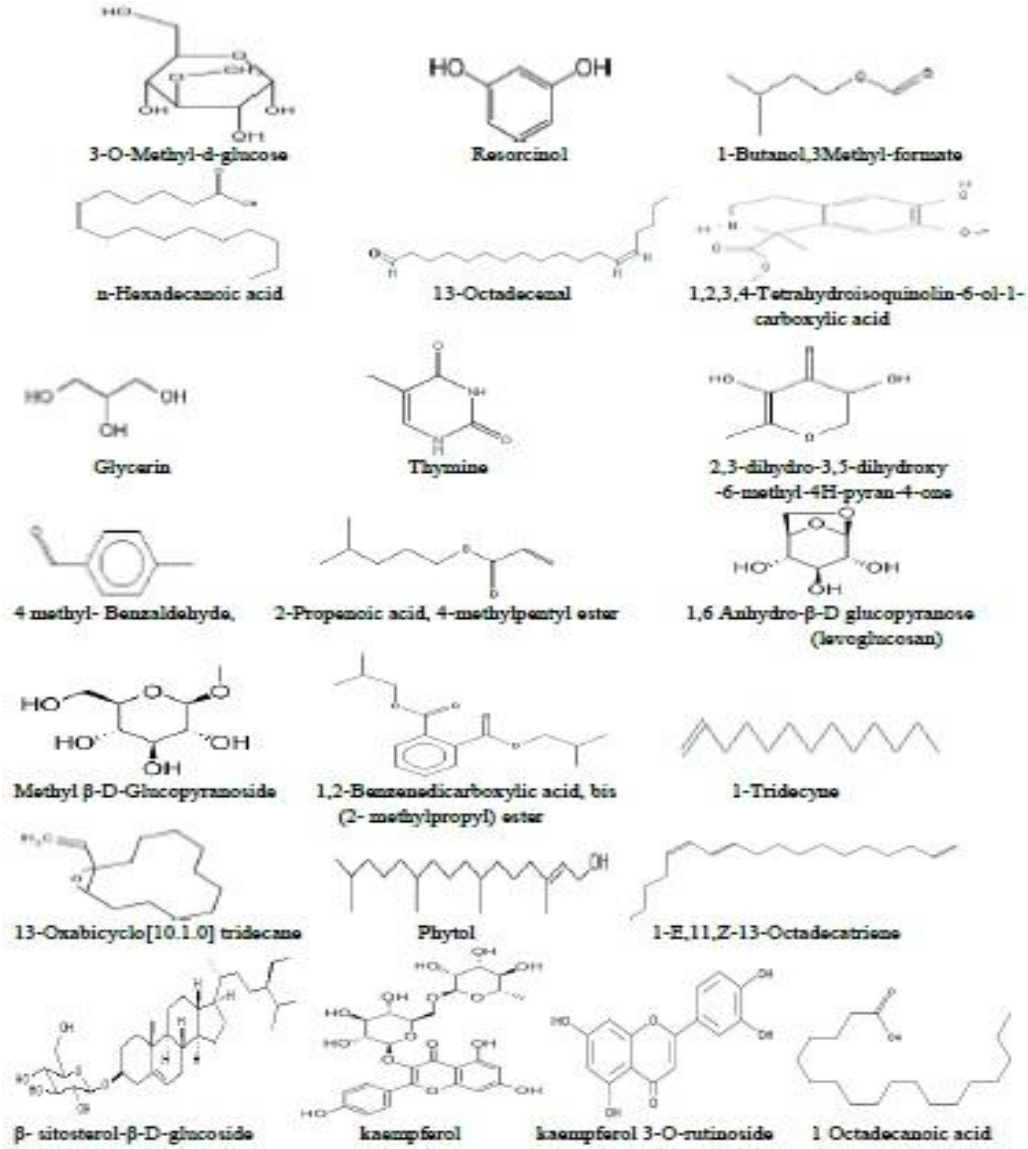
2.1 Ethno medicinal Review:

It is widely used in traditional medicine for rheumatism, conjunctivitis and diabetes [44]. The tea prepared from the leaves is used in chronic fever and fruits, barks and leaves are used as anthelmintic [45]. Tribals of Eastern Ghats, make pills from ground

leaves and fruits, for the treatment of leucorrhoea [46]. Southern Indian tribal's prepare paste from leaves in vinegar, which applied on skin for various skin diseases [47,48] and also some of them dropped the juice of fresh macerated leaves into ears in case of scorpion bite [49]. It was also found that the tenders of leaves mixed with lime and is given once a day for treatment of stomachache [50]. Leaves and flowers are used for treatment of diabetes and for religious function [51]. Flowers are used for spermatorrhoea. The dried powder of flowers mixed with goat milk taken orally to prevent white discharge by Indigenous tribes [52]. The flowers are also uses as food stuff [53] and also in preventive medicine for cattle in heat disease [54]. According to Ayurveda, roots are useful in urinary discharges and cures tumors, skin diseases and asthma. Powder of bark is uses for fixing teeth and decoction for chronic dysentery. Decorticated seeds in fine powder and paste are valued local applications to purulent opthalmia and conjunctivitis [55]. Various Indigenous communities used it for treatment of skin diseases, asthma, conjunctivitis and renal disorders, Leucorrhoea, body heat and cuts, even as a purgative for cattle [56].

2.2 Phyto-chemical review:

Cassia auriculata contains several active constituents (Fig 4) such as flavonoids, β- sitosterol-β-D-glucoside, polysaccharides, anthracene, dimeric procyanidins and myristyl alcohol etc [57]. The leaves of *Cassia auriculata* contains 29 compounds where the main constituents are 3-O-Methyl-dglucose (48.50%), α- Tocopherol-β-D-mannoside (14.22%), Resorcinol (11.80%), n-Hexadecanoic acid (3.21%), 13-Octadecenal, (Z)- (2.18%) and 1,2,3,4-Tetrahydroisoquinolin-6-ol-1-carboxylic acid (1.98%). Apart from that other compounds are found like Glycerin, Thymine, 1-Butanol,3Methyl-, formate, 4H-Pyran-4-one,2,3-dihydro-3,5-dihydroxy- 6- methyl, Benzaldehyde, 4 methyl. 2-Propenoic acid, 4-methylpentyl ester, Resorcinol, Sucrose, 1,6,Anhydro-β-D-glucopyranose (levoglucosan), 18.43 β-D-Glucopyranoside, methyl, 3-O Methyl-d-glucose, 1,2-Benzenedicarboxylic acid,bis (2-methylpropyl)ester, Benzenamine,2,3,4,5,6-pentamethyl, n-Hexadecanoic acid, Hexadecanoic acid, ethyl ester, 1-Tridecyne, 13-Oxabicyclo[10.1.0] tridecane, Phytol, 1-E,11,Z-13-Octadecatriene, 13-Octadecenal,(Z), 1 Octadecanoic acid, 1,2,3,4-Tetrahydroisoquinolin-6-ol-1- carboxylic acid, α- Tocopherol, N-Acetltyramine, α- Tocopherol-β-D-mannoside [58]. *C. auriculata* seeds also contains numerous phytochemicals like β.-Ethoxypropionaldehyde diethyl acetal, 2,3-dihydro-3,5- dihydroxy-6-methyl-4hpyran-4-one, Ethyl caprylate, Benzoic acid, 2-hydroxy-,methyl ester, Resorcinol, 2-methoxy-4-vinylphenol, Capric acid ethyl ester, Glycine, N- (trifluoroacetyl)-, 1- methylbutyl ester, Dodecanoic acid, 3',5'-Dimethoxyacetophenone, n-Hexadecanoic acid, Grape seed oil (Linoleic acid, Oleic acid), 9-Octadecenoic acid, (E)-, Stearic acid, Palmitic acid.beta.- monoglyceride, E,Z-1,3,12-Nonadecatriene, dl-.α.-Tocopherol, Stigmasta-5,23-dien-3-ol, (3.β.) Most recently it revealed the occurrence of active principles as kaempferol 3-O-rutinoside, luteolin, quercetin and kaempferol. All of these compounds along with rutin, a minor constituent, which was previously isolated from this plant [59].



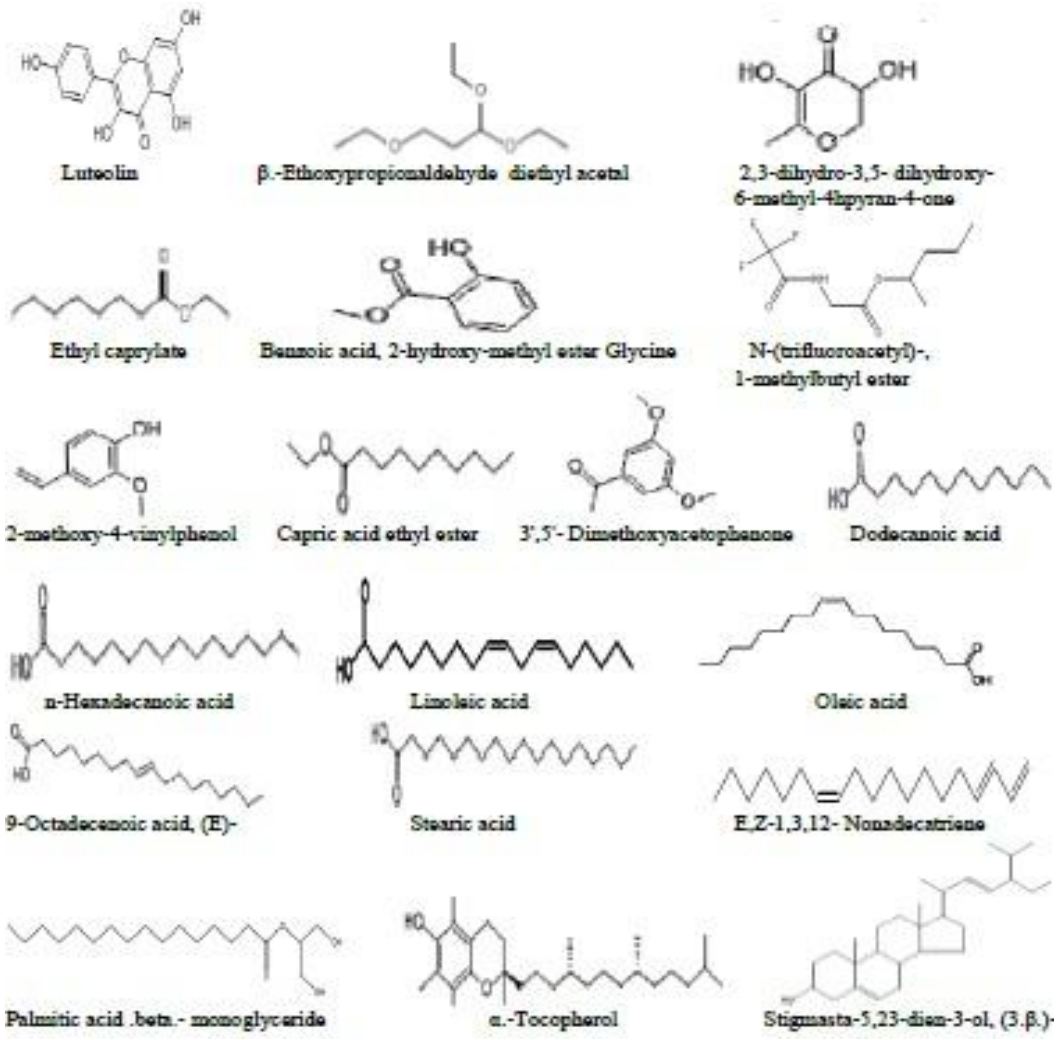


Fig. 4 Phyto-chemicals in *Cassia auriculata*

2.3 Pharmacological review:

Pharmacological activity	**Plant Parts used**	**Extract used (solvents)**	**Screening models**	**Reference**
Anti diabetic Activity	Flower Bark	Aqueous extract Methanol extract	Streptozotocin induced Diabetic Rats	Pari, L., *et al.,* (2002) [60], Mahendra Shiradkarg *et al.,* (2011) [61]
Hepatoprotective activity	Leaf and flowers	Alcoholic	Alcohol Induced liver injury in albino rats	Jeeva Jothi Dhanasekaran *et al.,* (2011) [62]
Anti bacterial activity	Dry flower Leaves Flower	Ethanol, methanol and aqueous extract Hexane, chloroform, ethyl acetate, acetone and methanol Aqueous and methanol extract	Agar disc diffusion method In vitro antibacterial activity, MIC.	Maneemegalai, S., *et al.,*(2010) [63] Anushi, C., *et al.*,(2009) [64] Gaurav M. Doshi *et al,*.(2011) [65]
Antipyretic Activity	Leaves Flower	Aqueous extract	Brewer's yeast.	Pari, L., *et al* (2002) [60], Vedavathy, S. *et al.,* (1991) [66]
Antioxidant Activity	Flower	Ethanol and methanol extracts	(ABTS) and (DPPH) radical scavenging method	Kumaran. A., *et al.,* (2007) [67], Anushia, C., *et al.,* (2009) [64], Kumar, P. S., *et al.,* (2008) [68]
Anthelmintic Activity	Leaves	Aqueous extract Petroleum ether, Ethyl acetate, Ethanol and Aqueous extracts	Anthelmintic potential against earthworms, tapeworms and roundworms. Against earthworms (*Eisenia foetida*)	Satish B. Kosalge *et al.,* (2009) [69], Salvekar. P. *et al.,* (2011) [70] Sushma Kainsa *et al.,* (2011) [71]
Hapatoprotective activity	Leaves	Ethanol extract	Alcoholic liver injury studies in rats	Senthil Kumar *et al.*, (2003) [72]

Antiulcer Activity	Leaves	Ethanol extract	Pylorous ligation Induced gastric ulcer	Ahmed M., *et al.*, (2010) [73]
Antimutagenic activity	Bark	Methanol extract	Mutagenicity assay	Mahendra Shiradkarg *et al.,* (2011) [61]
Antifertility Activity	Bark	Methanol extract	Antiimplantation and early abortifacient activity	Mahendra Shiradkarg *et al,.* (2011) [61]
Laxative activity	Pods	Ethanol extract	Charcoal meal test (Intestinal transit rate) and Faecal output.	Suresh H. M., *et al.,* (2007) [74]

3. FICUS BENGALENSIS LINN

Ficus bengalensis Linn. (Fig 5) syn. *Ficus banyana* Oken. belongs to the Family-Moraceae. It is a member of four sacred trees *Nalpamara* (*Ksirivrksas*) meant to be planted around the home and temples

Fig. 5: *Ficus bengalensis*

Vernacular names:		**Taxonomical classification:**	
English:	Banyan tree	Kingdom:	Plantae
Bengali:	Bar	Subkingdom:	Tracheobionta
Gujarati:	Vad	Super division:	Spermatophyta
Hindi:	Bargad	Division:	Magnoliophyta
Kanarese:	Ala	Class:	Magnoliopsida
Malayalam:	Ala, Vatam	Subclass:	Hamamelididae
Marathi:	Vada	Order:	Urticales
Sanskrit:	Bahupada	Family:	Moraceae
Tamil:	Al	Genus:	Ficus L.
Telugu:	Peddamarri	Species:	*Ficus benghalensis* L.

3.1 Ethno-medicinal Review: [75-81]

According to Ayurveda, it is astringent to bowels and very useful in treatment of biliousness, vaginal complains, fever, ulcers, erysipelas, vomiting, inflammations, diabetes and leprosy. According to Unani system of medicine, latex is maturant, lessens inflammations, aphrodisiac, tonic, vulnerary and is useful in piles, nose-diseases, gonorrhea etc. The aerial root is styptic and is useful in syphilis, biliousness, dysentery and inflammation of liver. It acts as an astringent, anti diarrheal, antidysenteric, hemostatic and antihemorrhoidal and its leaves are used for fodder.

3.2 Phyto-chemical review:

Preliminary phyto-chemical (Fig 4) investigation reported the presence of carbohydrates, flavonoids, amino acids/proteins, steroids, saponins and tannins in roots of *Ficus bengalensis* [82]. The bark of *F. bengalensis* yields 5,7 Dimethyl ether of leucopelargonidin-3-0-α-L rhamnoside and 5,3 dimethyl ether of leucocynidin 3-0-α-D galactosyl cellobioside, beta glucoside, glucoside,20-tetratriaconthene-2-one,6- heptatriacontene-10 one, pentatriacontan-5-one, beta sitosterol-alpha-Dglucose and meso-inositol [83-87], Leucodelphinidin derivative[88], bengalenoside[89], Leucopelargonin: a glycoside which has antidiabetic effects [90-92], leucocynidin derivative [93], have also been isolated from the bark of the *F. bengalensis.* Three ketones 20-tetratriacontene-2-one, 6-heptatriacontene-10-one, pentatriacontan-5-one were isolated from stem bark [94]. Coumarins (furocoumarins) have been identified from *F. bengalensis* Psoralen, Bergapten (5-methoxypsoralen) occurs naturally in the seeds of *F. bengalensis*. The Tiglic acid ester of ψ-traxasterol has been isolated from the heartwood of *F. bengalensis.* Recently three new esters were isolated and characterized from the bark of *F. bengalensis* along with linolyl glucoside and oleiyl glucoside. These esters are Keto-n-cosanyl stearate, Hydroxypentacosanyl palmitate and Phenyl tetradecanyl oleiate [95]. The leaves contain, crude protein, crude fibres, CaO, phosphorous, rutin, friedelin, taraxosterol, lupeol, β-amyrin along with psoralen, bergapten and β-sisterol, quercetin-3-galactoside [96], Leucodelphinidin derivative [97], bengalenoside, Aglucoside [94], Leucopelargonin and leucocynidin derivatives. The latex contains caoytchoue, resin, albumin, cerin, sugar, and malic acid and a serine protease was purified to homogeneity from the latex of *F. bengalensis* [98].

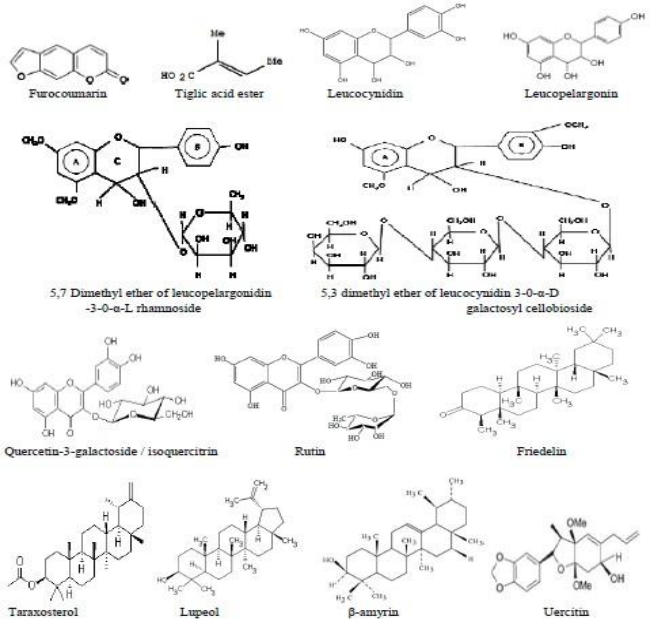


Fig. 6: Phyto-chemicals in *Ficus benghalensis*

3.3 Pharmacological Review:

Pharmacological activity	Plant Parts used	Extract used (solvents)	Screening models	Reference
Antioxidant activity	Bark Aerial root	Aqueous extract Methanol and 70% acetone (acetone: water, 70:30)	Hypercholesterolemia rabbits. Hyperlipidemic rats	Rimi Shukla *et al.*, (2004) [82] Daniel, R.S *et al.*,(1998) [96]
Antiatherogenic activity	Bark	Alcoholic	Alloxan diabetic dogs	Daniel RS *et al.*, (2003) [87]
Antitumor activity	Fruit	Alcoholic	Potato disc bioassay	Mousa O *et al.*, (1994) [97]
Anthelmintic activity	Root	Methanolic, chloroform, and pet. ether extracts		Aswar M *et al.*, (2008) [99]
Anti-inflammatory	Bark	Methanol, Ethanol and petroleum ether extracts	Carrageenan-Induced hind paw edema in rats. Acetic acid Induced vascular permeability and cotton pellet Induced granuloma	Patil V.V *et al.*, (2009) [100] Vishnu N Thakare *et al,* (2010) [101]
Analgesic activity	Bark	Aqueous, ethanol, chloroform and petroleum ether extracts Methanol extract	Hot-plate and tail-immersion method Acetic acid Induced writhing	Vikas V.P., *et al.*, (2010) [92] Vishnu N Thakare *et al.*, (2010) [101]
Antipyretic activity	Bark	Aqueous, ethanol, chloroform and petroleum ether extracts	Brewer's yeast-Induced pyrexia in rats	Vikas V.P., *et al.*, (2010) [102]
Anti stress and antiallergic activity	Bark	Aqueous, ethanol, and ethyl acetate extracts	Milk-Induced leucocytosis and milk Induced eosinophilia.	Taur, D.J., *et al.*, (2007) [103]
Antidiarrhoeal activity	Hanging root	Ethanol extract		Pulok K. Mukherjee *et al.*, (1998) [104]
Anti diabetic activity	Bark	Aqueous extract	Histological studies Streptozotocin Induced diabetic rats.	Mahalingam G *et al.*, (2008) [105] Joglekar, J.C *et al.*, (1963) [106], Vohra, S.B *et al,*,(1970) [107], Augusti KT *et al.*, (1975) [89], Babu, B.V *et al.*, (1985) [108], Kumar R.V *et al.*, (1989) [109], Sheeja Cherian *et al.*, (1992) [84], Cherian S *et al.*, (1993) [110], Geetha BS *et al.*, (1994) [88], Augusti KT *et al.*, (1994) [111], Shukla, R *et al.*, (1994) [112], Shukla, R *et al.*, (1995) [113]
Hypolipidemic activity	Bark	Aqueous extract	Alloxan diabetic rabbits, rats and in humans.	Agrawal V., *et al.*, (1988) [114]
Immunomodulatory activity	Aerial roots	Methanol and water extracts	Percentage phagocytosis in vivo studies	Gabhe S.Y., *et al.*, (1988) [115]
Wound healing activity	Leaf Bark	Ethanol and aqueous extract	Excision, incision, dead space wound Excision, incision wounds	Biswas T.K., *et al.*,(2003) [116]**,** Ayyanar M. *et al.*, (2009) [117], Vipin K. G., *et al.,* (2011) [118]
Growth promoting activity	Young prop roots	Alcohol and aqueous	One-month-old immature female rats	Nidhiya S.R., *et al.*, (2009) [119]

CONCLUSION

The knowledge of the properties of medicinal plants has likely been on to natives by their elders or is based on experience. This recent review can help better on those drugs for their utilization and most effective formulation aspects.

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