



ROLE OF NEEM IN PEST MANAGEMENT

Suresh Kumar Yadav, Prakash Chand Yadav and Chhagan Lal*

Department of Entomology, RCA, MPUAT, Udaipur (Raj)

*Division of Plant Breeding & Genetics, RARI, Durgapura, Jaipur (Raj)

Neem (*Azadirachta indica* A. Juss: Meliaceae) is a large, evergreen, hardy tree, native to the Indian sub-continent and well known their as the ' Botanical Marvel', It is an old and new insecticide. In our country neem is using from prehistoric times, primarily against household and storage pests, and to some extent against pests related to field crops. Neem kernel and leaves contain so many compounds which are useful for pest management. Unlike chemical pesticides, neem compounds work on the insect's hormonal system, not on the digestive or nervous system and therefore does not lead to development of resistance in future generations. These compounds belong to a general class of natural products called 'limonoids'. However, if neem seeds are consumed directly, these are highly toxic. But neem is harmless to other beneficial insects like birds, bees and ladybirds. The liminoids present in neem is very effective insecticides, pesticide, nematicide, fungicide etc. The most liminoids found in neem with proven ability to block insect growth are: azadirachtin, salanin, meliantriol and nimbin. Azadirachtin has shown bactericidal, fungicidal, and insecticidal properties, including insect growth regulating qualities. It is systemic in nature, absorbed into the plant and carried throughout the tissues, being ingested by insects when they feed on the plant. Thus, it is effective against certain foliage-feeders.

Azadirachtin is a tetranortriterpenoid, structurally similar to insect hormones "ecdysones", its biological activity as ecdysone-blocker thus disturbing insect growth. This substance interferes with synthesis of the insect molting hormone, a-ecdysone, as well as other physiologically active neuropeptides in insects. Certain hormones are necessary for growth and development of insects. These hormones control the process of metamorphosis as the insects pass from larva to pupa to adult. Azadirachtin blocks those parts of the insect's brain that produce these vital hormones. As a result, insects are unable to molt. It is through these subtle hormonal effects that this important compound of neem breaks the life cycle of insects. The insect populations decline drastically as they become unable to reproduce. But, for all the uncertainty over details, various neem extracts are known to act as various insects in the following ways:

Effects of neem on insect pests

| | |
|---|--|
| • Changes in biological fitness of larvae and adults. | • Fecundity suppression and Sterilisation |
| • Inhibition of Sexual communion | • Blocking the molting of larvae or nymphs |
| • Repelling larvae and adults Sterilizing adults | • Detering females from laying eggs Poisoning larvae and adults |
| • Detering feeding | • Sending metamorphosis awry at various stages |
| • Inhibiting the formation of chitin. | • Oviposition deterrent |
| • Blocking the ability to "swallow" (that is, reducing the motility of the gut) | |

All these effects listed above are not equally strong or certain. Blocking the larvae from molting is considered to be neem's most important quality which can be used to eliminate many pest species. In spite of high selectivity, neem derivatives affect ca. 400 to 500 species of insects belonging to Blattodea, Caelifers, Dermaptera, Diptera, Ensifera, Hetroptera, Hymenoptera, Isoptera, Lepidoptera, Phasmida, Phthiraptera, Siphonoptera and Thysanoptera, one species of ostracad, several species of mites, and nematodes and even noxious snails and fungi, including aflatoxin-producing *Aspergillus flavus*. Results of field trials in some major food crops in tropical countries will illustrate the value of neem based pest management for enhancing agricultural productivity in India.

Use of neem in storage

One of the traditional uses of neem in india has been for controlling pests of stored products. Farmers generally mix grains with neem dried leaves before keeping it in storage for several months. Neem leaves, oil or extracts acts as repellent against several insects such as weevils, flour beetles, bean-seed beetles and potato moths. Treatment of jute sack by neem oil or azadirachtin-rich-products prevents the penetration of pest like weevils and flour beetles. Neem oil destroys the bruchids. A mixture of neem leaves with clay and cow-dung develops pest resistant property so it can be used to make bins for storage of grain.

Future perspective:

The current crop of pests has developed resistance to a wide range of pesticides. Farmers are thus caught in a vicious circle the moment they start using chemicals. The Indian people have for millennia used this tree in agriculture, public health, medicine, cosmetics and livestock protection. The technology and practices that are being promoted are aimed at rejuvenating local low-cost use of neem as a bio-control agent. It is meant to serve as a sustainable-agriculture initiative.

References:

- Grace, W. R. (1991).** MSDS for Margosan-O. Washington Research Center, Columbia, MD. International Rice Research Institute, Philippines. 24-25 PP.
- Saxena, R.C., Jilani, G., and Abdul Karim, A. (1989).** Effects of neem on stored grain insects. In: M. Jacobson (ed.), Focus on Phytochemical Pesticides, Vol. 1, The Neem Tree, Boca Raton; Arc Press, pp. 97 – 111.
- Schmutterer, H. (1990).** Properties and potential of natural pesticides from the neem tree, *Azadirachta indica*. *Annual Review of Entomology*, **35**: 271 – 297.