Available Online at www.jddt.in

ISSN: 2320 - 4230

*Journal of Drug Discovery and Therapeutics* 1 (7) 2013, 100-105

REVIEW ARTICLE

# AN OVERVIEW ON *MORINGA OLEIFERA*: A POTENTIAL MEDICINAL HERB

***Jaya Yadav, Satish Kumar Sharma, Lalit Singh, Tanuja Singh**

Sunder Deep Pharmacy College, Ghaziabad, UP, India- 201001

**Received 28 June 2013; Revised 07 July 2013; Accepted 10 July 2013**

**ABSTRACT**

*Moringa Oleifera* tree is known as miracle tree, as an almost every part of this tree possesses product useful for humans. It is a multipurpose tree, used in very commonly in the spice, cosmetic oil, and as a medicinal uses. It contains alkaloids, flavonoids, anthocyanis, proanthocyanides and cinnamates. It possesses anti- inflammatory, anti- oxidant, antimicrobial, antihyperlipidimic, antifertility, anticancer, antihepatotoxic and antiulcer activities. Further, activity guided phytoanalytical studies may lead to development of novel agent to used various diseases.

**KEYWORDS:** moringa oleifera, multipurpose tree, pharmacological properties.

## INTRODUCTION:

Plants have played a significant role in maintaining human health and improving the quality of human life for thousands of years and have served humans well as valuable components of medicines, seasonings, beverages, cosmetics and dyes. Herbal medicine is based on the premise that plants contain natural substances that can promote health and alleviate illness. In recent times, focus on plant research has increased all over the world and a large body of evidence has collected to show immense potential of medicinal plants used in various traditional systems. Today, we are witnessing a great deal of public interest in the use of herbal remedies. Furthermore many western drugs had their origin in plant extract. There are many herbs, which are predominantly used to treat cardiovascular problems, liver disorders, central nervous system, digestive and metabolic disorders. Given their potential to produce significant therapeutic effect, they can be useful as drug or supplement in the treatment / management of various diseases. Herbal drugs or medicinal plants, their extracts and their isolated compound(s) have demonstrated spectrum of biological activities. Such have been used and continued to be used as medicine in folklore or food supplement for various disorders.

*MORINGA OLEIFERA* is one of the best known and most widely distributed species of monogeneric family (moringaceae)[1] it is a small or middle sized tree, about 10 m in height, cultivated subhimalaya tracts of India, Pakistan, Bangladesh, and Afganistan. It is a perennial softwood tree with timber of low quality, but which for centuries has been advocated for traditional medicinal and industrial uses. It is known as drumstick in English, saragvo in Guajarati, soaanjna in Hindi, sajna in Bengali, nugge in Kannada, sigru in Malayalam, shevga in Marathi, shobhanjana in Sanskrit, munaga in telgu and murungai in Tamil. It is used in abortion.[2] diabetes[3], antipyretic[4], and antiherpes[5] simplex virus type 1(HSV-1)[6]. All plants part of the tree contains medicinal properties, like it is used in venomous bites, cardiac stimulant. Root contain laxative, expectorant, diuretic, inflammation, piles, urinary discharge and asthma [7]the bark is useful in heart complaint, eye diseases, inflammation, dyspepsia, enlargement of spleen. Leaves are anthelmintic, cures hallucinations, dry tumours, hiccough. Fruit cures biliousness, leucoderma.

## COMMON NAME:

English-moringa,Drumstick,Horseradishtree.
latin-moringa oleifera
Sanskrit-surajana
Hindi-sahjan
Tamil-Amukira
Kannad-keramaddinagaddi
Telgu-mulakkaya
Malayalam-muringa
Marathi-shevga
Gujrati-sojnedauta
Oriya-sajana or sujana
Punjabi-surajana
Nepali-sajiwan or swejan
Assamese-sojina
Sinhalese-murunga



*Corresponding author: Jaya Yadav / Email: pr.jayayadav@gmail.com

**BOTANICAL CLASSIFICATION:**

Kingdom- Plantae
Division- Magnoliophyta
Class- Magnoliopsida
Order-Violes
Family- Moringaceae
Genus- Moringa
Species- Oleifera.

**MORPHOLOGY AND PHYSICAL CHARACTERISTICS:**

*Moringa* is a fast growing, perennial tree which can reach a maximum height of 7-12 m and a diameter of 20-40 cm at chest height.

**Stem:**

The stem is normally straight but occasionally is poorly formed. The tree grows with a short, straight stem that reaches a height of 1.5-2 m before it begins branching but can reach up to 3, 0 m.

**Branch:**

The extended branches grow in a disorganized manner and the canopy is umbrella shaped.

**Leaves:**

The alternate, twice or thrice pinnate leaves grow mostly at the branch tips. They are 20-70 cm long, grayish-downy when young, long petiole with 8-10 pairs of pinnae each bearing two pairs of opposite, elliptic or obovate leaflets and one at the apex, all 1-2 cm long; with glands at the bases of the petioles and pinnae .

**Flowers:**

The flowers, which are pleasantly fragrant, and 2.5 cm wide are produced profusely in axillary, drooping panicles 10 to 25 cm long. They are white or cream colored and yellow-dotted at the base. The five reflexed sepals are linear-lanceolate. The five petals are slender-spatulate. They surround the five stamens and five staminodes and are reflexed except for the lowest [8].

**Fruits:**

The fruits are three lobed pods which hang down from the branches and are 20-60 cm in length. When they are dry they open into 3 parts. Each pod contains between 12 and 35 seeds.

**Seeds:**

The seeds are round with a brownish semi-permeable seed hull. The hull itself has three white wings that run from top to bottom at 120-degree intervals. Each tree cans produce between15, 000 and 25,000 seeds/year. The average weight of the seed is per 0.3 g.

**PHYTOCHEMICAL CONSTITUENTS:**

**Roots:**

Roots Contain high concentration of both 4(α-L-rhamnophyranosyloxy) - benzylglucosinolate and benzylglusinolate.[10]

**Stem:**

Stem contains 4 – hydroxylmellein, vanillin, β-sitosterone, octacosanic acid and β- sitosterol[11.] And bark contains benzylglucosinolate.

**Leaves:**

Leaves contains nitrile glycosides, niazirin and niazirinin and three mustard oil glycosides, 4-[4-O-acetyl-α-L- rhamnosyloxy], benzyl isothiocyanate, niazimin A and B.[12, 13.]glucosinolates and phenolic( flavonoids, anthocyanis, proanthocyanidin and cinnamates). Leaves also contain quercetin-3-O glucosde and quercetin3-O (6'' malonyl-glucoside) and little amount of kaempferol-3-O (6'' malonyl-glucoside) also contained 3- caffeoylguinic and 5-caffeoylguinic acid.

**Flowers:**

Flowers contain natural sugars, dmannose and D-glucose in the ratio of 1:5 and two unidentified carbohydrates, protein and ascorbic acid. It also contain polysaccharide, which on hydrolysis gives D- glucose,G-galactose and D-glucoceronic acid in molar ratio of 1:1.9:0.9.[14]

**Pods:**

Pods contain nitriles, an isothiocynate and thicarbamates. And carbamate, methyl-p-hydroxybenzoate and β-sitosterol[15]

**Seeds:**

The crude protein, crude fat, carbohydrates present in the seeds of this plant. Drumstick seed contain vitamin E(0.01%) and beta carotene(0.014%) the precursor of vitamin A.[16] A glycoside was isolated from an acidic extract of seeds.[17] Mano-palmitic and di- oleic triglyceride have been isolated from benzene extract of semi dried seeds.[18]

**PHARMACOLOGICAL STUDIES:**

**1) Anti –inflammatory:**

The ethanolic extract of dried seeds was tested for anti-inflammatory activity by the model carrageenan induced inflammation in the mice and inhibits 85% of inflammation. And the mature green seeds inhibited edema by 77%. [19, 20] hot water infusions of flower, leaves, roots, seeds and bark also showed anti-inflammatory activity. A crude methanol extract of the root was also screened for anti-inflammatory effect.

**2) Antioxidant:**

The oil from the dried seeds showed higher antioxidant activity than butylated hydroxyl toluene and alpha tocopherol.[21] aqueous, methonal, and ethanol extracts of freeze- dried leaves showed radical scavenging and antioxidant activities. The major active compound of phenolics were found in flavonoids groups such as quercetin and kaempferol.[22] the drumstick leaves found to be a potential sources of natural antioxidants.[23]

**3) Antimicrobial:**

An active antimicrobial agent 4(α-L- rhamnosyloxy) benzyl isothiocyanate was identified from the seeds. Defatted and shell free seeds contain about 8-10 % of 4(α-L-rhamnosyloxy) benzylisothiocynate, but this amount is produced when ascorbic acid is added during water extraction. The antimicrobial activity of leaves, root, bark and seeds were also investigated against bacteria, yeast, dermatophytes to man. The leaf and seeds extract inhibited the growth of *Pseudomonas aeruginosa* and *Staphylococcus aureus*.[24] the seed extract of moringa oleifera have antibacterial activity against skin disease called pyodermia and their causative agent are bacterium, *S. aureus* in mice.[25]

**4) Cardiovascular:**

The extract of stem bark have positive inotropic effect at low concentration and negative inotropic effect at high concentration on isolated perfused frog heart. And hypotensive effect on dog blood pressure[26]. The compound niazinin A and B, niazimicin, niaziminin A and B from extract of leaves produced hypotensive and bradycardiac effect in rat.[27] the extract of whole pods and their parts, namely, coat, pulp and seed also showed hypotensive activity

**5) Antihyperlipidimic:**

The leaves possess hypocholesterolemic activity. leaf extract along with high – fat diet – induced increase in serum, liver and kidney cholesterol levels by 14.35%, 6.40%, and 11.09%, respectively.[28] In another study the fruits of moringa oleifera were reported to possess hypolipidaemic effect. They were lower the serum cholesterol, phospholipid, triglyceride, VLDL, LDL in hypercholesterolaemic rabbits, but increase the HDL ratio.[29]

**6) CNS depressant:**

The extract of root exhibited significance CNS depressant activity. The extract of root significantly the sleeping time induced by pentobarbitone sodium, diazepam and meprobamate, showed analgesic properties and also potentiated analgesia induced by morphine and pethidine. Pretreatment of extract caused significance protection against strychnine and leptazol-induced convulsion[30]. The aqueous extract of root on penicillin induced convulsion, locomotar behavior, brain serotonine(5-HT), dopamine(DA) and norepineprine(NE) level was studied in Holtzman strain adult albino rats. The extract improved the disturb balance between 5HT, DA, and NE.[31]

**7) Antiferility:**

The aqueous and ethanolic extract of root showed abortification and teratogenic effect in rat.[32] the bark of *moringa oleifera* was screened for antifertility effect on albino rats.[33] and the aqueous extract of roots has antiestrogenic and antiprogestational activity.[34] the aqueous extact of root is to induce biochemical alteration in female genital tract of ovariectomised rat[35].the aqueous extract of root induced anti-implantation activity in rats[36.]

**8) Anticancer:**

The leaves of moringa has been screened for its influence on the carcinogen detoxifying glutathione –s-transferase(GST) in Swiss albino mice. It increased GST activity in stomach, liver, and oesphagus and show protective against carcinogenesis. Ethanolic extract of seed exhibited antitumour activity against Epstein-Barr virus-early antigen (EBA-EA) [37]. A number of biosynthetically and chemical compounds were isolated from the roasted seed of *moringa oleifera*, structure activity correlation studies showed that acetamide exhibited mutagenic activity[38].

**9) Antihepatotoxic:**

Aqueous and ethanolic extract of root and flower of the plant were screened for antihepatotoxic activity in paracetamol treated albino rats. The $LD_{50}$ value of ethanolic extract of roots and flowers were calculated to be 1.23 and 1.47g/kg i.p. in mice, respectively.[39] Hepatoprotective effect of an ethanolic extract of leaves on liver damage induced by antitubercular drugs such as isoniazid, rifampicin and pyrazinamide in rats has been evaluated. The extract was found to enhance the recovery from hepatic damage induced by antitubercular drugs.[40, 41]

**10) Antiulcer:**

The methanolic extract of leaves inhibited gastric lesion induced by aspirin, serotonin or indomethacin in rats.[41] the methanolic extract of flower buds showed antiulcerogenic activity against aspirin induced gastric ulcer at a dosage of 4g/kg body weight.[42]

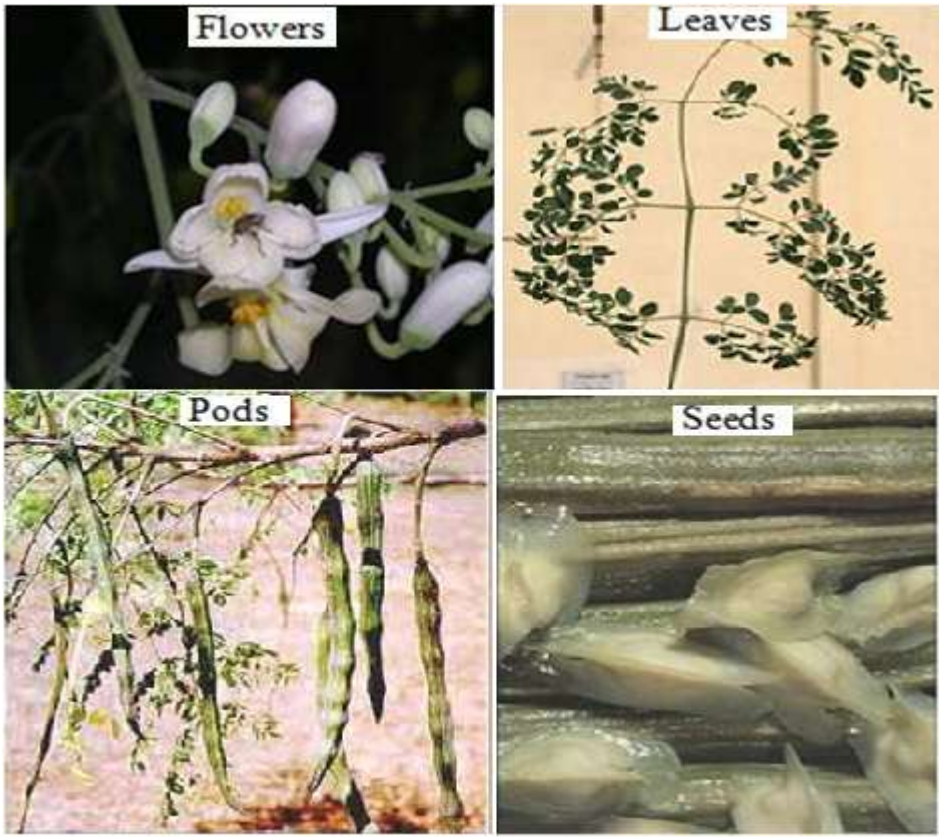


**Figure 1: Moringa Oleifera**

**CONCLUSION:**

*Moringa Oleifera*, popularly know as 'The miracle tree', mainly contains alkaloids, flavonoids, anthocyanins, proanthocyanidins and cinnamates. The pharmacological studies reported in the present review confirm the therapeutic value of the tree. Thus Phytochemical and phytoanalytical studies may lead to development of novel agents for various disorders.

**ACKNOWLEDGMENTS:**

I am highly thankful to all my teachers for their sincere guidance, other staff of Sunder Deep Pharmacy College and National Medical library.

**REFERENCES:**

1. Nadkarni AK.1976.Indian Materia Medica. Popular prakashan Bombay, 810-816.
2. Tarafder CR, Ethno-gynecology in relation to plants, 2. Plants used for abortion, JE con taxon bot, 1983, 4(2), 507-516.
3. Nath D, SethiN, Srivastava s, Jain AK and srivastava R, Survey on indigenous medicinal plants used for abortion in some districts of UP, fitoterapia, 1997, 68(3), 223-225.
4. Singh KK and Kumar K, Ethnotherapeutics of some medicinal plants used as antipyretic agents among the trible of India, J Econ Taxon Bot, 1999, 23(1), 135-141.
5. Bondya SL, Sharma HP, kumar J and Sahu HB, Native medicinal uses of plants for anthemensis at Rachi District of Jharkhand, J phytol Res, 2002, 15(1), 109-110.
6. Lipipun V,Kurokawa M, Suttisri R, Taweechotipatr P, Pramyothin P, Hattori M andShikari K, Efficacy of thai medicinal plant extract against herpes simplex virus type 1 infection in vitro and in vivo, antiviral Res, 2003, 60(3), 175-180.
7. Kirikar KR and Basu BD, Indian Medicinal plants.(M/s Bishen singh mahendra pal singh,New Cannaught place, Dehradun) 2nd Edn, Reprint, 1975, vol.1 pp. 676-683.
8. Morton, JF. The Horseradish tree, *moringa pterygosperma*( moringaceae), A boon to Arid lands, Economic Botany 45, 318-333.
9. Makkar, H.P.S and Becker, k. plant toxins and detoxification methods to improve feed quality of tropical seeds Asian – Australian Journal of Animal Science 12, 467-480.
10. Bennett RN, mellon FA, Foidl N, Pratt JH, DU Pont MS, Perkins L and kroon PA, profiling glucosinolates and phenolic in vegetative and reproductive tissue of the multipurpose tree. *moringa oleifera* L(horseradish tree) and *moringa stenopetala* L. J Agric Food Chem, 2003, 51(12), 3546-3553.
11. Saluja MP, Kapil RS and popli SP, studies in medicinal plants. part vi chemical constituent of *moringa oleifera*

Lam.(hybrid variety) and isolation of 4 Hydroxy mullein, Indian J chem., 1978, 16B, 1044-1045.

**12.** Faizi S, siddiqui BS, Saleem R siddiqui S and Aftab K, Isolation and structure elucidation of new nitrile and mustard oil glycosides from *moringa oleifera* and their effect on blood pressure, J Nat prod, 1994, 57(9) 1256-1261.

**13.** Aftab K and Gilani AH, Fully acetylated carbamate and hypotensive thiocarbamate glycosides from *moringa oleifera*, Phytochemistry, 1995, 38(4), 957-963.

**14.** Pramanik A and Islam SS, chemical investigation of aqueous extract of the mature and premature flowers of *moringa oleifera* and structural studies of a Polysaccharide isolated from its premature flowers, Indian J Chem, 1998, 37B, 676-682.

**15.** Faizi S, Siddiqui BS, Saleem R, Aftab K, Saheen F and Gilani A, hypotensive constituent from the pods of *moringa oleifera*, plant Med, 1998, 64, 225-228.

**16.** Dahot MU and Memon AR, Nutritive significance of oil extracted from *moringa oleifera* seeds, J Pharm Univ Karachi, 1985, 3(2), 75-80.

**17.** Memon GM, Memon SA and Memon AR, Isolation and structure elucidation of moringaceae, a new glycosides from the seeds of *Moringa Oleifera*, Pak J sci ind Res, 1987, 30(5), 393-395.

**18.** Anwer F and Bhanger MI, Analytical characterization of *moringa oleifera* seed oil grown in temperate region of Pakistan, J Agric Food Chem, 2003, 51(22), 6558-6563.

**19.** Udupa AL, Udupa SL and Guruswamy MN, The possible site of anti- asthmatic action of *Tylophora asthmatica* on pituitary adrenal axis in albino rats*, planta med*, 1991, 57, 409-413.

**20.** Guevara AP, Vargas C, Sakurai H, Fujiwara Y, Hasimoto K, Maoka T, et al, An anti-tumor promoter from *Moringa oleifera* Lam, Mutation Res, 1999,440(2), 181-188.

**21.** Lalas S and Tsakins J, extraction and identification of natural antioxidant from the seeds of the *Moringa oleifera* tree variety of Malawi, J Am oil Chemist Soc, 2002, 79(7), 677-683.

**22.** Siddhuraju P and Becker K, antioxidant properties of various solvent extract of total phenolic constituent from three different agroclimatic origins of drumstick tree leaves, J Agric Food Chem, 2003, 51(8), 2144-2155.

**23.** Eilert U, Wolters B and Nahrstedt A, The antibiotic principal of seed of *moringa oleifera* and *Moringa stenopetala*, Planta Med, 1981, 42, 55-61.

**24.** Cacres A,Cebreva O, Morales O, Miollinedo p and MendiaP, Pharmacological properties of *Moringa oleifera* 1: Preliminary screening for antimicrobial activity, J *Ethanopharmacol,*1991, 33(3), 213-216.

**25.** Cacres A and Lopez S, Pharmacological effect of *Moringa Oleifera* 3: Effect of seed extract in the treatment of experimental pyodermia, Fitoterapia, 1991, 62(5), 449-450.

**26.** Limaye DA, Nimbaker AY,Jain R and Mansoor A, Cardiovascular effect of aqueous extract of *Moringa pterygosperma,* Phytother Res, 1995, 9(1), 37-40.

**27.** Gilani AH,Khalid A, Amin S, Sidduqui S and Salem R, Pharmacological studies on hypotensive and Spasmolytic activity of pure compound from *moringa oleifera* , Pytother Res, 1994, 8(2), 87-91.

**28.** Ghasi S, Nwobodo E and Ofili JO, Hypercholesterolemic effect of crude drug extract of leaf of *Moringa oleifera* Lam. in high- fat diet fed wister rats, J Ethanopharmacol, 2000, 69(1), 21-25.

**29.** Mehta K, Balaraman R, Amin AH, Bafna PA and Gulati OD, Effect of fruit of *Moringa Oleifera* on the lipid profile of normal and hypercholesterolaemic rabbits, J Ethanopharmacol, 2003, 86(2-3). 191-195.

**30.** Gupta M, Mazumdar UK and Chakrabarti 8, CNS activity of methanolic extract of *Moringa Oleifra* root in mice, Fitoterapia, 1999, 70(3), 244-250.

**31.** Ray K, Hazra R and Guha D, Central inhibitory effect of *moringa oleifera* root extxact: possible role of neurotransmitter, Indian J Exp Biol, 2003, 41(11), 1279-1284.

**32.** Nath D, Sethi N, Singh RK and jain AK, Commonly used Indian abortifacient plants with Special reference to their teratologic effects in rats, J Ethanopharmacol, 1992, 36(2), 147-154.

**33.** Prakash AO, Tewari RK, Shukala S , Mathur R and Tiwari KK, Post-coital antifertility effect of some medicinal plants in rats, Indian Drugs , 1987, 25(2), 40-44.

**34.** Shukla S, Mathur R and prakash AO, Antifertility profile of the aqueous extract of *Moringa oleifera* roots, J Ethanopharmacol, 1988, 22(1), 56-62.

**35.** Shukla S, Mathur R and Prakash AO,Biochemical alteration in the female genital tract of overcustomized rats treated with an aqueous extract of *Moringa Oleifera* lam,Pak J Sci Ind Res, 1987, 49(6), 218-219.

**36.** Shukla S, Mathur R and Prakash AO, Antiimplantation efficacy of *Moringa Oleifera* Lam. and Moringa – Concanensis nimmo in rats, Int J Crude Drug Res, 1988, 26(1), 29-32.

**37.** Guevara AP, Vargus C, Sarkari H, Fujiwara Y, Hashimoto K, Maoka T, et al. An anti-tumour promoter from *Moringa Oleifera* Lam., Mutation Res, 1999, 440(2), 181-188.

**38.** Villasenor IM and Lim Sylino CY and Dayrit F, Mutagens from roasted seeds of *Moringa Oleifera*, Mutation Res, 1989, 224(2), 209-212.

**39.** Ruckmani K, Kacimani S, Anandan R and Jayker B, Effect of *Moringa Oleifera* Lam.on paracetamol – induced hepatotoxicity, Indian J Pharm Sci, 1998,60(1), 33-35.

**40.** Pari L and Kumar NA, Hepatoprotective activity of *Moringa Oleifera* on antitubercular drug- induced liver damage in rats, J Med FoodZ, 2002, 5(3), 171-177.

**41.** Kumar NA and Pari L,Antioxidant action of *Moringa Oleifera* Lam. (drumstick) 6(3),255-259.

**42.** Pal SK, Mukherjee PK and Saha BP, studies on the antiulcer activity of *Moringaoleifer*a leaf extract on gastric ulcer models in rats, Phytother Res, 1995, 9(6), 463-465.