
A Guide to Organic Pesticide preparation from Neem seed extract

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A. Introduction

Organic farming is a cultural crop production technique which involves the use of cultural and biological methods to enhance soil fertility and achieve ecological balance in farming systems. The system relies on ecologically balanced agricultural principles like crop rotation, green manure, organic waste, biological pest control among others. Organic farming makes use of pesticides and fertilizers if they are considered natural and devoid of various petrochemical or active components.

From an environmental standpoint, organic farming is the preferred method for pest and disease control in agriculture. It is considered to be non-toxic, has less input requirements and greatly enhances the ecological balance while promoting biological diversity and protects the environment.

Pest and diseases continuously pose as threats to agriculture causing considerable yield losses every year. One of the basic approaches to addressing crop loss is the use of organic pesticides within the farming system. This basic manual outlines a simplified step-by-step guide to organic pesticide preparation using **neem-seed oil** extract which can be readily available in most tropical environments.

B. Organic pesticide preparation steps

The **Neem** tree (*Azadirachta indica*), is a tropical evergreen tree originally from India and now found throughout the tropics, particularly in the dry regions of Africa. The tree is fast growing and very tolerant to drought conditions. In the Sahel region of West Africa, the neem tree is often planted as windbreaks and for shade in the villages and cities. In India, the neem tree is known as “the village pharmacy” because of its healing versatility and has been used in medicine to cure a number of ailments by local communities.

Early literature make mention of the neem fruit, seeds, oil, leaves, roots and bark for their medicinal properties and are reported to contain compounds with proven antiseptic, antiviral, antipyretic, anti-inflammatory and antifungal properties.

In the preparation of organic pesticides from the neem tree, 2 major steps are involved. The first step involves the collection of ripe seeds, drying, roasting, crushing and pressing them to extract the neem oil. In the second step, the oil is then formulated into a pesticide by diluting it to the desired volume using water.



Neem Tree (Azadirachta indica)



(Neem Fruits)

1. Extraction of oil from neem seeds

Various methods are employed for extracting the oil from the neem seeds. These range from simple to complex techniques depending on the resources available. In this guide, we will concrete on a simple mechanical method using a seed pressing machine which can either be modified from a normal oil extracting machine or easily built by local technicians using simple specifications.

The steps involved arenas follows:

- (a). **Seed collection:** Once the neem seeds are matured, they can be easily collected from the trees.
- (b). **Cleaning, drying and sorting of seeds:** The ripe seeds collected are cleaned to remove the skin. The seeds are then dried by spreading them out in the sun. The drying reduces their moisture content and makes their decortication much easier. Foreign materials such as stones and dirt are then removed by hand picking.



(Drying, sorting and crushing of neem seeds)

- (c). **Shelling of seed and winnowing:** Once completely dried, the seeds are shelled by pounding to get clean kernels. The pounded mass is then subjected to winnowing to separate the seeds from the shells.



(Shelling and winnowing of seed)

- (d). **Crushing the kernels:** The cleaned kernels are then crushed by pounding using mortar and pestle to obtain a fine mesh. To facilitate the next step, the crushed material is then winnowed.



- (e). **Sieving:** The pounded pulp is then sieved using a very fine-sized sieve to obtain a fine greenish brown powder.



- (f) **Steaming:** The neem powder is then steamed by placing it over boiling water for about 15 – 20 minutes. This exercise allows for the formation of the dough from which oil can be readily extracted.



(Steaming of neem dough)

- (g). **Oil extraction using the pressing machine:** Upon the formation of dough, the hot material (dough) is enclosed in a fine cloth or empty bag capable of allowing liquid passage and then placed in the barrel of oil extraction machine. Inside the barrel, is a metal lid which is placed on the enclosed dough to be pressed. The pressing is done by turning the metal wrench-bar in a clockwise direction and when enough pressure is exerted on the dough, oil will start to flow from the mouth of the barrel which is then collected below.



(Pressing to extract oil from the neem seeds)



(Collecting the neem oil)

If the exercise is done correctly, one can get between 100 - 150 ml of neem oil from 1 kg of neem seeds

11. Pesticide formulation

Once the neem oil is extracted, the final step involves the formulation of the organic pesticide. For most crops, it is recommended to dilute 0.25 ml of neem oil with 20 litres of water to be applied as aerial spray. Spraying on crops can be done with a Knapsack sprayer or simply dipping a broom and sprinkling the liquid on crop leaves.



(Organic pesticide formulation demonstration)

C. Properties of neem organic pesticide

The neem tree contains various insect repelling compounds (*azadirachthin*, *meliantriol* and *salannin*), which inhibit the maturation or feeding ability of insect pests without having any adverse effects on birds and mammals. These substances are known to have been used as insecticides in many parts of the world and have been reported to be successful in pest and disease control. In The Gambia, Phyllis Kasper (1993) reported on the use of the neem tree materials for the control of various pests among the farming community.

D. Advantages of neem organic pesticide

Besides the numerous uses and benefits associated with neem tree products which include its anti-fungal and pesticide properties, neem organic pesticide has the following advantages:

1. They are readily available in most localities in the tropics.
2. Less expensive to prepare.
3. Easy to prepare and apply.
4. Less toxic to non-target (more environment friendly).
5. Handling and application does not require high level training
6. Required simple application equipment and techniques.

E. Some of the most important documented uses of neem

1. Neem products have antiseptic, fungicidal and nematocidal properties. As a fungicide, neem oil is mainly used as a preventative material when the disease is just beginning to manifest symptoms.
2. Neem leaves can be used as a soil conditioner and organic manure. The neem cake (by-product from pressing of Neem fruits and kernels), can be used as organic manure and typically contain about 4% Nitrogen, 0.5 % Phosphorus and 0.5% Potassium and smaller quantities of micro nutrients.
3. The cake is also used to protect eggplant from borers and tomato from leaf spot diseases.
4. Research indicates that neem products are not harmful to humans or animals. Pests will not develop resistance over time while most beneficial insects will be spared.
5. Neem oil has insecticidal and medicinal properties and has been used in pest control, cosmetics, medicines, etc for many years.
6. Neem leaves are often by local communities in storage of grains and are considered very effective in warding off insects. Twigs of neem are also used in India and Africa as toothbrushes and are believed to effective against mouth and gum diseases.
7. Neem leaves and seeds are used by locals for relieving pain, inflammation, treating fevers, healing of cuts, burns, sprains and headaches.
8. Neem extracts have been approved by the U.S. Environmental Protection Agency for use on food crops. Various studies have shown that neem is non-toxic to birds, beneficial insects or humans and protects crops from over 200 of the most costly pests.
9. Neem is a key ingredient in Non-Pesticide Management (NPM), providing a natural alternative to synthetic pesticides. Neem does not directly kill insects on the crop. It acts as an anti-feedant, repellent, and egg-laying deterrent thus protecting the crop from damage.