

NEEM – BOON FOR ORGANIC AGRICULTURE

Naveen^{1*}, Neeraj Kumar² and Priyanka Kumari Meena³

¹Ph.D. Scholar, Department of Entomology, RVSKVV, Gwalior,
Madhya Pradesh

² Ph.D. Scholar, Department of Entomology, JNKVV, Jabalpur,
Madhya Pradesh

³Ph.D. Scholar, Department of Plant Pathology, Rajasthan Agricultural Research Institute,
Jaipur, Rajasthan.

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INTRODUCTION

India is mainly an agricultural country, with over a hundred million people reliant on agriculture for their living. The success of agricultural output remains crucial to the liberalised Indian economy, with agriculture accounting for 35 to 40% of India's national income. It will be impossible to fulfil the increasing population's food demands at the current rate of food production.



Agriculture has been practised in India for over 5000 years. The area was cared for with natural resources and organic materials until approximately 1950. Chemical fertilisers and pesticides were unheard of, and livestock were an important part of farming. Albert Howard, a prominent agricultural scientist, stated in the early twentieth century that Indian farmers utilised compost and organic manures, which allowed them to cultivate on the same ground for over 2000 years without losing yields. He went on to say that the crops were pest-free and nearly as long-lasting as the prehistoric forest.

Pest management in most developing nations today is mostly based on the use of imported insecticides. This reliance must be lessened. Although pesticides are typically advantageous in terms of direct crop yields, their usage frequently results in environmental pollution, damage to beneficial insects and wild biota, unintentional poisoning of humans and livestock, and the twin issues of pest resistance and comeback.



Over 500 pest arthropods have developed resistance to one or more pesticides. The resistance of the cotton bollworm, *Helicoverpa armigera*, in India and Pakistan, and the Colorado potato beetle, *Leptinotarsa decemlineata*, in the United States, to all available insecticides, and the resistance of the diamond black moth, *Plutella xylostella*, in Hawaii, Malaysia, the Philippines, Taiwan, and Thailand, to all classes of insecticides, including *Bacillus thuringiensis*, in Hawaii, Malaysia. Pest status shifts from minor to significant, and pest resurgences, such as white flies, induced by direct or indirect loss of pest's natural enemies, are two more unpleasant consequences of pesticide usage.

NEEM IN PEST MANAGEMENT

Unlike chemical insecticides, neem compounds target the insect's hormonal system rather than the digestive or neurological systems, preventing subsequent generations from developing resistance. These compounds are part of a group of natural products known as liminoids. Neem contains liminoids, which make it a safe and efficient insecticide, pesticide, nematicide, and fungicide. Azadirachtin, salanin, meliantriol, and nimbin are the most important liminoids discovered in neem that have been shown to inhibit insect development. Azadirachtin is now thought to be neem's primary insect-control agent. 'It appears to have a 90% effect on the majority of pests.' It repels and disrupts insect growth and reproduction rather than killing them (at least not immediately). It has been proven over the years to be the most effective growth regulator and feeding deterrent ever tested. Many pest insect species, as well as some nematodes, will be repelled or reduced from feeding. It's so strong, in fact, that merely a trace of it stops some insects from reaching the plants.

Neem extracts are known to act on various insects by:

- Disrupting or inhibiting the development of eggs, larvae or pupae.
- Inhibiting the formation of chitin.
- Blocking the moulting of larvae or nymphs
- Deterring feeding
- Sterilizing adults
- Repelling larvae and adults
- Disrupting mating and sexual communication
- Deterring females from laying eggs

- Poisoning larvae and adults
- Blocking the ability to "swallow" (that is, reducing the motility of the gut)
- Sending metamorphosis awry at various stages

USES OF NEEM BASED PRODUCTS:

1. Neem Kernel Aqueous Extract (NKAE):

The simple method of Neem Kernel Aqueous Extract preparation and spray consist of following steps –

- Take dried neem seed. Decorticate (Removal of seed coat) it with the help of mortar and pestle or any mechanical decorticator. Clean the neem kernel and seed coat mixture by winnowing seed coat.
- Weigh 1 kg of clean neem kernel and make powder of grain size like fine tea powder. It should be pounded in such a way that no oil comes out. Soak it in an about 10 lit of clean water. Add 10 ml of pH neutral adjuvant (mixture of emulsifier, spreader etc.) and stir the mixture.
- Keep the mixture overnight and filter it on the next day with clean muslin cloth. Put water in the residue and repeat the extraction 2-3 times. Use residue as manure for plants.
- The spraying of 1.25% to 5% (Neem Kernel wt. Basis) of NKAE is recommended on the crops.
- The use of it is recommended as a preventive at lower concentration and protective at higher concentration i.e. up to 5 %.
- Use the spray solution on the same day.
- Spraying should be done in the low intensity of sunlight preferably in the afternoon.
- The effect of the NKAE remains for 7-10 days. Care to be taken to cover all plant foliage with NKAE.



2. Neem Leaf Extract

1 kilogramme of green neem leaf is needed to make 5 litres of water. Because the amount of leaves needed to make this extract is fairly large (almost 80 kg for 1 acre), it can

be utilised in nurseries and kitchen gardens. The leaves are steeped in water overnight. The leaves are crushed the next day, and the extract is filtered. The extract is beneficial against leaf eating caterpillars, grubs, locusts and grasshoppers. To the extract, emulsifier is added as mentioned in kernel extract.

3. Neem Cake Extract

100 g of Neem cake is required for 1 litre of water. The Neem cake is put in a muslin pouch and soaked in water. It is soaked overnight before use in the morning. It is then filtered and emulsifier is added -1-ml for 1-litre of water. It can then be used for spraying.



4. Neem Oil Spray

15-30 ml Neem oil is added to 1 litre of water and stirred well. To this emulsifier is added (1ml/1litre). It is very essential to add the emulsifier and mix properly. This should be used immediately before the oil droplets start floating. A knapsack sprayer is better for Neem oil spraying in preference to a hand sprayer.



PRECATUTIONS FOR USING NEEM EXTRACTS /FORMULATIONS:

Spraying should be undertaken in the morning or late in the afternoon. Insects lay eggs on the underside of the leaves. Hence it is important to spray on the underside of the leaves as well.

Caution

The active principles of Neem are destroyed by:

- Heating and boiling the extract- do not boil the mixture
- Acidic or alkaline pH emulsifier- use neutral pH emulsifier
- Ultraviolet rays of sunlight - Spry during moderate sunlight,
- Hydrolysis of water- use aqueous extract on same day

NEEM AGAINST NON-INSECT PESTS

Research in recent years has shown that neem is quite effective against non-insect pests also.

For protecting Stored Grains

- In Asia, one of the traditional applications of neem has been to control pests in stored goods.
- Farmers typically combine neem leaves with grain before storing it for months.
- Weevils, flour beetles, bean-seed beetles, and potato moths are all insects that are repelled by neem leaves, oil, or extracts.
- Neem oil treatment of jute sacks is ineffective and inhibits pests such as weevils and flour bugs from penetrating.
- Annual losses in storage account for up to 10% of all stored grain globally, i.e. 13 million tonnes of grain lost owing to insects or 100 million tonnes due to improper storage.

Neem for Soil Fertility and Fertilizer Management

- Traditionally, Indian farmers have used de-oiled Neem cake as a fertiliser in their fields.
- Neem cake is a popular input because of its dual function as a fertiliser and a pest repellent.
- The leaves of the neem tree have also been used to improve soil.
- They're both frequently utilised to fertilise cash crops in India.
- Neem cake protects plant roots against nematodes and white ants when ploughed into the soil.

Threadworm are among the most devastating agriculture pests.

- These pests have been found to be sensitive to neem products, according to research.
- 'Active protection/defence against root-knot nematodes is provided by certain liminoid fractions isolated from neem kernels.'
- Nematicidal properties are also seen in water extracts of neem cake.
- Cardamom growers in south India are already using neem cake for commercial purposes.
- Fungi attack plants and trees in a variety of ways.
- The fungus *Aspergillus flavus* was not killed by neem-leaf extracts, but they totally prevented it from generating aflatoxin'. This is important because aflatoxin is a



powerful carcinogen that is causing increasing concern regarding the world's food supplies.

CONCLUSION

- Neem Kernel Aqueous extract is the most potent growth regulator and feeding deterrent ever assayed.
- It will repel or reduce the feeding of many species of pest insects as well as some nematodes.
- The effect of the NKAЕ remains for 7-10 days.
- The Neem extract can be used to kill caterpillars, grubs, locusts and grasshoppers.
- Neem acts as a fungicide and could have enormous positive effects on agriculture, environment and food supply.
- Neem-leaf extracts failed to kill the fungus *Aspergillus flavus* but completely stopped it from producing aflatoxin.