



Chapter 12

Production and Use of Products from the Neem Tree

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The neem tree (*Azadiracta indica*) is a medium-sized tree from Southern Asia belonging to the family *Meliaceae*. It has glossy, dark green, compact foliage and aromatic, compound leaves with toothed, curved, pointed leaflets. The flowers are small and cream-white forming thin-skinned yellow berries. The bark is pale grey-brown and grooved. For over 5000 years, the neem tree has been used in India as traditional medicine.



Figure 1. A young neem tree

In East and Southern Africa, neem was widely planted by Indian settlers at the end of the nineteenth century and became naturalized along the coastal strip from Mogadishu to Maputo. Neem was brought to Africa by Asian traders over two centuries ago. Research on the neem tree and its properties has been conducted over the past 40 years, following the observations by Prof. Schmutter of the University of Nairobi (then the Royal Technical College) that a swarm of locusts in the Sudan destroyed all but one tree species, later identified as neem.

By the 1980s, development organizations began to realize the commercial and industrial potential of the tree and its products. In 1995, the International Center of Insect Physiology and Ecology (ICIPE) initiated an awareness programme in East Africa, and later throughout Africa, to promote the use of the neem tree in agriculture (ICIPE, 1995). Around the same time, a private company, Saroc Ltd. (later renamed Saroneem Biopesticides) started industrial processing and marketing of neem products. In the following years, several entrepreneurs and non-governmental organizations became involved in the processing of neem into soaps and herbal products.

Neem, popularly referred to as the 'health-maker tree', is increasingly in demand because of its many uses in afforestation, animal and human health and as fuelwood and pesticide. Although not indigenous to Africa, it has been planted as an exotic shade tree in many areas for its remarkable properties in controlling insect pests (Figure 1). Whole leaves and seeds may be used or ground into seed oil, seed meal and water-oil emulsions.

Harvest and Oil Extraction

The raw materials used for various neem products are derived from the tree's seeds and leaves. The bark and roots have useful properties as well but their recovery is more destructive to the tree. Collection of seeds along the East African Coast is facilitated by bats that drop the seed after eating the fruit. The fallen seeds should be collected immediately to prevent sprouting and molding. In up-country areas where fruit-eating bats do not occur, it is more difficult to collect seeds but some birds will also drop seeds after eating the fruit. The collected seeds are cleaned and dried, packaged and sold directly to processors or farmers for seedlings. Neem is also valued for wood carving, so leaf and seed recovery may be performed in conjunction with wood harvest. Neem oil is extracted through the following procedure.

1. Small-scale processors will crush seeds using a mortar and pestle. The crushed seeds are

placed in a bowl of water. Then the floating oil is skimmed off the bowl

2. A simple hand operated press can extract seed oil leaving a cake. The efficiency of the presser is improved by adding a modified groundnut decorticator. The oil presser can crush 100 kg of raw seeds per day with an oil yield of up to 20%
3. Electrical and diesel machines for crushing the seeds and extracting oil are available although they are costly to buy and maintain. The electrical machine is more efficient in grounding the seeds and uses air pressure to separate kernels from seeds. This method produces clean seeds used for processing higher value products such as medicines.

Neem Products and their Uses

From the process of crushing neem seed for oil, kernel dust and neem cake are also obtained and used to prepare various pesticides and medicines. The cake may be ground into a powder and used as an insecticide. The powder can also be placed in water for 12 hours, resulting in an aromatic solution that is sprayed in the houses to repel various biting and blood-sucking insects. A variety of commercial products, including pesticides, human and animal medicines and health care materials are produced from the neem seed and are currently being marketed in Kenya.



Figure 2. Mature and ripe neem fruits. The fruit is 1.5 to 2.2 cm in length.

Soap. Neem oil may be converted into soap by mixing with coconut or palm oil then heating and mixing with potash. Potash is obtained by passing water several times through a wood ash, until it has reached the required alkalinity to react with the oils. This soap is then placed in wooden or plastic containers until it hardens sufficiently to be removed.

Insecticides. An alcohol extract of neem seed cake and neem oil emulsifiable concentrate derived from the neem seed are used for the control of many insect pests and fungal diseases. The seed powder made from neem seed cake is recommended for controlling crawling insects. Neem oil is also used as an insect repellent.

Alcohol may be passed through the cake to produce an alcoholic extract which contains oil residues and a large number of terpenoids, in particular azadiractin, a compound that is contained in the oil in very small proportions. By passing the alcohol extract through several lots of cake, the azadiractin content can be increased resulting in a material with exceptional insecticidal properties.

Medicine. Three products are derived from the neem seed for the treatment of human diseases. These products are neem leaf powder, neem oil and neem soap. Neem leaf powder is recommended for respiratory diseases, diabetes, typhoid, amoeba, malaria, hepatitis, fatigue, pneumonia, and eye and kidney infections. Refined neem oil derived through filtration is recommended for treatment of skin rashes, pimples, dandruff, wounds, scalds, worms and fungal infections. It is also used as an anti-bacterial medicine to treat teeth and gum problems. A third product is neem soap, which is useful against fungal skin infections, ringworm and athletes' foot, and as an insect repellent against lice, fleas, ticks and mosquitoes. Skin problems treated with neem oil include acne, itching, dandruff and allergies. It was also used to treat chicken pox, wounds, scalds and burns. Twigs are cut to make tooth brushes to prevent tooth decay. Leaves are boiled for use against malaria, diabetes, stomach problems and asthma. Leaves should be dried and ground into neem powder before boiling.



Figure 3. Some of the medicated neem tree products that are used as cosmetics.

Veterinary medicine. Neem powder derived from both the seed and the leaf is used to treat animal

diseases such eye infections, coccidiosis and Newcastle disease in poultry. It is also used as a vermifuge in domestic animal husbandry. The wood and bark of the neem tree is processed into neem cake and it is fed to livestock as a deworming medicine.

Organic fertilizer. Neem cake and neem shells are combined to form neem fertilizer that is applied as an organic amendment to soils and plant growth stimulant.

Conclusion

Neem tree products contribute to human and animal health, plant nutrition and growth, and environmental conservation. Through these functions, the neem tree products have a great potential for income generation. Nonetheless, there is need to further promote awareness of the neem tree, its uses and products. Integration of socioeconomic studies into biological research will greatly enhance the potential of this tree and its utilization. Information materials such as publications, booklets, flyers, audiovisual tutorial modules and documentary films should be prepared, distributed and disseminated through national extension channels in various African countries.

Reference

International Center of Insect Physiology and Ecology (ICIPE). 1995. The Neem Tree. An Affordable, Efficient and Environmentally-Friendly Source of Pest Control Products. International Center of Insect Physiology and Ecology. Nairobi, Kenya.

Editors Note. The editors are not medical professionals and as such cannot verify the medical claims in this chapter. We do note, however, that several neem-based healthcare products are marketed throughout the world, including Kenya. We remind readers that they should not attempt to treat persistent symptoms or serious medical conditions without the advice of a doctor.



Figure 4. Packaged neem oil (left) and cake (right).

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