

## Neem: A Botanical Plant for Pest Control

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Over the years, injudicious use of commercially available synthetic pesticides against phytophagous insects has led to many problems such as pest outbreak, pest resurgence and their bioaccumulation in the environment causing increased resistance and reduction in soil biodiversity. About 90% of the applied pesticides enter the various environmental resources as a result of run-off, exposing the farmers as well as consumers of the agricultural produce to severe health issues such as cancer. Therefore, growing attention has been given towards the development of alternate environment friendly pesticides/insecticides that would help an efficient pest management system and also prevent chronic exposures leading to diseases. One such strategy is, the use of neem, *Azadirachta indica* belonging to the meliaceae family and native to India and Burma. It has more than 200 allelochemicals prevalent in variable concentrations in the different parts exhibit agro-medicinal, insecticidal as well as immunomodulatory and anti-cancer properties. The active ingredient is a mixture of Azadirachtin, melantriol, salannin, nimbin and nimbidin and all these belong to group of tetranortriterpenoid (limonods). The most prominent constituent of neem is azadirachtin found in seeds and leaves and it varies from 2-4mg/g kernel and also has several stereoisomers, but so far 7 stereoisomers have been reported viz., AZA (A-G). Azadirachtin A constitutes 85% followed by Azadirachtin B which is almost 14%. Azadirachtin has been found to be effective as a feeding deterrent, repellent, toxicant, repungent, sterilant and growth disruptant. Azadirachtin interferes with the growth and molting process of insects. Its ingestion leads to abnormal molts, inhibit cell division as well as protein synthesis, growth reduction and increased mortalities. Azadirachtin prevents oviposition by inhibiting oogenesis and synthesis of ovarian ecdysteroid. In males, azadirachtin acts by interrupting the meiotic process

responsible for sperm production. Neem products influence fecundity in female insects in adose-dependent manner. Seed cake obtained during the processing of neem oil is a vital natural fertilizer as in neem coated urea used in the common agricultural practices. Additionally, neem leaves have been employed for centuries against the stored grain pests due to its repellent properties. Neem oil extracted by cold-pressing the seed kernels of neem is highly effective against soft-bodied insects and mites. Neem oil is non-toxic to mammals, birds and fishes and exhibits fewer chances of resistance, due to its multiple mode of action on insects. The larvicidal property of neem oil against mosquitoes has long been investigated. Neem bark extract based dyed fabric exhibit anti-lepidopteran due to the presence of higher azadirachtin, cyanogenic glucosides, and nimbin content than leaves. Collectively, all parts of this plant are known to exhibit by-products that inherently impart an internal chemical defense making neem free from the pest attack, which can also be exploited to develop an efficient pest control strategy.

