



BOTANICAL PESTICIDES - GREEN WEAPONS FOR SUSTAINABLE PEST CONTROL (A need for Environmental safety)

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ABSTRACT

Stress on agricultural sector for production of sufficient food for overgrowing population has necessitated application of novel technologies. Green Revolution has shown a instant panacea providing food security, but at the same time resulted in a serious environmental and health consequences, pest resistance, seeking a way in search of eco friendly alternatives to check pesticide problem.

Bio pesticide application as a part of IPM, gave a tremendous results with eco friendly, easy and efficient methods for agricultural sector. As all the Bio pesticide are not in handy, small and marginal farmers, not in a position to procure, and those in remote area turn to apply available plant extracts as natural bio control agents to control pest., often called as Botanical Pesticides. . These Botanical Pesticides were used by our ancestors in traditional farming system, which over shadowed by modern synthetic pesticides. But easy availability, simple extraction methods, reduced health effects, low cast, biodegradable, farmer friendly systems made them resurrect once again. In this article major botanical pesticides having long history, and some of the botanical pesticides which were practising now in rural area which will have to be given due recognition for their bio pesticidal properties were discussed.

Key words: Pests, Biological control, botanical pesticides, Plant extracts, Eco friendly control

INTRODUCTION:

Achieving Food security in a sustainable manner is the prime goal for further agricultural and rural development of every developing nations.¹ Insect pests and diseases and weeds are potential threats to agricultural production.² Introduction of Green Revolution using Hybrid varieties, chemical fertilizers and chemical pesticides, spiked the utilization to a peak position.³ Although high pesticide utilization, decline in production also noticed .⁴ &⁵. Indiscriminate use of Pesticides resulted in pest resurgence, outbreak of new pests, toxicity to non target organism, hazardous effect on environment ,endangered the sustainability of ecosystems.⁶ Due to this impact and concern on environment , decline of pesticide utilization witnessed³ and seeking new and alternative pesticide methods necessitated.⁷

In this juncture, Integrated Pest Management methods by natural enemies, became prominence using *Trichogramma*, *Bacillus thuringiensis*, *Bracons*, *NPVirus*,



Trichoderma etc. About 160 such natural enemies studied for control of insect pests.⁸ But due to the several constraints such as slow action, short self life, host specificity⁹, only 2% of area of total used biopesticide, and claim only 2% share in biopesticide market.¹⁰ These lead to the further alternate bio pesticide search.

The search for novel pesticides leads to utilization of natural bio chemical compounds of plants in one promising way.¹¹ Among the biopesticides of 3 major groups, bio chemical pesticides or botanical pesticides emerged as novel weapons against pests. All chemical compounds such Pheromones, plant extracts, plant volatiles, essential oils, included in this which collectively termed as Bio Control Agents.¹² These chemical compounds are part of plant defence mechanism of against many insects for the survival of fittest.

Many of these Botanical pesticides are eco friendly, less risk to humans, animals, their selective mode of action, avoidance of emergences of resistant race of pests, can be used in IPM.¹¹ They can be used as potential fungicides, nematicides, herbicides, weedicides and insecticides,¹³ Azadirachtin, Pyrethrum, Rotenone and Essential oils are the major botanical pesticides used since ancient times.

Azadirachtin:

Neem (*Azadirachta indica. L.*, Meliaceae family) is a colossal of botanical pesticide, containing Azadirachtin, Nimbin, Nimbidin. Azadirachtin, the principle active compound is used in more than 400 different biopesticidal formulations.¹⁴ It posses repellent, antifeedant activity.¹⁵ growth inhibitor¹⁶ but slow action, and relative high cost made it less commercial.¹⁷

Pyrethrum:

Pyrethrum from the dried flower of *Tanacetum cinerariaefolium* (Asteraceae) constitute another major botanical pesticide. 20-25% of technical grade pyrethrin¹⁸ called Pyrethrum is a potent insecticide acts as neurotoxin. It is mainly used in domestic and green pests.

Essential oils:

Essential oils of Lamiaceae also constitute as botanical pesticides. Rosemary (*Rosemarinus officinalis*), Eucalyptus oils (*Eucalyptus globus*), Eugenol(*Sizygium aromaticum*), and Menthol (*Mentha sps*)¹⁹ and act as contact insecticidal and fumigant. It is mainly used in domestic and green pests.²⁰

Rotenone:

Rotenone, constituent of Derris, Tephrosia is another mitochondrial poison causing energy depletion and a major botanical pesticide and used as garden purpose.²⁰



Nicotine:

Nicotine, Nor nicotine from *Nicotiana* sps has long history as insecticides , but now used as reduced bio active fattyacid soaps.²¹

The above major botanical pesticides has played a immense role as pesticide control over the years , but commercially unsuccessful., only limited access, need of some technicality paved way for cheaper and easy and abundant available plants are screened for this purpose.

As a result there is flood of literature about more botanical pesticides, which were using in rural areas by small farmers who can't afford cost effective one , was described below for their potential pesticidal activity.

S. No	Plant name	Family	part	Active compound	Utility	Reference
01	<i>Annona squamosa</i>	Annonaceae	Seeds, Leaves	Anjnonin, Acetogrns	Insectide against diamondback moth	22
2	<i>Melia azadirach</i>	Meliaceae	Seeds, leaves	Melicorpins	Insect growth inhibitor	23
3	<i>Vitex negundo</i>	Verbinace	Seeds. Leaves , bark	Iridols, Flavonoids	Antifeedant, Larvicidal	24
4	<i>Euphorbia tirucalli</i>	Euphorbiaceae	Leaves., latex	Sitosterol, stigmasterol	Insecticide	25
5	<i>Aloe vera</i>	Lilliaceae	Leave, Roots	Alonin, Aloetic acid	Insectidal Against maize weevil	26
6	<i>Bryophyllum</i>	Crassulace	Leaves	Saponins, Flavonoids	Insecticide	27
7	<i>Allium cepa and Allium Sativum</i>	Lilliaceae.	Leaves, Tuberos Bulbs	Allicin, quacertin, diallyl sulphide	Fungicide, Insecticide	28
8	<i>Piper nigrum</i>	Piperaceae	Leaves, seeds	Piperin	Pesticide Incesticide	29
9	<i>Strychnos nux vomica</i>	Loganiaceae	Seeds. Leaves	Strichnine, Brucine	Larvicidal	30

Conclusion:

Above mentioned botanical either singly or mixture with neem or capsicum are prevalently used in Guntur district, where Bt cotton , Mirchi cultivation is high. Besides above , there are huge number of plant with potential with pesticidal activity of botanical origin, such as *Cassia auriculata*, *Tagetus petula*, *Abutilon indicum*,



Vernonia cyneria, *Andrographis paniculata*, *Hypties sauveolence*, *Mimordica chacharantia*, *Crotalaria*, *Ricinus*, *Simaruba gluaca*, *Salvia*, , *syzygium*, *Artimisia*, *Zinger*, etc which all easily available to even small farmer. They contains a rich source of botanical pesticides and may provide an aleternative source of insect controls and deserve a further scientific evaluation and it a high time to refocus the attention of research community towards development of know botanical than screen more plants.

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