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Review Paper

Ethnophormacological screening of some selected medicinal plants

Ram Bhajan Kumawat[1], Ram Avatar Sharma[1,2], Pratap Chand Mali[1,3] and P. Chandrawat[2]*
[1]School of Basic and Applied Science, Poornima University, Jaipur-302022, India
[2]Department of Botany, University of Rajasthan, Jaipur - 302004, India
[3]Reproductive Biomedicine and Natural Products Lab, Reproductive Physiology Section, Department of Zoology, University of Rajasthan, Jaipur - 302004, India
pchandrawat@gmail.com

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Abstract

Human from ancient times have been used plants and their products to various ailments because plant products cause minimal or no side effects. In the present paper we review five traditional Indian medicinal plants used for ethanomedicinal and pharmacological in India traditional medicinal system (Ayurveda), several researchers of have been explored different activities of these plants includes Citrullus colocynthis, Delonix regia, Kiglia pinnata, Martynia annua and Pongamia pinnata. These plants have been used for several medicinal and pharmacological activities like as anti-inflammatory, antifungal and antibacterial, antioxidant, analgesic or anti-proliferative, antifertility and abortion etc in different parts around the world.

Keywords: Citrullus colocynthis, Delonix regia, Kiglia pinnata, Martynia annua and Pongamia pinnata.

Introduction

It is observed that use of medicinal plants in traditional system for human health care because they cause no side effects. Over 80% of the global population relies on traditional medicine, much of which is based on plant remedies. Traditional Chinese medicine alone uses over 5,000 plant species, folkloric medicinal use in the Philippines, Bangladesh folk medicine and India. In the recent years, research on medicinal plants has attracted a lot of attentions globally. Large body of evidence has accumulated to demonstrate the promising potential of Medicinal Plants used in various traditional, complementary and alternate systems of treatment of human diseases[1-4].

Citrullus colocynthesis: The plant *Citrullus colocynthis* belongs to Family Cucurbitaceae is a perennial trailing herb, usually found wild in the sandy lands of North West, the Punjab, Sind, and Central and southern India, and coromandal coast, also known as Indrayan, Indrayan ki jad (root), Chedu Puccha, Cinna Papara, Kuturu budama, Pikkumutti. Tamate Kayi, Tamte Kai, Rakhale Shasa, kaudatumma, paparabudam and Colocynth, bitter apple, bitter cucumber, desert gourd, vine of Sodom[5,6].

Ethanomedicnal properties

In people with sensitive stomach, it may produce severe purgation, contra indicated in pregnancy, lactation and in children. It should only be used under medical supervision. Take this herb only till the prescribed time period in the prescribed dosage. It is used in Ayurvedic medicine with colocynth as ingredient: Maha Manjishtadi kashayam – as blood purifier in skin diseases. Abhayarishta – in haemorrhoids, constipation etc., Maha Vishagarbha Taila – in sciatica and joint disorders with stiffness as a symptom and Mrita Sanjeevani Sura – an alcoholic Ayurvedic preparations (Table-1).

Pharmacological activities

The main chemical contain of fruit pulp colocynthin, colocynthein, colocynthetin, pectingum. Seed contain a fixed oil and albuminiods. Flavonoid glycoside quercetin, flavone- 3-glucoside viz iso-vitexin, isoorentine and isoorentine-3-methyl ether. Cucurbitane type triterpen glycoside viz colocynthoside A and B, cucurbitane type triterpen glycoside viz cucurbitacin E 2-O-beta-D-glcoside and it's a glycone cucurbitacin E,2-O-beta-D-glucopyranosyl-16alpha-20R-dihyroxy-cucurbita-,5,23E,25(26)-teraen-3,11,22-trione,2-O-beta-D-glcopyranosyl-cucurbitacin B and 2,25-di-o-beta-D-glucopyranosyl-cucurbitacin L[7,8,9]. Different parts of the plant explored for the anti-inflammatory[10], antifungal and antibacterial[11], antioxidant, analgesic or anti-proliferative[12], hypoglycemic[13], immature fruit and seed shows anti-inflammatory and analgesic activities[14], anti –alopecia[15], antioxidant and free radical scavenging[16]. It also exhibits growth inhibitory effects on breast cancer cells[17] and antifertility in male rats[18] (Table-1).

Delonix regia: The plant *Delonix regia* (Bojer ex Hook.) Raf belongs to the Fabaceae family, is an ornamental plant, commonly known as flamboyant, "flame tree", royal *Poinciana regia* or "flamboyant", the Royal Poinciana or Flamboyant, *Poinciana*, named after Phillippe de Longvilliers de Poincy (1583-1660), who is credited with introducing the plant to the

America[3]. It is found in Malagasy dry forest and its roots can damage nearby building foundations, paving and drains; the branches of the tree are brittle and can fall without warning. It produces in spring striking flame-like scarlet and yellow flowers before leaf emergency. In India it is cultivated in rural and urban areas, the flowers of the plant are often used to prepare home-made water-extracts, traditionally known to have medicinal properties such as antimicrobial and antifungal activities or used as antibiotics. It is used in the local medicine in several African counties, scaling-up at pilot plant level, concentrated bioproducts containing various natural phenolic compounds[15] (Table-1).

Ethanomedicnal properties

Delonix regia has been used in the folk medicine systems of several civilizations, anti-diarrhoeal, anti-inflammatory activity, antioxidant, hepatoprotective and antimicrobial, constipation, inflammation, arthritis, hemiplagia, leucorrhoea and rheumatism have been reported. Flowers of *Delonix regia* have been used as traditional herbal remedies for gynecological disorders and they are also used as tablet binder[3], also is used by folklore for joint pains and in flatulence. The root of *D. regia* used for a potent against abdominal pain while leaves are used as anti-inflammation, antibacterial activity. Leaves are used by traditional practitioners in cases of inflammatory joint disorders as a folklore remedy[16]. Roy S. and Sengupta P.[17] extracted dried and powered bark of *D. regia* for lupeol acetate and o-sitosterol acetate. The floral parts and buds of *D. regia* contrained 2-ketoglutaric acid, oxaloacitic acid, pyruvic acid and glyoxylic acid. Mukherjee D.[18] and Saleh N.A.M. and Ishak M.S.[19] reported anthocyanins and other flavonoids. Baruah P. and Sarma G.C. [20] analysed *D. regia* and other plants qualitatively and quantatively for amino acids. Parekh J. and Chanda S.[21] have reported protein content of amino acid compounds and analysed *D. regia* seeds for organic matter, ash, crude protein crude carbohydrate, crude lipid, gross energy antinutrients. Abdullahi S.A. and Abdullahi G.M.[22] and Satish et al[23] reported antimicrobial and antibacterial activity of ethanol extracts of *D. regia* seed and leaves. Ali M.S. et al[24] extract crude extracts of *D. regia* and reported antifungal potential. (Table-1) .

Pharmacological activities

D. regia shows many pharmacological activities such as anti-diarrhoeal activity, gastroprotactive activity[25], anti- diabetic[26], antioxidant[27], hepatoprotactive activity[28]. Carotenoids are present in floral parts of *Delonix regia*[29], cyanidin diglycoside, kaempferol and quercetin and carotenoids[30] and polyphenols[31], seeds contain flavonoids are used as wound healing agent in households. Stem bark contains flavonoids, alkaloids, saponins, sterols, stigmasterols, carotene, hydrocarbons phytotoxins β-sitosterol, lupeol[32], p-methoxybenzaldehyde, isolupeol, carotene, hydrocarbons phytotoxins and phenolic acids[33] (Table-1).

Kigelia pinnata: *K. pinnata* (Family Bignoniaceae) also known as Balam Kheera, Shiva Kundalam, Yaanai Pudukan. The tree is widely grown as an ornamental tree in tropical regions for its decorative flowers and unusual fruit. Planting sites should be selected carefully, as the falling fruit can cause serious injury to people, and damage vehicles parked under the trees.

Ethanomedicnal properties

The roots and bark of the plant have the naphthoquinone lapachol and the dihydroisocoumarin kigelin as major compounds[34] many other compounds, such as naphthaquinoids kigelinone, pinnatal, and isopinnatal, and the sterols stigmasterol and beta-sitosterol have been reported in the bark. It has many anecdotal uses[35].

The fruit power is applied as a dressing in the treatment of wounds, abscesses, and ulcers. The green fruit is used as a poultice for syphilis and rheumatism, and treatment for backache is reported by a poultice made from leaves. An infusion is made from the ground bark and fruits to treat stomach problems in children and an infusion from the roots and bark are taken for the treatment of pneumonia. Fruit is useful in sores for constipation, gynecological disorders, hemorrhoids, lumbago, dysentery, as a purgative and galactagogue.

Traditionally, the use of the *K. pinnata* bark in many parts of Africa is for the treatment of sexually transmitted diseases. Crude aqueous extracts from the stem bark have shown significant antimicrobial activity[36,37]. *K. pinnata* extracts tested showed mild antibacterial activity, and the highest inhibition was displayed by the chloroform-soluble extract against *Shigella boydii* and *Pseudomonas aeruginosa*[38] (Table-1).

Pharmacological activities

The flavonoids 6-hydroxyluteolin-7-alpha-glucoside and luteolin have been isolated from the fruits and the leaves[39] of the *Kiglia pinnata,* while the roots have also yielded dihydroisocoumarins, lapachol, and sterols, and the presence of iridoid glycosides also has been reported[40]. Heartwood of the plant shows the presence of lapachol, dehydro-alpha-lapachone, tecomaquinone-I, D-sesamin, paulownin, kigeliol, kigelinone, β-sitosterol, and stigmasterol[41]. It is used in skin care products, cytotoxic activity, anti-inflammatory[42], wound healing[42], antidiarrheal activity[43] antimalarial activity[44] hepatoprotective activity[45] (Table-1).

Martynia annua: The plant *Martynia annua* L. belongs to Family Martyniaceae, is a native of Mexico and also found throughout India, in waster places, rubbish heaps and road sides. *M. annua* seeds and fruits have been reported for the treatment of asthma, itch and aczema; caused antiandrogenic / antifertility effects in rats[5].

Ethanomedicnal poperties

Martynia annua L. is a well-known small herbaceous annual plant commonly known as Devil's claw (English), Bichu (Hindi), Kakanasika (Sanskrit) and Vichchida (Gujarati). known

as: Vinchhoodo, Telugu;: Bhagnaka, English -Tiger's claw, Garuda Mukku, Marathi; Punjabi: Kaktundi, Bichu, Hathajari, Tamil : Thael kodukkukai, Kaakkaa mookuchedi Hata Jori, Gujarati. *M. annua* L. (Family: Martyniaceae), is native of Mexico and also found throughout India, in waster places, rubbish heaps and road sides. In Ayurveda it is used as kakanasika, which is being used in Indian traditional medicines for epilepsy, inflammation and tuberculosis, anthelmintic, analgesic, antipyretic, antibacterial, anticonvulsant, antifertility, antinociceptive, antioxidant, CNS depressant and wound healing activity[4,5,47,48].

M. annua chemical constituents includes oleic acid, arachidic acid, linoleic acid, palmitic acid, gentisic acid, stearic acid, pelargonidin-3,5-diglucoside, cyanidin-3-galactoside, p-hydroxy benzoic acid, apigenin, apigenin-7-oglucuronidehave been isolated from this plant and the presence of glycosides, tannins, carbohydrates, phenols, flavonoids and anthocyanins[49], oleic acid, constitutes the major part. Other major biological compounds include pelargonidin-3-5-diglucoside, cyanidin-3-galactoside, p-hydroxy benzoic acid, gentisicacid, arachidic acid, linoleic acid, palmitic acid, stearic acid, apigenin, apigenin-7-0-glucuronide[50] (Table-1).

Pharmacological activities

Anthelmintic activity[46], analgesic , antipyretic activity[46], anti-convulsant[52], antifertility[5], antinociceptive activity and CNS depressant activity[52], antioxidant activity[47], wound healing[49] and antibacterial activity against *Proteus vulgaris*, Bacillus subtilis and B. Thuringensis, *Salmonella paratyphi* A, *Salmonella paratyphi* B, *Proteus mirabilis*, *P. vulgaris* and *Klebsiella pneumonia*, *Proteus vulgaris*, *B. subtilis, S. paratyphi* B and *Pseudomonas aeruginosa* [53] (Table-1).

Pongamia pinnata: The plant *Pongamia pinnata* L. Syn. *Pongamia glabra* (Vent); Derris indica (Lamk.) belongs to Family Leguminosae[55] have one species only *Pongamia pinnata* (L.) Syn. *Pongamia glabra* (Vent). *Syn Milletia pinnata* common names include *Karanj*, (Hindi) *Naktamāla* (Sanskrit), *Kānuga* (Telugu). It is also grown as a host plant for lac insects. Pongamia also known as *Millettia pinnata*, formerly known as Pongamia *pinnata*, is a tree/shrub with a broadly distributed from India, through central and south-eastern Asia, Indonesia and into northern Australia. The Queensland Herbarium considers *Pongamia* native to northern Australia.

Ethanomedicinal properties

P. pinnata is finding in arid zones. It is commonly used for landscaping.The flowers are used by gardeners as compost for plants. The bark uses to make twine or rope and it also yields a black gum that has been used for the treatment of wounds caused by poisonous fish. The wood is using as firewood, posts, and tool handles.

Pongamia seeds and oil is anthelmintic, styptic, and depurative. It is useful in rheumatism arthritis, whooping cough, skin alinments and scabies. Seed oil is mainly used in cosmetics, in soap making and as a lubricant. Seed oil is also used as insecticidal, nematicidal and bactericidal. Flowers are useful to quench dipsia in diabetes and for alleviating vata and kapha. Leaves are digestive, laxative and useful in flatulence, dyspepsia, diarrhea, leprosy and cough. Bark is anthelmintic and used in pesticides. Dried leaves are used in stored grains to repel insects. The bark also yields a black gum that is used to treat wounds caused by poisonous fish.

While the oil and residue of the plant are toxic and will induce nausea and vomiting if ingested, the fruits and sprouts, along with the seeds, are used in many traditional remedies. Juices from the plant, as well as the oil, are antiseptic and resistant to pests. Seeds oil of *P. pinnata*, known as pongamia oil, is an important asset of this tree and has been used as lamp oil, in soap making, and as a lubricant for thousands of years. The oil has a high content of triglycerides, and its disagreeable taste and odor are due to bitter flavonoid constituents including karanjin, pongamol, tannin and karanjachromene. It can be grown in rain water harvesting pits /ponds / lands up to 6 meters water depth without losing the greenery and to produce bio diesel.

The seeds of pongamia are rich in oil, which might be a new source of 'biofuel'.

Pharmacological activities

It is reported to have anti-plasmodialactivity[57], anti-inflammatory activity[57], anti-diarrhoeal activity[57], antioxidant and anti-hyperammonemic activity[58], anti-ulcer activity[59], anti-hyperglycaemic and anti-lipidperoxidative activity[59]. This table deals with the problem reladed with Phytochemistry, Ethanomedicine and Pharmacological Activities (Table-1).

Conclusion

A number of secondary metabolites viz.-alkaloids, flavonoids, phytosterols, terpenoids, glycolsides, fatty acids, different types of proteins and many other metabolites are present in different plant parts. These compounds exhibit various pharmacological activities and are being used to cure various diseases and hence these plants may become a good source of indigenous medicines.

1.Citrullus colocynthis

2.*Delonix regia*

4.*Martynia annua*

3.*Kigelia pinnata*

5. *Pongamia pinnata*

Figures-1-5: Traditional medicinal plants.

Table-1: Phytochemistry, ethanomedicine and pharmacological activities.

S.N.	Workers/ year	Name of Plant and Plant Part	Sample used	Type of activity studied	Type of activity studied	Area / status	Test methods
				Antimicrobial activities	Pharmacological		
1.	Belsem *et al,. (2011)*	Anti-infammatory *Citrullus colocynthis* Schrad.	Aqueous extracts	Antifungal/antibacterial	Anti-inflammatory	International	Disc diffusion and streak Optimized, Inflammatory process and screening methods
2.	Mali *et al,. (2003)*	Antifertility with a crude ethanol extracts of *C. colocynthis* Schrad fruit	Ethanol extracts	-------	Antifertility	National rajasthan	Surgical methods
3.	Dhanotia *et al,. (2011)*	Effect of *C. colocynthis* Schrad fruits	Ether extracts	-------	Anti-inflammatory	International	Disc diffusion and streak method Optimized, Inflammatory process and

							screening methods
4.	Rasool *et al,. (2011)*	Anticandidal screening and antibacterial of *C. colocynthis*	Aqueous extracts	Anticandidal/ antibacterial	--------	Internatio nal	Disc diffusion and streak method
5.	Ahmed *et al,. (2011)*	Hepatoprotect ive activity of methanol extract of aerial parts of *Delonix regia*	Methanol extract	---------	Hepatoprotective activity	National	Continuous extraction method
6.	Rahman *et al,. (2011)*	*D. regia* leaf extract on glucose	Methanol extract	-------	Hyp erglycemic	Internatio nal	Glucose clamp technique
7.	Rani *et al,. (2011)*	Screening of antioxidant activity of *Delonix regia*.	Phenolics extract	Antifungal/antibact erial	Antioxidant	Internatio nal	Disc diffusion, streak and DPPH method
8.	Shabir *et al,. (2011)*	leaves, flowers and bark of Gold mohar *Delonix regia.*	Aquous, ethanplic extracts	Antimicrobial	Antioxidant	Internatio nal	Disc diffusion, streak and DPPH method
9.	Vaishali *et al,. (2011)*	Gastroprotecti ve activity of ethanolic extract *Delonix regia* flowers	Ethanolic extract	Antimicrobial	Gastroprotective activity	Internatio nal	Disc diffusion and streak method CPRHE screening
10.	Pradeepa *et al.,* (2012)	The leaf *Delonix regia*	Ethanolic extract	Antimicrobial	Antinociceptive activity, antioxidant	National	Disc diffusion and streak Method Tail-immersion test; narcotic agonists and partial agonists DPPH
11.	Satyavani *et al.,* (2010)	*Citrullus colocynthis* biomedical potentials.	Methanol extract	Antifungal/antibact erial	Anti-inflammatory	Internatio nal	Disc diffusion and streak method Optimized, Inflammatory process and screening methods
12.	Adje *et al.,* (2008)	*Delonix regia* flowers.	water extracts	Antifungal/antibact erial	Anti-inflammatory	Internatio nal	Disc diffusion and streak method Optimized, Inflammatory process and screening methods

13.	Ali *et al.,* (1999)	*D. regia* seed.	Ethanolic extract	Antifungal/antibacterial	----	International	Disc diffusion and streak method
14.	Saba *et al.,* (2010)	*Citrullus colocynthis*	Methanol extract	----	antioxidant, anti-inflammatory/analgesic or anti-proliferative drug	National	DPPH method Optimized, Inflammatory process and screening methods
15.	Akah *et al.,* (1996)	*Kigelia africana*	water extracts	Antibacterial	Antidiarrheal activity	National	Disc diffusion and streak method
16.	Kumar *et al.,* (2008)	*Kigelia pinnata* DC fruits.	Methanolic extract	----	Anti-nociceptive Anti-inflammatory	National	Tail-immersion test; narcotic agonists and partial agonists Optimized, Inflammatory process and screening methods
17.	Jackson *et al.,* (1996)	Stem bark and fruit *Kigelia pinnata* (Bignoniaceae).	Ethanolic ext.Stem bark and fruit extracts	-----	Antineoplastic	National	Oral feeding in Swiss mice Method liquid chromatography-mass spectrometry/mass spectrometry (LC-MS/MS) analytical methods
18.	Mali *et al.,* (2002)	*Martynia annua* root	Root extract	--------	Antifertility	National Rajasthan, Jaipur	Oral feeding in Swiss mice and Surgical methods
19.	Nagda *et al.,* (2009)	leaves *Martynia annua*	Methanolic and aqueous extract	Antimicrobial	Antioxidant activities	National	Disc diffusion, streak and DPPH method
20.	Prabha *et al.,* (2003)	*Pongamia pinnata* root	Root extract	-----	Gastriculcers	National	Oral feeding in Swiss mice method
21.	Satish *et al.,* (2007)	Seeds *Pongamia Pinnata*	Plant extracts	Antifungal activity	------	International	Disc diffusion and streak method
22.	Singh *et al.,* (2013)	*Pongamia Pinnata* (L.) . calls	Hydroalcoholic Extract	Antimicrobial	Anti-Inflammatory and Anti-Arthritic Activity	International	Optimized, Inflammatory process and screening methods
23.	Priya *et al.,* (2008)	Crude Extract of *Ficus Racemosa.*	Crude and Ethanol Extract	Anthelmintic	-------	International	Maceration, Egg hatch test, Larval motility

							test and Adult worm motility test method
24.	Azu *et al.,* (2010)	*Kigelia Africana* Fruit	Fruit Extract	----------	Antioxidant	International African	DPPH method
25.	Owolabi *et al.,* (2007)	leaves extract of *Kigelia africana*	Methanolic leaves extract	--------	Analgesic and anti-inflammatory activities	International African	Optimized, Inflammatory process and screening methods
26.	Shivhare *et al.,* (2010)	Trichosanthes dioica Roxb (fruits)	Methanolic extract	Antifungal/antibacterial	----------	National	Disc diffusion and streak method
27.	Sadaf *et al.,* (2006)	Sphaeranthus indicus	Cream containing extract	Antifungal/antibacterial	------	International	Disc diffusion and streak method
28.	Nayak *et al.,* (2009)	Morinda citrifolia L. leaf	Ethanolic extract	Antifungal/antibacterial	Anti-Inflammatory	National	Disc diffusion and streak method Optimized, Inflammatory process and screening methods
29.	Leite *et al.,* (2002)	Vernonia scorpioides	Vernonia scorpioides extract	Antifungal/antibacterial	Healing activity	International	Disc diffusion and streak method Hematological parameters
30.	Mukherjee *et al.,* (2000)	Hypericum patulum leaf	Leaf extract	Antifungal/antibacterial	Healing activity	International	Disc diffusion and streak method Hematological parameters
31.	Rashed *et al.,* (2003)	Portulaca oleracea L. (growing in Jordan)	Crude extract	Antifungal/antibacterial	Healing activity	International	Disc diffusion and streak method Hematological parameters
32.	Moiden *et al.,* (1999)	*Kigelia pinnata* against Trypanosoma brucei brucei	F. Activity of extracts	Antifungal/antibacterial	Anti-Inflammatory	National	Disc diffusion and streak method Optimized, Inflammatory process and screening methods
33.	Weiss *et al.,* (2000)	*Kigelia pinnata* against Plasmodium falciparium.	Activity of extracts and isolated naphthoquinones	-----	Antimalarial	National	Disc diffusion and streak method
34.	Bharti *et al.,*	*Kigelia pinnata.*	Isolation extracts	Antiamoeboic activity	------	International	Disc diffusion and streak

	(2006)						method
35.	Owolabi *et al.,* (2007)	Stem bark *Kigelia africana*	Ethanolic stem bark extract		Analgesic and anti□inflammatory activities	Internatio nal	Optimized, Inflammatory process and screening methods
36.	Balakrishn an *et al.,* (2010)	Alangium salvifolium leaf	Salvifolium leaf extracts	-------	Antiepileptic activity	Internatio nal	Screening methods
37.	Pandey *et al.,* (2013)	*Martynia annua*	Incorporated extract	Antifungal/antibact erial	----------	Internatio nal	Disc diffusion and streak method
38.	Behera *et al.,* (2012)	*Pongamia pinnata* Alcoholic Leaf	Alcoholic Leaf Extract	------	Antioxidant	Internatio nal	DPPH method
39.	Senthil *et al.,* (2001)	Jatropha curcus oil and its methyl esters as a fuel	Methyl Extract	Antimicrobial	----------	Internatio nal	Disc diffusion and streak method
40.	Elanchezh iyan *et al.,* (1992)	*Pongamia pinnata*, Linn cells.	Ethanolic and Seed extract	Antiviral properties	----------	Internatio nal	Screening, plaque reduction, inhibition of virus yield and prevention of HSV-2 methods
41.	Divya *et al.,* (2013)	*Pongamia Pinnata* (L.) Pierre Seed. cells	Hydroalcoholi c Extract	Antimicrobial	Anti-Inflammatory and Anti-Arthritic Activity	Internatio nal	Disc diffusion and streak method Optimized, Inflammatory process and screening methods

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