

USES OF NEEM (MIRACLE TREE) IN AGRICULTURE

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Introduction: Neem, *Azadirachta indica* is native to the arid regions of the Indian sub continent. In India, Neem is also called 'arista' in Sanskrit- a word that means 'perfect, complete and imperishable'. The Sanskrit name 'nimba' comes from the term 'nimbatisyasthyamdadati' which means 'to give good health'. The seeds bark and leaves contain compounds with proven antiseptic, antiviral, antipyretic, anti-inflammatory, anti-ulcer and antifungal uses. *Azadirachta indica* can be propagated easily by seed, or 9 to 12 month-old neem seedlings can also be transplanted. Fresh fruit yield per neem tree ranges between 37 and 50 kg per year. Forty kg fruit yields nearly 24 kg of dry fruit (60%), which in turn gives 11.52 kg of pulp (48%), 1.1 kg of seed coat (4.5%), 1 kg of husk (25%) and 5.5 kg of kernel (23%). The kernel gives about 2.5 kg of neem oil (45%) and 3.0 kg of neem cake (55%).



Neem is recognized today as a natural product which has much to offer in solving global agricultural, environmental and public health problems. Researchers worldwide are now focusing on the importance of neem in the agricultural industry. The magical tree and hundreds of its active compounds are used to manufacture a number of products. Natural properties of neem do not have any toxic reactions, to produce high quality product. Products derived from Neem tree act as powerful Insect Growth Regulators (IGR) and also help in controlling several nematodes and fungi. Neem products reduce insect growth in crops and plants. Neem products are used as neem insecticide, neem pesticide, neem pest fumigant,

neem fertilizer, neem manure, neem compost, neem urea coating agent and neem soil conditioner.

Chemistry of neem: Neem plants contain several thousands of chemical constituents. Of special interest are the terpenoids from different parts of the neem plant. Of its biological constituents the most active and well studied compound is Azadirachtin. However, in most traditional preparations of neem as pesticide or medicine a mixture of neem chemicals are present and provide the active principles. Several kinds of azadirachtins (A to K) have been isolated, the most abundant of which is Azadirachtin. The neem terpenoids are present in all parts of the plant, in the living tissues. Recently, the site of synthesis and accumulation of the neem chemicals have been identified as secretory cells. Secretory cells are the most abundant in the seed kernels. The secretory cells can be seen with iodine solution. Besides the terpenoids, neem also contains more than 20 sulphurous compounds responsible for the characteristic smell of crushed seeds and neem oil.

Uses of Neem: Neem leaves are used as green leaf manure and also in preparation of litter compost. Neem leaves are also used in storage of grains. Twig of neem when tender is used as green manure after decomposing and widely incorporated in rice cultivation fields. Neem bark and roots also have medicinal properties. Neem has anti-bacterial, anti-fungal and anti-nematicidal properties and positive effect in combating several diseases in crop cultivation. Neem (leaf and seed) extracts have been found to have insecticidal properties. It is used as foliar spray and in treating seeds in crop cultivation. Neem oil is extracted from the seeds of the neem tree and has insecticidal and medicinal properties due to which it has been used in pest control in rice cultivation. Neem seed cake (residue of neem seeds after oil extraction) when used for soil amendment or added to soil, not only enriches the soil with organic matter but also lowers nitrogen losses by inhibiting nitrification. It also works as a nematicide, and there are many active constituents of Neem which are still to be exploited.

1. Neem used as Fertilizer: The material left after oil is squeezed out from seeds and is popularly known as the seed cake; It acts as a bio fertilizer and helps in providing the required nutrients to plants. It is widely used to ensure a high yield of crops. Neem is used as a fertilizer both for food crops and cash crops, particularly rice and sugarcane crop.

2. Neem used as Manure: 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. Manure is any animal or plant material used to fertilize land especially animal excreta for improving the soil fertility and thus promoting plant growth. 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.

3. Neem as urea coating agent: Neem and its parts are being used to manufacture urea coating agent to improve and maintain the fertility of soil. The fertility of the soil can be measured by the amount of Nitrogen, Potassium and Phosphorous it has; there are certain bacteria found in soil, which denitrify it. Use of neem urea coating agent helps to retard the

activity and growth of the bacteria responsible for denitrification. It prevents the loss of urea in the soil.

4. Neem as soil conditioner: Neem seed granules or powdered seeds are used to manufacture the soil conditioner. It can be applied during sowing of plants or can be sprinkled and raked into the soil. The process of sprinkling should be followed by proper irrigation so that the product reaches the roots. It is a natural soil conditioner that helps improve the quality of soil, thereby enhancing the growth of plants and fruits.

5. Neem as fumigant: Neem tree has been used against household, storage pests and crop pests. Neem pest fumigant is available in gaseous state and is used as a pesticide and disinfectant. This 100% natural product is being exported as it is non toxic and does not affect the environment. This natural fumigant not only kills pests but also affects them negatively by acting as feeding and oviposition deterrence, mating disruption, inhibition of growth etc. This is a good opportunity for manufacturers and exporters to produce quality bio agricultural products. Neem oil and seed extracts are known to possess germicidal and anti bacterial properties which are useful to protect the plants from different kinds of pests. This natural product does not leave any residue on plants.

6. Neem as pesticide: Neem pesticides play a vital role in pest management and hence have been widely used in agriculture. There has been an evident shift all over the world from synthetic pesticides to non-synthetic ones; this is largely because of the wide spread awareness of the side effects of these synthetic pesticides not only on plants and soil but also on other living organisms. Azadirachtin is the main ingredient used to manufacture bio pesticides. Neem oil and seed extracts are known to possess germicidal and anti-bacterial properties which are useful to protect the plants from different kinds of pests. One of the most important advantages of neem-based pesticides and neem insecticides is that they do not leave any residue on the plants.

References:

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