

**REVIEW ON NEEM PLANT****Sonalkar Manisha .Y., Nitave Sachin .A., *Kagalkar Amrita .A.**

Anil Alias Pintu Magdum Memorial Pharmacy College, Dharangutti. Tal: Shirol Dist:
Kolhapur.

Article Received on
26 February 2014,

Revised on 20 March 2014,
Accepted on 8 April 2014

Correspondence for Author*Amrita Kagalkar**

Alias Pintu Magdum Memorial
Pharmacy College,
Dharangutti. Tal: Shirol Dist
Kolhapur

ABSTRACT

Neem; *Azadirachta indica* have been known to possess a wide range of pharmacological properties, especially as antibacterial, antifungal, antiulcer, antifeedant, repellent, pesticide, inhibitor and sterilant and is thus commercially exploitable, and hence, traditionally used to treat large number of diseases. Neem is a large tree growing about 25 m in height with semi-straight to straight trunk, 3 m in girth and spreading branches forming a broad crown . A neem tree normally starts fruiting after 3-5 years. In about 10 years it becomes fully productive. Neem is considered to be a part of India's genetic diversity. The internal medicinal uses of Neem include malaria, tuberculosis, rheumatism,

arthritis, jaundice and intestinal worms as well as skin. The tree grows naturally in areas where the rainfall is in the range of 450 to 1200 mm. Neem trees have the ability to neutralize acidic soils by a unique property of calcium mining. Plant extracts have exclusive antimicrobial properties, which act in holistic mode. So the neem (*Azadirachta indica*. A. Juss.), contains at least 35 biologically active principles of which nimbin and azadirachtin are the most active insecticidal ingredients and are present mostly in the seeds, leaves and other parts of the neem. The extracts are also beneficial for heart diseases, hepatitis, fungal infection, malaria, psoriasis, and ulcers.

Key Words: Acquired Immune Deficiency Syndrome (AIDS), Superoxide Dismutase (SOD), Estimated Safe Dose (ESD), Bilateral Common Carotid Artery (BCCA).

INTRODUCTION

Neem; *Azadirachta indica* (*A. indica*), is one of the most promising medicinal plant, having a wide spectrum of biological activity, well known for its insecticidal properties. Every part of neem tree have been known to possess a wide range of pharmacological properties, especially

as antibacterial, antifungal, antiulcer, antifeedant, repellent, pesticide, inhibitor and sterilant and is thus commercially exploitable, and hence, traditionally used to treat large number of diseases. This eco-friendly native tree of India is perhaps most researched tree in the world. Water soluble extract of *A. indica* leaves was found to possess significant hypoglycemic, hypolipidemic, hepatoprotective, anti-fertility and hypotensive activities.⁽¹⁾

Fungal diseases of crop plants have always been one of the major constraints in successful crop production which causes severe yield loss every year. Indiscreet use of synthetic fungicides for controlling plant diseases have given rise to negative effects on human and animal health and agro-ecosystem. However, the researchers are confident in developing alternatives to chemical fungicides. Eco-friendly systems involving plant products and biological agents, which act directly on the pathogens or indirectly by inducing resistance in plants have gained considerable importance as an alternative to synthetic fungicides. Plant extracts have exclusive antimicrobial properties, which act in holistic mode. So the neem (*Azadirachta indica*. A. Juss.), contains at least 35 biologically active principles of which nimbin and azadirachtin are the most active insecticidal ingredients and are present mostly in the seeds, leaves and other parts of the neem tree.⁽²⁾

The Sanskrit name '*nimba*' comes from the term '*nimbati swasthyamdadati*' which means '*to give good health*'. The benefits of neem are listed in ancient documents '*Charak-Samhita*' and '*Susruta-Samhita*', which form the foundation of the Indian system of natural treatment, Ayurveda. It is commonly called 'Indian lilac' or 'Margosa' and belongs to the family Meliaceae. The Persian name of neem is '*Azad- Darakth- E- Hind*' which means 'Free tree of India'. Neem is considered to be a part of India's genetic diversity. Neem tree is the most researched tree in the world and is said to be the most promising tree of 21st century. It has great potential in the fields of pest management, environment protection and medicine. Neem is a natural source of insecticides, pesticides and agrochemicals.⁽³⁾

Cultivation Collection of Neem

Neem is a large tree growing about 25 m in height with semi-straight to straight trunk, 3 m in girth and spreading branches forming a broad crown. A neem tree normally starts fruiting after 3-5 years. In about 10 years it becomes fully productive. From the tenth year onwards it can produce up to 50 Kg of fruits annually. The plant is reported to live up to two centuries. The tree has adaptability to a wide range of climatic, topographic and edaphic factors. It grows well in dry, stony shallow soils and even on soils having hard calcareous or clay pan,

at a shallow depth. Neem tree requires little water and plenty of sunlight. The tree grows naturally in areas where the rainfall is in the range of 450 to 1200 mm. However, it has been introduced successfully even in areas where the rainfall is as low as 150 to 250 mm. Neem grows on altitudes up to 1500 m . It can grow well in wide temperature range of 0⁰C to 49⁰C . It cannot survive water-logged areas and poorly drained soils. The pH range for the growth of neem tree lies in between 4 to 10. It grows on almost all types of soil including clayey, saline and alkaline soil, but does well on black cotton soils and deep well drained soil with good sub-soil water. Neem trees have the ability to neutralize acidic soils by a unique property of calcium mining.⁽⁴⁾

TAXONOMICAL CLASSIFICATION OF NEEM ⁽⁴⁾

Order:	Rutales
Suborder:	Rutinae
Family:	Meliaceae
Subfamily:	Melioideae
Genus:	Azadirachta
Specie:	Indica
Latin:	Azadirachta indica

Therapeutic properties

The internal medicinal uses of Neem include malaria, tuberculosis, rheumatism, arthritis, jaundice and intestinal worms as well as skin diseases. The oil is NOT normally taken internally - but as a decoction made from the leaves. The extract of Neem leaves has also demonstrated significant anti-diabetic potential. Neem also enhances the immune system – making it a possible substance of use for AIDS and cancer patients. It also helps to decrease blood sugar levels and may possibly be used to reduce the use of insulin by 30%-50% - making it a possible effective compound for diabetic patients. The extracts are also beneficial for heart diseases, hepatitis, fungal infection, malaria, psoriasis, and ulcers. Neem is used externally for ringworm, eczema, psoriasis, lice, fungal infection as well as for painful joints and muscles. The cosmetic use of Neem oil includes the fighting of acne and pimples as well as improving skin elasticity.⁽⁵⁾

Table No. 1: Parts of Neem with their uses⁽⁶⁾

Sr. No.	Parts of Plant	Uses
1.	Cake	Soil Manure & additive, Animal fodder, Fertilizer
2.	Seed, Cake, Oil	Plant Protectant, Commercial Pesticide, Medicine, Animal Care, Oil Extraction.
3.	Twigs	Dental Hygiene.
4.	Wood	Fuel, Furniture, Construction Material
5.	Roots & Fruits	Oil Extraction, Medicine
6.	Leaves	Plant Protectant, Animal Care, Cosmetics



(A)



(B)



(C)



(D)



(E)

Figure 1. The Neem Products. (A) Twigs, (B) Leaves, (C) Fruits, (D) Seeds (with endocarp), (E) Seeds (without endocarp).

Table No. 2 : Chemical Constituent & Uses of Neem Plant ⁽⁷⁾

Sr. No.	Source	Chemical Constituents	Uses
1.	Seed Oil	Nimbidin	Anti-inflammatory, Ant arthritics, Hypoglycemic, Antipyretic, Spermicidal, Antifungal, Antibacterial, Diuretic.
2.	-	Sodium Nimbidate	Anti inflammatory
3.	Seed Oil	Azadirachtin	Antimalarial
4.	Seed Oil	Nimbin	Spermicidal
5.	Seed Oil	Nimbolide	Antimalarial, Antibacterial
6.	Seed Oil	Gedunin	Antimalarial, Antifungal
7.	Seed Oil	Mahmoodin	Antibacterial
8.	Bark	Gallic Acid & Catechin	Antibacterial
9.	Bark	Margolone, Margolonone & isomargolonone	Antibacterial
10.	Leaf	Cyclic Trisulphide & cyclic tetrasulphide	Antifungal
11.	Leaf	Polysaccharides	Antiinflammatory
12.	Bark	Polysaccharides G1A, G1B	Antitumour
13.	Bark	Polysaccharides G2A,	Antiinflammatory
14.	Bark	NB-2 Peptidoglucon	Immunomodulatory

Neem (*A. indica*) plant extracts have been used for its antibacterial, antifungal and insecticidal activities in addition to improvement of plant seed quality and emergence of plant seedlings. The crude neem extract exhibited antimicrobial activity against both Gram- positive and Gram- negative bacteria.

Pharmacological Activity

Mosquito Repellent⁽⁸⁾

G. Arunpandiyan et al studied five grams of leaves of Neem taken & washed with distilled water. Make thick paste in mortar & pestle & add 45ml of distilled water. Prepared Neem extract was then transferred in to a mosquito refill apparatus. Three replicate of same concentration carried on with the control. In the control 1% ethanol was added instead of Neem extract. Mosquito refill apparatus is connected to the electric vaporizers. The Mortality rate of mosquito was found to be 30% & 70% for 6hrs. & 12hrs. respectively. In the control group no mortality was recorded. These studies indicate that neem based pesticides do not rapidly lead to mortality but it can cause certain changes in their activity. The biological activity of neem extract might be due to active compounds in Neem including phenolics, terpenoids, & alkaloids which may also lead to death of mosquitoes.

Neuroprotective effect⁽⁹⁾

Yanpallewar S has studied When blood flow to brain region that has undergone critical period of ischemia is re-established, additional injury is to be expected from the reperfusion. In the present study, bilateral common carotid artery (BCCA) occlusion for 30 min followed by 45 min reperfusion resulted in increase in lipid peroxidation, superoxide dismutase (SOD) activity and fall in total tissue sulfhydryl (T-SH) groups. *A. indica* pretreatment (500mg/kg/day x 7 days) attenuated the reperfusion induced enhanced lipid peroxidation, SOD activity and prevented fall in T-SH groups. Moreover, *A.indica* per se increased brain ascorbic acid level, which was unchanged during reperfusion insult. Long-term cerebral hypoperfusion induced by permanent BCCA occlusion has been reported to cause behavioral and histopathological abnormalities. In the present study, as tested by open field paradigm and Morris' water maze, a propensity towards anxiety and disturbances of learning/memory were observed in animals subjected to hypoperfusion for 2 weeks. *A. indica* (500 mg/kg/day x 15 days) significantly reduced these hypoperfusion induced functional disturbances. Reactive changes in brain histology like gliosis, perivascular lymphocytic infiltration, recruitment of macrophages and cellular edema following long term hypoperfusion were also attenuated effectively by *A. indica*. They conclude that our study provides an experimental evidence for possible neuroprotective potentiality of *A. indica*.

Pesticides⁽¹⁰⁾

Boeke SJ et al, they study the toxicological data from human and animal studies with oral administration of different neem-based preparations. The non-aqueous extracts appear to be the most toxic neem-based products, with an estimated safe dose (ESD) of 0.002 and 12.5 microg/kg bw/day. Less toxic are the unprocessed materials seed oil and the aqueous extracts (ESD 0.26 and 0.3 mg/kg bw/day, 2 microg/kg bw/day respectively). Most of the pure compounds show a relatively low toxicity (ESD azadirachtin 15 mg/kg bw/day). For all preparations, reversible effect on reproduction of both male and female mammals seem to be the most important toxic effects upon sub-acute or chronic exposure. From the available data, safety assessments for the various neem-derived preparations were made and the outcomes are compared to the ingestion of residues on food treated with neem preparations as insecticides. This leads to the conclusion that, if applied with care, use of neem derived pesticides as an insecticide should not be discouraged.

Neem used as Manure⁽¹¹⁾

Subbalakshmi Lokanadhan et al, studied Manure is any animal or plant material used to fertilize land especially animal excreta for improving the soil fertility and thus promoting plant growth. Neem manure is gaining popularity because it is environmental friendly and also the compounds found in it help to increase the nitrogen and phosphorous content in the soil. It is rich in sulphur, potassium, calcium, nitrogen, etc. Neem cake is used to manufacture high quality organic or natural manure, which does not have any aftermaths on plants, soil and other living organisms. It can be obtained by using high technology extraction methods like cold pressing or other solvent extraction. It can be used directly by mixing with the soil or it can be blended with urea and other organic manure like farm yard manure and sea weed for best results.

Anti fertility⁽¹²⁾

Jyotsna A Saonere Suryawanshi studied the anti-fertility activity. Neem leaves have shown reversible male anti-fertility activity. A vaginal contraceptive has also been developed from NIM-76. It is found that 3mg of neem leaf extract immobilize and kill 100% of spermatozoa within 20 seconds. The block in fertility was, however, reversible as half of the animals regained fertility and delivered normal litters by five months after treatment, without any apparent teratogenic effects. Neem oil appears to be a safe and very effective contraceptive, pre and post coital (before and after sex). The way it was applied in the studies it was 100% effective in preventing pregnancies. During in vitro experiments, neem oil also totally immobilized sperm cells within 20 to 30 seconds of being in contact with neem oil. Population is the main problem worldwide today it is necessary to control it on time. To increase the use of neem as contraceptive this review entitled the detail study of anti fertility activity of neem which is safe and effective without producing any side effect as compared to the other available contraceptive in the market.

Anti tubercular activity⁽¹³⁾

Neem oil inhibited growth of mycobacterium strains in concentration of 12.5 mg/ml. Neem oil and Nimbidol in higher concentration exhibited partial inhibitory influence where as Nimbidin prolong the survival period of mice affected with T.B.

Antifungal⁽¹³⁾

Nimbidin, Nimbin, Nimbidol & Neem oil are very effective against fungi like *Tinea rubrum* ring worm fungus, *Trichophyton interdigitale*, *Coccidioides*, *Immitis* & other species of

Trichophyton at very low concentration.

Antiprotozoal⁽¹³⁾

Nimbidin & Sodium Nimbidinate killed *Paramecium candidum* in 1/500 dilution in 1 min. The action of sodium nimbidinate was found to be more potent than nimbidin.

Antiallergic⁽¹³⁾

Nimbin inhibited the stimulation produced by histamine in guinea pig ileum in a dose of 1mg/ltr. In doses of 2mg/ml Nimbidin block the stimulant action of acetylcholine in frog rectus abdominal muscles.

Dermatological diseases⁽¹³⁾

Nimbidin effective against various skin diseases like furunculosis, arsenical dermatitis, eczema & scabies.

Dental Diseases⁽¹³⁾

Nimbidin gargal & dentifrices have been found effective in bleeding gums & pyorrhea, 'Silvose T & Silvo TRS'. Which are patented extracts of the bark neem. It is active ingredient in tooth paste & other oral hygiene preparation. Neem extract when added to a tooth paste in preventing & healing the inflammation of gums.

Table No.3: List of Marketed Products with their uses.

Sr. No.	Marketed Product	Uses
1.	NATURE NEEM OIL	Making Shampoo, Tooth Paste, Soaps, Cosmetics, Mosquito repellent, Insecticidal,
2.	TOTAL CARE	Pest Control
3.	BIOCARE	Animal Skin Care, Healing Aid For Skin Irritation, Minor Cuts, Broken Skin, Pesticidal, Insecticidal
4.	NEEM GUARD	Urea Coating Agent
5.	NATURE NEEM SEED CAKE & SEED POWDER	Organic Plant Food which increase productivity & Soil Fertility, Antifungal

REFERENCES

1. Mamdouh a. a. Mousa et al; Effect of neem leaf extract on freshwater fishes and zooplankton community, 8th International Symposium on Tilapia in Aquaculture 2008.
2. Anjali Kumari et al; Antifungal efficacy of aqueous extracts of neem cake, karanj cake and

- vermicompost against some phytopathogenic fungi, *The Bio scan*, 8(2): 671-674, 2013.
3. Girish K. et al; Neem – A Green Treasure *Electronic Journal of Biology*, 2008, Vol. 4(3):102- 111.
 4. I.P. Ogbuewu et al; The growing importance of Neem, *Res. J. Med. Plant*, 5(3): 230-245,2011.
 5. www.wikipedia.com.
 6. Opende Koul Neem: A Global Perspective, Kluwer Academic Bark Publisher 2004, 1-19
 7. Sharma Pankaj et al; Review on neem (*azadirachta indica*) : Thousand problem one solution *IRJP* 2011, 2(12), 97-102.
 8. G. Arunpandiyam, Toxicity of aqueous crude neem leaf extract against *culex* mosquitoes
 9. Yanpallewar S, Rai S, Kumar M, Chauhan S, Neuroprotective effect of *Azadirachta indica* on cerebral post-ischemic reperfusion and hypoperfusion in rats. *Life Sci.* 2005 Feb, 4;76(12):1325-38. Epub 2005 Jan 18.
 10. Boeke SJ et al. Safety evaluation of neem (*Azadirachta indica*) derived pesticides. *J Ethnopharmacol.* 2004 Sep;94(1):25-41.
 11. Subbalakshmi Lokanadhan, Neem products and their agricultural applications, *JBiopest*, 5 (Supplementary): 72-76 (2012).
 12. Jyotsna A Saonere Suryawanshi , Neem - natural contraceptive for male and female - an overview, *International Journal of Biomolecules and Biomedicine (IJBB)* ISSN: 2221-1063. (Print) 2222-503X (Online) Vol. 1, No.2, p. 1-6, 2011.
 13. *Pharmacognosy & Phytochemistry*, Mohammed Ali , Vol-1, 680 -681.