

Lecture 27: INTEGRATED PEST MANAGEMENT - HISTORY, PRINCIPLES AND STRATEGIES RELATIONSHIP BETWEEN DIFFERENT COMPONENTS AND ECONOMICS

History of Integrated Pest Management

- Michelbacher and Bacon (1952) coined the term “integrated control”
- Stern *et al.* (1959) defined integrated control as “applied pest control which combines and integrates biological and chemical control”
- Geier (1966) coined the term “pest management”
- Council on Environmental Quality (CEQ, 1972) gave the term “Integrated Pest Management”
- Food and Agricultural Organization (FAO, 1967) defined IPM as “a pest management system, that, in the context of associated environment and population dynamics of the pest species, utilizes all suitable techniques and methods in as compatible a manner as possible and maintains pest populations at levels below those causing economic injury”
- In 1989, IPM Task Force was established and in 1990. IPM Working Group (IPMWG) was constituted to strengthen implementation of IPM at international level.
- In 1997, Smith and Adkisson were awarded the World Food Prize for pioneering work on implementation of IPM.

Principles and strategies of Integrated Pest Management

I. Monitoring insect pests and natural enemies

Pest surveillance and forecasting are essential tools in IPM which help in making management decision.

II. Concepts of injury levels

ETL (Economic threshold level) and EIL (Economic injury level) concepts are followed to reduce the use of insecticide and their impact on environment.

III. Integration of pest control tactics

Proper choice of compatible tactics and blending them so that each component complements the other.

The strategy of applying pest management tactics is similar to that of human medicine.

- i.e. Preventive practice
- Curative practice

Preventive methods of IPM include the following

- a. Natural enemies
- b. Host plant resistance
- c. Cultural control
- d. Legal control (Plant Quarantine)

Curative methods of IPM include the following

- a. Physical and mechanical methods
- b. Inundative method releasing biocontrol agents
- c. Chemical insecticides, IGR

- Preventive methods can be used, irrespective of the level of pest incidence. It can be followed as a routine, even if the pest is at a low level.
- Curative methods have to be followed only when the pest attains economic threshold level (ETL).

Integration of different components of IPM

There are two steps involved

- i. Selection of appropriate method
- ii. Integration of pest control method

i. Selection method: It could be preventive (prophylactic) or curative.

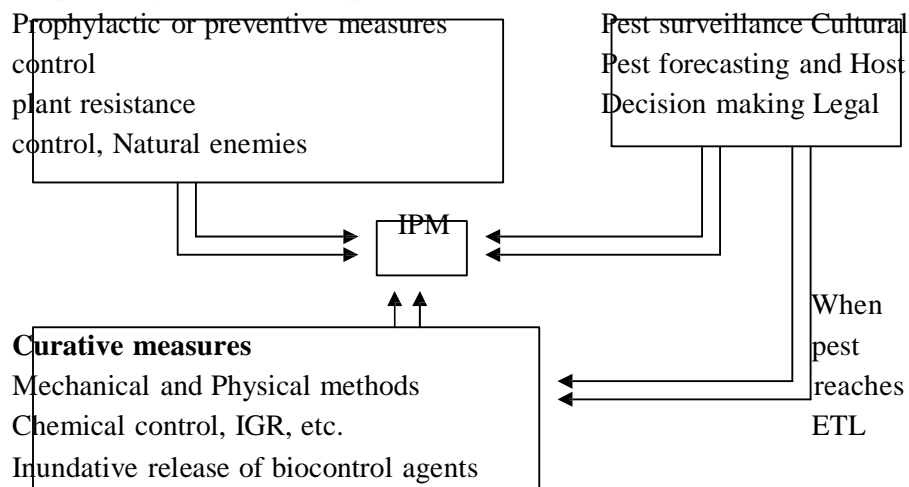
While selecting the method, it should possess following features:

- a. It should be ecofriendly and cause minimum adverse effect on agro-eco system
- a. There should not be any conflict between the methods
- b. The methods should be least expensive

Integration of tactics

- Integrating management tactics is not simply adding a number of these tactics to form a program.
- Actual integration involves proper choice of compatible tactics and blending them so that each complements the other.
 - e.g. (1) Host plant resistance can be easily blended with crop sanitation
 - (2) Insecticide control is compatible with other preventive methods
 - (3) It is difficult to blend natural enemy release with others like pesticides
- Integration of tactics, requires interdisciplinary approach.
- A knowledge of other subjects like, nematology, plant pathology, microbiology, crop and farm management also required when we go upward in level of integration.

Relationship among different components of IPM



ECONOMICS OF INTEGRATED PEST MANAGEMENT

An Integrated Pest Management (IPM) programme can be successful only if reduces cost on control measures, or increases crop yield (or both) and also reduce environmental pollution and health hazards.

The following are some examples of successful IPM programmes worldwide

1. In Philippines, in 1993, IPM farmers obtained 4.7 to 62% higher rice yield and reduced pesticide use by 15% compared to non-IPM.
2. In India in 1995, IPM farmers obtained 6.2 to 42.1% increased rice yield, and reduced pesticide use by 50% compared to non-IPM farmers.
3. In India on cotton crop, adoption of IPM technology resulted in 73.7 and 12.4% reduction in the number of insecticide sprays against sucking pests and bollworms. In spite of reduction in pesticide sprays 21-27% increase in seed cotton yield was obtained in IPM areas compared to non-IPM. Natural enemy population also increased 3 folds.
4. In Thailand in 1993 adoption of IPM technology resulted in 145% increase in net profit in IPM fields over non-IPM fields in cruciferous vegetables.
5. IPM is useful and economical in high value, plantation crops like Coconut, Coffee, Tea, Cashewnut and Arecanut.

Institutional support for IPM

International: IPMWG, FAO, CABI, ICIPE

Global IPM facility (1992) - Sponsored by FAO, UNDP, UNEP and
World Bank

National : NCIPM: National Centre for Integrated Pest Management at Faridabad
(Near Delhi) (1988) - Supports IPM in India