AN ETHNO-PHYTO-PHARMACOLOGICAL OVERVIEW OF TWO NOVEL INDIAN MEDICINAL HERBS USED IN POLYHERBAL FORMULATIONS

Pulak Majumder*1 and M. Paridhavi2

1Research scholar, CRD, PRIST University, Vallam, Thanjavur, Tamilnadu--613403
2Rajiv Gandhi institute of Pharmacy, Trikaripur, Kasaragod dist. Kerala-671310

*Corresponding author, Email: pulak2007@gmail.com Mob no- 07736404410

ABSTRACT
Medical plants play an important role in the health care management and different clinical problems in developing countries and developed countries as well. Medicinal plants in Indian sub continent have a tremendous role since from the Vedic eras and also in recent advances on the field of herbal medicines. It has been proved that the medicinal plants are the main sources of chemical substances with potential therapeutic and pharmacological effects. Various phyto compounds were characterized from plants which are now using in the treatment of many diseases either in single or combination formulations. The present paper reviews the up to date literature on recent ethno medicinal uses with pharmacological screening of every plant part of different two medicinal plants, i.e Trichosynthes dioica and Mangifera indica and their phytochemical properties used for the treatment of various ailments in human civilization as well as used in folk medicine as a remedy. The name and parts of the plant studied, the spectrum of activity, and methods used are discussed in this review paper.

KEY WORDS: Medicinal Plants, Ethno medicinal use, Phytochemistry, Pharmacological Screening.

INTRODUCTION
Herbs are the best gift by the nature to mankind. In Ayurveda, it is clearly mentioned that any patients can be cured with the help of herbs in the surroundings. There are two types of illness described in Ayurveda, preventive and curative1. On that fundamental basis of Ayurveda various medicinal formulations has been made and using since 5000 years in various human ailments which had well documented in various ancient literatures. Traditional medicinal systems use plants as an indispensible source of medicinal preparations. More than thousands of plant species are recognized as having medicinal value and called as ‘Phytomedicines’. Besides the remarkable development of synthetic medicine in recent era may lead to little suppression of the traditional herbal medicine in various ways but it must not be denied that till date 80% population of this world as specially India like developing countries still depends on traditional medicines for their regular health problems. On growing adverse effect of synthetic medications as especially in the field of cosmetology, people now readily shifts to the drugs from herbal origin.

India is well known for its rich traditional system of medicine, i.e. Auyrveda, Siddha, Unani and Tibetan besides a vast reservoir of living traditions of ethno medicine. Medicinal plant flora of some 25,000 species of these 150 species is commercially used for extracting medicines or drug formulation. 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. 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 on the phytochemicals, ethnomedicinal uses and pharmacological activities of this medicinal plants (Trichosynthes dioica and Mangifera indica) 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.

**MANGIFERA INDICA**

*Mangifera indica* L. is a large evergreen tree, long living, 10-45 m high with a strong trunk and heavy crown. Native from tropical Asia, it has been introduced wherever the climate is sufficiently warm and damp and is now completely naturalized in many parts of tropics and subtropics.

<table>
<thead>
<tr>
<th>Vernacular names</th>
<th>Taxonomical classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanskrit: Ambrah</td>
<td>Kingdom Plantae</td>
</tr>
<tr>
<td>English: Mango</td>
<td>Subkingdom Tracheobionta</td>
</tr>
<tr>
<td>Hindi: Aam</td>
<td>Superdivision Spermatophyta</td>
</tr>
<tr>
<td>Tamil: Ambiram</td>
<td>Division Magnoliophyta</td>
</tr>
<tr>
<td>Punjabi: Amb, Wawashi</td>
<td>Class Magnoliopsida</td>
</tr>
<tr>
<td>Gujarati: Ambo</td>
<td>Subclass Rosida</td>
</tr>
<tr>
<td>Kashmiri: Amb</td>
<td>Order Sapindales</td>
</tr>
<tr>
<td>Malayalam: Amram, Manga</td>
<td>Family Anacardiaceae</td>
</tr>
<tr>
<td>Marathi: Amchur,amba</td>
<td>Genus Mangifera L.</td>
</tr>
<tr>
<td>Bangali: Aam</td>
<td>Species Mangifera indica L.</td>
</tr>
</tbody>
</table>

**Ethanmedicinal Review**

The root, bark, leaves, flowers; unripe and ripe fruit are acrid, cooling and astringent to the bowels and have been employed to cure “vata”, “pitta”, and “kapha”. The parts of *M. indica* mentioned above have also been employed traditionally for treatment of leucorrhoea, bad blood; dysentery, piles, bronchitis, biliousness, urinary discharges, throat troubles, vaginal troubles, hiccough, ophthalmic, eruption, asthma and labouring under habitual constipation. It is also used as aphrodisiac, tonic, appetizer, beautifier of complexion, hiccough, laxative, diuretic, stomachic, antisyphilitic and for tanning purposes in various parts of the world. The widely available leaves of *M. indica* traditionally known to be useful for the treatment of wide panel of disease like throat infection, burns, scalds, antidiabetic, antioxidant, antimicrobial, antiviral and antibacterial.

**Phytochemical Review**

Different chemical constituents like polyphenolics, flavonoids, triterpenoids etc has been isolated from *Mangifera indica*. Mangiferin, a xanthone glycoside, found as major bio-active constituent, isomangiferin, tannins & gallic acid derivatives also present. The bark is reported to contain protocatechic acid, catechin, mangiferin, alanine, glycine, γ-aminobutyric acid, kinic acid, shikimic acid and the tetracyclic triterpenoids cycloart-24-en-3β,26diol, 3-ketodammar-24 (E)-en-20S,26-diol, C-24 epimers of cycloart-25 en 3β,24,27-triol and cycloartan-3β,24,27-triol.
Stem Triterpenoids (29-hydroxymangiferonic acid, Mangiferonic acid, Mangiferolic acid, Hydroxymangiferolic acid, 3α-22ξ-dihydroxycycloart-24E-en-26-oic acid), Sitosterol arachidate, Friedelin, Friedelan-3β-ol, β-sitosterol, Epimers of 5α-stigmasterane-3β, 20-diol, The mixture of 6β-hydroxystigmast-4-en-3-one, 6β-hydroxycampesten-4-en-3-one and 6β-hydroxy-(3β,22-dien-3-one, 5α-stigmasterane-3β, 6α-diol, Cycloartane-3β ,24,25-triol, Phenolic acids (gallic acid, 3,4-dihydroxy benzoic acid, gallic acid methyl ester, mangiferin, (+)-catechin, (-)-epicatechin). Benzoic acid, benzoic acid propyl ester, Saponins (indicoside A, indicoside B), Triterpenoids (25 (R)-3-oxo-methylene cycloarten-26-ol, Ψ-taraxastanol, cycloarten-24-ene-3β ,26-diol, C-24 epimers of cycloarten-25-ene-3β, 24,27-triol, the C-24 epimers of cycloarten-3β ,24,25-triol, 3-ketodammar-24E-ene-2OS, 26-diol, hopane-lβ, 3β ,22-triol), manghopan, mangoleanone, mangsterol, manglupenone, mangocoumarin, n-tetacosane, n-heneicosane, n-triacontane, Mangostin, An unusual fatty acid, cis-9, cis-15-octadecadienoic acid was isolated from the pulp lipids of mango. Phenolic Antioxidants, Free Sugars and Polyols isolated and analyzed from Stem Bark. 5 - [12 (Z)-heptadecenyl] resorcinol / Mangol II was found in milk of this tree. Fruit contains Gallotannins (penta-, hexa-, and hepta-O-galloylgucose). The flower yielded alkyl gallates such as gallic acid, ethyl gallate, methyl gallate, n-propyl gallate, n-pentyl gallate, n-octyl gallate, 4-phenyl gallate, 6-phenyl-n-hexyl gallate and dihydrogallic acid. Root of mango contains Friedelin, chromones, 3-hydroxy-2-(4′-methylbenzoyl)-chromone and 3-methoxy-2-(4′-methyl benzoxy)-chromone. Leaves also contains Friedelin, Taraxerol, Taraxerone, Lupeol The leaf and flower yield an essential oil containing humulene, elemene, ocimene, linalool, nerol and many others. The fruit pulp contains vitamins A and C, β-carotene and xanthophylls the presence of a phenolic compound from leaves which was named as homomangifirin. 5-Alkyl- and 5-alkenylresorcinols, as well as their hydroxylated derivatives, extracted from peels the bioactive marker compound mangiferin in the stem bark & leaves. Friedelin, Friedelan-3β-ol, Cycloartenol, α- amyrin, β- amyrin, Mangiferonic acid, Mangiferolic acid was isolated from root bark. Steam bark also contains Cycloartenol. The volatile composition of M. indica a total of 19 different compounds, were identified. Sesquiterpene hydrocarbons were shown to be the main group of constituents of all taxa. The main constituents of the oil were α-gurjunene (24.0%), β-selinene (24.0%), β-caryophyllene (11.2%), α-humulene (7.2%), caryophyllene oxide (5.5%) and humulene epoxide (2.4%).

![Mangiferin](image1)

![Isomangiferin](image2)

![Gallic acid](image3)

![Protocatechuic acid](image4)

![Catechin](image5)

![Cycloart-24-en-3β, 26-diol](image6)

![3-methoxy-2-(4′-methyl, benzoxy)-chromone](image7)

![Cycloarten-3β, 24,27-triol](image8)

![29-hydroxymangiferonic acid](image9)

![Mangiferonic acid](image10)
Mangiferolic acid

Hydroxymangiferolic acid

3α-22ξ-dihydroxy cycloarten-24E-en-26-oic acid

Friedelin

Friedelan-3β-ol

Epi-Ψ-taraxastane-3β,20-diol

β-sitosterol

6β-hydroxystigmast-4-en-3-one

Cycloartenol

Indicoside A

Indicoside B

5-[12 (Z)-heptadecenyl] resorcinol / Mangol II

3-hydroxy-2-(4′-methylbenzoyl) chromone

Cycloart-25 en 3β,24,27-triol
## Pharmacological review

<table>
<thead>
<tr>
<th>Pharmacological activity</th>
<th>Plant Parts used</th>
<th>Extract used (solvents)</th>
<th>Screening models</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stem bark</td>
<td>Ethanol extract</td>
<td>Fe²⁺-citrate-induced lipoperoxidation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stem bark</td>
<td>Ethanol extract</td>
<td>Rats perfusion study</td>
<td></td>
</tr>
<tr>
<td>Anti inflammatory activity</td>
<td>Leaves</td>
<td>Aqueous extract</td>
<td>Carrageenan induced rat paw edema and cotton pellet granuloma.</td>
<td>K.P. Latha <em>et al.</em>, (2012)⁷⁸</td>
</tr>
<tr>
<td>Hepatoprotective activity</td>
<td>Seed kernels</td>
<td>Isolated compound from ethanolic extract</td>
<td>Against liver injury in rats induced by carbon tetrachloride</td>
<td>Saruth Nithitanakool <em>et al.</em>, (2009)⁷⁹</td>
</tr>
<tr>
<td>Radioprotective effect</td>
<td>Isolated compound (mangiferin)</td>
<td>Radiation-induced micronuclei formation in cultured human peripheral blood lymphocytes and in DBAxC57BL mice</td>
<td>Jagetia GC <em>et al.</em>, (2005)⁸⁰</td>
<td></td>
</tr>
</tbody>
</table>
TRICHOSANTHES DIOICA ROXB.

*Trichosanthes*, a genus of family *Cucurbitaceae* is an annual or perennial herb distributed in tropical Asia, Polynesia, & Australia. Over 20 species are recorded in India of which two namely *T. anguina* & *T. dioica* are cultivated as vegetable.

**Vernacular Names**

<table>
<thead>
<tr>
<th>Language</th>
<th>Name</th>
<th>English</th>
<th>Hindi</th>
<th>Bengali</th>
<th>Gujarati</th>
<th>Kananda</th>
<th>Malayalam</th>
<th>Punjabi</th>
<th>Tamil</th>
<th>Telegu</th>
<th>Oriya</th>
</tr>
</thead>
</table>

**Taxonomical classification**

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Plantae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division</td>
<td>Magnoliophyta</td>
</tr>
<tr>
<td>Class</td>
<td>Magnoliopsida</td>
</tr>
<tr>
<td>Order</td>
<td>Cucurbitales</td>
</tr>
<tr>
<td>Family</td>
<td>Cucurbitaceae</td>
</tr>
<tr>
<td>Genus</td>
<td>Trichosanthes</td>
</tr>
</tbody>
</table>

**Species**

*Trichosanthes dioica*

Fig. 2 *Trichosanthes dioica*

**Ethno pharmacological Review**

*Trichosanthes dioica* is known for the important vegetables. The fruits and leaves are the edible parts of the plant which are cooked in various ways either alone or in combination with other vegetables or meats. Juice of leaves of *T. dioica* is used as tonic, febrifuge & in sub acute cases of enlargement of liver & spleen. In Charaka Samhitha, leaves & fruits used for treating alcoholism & jaundice. Leaves are used in edema and alopecia. It is also used as antipyretic, diuretic, cardio tonic & laxative.

**Phytochemical Review**

Chemical study reveals that in addition to a number of tetra and pentacyclic triterpenes, the toxic bitter principles Cucurbitacins (a group of often highly oxygenated tetracyclic compounds with a unique carbon skeleton and almost a carbonyl group in ring C) may be considered as a taxonomic character of Cucurbitaceae. *T. dioica* is rich in vitamins and contains 9.0 mg Mg, 2.6 mg Na, 83.0 mg K, 1.1 mg Cu, and 17.0 mg S per 100 g edible part. The various chemical constituents present in *T. dioica* are vitamin A, vitamin C, tannins, and saponins. Two main phytosterols present in *T. dioica* are namely, 24α-ethylcholest-7-enol & 24β-ethylcholest-7-enol. Also seeds of *T. dioica* contain lectin, a carbohydrate (specifically galactose) binding protein which is homologous to Type-II ribosome inhibitory proteins (Type-II RIP). Leaves contain 0.97% hentriacontane, chlorophylls, phytin, resins and anthaquinone derivatives.

**Cucurbitacins**

**7-Hydroxy-4H- 5-chromen-4-one.**
5,7-dihydroxy-2-(2-hydroxy-5-methoxyphenyl)-4H-chromen-4-one.

5-Hydroxy-2-(2,4-dihydroxy-methoxyphenyl)-7-Methoxy 4H-chromen-4-one.

### Pharmacological Review

<table>
<thead>
<tr>
<th>Pharmacological activity</th>
<th>Plant Parts used</th>
<th>Extract used (solvents)</th>
<th>Screening models</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholesterol-Lowering Activity</td>
<td>Fruit</td>
<td>Aqueous extract, alcoholic extract</td>
<td>Normal and streptozotocin diabetic rats</td>
<td>Sharmila et al. (2007)(^{63}), Sharma et al. (1992)(^{64}).</td>
</tr>
<tr>
<td>Anti-Inflammatory Activity</td>
<td>Polyherbal formulation (Jatyadi Ghrita)</td>
<td>Carrageenan induced rat paw edema</td>
<td>Fulzul et al. (2001)(^{65}).</td>
<td></td>
</tr>
<tr>
<td>Antifungal Activity</td>
<td>Seeds</td>
<td>Fixed oil</td>
<td></td>
<td>Hariti et al. (1996)(^{66}).</td>
</tr>
<tr>
<td>Antibacterial Activity</td>
<td>Seeds</td>
<td>Fixed oil</td>
<td>Disc diffusion method</td>
<td>Hariti et al. (1995)(^{67}), Rai PK et al. (2010)(^{68}).</td>
</tr>
<tr>
<td>Anti-Oxidant Activity</td>
<td>Fruit</td>
<td>Aqueous extract</td>
<td>1, 1 diphenyl-2- picryl hydrazyl, nitric oxide, reducing power assay and hydrogen peroxide radical method.</td>
<td>Shivhare et al. (2010)(^{69}).</td>
</tr>
<tr>
<td>Wound Healing Activity</td>
<td>Whole plant</td>
<td>Methanolic extract</td>
<td>Burn wound model in rats</td>
<td>Shivhare et al. (2010)(^{70}).</td>
</tr>
<tr>
<td>Gastric Antiulcer Activity</td>
<td>Leaves</td>
<td>Aqueous extract</td>
<td></td>
<td>Singh KP et al. (1985)(^{71}).</td>
</tr>
</tbody>
</table>

### CONCLUSION

In this review article, an attempt has been made to compile the reported information about medicinal values of *Trichosynthes dioica* and *Mangifera indica* has paramount importance in Pharmacy and ethno herbal utility. Moreover, it can be initiative for further phytochemical and pharmacological investigations about the medicinal use of the plant and probable herbal formulations, which may be a step ahead towards the new drug development and may be useful to the health professionals, scientists and scholars working the field of pharmacology and therapeutics.
to develop evidence-based alternative medicine to cure different kinds of diabetes in man and animals. These plants are also proven to be very valuable to the discovery and utilization of medicinal natural products.

ACKNOWLEDGEMENT
Authors are thankful to the PRIST University for their co-operation and facilitation for success fully completion of this review work.

REFERENCE