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Innovative Approach of Pest Management

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INTRODUCTION

Most of the agricultural resources are exploited by modern agricultural technologies without taking care of ecology and possible consequences. The modern agricultural technologies like, monoculture causing rapid erosion of crops and natural soil fertility, and pest outbreaks, while chemical inputs causing environmental pollution and chemical hazards, mechanization causing high cost of cultivation and capital intensive agriculture breakdown the social fabrics of rural communities. Its urgent need to minimize this exploitation for safe hand over agricultural resources to the next generations keeping healthy agriculture for wealthy nation. Sustainable agriculture is a holistic approach of eco-friendly agricultural technologies. Insect pest management is the key input in sustainable crop production. Insecticides are most common pesticides used widely in crop production. They are general biocides having ability to cause toxic to all living organisms. Pesticides are highly potent chemicals that enter our food chain and then begin to increase in their concentrations at successive trophic levels. The indiscriminate use of pesticides has led to serious consequences like, harmful residues in the produce, pesticide resistance and outbreaks of secondary pests. This has brought a complete change in strategy of insect pest management. This pest management motivated agricultural scientists, administrators and leaders to promote Integrated pest management (IPM). It is an eco-friendly approach of pest management, that is practical, economical, effective and protective to both public health and environment. So, the integrated pest management is generally termed eco-friendly pest management. There are varieties of techniques for pest management have been practicing since traditional to modern. Biointensive IPM, Ecological engineering, and Ecofriendly insecticide toxicology has been found major current advances in innovative approach of pest management.

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Biointensive IPM

Biointensive IPM is a more biological approach of pest management. It is an approach that considers the farms as part of an agroecosystem that relies on monitoring and diagnosis for pest management. It is based on proactive measures to redesign the agricultural ecosystem to the disadvantage of the pests and to the advantage of its bioagents. According to Benbrook *et al*. (1996), "Biointensive IPM is a systems approach for management of crop pests based on an understanding of pest ecology. It begins with steps to accurately diagnose the nature and source of pest problems, and then relies on preventive tactics and biological control to keep pest population within acceptable limits." The minimizing the use of pesticides is the global demand of the nature for safer environment. Biointensive IPM attempts to reduce the application of chemical pesticides by using biopesticides, biotic stress tolerant varieties, and application of ecofriendly insecticides. Biointensive IPM utilizes all the available techniques which promote pest management more biological and ecofriendly. Ecological engineering and ecofriendly insecticide toxicology are the most effective techniques for biointensive IPM. There is recently added an effective experience with biointensive IPM in cotton by ICAR-NCIPM. The successfully tested module comprised use of bioagents, biopesticides based on scouting and constant monitoring of pests and their economic threshold levels (ETL) with introduction of suitable crop management practices. The management practices adopted included planting of maize as a border crop interspersed with cowpea for buildup of lady bird beetles predators and their migration to cotton; planting a row of Setaria between every 9 or 10 rows of cotton to enhance the activity of predatory birds by serving as a food source and acting as a live perch; release of *Trichogramma chilonis* @ 1,50,000/ha in cotton fields when 2-8 adult moths of *Helicoverpa armigera* per pheromone trap were captured continuously for 3-4 days in a week; spraying of Neem seed kernel extract (NSKE) 5% a week after release of *T. chilonis*.

Ecological engineering

Ecological engineering is the new paradigm to enhance the biological pest management system. It is an important strategy for promoting biointensive IPM. It is based on cultural practices to enhance the bioagents population by habitat manipulation under agroecosystem of crop field. According to Gurr *et al*. (2004), "Ecological engineering emerged as a paradigm for considering pest management approaches that are based on cultural practices and informed by ecological knowledge rather than on high technology approaches such as synthetic pesticides and genetically engineered crops." The primary objective of ecological engineering is to make environment of the agroecosystem suitable for the better survival of bioagents of pests. The ecological engineering provides habitat manipulation of bioagents of pests with nectar, pollen, physical refuge, alternate prey, alternate hosts and living sites. This can be achieved by push and pull technique using trap and repellent crops. The Push and pull technique involves biorational approach of insect pests and their bioagents by integration of stimuli that act to make the protected resources unattractive or unsuitable to the pest (push), while luring them toward an attractive source (pull), from where the pests are subsequently removed. The pests are repelled or deterred away from the resource by using stimuli that mask host apparency. The pests are simultaneously attracted using highly apparent and attractive stimuli to other areas of trap crops, where there concentrated facilitating their elimination.

Ecofriendly insecticide toxicology

The indiscriminate use of insecticides has led to serious consequences like, harmful residues, insecticide resistance, outbreaks of secondary pests, and threaten bioagent population. The

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modification of insecticide application is the most commonly implemented form of conserving bioagents. Insecticide application can be modified to favour bioagents in variety of ways, including treating only when economic thresholds observed, use of less toxic formulations, lowest effective rate and timing of insecticide application and temporal & spatial separation of bioagents and insecticides. The use of selective insecticides is perhaps the most powerful tool can be favour bioagents diversity. Ecological selectivity is the judicious use of insecticide based on critical selection, timing, dosages, placement and formulation with the goal of maximizing bioagents population. Some of the important insecticides reported as comparatively safe to bioagents are given in Table-1. Insecticide resistance is one of the serious problems in insect pest management due to continuously intensive use, misuse and overuse of insecticides. Therefore, the Insecticide resistance management is an important component of integrated pest management. There are three chemical strategies of resistance management-management by moderation, management by saturation and management by multiple attacks. The basic principles of insecticides resistance management are 1. Monitor pest population 2. Avoid the use of mixtures of insecticides 3. Extend the useful life of satisfactory insecticides 4. Choose a sequence of suitable alternative insecticides and 5. Reduced selection pressure by decreasing the frequency and extent of insecticide application.

Table 1: Insecticides reported as comparatively safe to bioagents.

S.N.	Bioagents	Status	Safe insecticides
1.	*Lycosa* spp.	Preadator	Phosphamidon
2.	*Coccinella septempunctata*	Preadator	Methyl demeton
3.	*Cyrtorhinus lividipennis*	Preadator	Phosalone, Phosphamidon
4.	*Chrysoperla carnea*	Preadator	Fenvalerate, Phosalone,
5.	*Trichogramma* spp.	Egg parasitoid	Diazinon, Deltamethrin, Fenvalerate, Diflubenzuron
6.	*Telenomus remus*	Egg parasitoid	Monocrotophos, Phosalone
7.	*Bracon brevicornis*	Larval parasitoid	Phosalone
8.	*Apanteles* spp.	Larval parasitoid	Phosalone, Permethrin, Fenvalerate, Cypermethrin
9.	*Tetrastichus pyrillae*	Egg- larval parasitoid	Quinalphos
10.	*Chelonus blackburni*	Egg- larval parasitoid	Phosalone, Permethrin, Diflubenzuron, Dimethoate, Fenpropathrin

REFERENCES

Benbrook, C.M., Groth, E., Halloran, J.M., Hansen, M.K. and Marquardt, S. (1996). Pest management at the crossroads. Consumers Union, Yonkers, New York, USA, 272 pp.

Cook, S.M., Khan, Z.R. and Pickett, J.A. (2007). The use of push-pull strategies in integrated pest management. *Annual Review of Entomology*, 52: 375-400.

ISSN: 2582 - 7022

Dhaliwal, G.S. and Koul, O. (2010). Quest for Pest Management: From Green Revolution to Gene Revolution. Kalyani Publishers, Ludhiana, India, 386 pp.

Gurr, G.M., Wratten, S.D. and Altieri, M.A. (2004). Ecological engineering a new direction for agricultural pest management. *Australia Farm Business Management Journal*, 1(1): 28-35.

Morya, G.P. and Kumar, R. (2019). Eco-friendly pest management in sustaining crop production. *International Journal of Pure and Applied Bioscience*, 7(1):177-182.

Rao, C.S. (2019). Ecologically sustainable strategies for pest management. *Extension Digest*, 3(1): 2-26.

Sharma, O.P., Murthy, K.S., Puri, S.N., Lavekar, R.C. and Mayee, C.D. (2016). Integrated pest management in cotton at Ashta village. *In*: Success stories of Integrated Pest Management in India, Vennila, S., Birah, A., Kanwar, V. and Chattopadhyay C., ICAR-NCIPM, New Delhi, India.