



Botanical Formulations from Neem in Organic Agriculture

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The plant kingdom is recognized as the most effective producer of chemical compounds, synthesizing many products that are used as defense against different pests. Botanical extracts induce insecticidal activity, repellance to pests, antifeedant effects and insect growth regulation, toxicity to nematodes, mites and pests, as well as antifungal, antiviral and antibacterial properties against properties. These are unique because they can be produced easily by farmers and small industries. As consumers' demand for organically produced foods increases, use of neem extracts in Integrated Pest Management is now gaining momentum.

Introduction

Neem (*Azadiracta indica*), the versatile tree having many good and useful qualities is indigenous to India. Neem is known for its "bitter taste" derived from limonoids, a group of tetranortriterpenoids of which *azadiractin* is the most active. Neem products have shown activity on a wide range of insect pests of many crops worldwide, and its derivatives are known to have distinct antifeedant and growth inhibitory effects. Although all parts of the tree repel insects, extracts of the seeds are outstanding repellents and feeding deterrents for a broad spectrum of economically agricultural and household insects-pest. Seed extracts deter at least 25 species of crop pests from feeding, inhibit the growth and development of others and render others sterile, 140 active components have been identified to date that occur in different parts of tree. The most important component identified has been the tetranortriterpenoids (limonoids) the azadiractin. Unlike most of the present insecticides available on the market, the seed extracts appear to be non toxic to man and animals and are essentially non-phytotoxic. Biologically active principles isolated from different parts of the plant include: azadiractin, meliacin, gedunin, salanin, nimbin, valassin and many other derivatives of these principles. Meliacin forms the bitter principles of neem seed oil, the seed also contain tignic acid (5-methyl- 2-butanic acid) responsible for the distinctive odour of the oil. These compounds belong to natural products called triterpenoids (Limonoids). The active principles are slightly hydrophilic, but freely lipophilic and highly soluble in organic solvents like, hydrocarbon, alcohols, ketones and esters. The insecticidal effect of neem has been proved on several insect groups, including Lepidoptera, Diptera, Coleoptera, Homoptera and Hemiptera species.

Different Formulations of Extracts from Neem

Neem Leaf Extract

Method 1:

Materials required: 2 kg of neem leaves, Mortar and pestle, cotton cloth, Pot, Soap, Strainer,

Methods of preparation: Pound neem leaves gently. Place in a pot. Add 2-4 liters of water. Cover the mouth of the pot securely with the cloth and leave it as such for 3 days. Strain to get clear extract. String 10-12 kg of neem leaves are needed for 0.4 ha.

How to use: Dilute 1 liter of neem leaf extract with 9 liters of water. Add 100 ml of soap. Stir well. Spray on the infested plants.

Pest target: Aphids, Colorado beetles, Grasshoppers, Grubs, Japanese beetles, Leaf hoppers, Locusts, Plant hoppers, Scales, Snails, Thrips, Weevils, White flies

Method 2:

Materials required: 5 kg of neem leaves, 5 lit. of cow's urine, 2 kg cow's dung Mortar and pestle, cotton cloth, Pot, Soap, Strainer,

Methods of preparation: Five kg of neem leaves was crushed in 1 lit. of water and mixed with 5 lit. of cow's urine and 2 kg cow's dung, and kept for 24h for fermentation with intermittent stirring.

How to use: The extract was filtered and used for spraying.

Pest target: All sucking pests

Neem seed extract

Materials required: 3-5 kg of neem seeds, Mortar and pestle, cotton cloth, earthen pot, Soap, Strainer and String.

Methods of preparation: Remove the shells. Pound seeds gently. Place in a pot. Add 10 liters of water. Cover the mouth of the pot securely with the cloth and leave it as such for 3 days. Strain to get clear extract

How to use: Dilute 1 liter of this extract with 9 liters of water. Add 100 ml of soap. Stir well. Spray on the infested plants.

Pest target: Aphids, Beetles, Bugs Grasshoppers, Grubs Flies, Leafhoppers, Locusts, Moths, Nematodes, Planthoppers, Scales, Snails, Thrips Weevils, Whiteflies

Neem Seed Kernel Extract

Materials required: Neem seed kernel, teepol, muslin cloth

Methods of preparation: Five kilograms of neem seed kernel were ground gently and soaked in 10 lit. of water overnight. Squeeze the soaked material repeatedly for better extraction of the azadirachtin in the aqueous suspension. Then, in the next day morning, the content was stirred till solution becomes milky white, filtered through double layer of muslin cloth and it was made to 100 litres. Filter the contents through muslin cloth.

How to use: Add 1 ml teepol or soap water (2%) and spray. The seeds that are used for the preparation of neem kernel extract should be between three and eight months old. Otherwise, the quantity of azadirachtin in the seeds is quite low and hence they cannot be efficiently used for pest control.

Pest target: All sucking pests

Neem Seed Powder Extract

Materials Required: Matured, dried neem seeds, Mortar and pestle, Basin, pail, Muslin pouch, Strainer, Soap (5 ml/10 l of water), Water.

Methods of preparation: Remove shells and pulps from seeds in the desired amount. Then pound seeds gently in such a way that no oil comes out. Once done, put the desired amount of powder in a pail of water. Stir well for about 10 minutes and steep for at least 6 hours but not more than 16 hrs. Stir it again for another 10 minutes. Strain. Add soap. Stir well.

How to use: Spray on the infested plants thoroughly. Spray early in the morning or late afternoon.

Pest target : Cotton bollworm ,Aphids ,Colorado beetles ,Cotton leaf roller ,Cutworm ,Diamondback moth ,Fall armyworm , Grasshopper ,Japanese beetles ,Leaf miner ,Leaf hopper , Locust ,Mexican bean beetle ,Whiteflies

Neem Oil Extract

Materials Required: 40 ml neem oil, 1 liter of water, A few drops of soap , Basin

Methods of preparation: Forty millilitres of neem oil are added to the emulsifier and stirred well to ensure that the oil and water can mix well. After this, 1 litre of water is added and stirred well.

How to use: It should be used immediately otherwise oil droplets will start floating. A knapsack sprayer is better for neem oil spraying than a hand sprayer. Spray immediately on infested plants.

Pest target: Aphid, Leafminer, White fly

Neem Seed Oil Suspension in Water Extract

Materials required: 5 kg of finely ground neem seeds, 1/2 liter of hot water, Soap, Basin

Methods of preparation: Put the finely ground seeds into a basin. Add hot water little by little until it is possible to knead the mixture. Knead and press the mixture to get the oil.

Approximately 650-750 ml oil is extracted from this mixture.

How to use: Take desired amount of neem oil and mix with soap before adding water. Stir thoroughly to prevent oil separation. Fill in the knapsack sprayer. Spray thoroughly on infested plants.

Pest target: Aphids, Brown planthopper, Flea beetle, Leafhopper, Potato tuber moth, Psyllid, Scaleinsects, Whitefly, Whorlmaggot

Neem Cake Extract

Materials Required: 1 kg of pounded neem cake, Muslin pouch, Soap (1 ml/liter of water).

Methods of preparation: Soak one kilogram of neem cake in 5 litres of water for 2 days and filter through muslin cloth.

How to use: Dissolve 200 g of soft soap in the filtrate and make up to 10 L of water before spraying. Stir well. Spray on infested plants.

Pest target: Tobacco cutworm, leaf miners of citrus, groundnut, tomato and beans

Benefits of Neem

Some of the important advantages of neem based products, which differs it from its synthetic counterparts are as follows:

1. They are environmental friendly and do not contaminate terrestrial and aquatic environment.
2. They are non toxic.
3. They can be used in combination with other pesticide and oil for more effectiveness.
4. They possess anti-feedant properties, which helps to protect the plants.
5. Pests generally do not develop resistance to them.
6. They are generally water soluble and help in the growth of the plants.
7. They act as pest reproductive controller.
8. They help to nourish and condition the soil.
9. They are relatively less expensive.

Conclusion

Today Neem is recognized as a natural product which has much to offer in solving global agricultural, environmental and public health problems. The magical tree and hundreds of its active compounds are used to manufacture a number of products. Natural properties do not have any toxic reactions, so they are helpful in plant protection and management. Extracts derived from Neem act as powerful Insect Growth Regulators (IGR) and also help in controlling several nematodes and fungi. It also reduces insects growth in crops and plants.