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ORIGINAL PAPER



Role of bio-pesticides in vegetable crop production

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INTRODUCTION

A class of insecticides known as "biopesticides" uses non-toxic manufacturing techniques to manage pests in a way that is good to the environment. Bio pesticides, which are derived from plants like *Azadirachta* and *Chrysanthemum*, and microorganisms like the *Nucleopolyhedrosis virus*, *Bacillus thuringiensis* and *Trichoderma*, pose less risk to people and the environment than conventional pesticides. They are becoming more popular as a new tool for getting rid or controlling pest species like weeds, plant diseases, and insects (harmful enemies). Globally, the use of bio pesticides has been rising by almost 10% annually.

Table 1. Mode of action of few selected botanical pesticides on selected crop pests.

Bio- Pesticide	Target Pest	Mode of action	Crops
Neem (<i>Azadirachta indica</i>)	Cotton ballworm (<i>Helicoverpa armigera</i>)	<ul style="list-style-type: none"> • Binding to acetylcholine receptors by disrupting the nervous system. • Neuro-toxicant effects on insect pests causing paralysis and knock down. 	Chilli, Tomato, Okra, cotton and other wide range of crops.
Garlic (<i>Allium sativum</i>)	Red flour Beetle (<i>Tribolium castaneum</i>)	<ul style="list-style-type: none"> • Interfere with oviposition and egg hatching. 	Stored grains, nuts and baked products.

Aloe Vera (<i>Aloe Barbedensis</i>)	Larvae of aphids, spider mites & caterpillars	<ul style="list-style-type: none"> Inhibit ATP production and Glucose Uptake. 	Solanaceae crops like Brinjal / Eggplant, Rape seed etc.
Tumeric (<i>Curcuma Longa</i>)	Cabbage loopers { <i>Trichoplusia ni</i> (Hubner)}	<ul style="list-style-type: none"> Destruction in membrane proteins, inhibition of ATPase activity and cell respiration. mortality, repellence, toxicity and inhibition of progeny emergence 	Cabbage and other wide range of agronomical crops.

(Source: Seenivasagan, R. and Babalola, O. O. 2021)

Neem component like NSKE (Neem Seed Kernel Extract) and is extracted from the Neem tree, *Azadirachta indica* Juss, a member of the *Meliaceae* family that originates from the Indian subcontinent and is now valued worldwide as an important source of phytochemicals for use in human health and pest control. Its components contains at least 100 biologically active compounds. Among them, the major constituents are triterpenes known as limonoids, the most important being azadirachtin which appears to cause 90% of the effect on most pests. Other components present include meliantriol, nimbin, nimbidin, nimbinin, nimbolides, fatty acids (oleic, stearic, and palmitic), and salannin.

Table 2- Neem components and its effect on different horticultural crop pest

Neem component	Fruit crop	Vegetable crop	Pests
Neem oil 2% and NSKE 5%	-----	Brinjal	Red spider mites, <i>T. macfarlanei</i>
NSKE (5%) and Neem Azal (Azadirachtin 1%)	-----	Okra	Aphid (<i>A. gossypii</i>), Leafhopper, (<i>Amrasca biguttula</i>), Whitefly, (<i>Bemisia tabaci</i>).
Neemarin 1500 and 10000 ppm both at 5 and 6 ml/ litre of water	-----	Cabbage	Leaf Webber, <i>Crocidolomia binotalis</i> , Tobacco Caterpillar, <i>S. litura</i> F., DBM <i>P. xylostella</i> L.
Neem oil 2%	-----	Ridge guard	Leaf miner, <i>Liriomyza trifolii</i>
NSKE 5%	-----	Potato	Potato tuber moth

Neem oil at 4%	Citrus	-----	Mealybugs, <i>Planococcus citri</i> and citrus psylla, <i>Diaphorina citri</i>
Neem Azal (4%) (Stem injection)	Banana	-----	Banana pseudo stem weevil, <i>Odoiporus longicollis</i>

(Source. Elanchezhyan K. and Vinothkumar B. 2015).

PREPARATION OF NEEM BASED BIO PESTICIDE

Neem oil spray

(A) For Kitchen Garden: To 1 litre of water, 15–30 ml of neem oil (2-4%) is added and thoroughly mixed. This is then mixed with a surfactant (1m/1litre), such as dishwasher or soap solution. It's crucial to properly combine and incorporate the emulsifier before spraying. Utilizing a spray bottle, this should be done as soon as the oil droplets begin to float.

(B) For Field : Mix neem oil (2-4%) (3 litre) with 200 ml of soap solution and spray an acre in 200 litre of water. A knapsack sprayer is better for Neem oil spraying in preference to a hand sprayer.

Neem Kernel Seed Extracts 500 to 2000 ml per tank (10 litres capacity)

For an acre, 3 to 5 kg of neem kernel are needed. Use only the kernel of the seed; discard the outer seed coat. Three kilogrammes of kernel, if the seeds are fresh, are sufficient. 5 kg are needed if the seeds are old. Gently pound the kernel and bind it with a piece of cotton fabric. Put this in a container with 10 litres of water and soak it overnight. Following that, it is filtered. 6-7 litres of extract can be produced after filtering. This extract should be diluted with 9 ½ or 9 litres of water, between 500 and 1000 ml respectively. For the extract to adhere properly to the leaf surface, khadi soap solution @ 10 ml/litre should be added before spraying. This concentration of the extract can be increased or decreased depending on the intensity of pest attack.

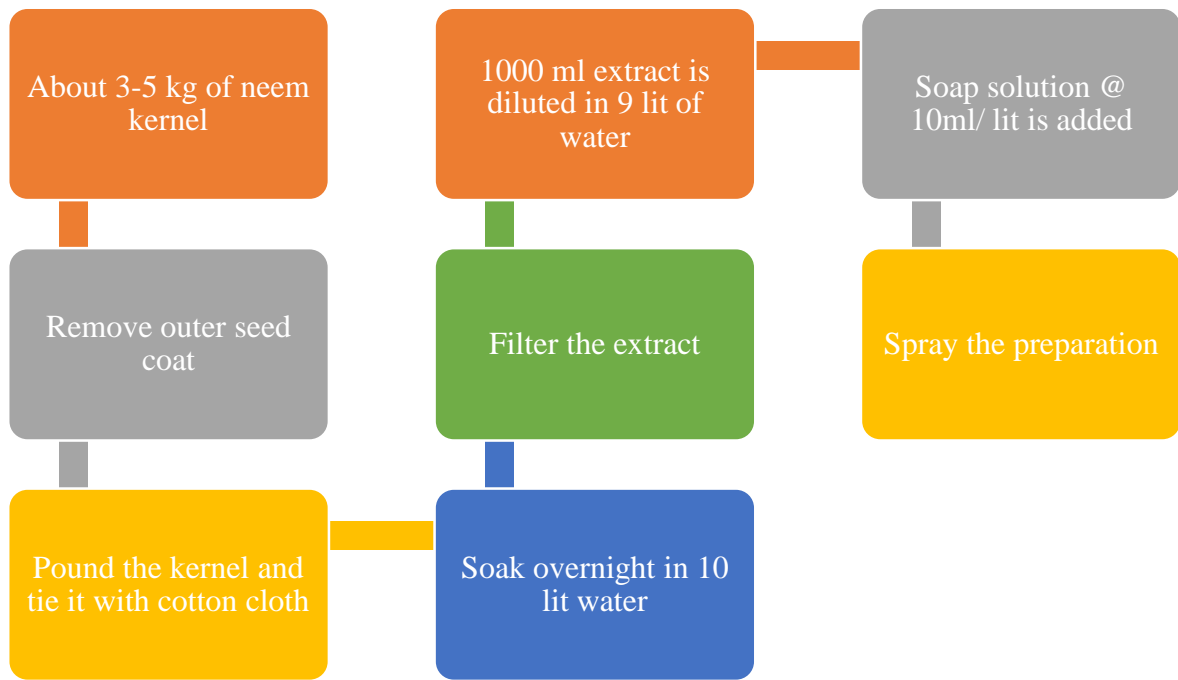


Figure 1. Flow chart of NSKE preparation

CONCLUSION

These kinds of botanical bio-pesticides have a negligible bioavailability, are less toxic, and do not significantly disrupt the food chain. Neem, which is non-toxic and beneficial to the environment, can be utilised widely without endangering the ecology and its constituent parts. For a better and more sustainable future, all of its components, including the leaves, seeds, kernels, bark, and by-products, can be used.

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