



Pharmacological Properties of Azadirachta Indica

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ABSTRACT

The tree neem, *Azadirachta indica* is widely used in the animal kingdom. *Azadirachta indica* is a widely distributed, quickly growing, evergreen tree that is native to America, Africa, and India¹. For effective crop and pest management, neem is applied as fertilizer, manure, urea coating agent, fumigant, pesticide, soil conditioner, and neem pest control.² Numerous medical ailments have been indicated as using it by Ayurveda. The demand for neem products is rising daily, indicating a significant increase in public awareness of herbal products.³ Every portion of the neem plant has several uses. Neem is well known for having anti-inflammatory, anti-diabetic, and anti-cancer properties.⁴ Many Hindu rites involve the usage of neem. neem which will educate them much and inform them of the benefits of neem. People have used herbal treatments to strengthen their health and heal a variety of ailments for thousands of years.⁵ Almost every civilization has tried to find a real cure-all or panacea. Very few drugs have withstood contemporary scientific investigation, despite hundreds having been attempted and evaluated.⁶ Neem is a tropical evergreen that is predominantly native to India and is used in Ayurvedic medicine. It is a botanical that most closely resembles a panacea. Neem is used to treat a wide range of ailments, thanks to the countless years of work done by Indian herbalists and healers.⁷ They have been bolstered by contemporary scientific research that consistently shows how beneficial neem is for both preventing and curing disease.⁸



INTRODUCTION:

For generations, people have believed that the neem tree, *Azadirachta indica*, has amazing health-promoting qualities.⁹ At that period, neem was being used to aid with healing. It has long been revered as one of the most adaptable plants known, having first been used in ancient India and its surrounding countries.¹⁰ In fact, the neem tree is still referred to as the "Village Dispensary" since every part of it has unique, medicinal benefits.¹¹ The neem tree, which belongs to the mahogany family Meliaceae, grows quickly and is an evergreen that is well-known for its resistance to dryness.¹² The neem tree can grow to be 150–200 years old and becomes a large shade tree with a thick, rounded canopy. Neem's blooms have a delicious nectar-like scent that is detectable for kilometers, despite the plant's well-known strong, unpleasant odor.¹³ Neem is a rapidly growing tree with minimal water requirements, making it a limitless supply. Neem is commonly used in Ayurveda to balance Pitta and Kapha.¹⁴

Vata will generally be aggravated by its chilly, light, and dry features. Thus, neem is often administered in combination with other plants to help curb its vata-inciting properties. The Meliaceae family includes the neem tree, *Azadirachta indica* a tropical evergreen closely related to mahogany.¹⁵ Native to east India and Burma, the plant is also found throughout most of Southeast Asia and West Africa. India's neem tree has been treasured for generations by its people, who have used its twigs to clean their teeth, its juice to treat skin conditions, its tea as a tonic, and its leaves to ward off unwanted insects in their beds, books, grain bins, cupboards, and closets. Trees can grow up to 30 meters tall and have limbs that are half that big.¹⁶ The up to 30-cm-long, glossy, dark green, pinnately complex leaves. Ten to twelve serrated, 2.5 cm wide by 7 cm long leaflets are present on each leaf. It grows in regions with less rainfall and flourishes in regions with intense heat, reaching temperatures as high as 48°C.¹⁷

One of the main benefits of using neem instead of other plants or medical treatments is that it complies with the first Hippocratic Oath, which all doctors must take "First, do no harm." Neem has been used by hundreds of millions of people for thousands of years, and at typical dosages, no known risks have been reported. Neem gives its consumers the power to combat illnesses with the herb's time-tested safety.¹⁸ Numerous myths from Indian mythology describe how neem evolved into a sacred tree endowed with the power to cure any illness. The most popular version of the tale is how Indra, the monarch of the Celestials, was coming down from heaven with a golden pot that contained ambrosia that he had captured from the demons.¹⁹ The Neem trees were bestowed with extraordinary healing qualities for all eternity when a portion of the priceless Ambrosia overflowed the pot and fell on them. There are countless ways that neem can improve immunity, heal illnesses, and support human health. One of the most effective and well-known blood purifiers and detoxifiers is neem.²⁰



Use of Neem

Rice agriculture has utilized neem oil, which is derived from the seeds of the neem tree, for pest control because of its medicinal and insecticidal qualities. When put to soil or utilized as a soil amendment, neem seed cake the leftover residue from neem seeds after their oil is extracted not only enriches the soil with organic matter but also reduces nitrogen losses by preventing nitrification. It functions as a nematicide as well. Neem leaves are utilized in the production of litter compost as well as green leaf manure. Grain is also stored using neem leaves. Neem twigs that are still tender are often employed in rice fields as green manure once they have broken down.²¹

It has been discovered that neem leaf and seed extracts contain insecticidal qualities. It is applied topically as a foliar spray and for treating rice seedlings. The bark and roots of neem are also therapeutically useful. In rice farming, powdered bark and roots are also used to manage fleas and other sucking pests. In addition to its beneficial effects in preventing several diseases associated with rice farming, neem possesses anti-bacterial, anti-fungal, and anti-nematipidal qualities. Its numerous active components are still untapped.²²

Using Neem as a Fertilizer:

The substance that remains after oil is extracted from seeds and is commonly referred to as "seed cake." It functions as a biofertilizer and aids in giving plants the nutrients they need. It is frequently employed to guarantee a good crop production. Rice and sugarcane crops in particular benefit from the usage of neem as a fertilizer for both food and revenue crops.²³

Benefits:

Neem seed cake serves as a fertilizer and pesticide in one, enriches the soil, inhibits the growth of bacteria and soil pests, supplies macronutrients necessary for all plant growth, and ultimately increases plant yield. It is also an excellent soil conditioner that is biodegradable and environmentally friendly.²⁴

Using Neem as Manure:

Any material, plant or animal, that is used to fertilize land is called manure; in particular, animal excrement is utilized to increase soil fertility, which in turn encourages plant development. Because neem manure is environmentally safe and contains components that assist raise the soil's phosphorus and

nitrogen content, it is becoming more and more popular. It has high concentrations of calcium, nitrogen, sulfur, and potassium. Superior grade organic or natural manure that doesn't harm plants, soil, or other living things is made from neem cake. High tech extraction techniques like solvent extraction or cold pressing can be used to acquire it.²⁵ combine it with urea and other organic manures, such as farm yard manure and seaweed, before applying it directly to the soil.

Benefits include being environmentally friendly and biodegradable, supplying all the macro and micronutrients needed for plants to thrive, aiding in the removal of bacteria that cause denitrification in the soil, making it perfect for both food and cash crops, increasing crop yields, and lowering the cost of growing plants by using less fertilizer.²⁶

Neem as a coating agent for urea:

To preserve and increase soil fertility, urea coating agents are made from neem and its constituent parts. The amount of nitrogen, potassium, and phosphorus in the soil can be used to determine how fertile it is some microorganisms in the soil can denitrify it. The denitrification-causing bacteria's growth and activity are slowed down by using neem urea coating agent. It keeps urea from evaporating out of the soil. A wide range of pests, including caterpillars, beetles, leaf hoppers, borer, mites, and others, can also be controlled using it. Generally speaking, urea coating is offered in liquid or powdered form. Neem Urea Coating's characteristics are antifertility, antifeedant, and antipest.

Advantages: Neem urea coatings are great soil conditioners, natural or biopesticides, safe for the environment, easy to apply, minimize urea usage, very fertile soil, and boost agricultural yields.²⁷

Using Neem to Condition Soil :

The soil conditioner is made from powdered or granulated neem seeds. It can be sprayed on and raked into the soil, or it can be administered during plant seeding. To ensure that the substance reaches the roots, irrigation should be properly timed after the sprinkling process. It is a naturally occurring soil conditioner that aids in raising the soil's quality and promoting fruit and plant growth.

Benefits:

Neem is a naturally occurring soil conditioner that helps raise soil quality, which in turn promotes plant and fruit growth. It keeps certain insects and pests from destroying the plants in addition to aiding in their growth. In the agriculture sector, organic soil conditioner is becoming more and more popular. They are less expensive than conventional soil conditioners and have no negative effects because they are organic. Additionally multipurpose, this natural soil conditioner is found in subtropical areas. It is well known that applying neem soil conditioner to plantation crops improves the soil's fertility.²⁸

Using neem as a fumigant:

Neem trees have been used to combat pests in the home, storage, and agriculture. Neem pest fumigant, used as a disinfectant and insecticide, is available in gaseous form. Farmers and agriculturists use it for business purposes in many different countries. Natural products that are exported are non-toxic and have no negative environmental effects. annually as a result of inadvertently consuming synthetic pest fumigants. This all natural fumigant not only eliminates pests but also has detrimental effects on them, such as preventing them from feeding or ovipositing, disturbing their mating habits, slowing down their growth, etc.²⁹

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Neem is becoming more and more significant in crop management. It is not surprising that studies are being conducted to try neem and its products for large-scale production of natural pesticides and insecticides, given that neem is not only a naturally occurring, less expensive product and an effective way to control pests and insects, but it also has no negative effects on plants or other living things. Manufacturers and exporters have a great chance to create high quality bio agriculture products with this. It is well known that neem seed extracts and oil have antibacterial and germicidal qualities that help shield plants from various pests. There are no leftovers from this natural product on plants.

Advantages:

Neem fumigants are safe for the environment, do not damage other microorganisms, are not harmful, and do not pollute the land or the water. It is comparatively less expensive, repels pests, nourishes the soil, and controls pest reproduction without causing any undesirable side effects or resistance in pests.³⁰

Using neem as a pesticide :

Neem insecticides are extensively utilized in agriculture since they are essential for managing pests. The usage of non-synthetic pesticides has clearly increased throughout the world, primarily as a result of increased public awareness of the negative effects that synthetic pesticides have on not just plants and soil but also other living things.

Manufacturers of neem pesticides have a fantastic chance to profit from the rising demand for natural or herbal pesticides. As a result of extensive study on the safety and effectiveness of neem as a pesticide, neem insecticides are produced and exported to numerous nations. The primary component utilized to make biopesticides is azadirachtin. It is well known that neem seed extracts and oil have antibacterial and germicidal qualities that help shield plants from various pests. The fact that neem-based herbicides and insecticides leave no trace on the plants is one of their main advantages.³¹ For effective crop and pest management, neem pest control is quite advantageous. In addition, it is non toxic, environmentally benign, and helps to condition and nourish the soil. For maximum efficacy, it can be used with other pesticides and oils. It modifies the pests' life cycle rather than eliminating them. Neem components anti-feedant qualities aid in the protection of the plants. Neem-based pesticides often do not cause pests to become resistant. Neem insecticides aid in plant growth and are typically soluble in water. It controls the reproduction of pests and serves as a repellent. In the agriculture sector as well, there has been a noticeable shift from the use of synthetic to natural products. A number of issues, including insect resistance to pesticides, harm to other natural enemies of insects, harmful effects on plants and soil, etc. have been brought about by the overuse of synthetic insecticides. The natural or bio insecticide, which is benign to the environment and has no harmful effects on plants or soil, is made from neem. Insecticides made of neem are used to safeguard cash crops such as oilseeds, rice, pulses, cotton, and others, as well as food crops. Excellent for both organic and commercial producers, as well as all types of crops, trees, plants, flowers, fruits, and vegetables around the house.³² Azadirachtin, the neem tree's active chemical, protects the plants by acting as an insect repellent and insect feeding inhibitor. Tetranoortriterpenoids are a class of chemical molecules that includes this component. Its structure is comparable to that of "ecdysones," insect hormones that regulate an insect's transition from larva to pupa to adulthood. It's noteworthy to observe that neem changes the life cycle of insects rather than killing them.³³ The majority of neem seed extracts are utilized to create neem pesticides. Recent research on several components of the neem plant revealed that azadirachtin, which is included in neem seed extracts, inhibits the growth of young insects. Insecticides for a variety of crops are frequently made using neem oil or neem seed oil. Neem oil gets into the pests' systems and prevents them from functioning properly. Because they cannot reproduce, eat, or lay eggs, insects' life cycle is broken. Neem oil pesticides also have the intriguing feature of not harming beneficial insects. The insecticides made from neem oil exclusively target sucking and chewing insects.

Teeth and Gums:

Using neem toothpaste, neem leaf extract diluted in water, or neem mouth rinse every day has proven to be a very effective treatment for gum disease, infection, and bleeding gums. Periodontal disease and tooth decay are prevented by neem extract. Some users indicate that after just a few weeks or months of Neem use, their gum deterioration and gum bleeding completely stopped. In India, the majority of people use the twigs from the Neem tree's branches, and you can see that their teeth are white and their gums are in excellent condition.³⁴

Skin Conditions:

When it comes to persistent skin conditions, neem almost works like magic, especially when traditional therapies don't work. When a high-quality organic Neem product is used, it consistently helps clear up a variety of conditions, including acne, psoriasis, eczema, itching, rosacea, shingles, ringworm, athlete's foot, herpes, fungal infections, cold sores, dandruff, dry skin, hemorrhoids, rash, skin ulcers, rheumatism, sprains, pain, warts, and wrinkles. The use of synthetic drugs to treat these illnesses may have unfavorable side effects, including skin redness, allergic responses, and rashes. It lessens the redness and scaling of the patchy lesions and eases the pain and itching associated with psoriasis.³⁵

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