

## INTEGRATED PEST MANAGEMENT AND NEED FOR PROMOTING IT

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### Introduction:

According to FAO (1967), IPM was defined as “*a pest management system in the context of associated environment and population dynamics in pest species. It utilizes all suitable techniques and methods in as compatible manner as possible and maintains the pest population at levels below those cause economic injury*”.

In 1972 the term IPM was accepted by CEQ (Council of Environmental Quality) where IPM includes-

**I** - Integration that is harmonious use of multiple methods to control the impact of single pest as well as multiple pests.

**P** - Pest- any organism that is detrimental to humans including vertebrates and invertebrate or weed or pathogens.

**M** -Management refers to a set of decisions or rules based on ecological principles, economic and social consideration.

### Inventories or tools or components of IPM

(Arranged in increasing order of complexity)

#### A. Cultural method or use of agronomic practices

1. Crop rotation
2. Crop refuse destruction
3. Tillage of soil
4. Variation in time of planting or harvesting
5. Pruning or thinning
6. Fertilizer management
7. Water management
8. Intercropping
9. Trap crop

#### B. Host plant resistance –

1. Antixenosis,
2. antibiosis,
3. tolerance

#### C. Mechanical methods of pest control

1. Hand destruction
2. Exclusion by screens, barriers
3. Trapping, suction devices, collecting machine
4. Crushing and grinding

#### D. Physical methods

1. Heat
2. Cold
3. Energy - light trap, irradiation, light regulation
4. Sound

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### E. Biological methods

1. Protection and encouragement of NE
2. Introduction, artificial increase and colonizing specific parasitoids and predators
3. Pathogens on insects like virus, bacteria, fungi and protozoa
4. Use of botanicals like neem, pongam, etc.

### F. Chemical methods

1. Attractants
2. Repellents
3. Insecticides - OC, OP, carbamates, pyrethroids, etc.
4. Insect growth inhibitors
5. Chemosterilants

### G. Behavioural methods

1. Pheromones
2. Allelochemicals

### H. Genetic/biotechnology method

1. Release of genetically incompatible/sterile pests
2. Transgenic plant

### I. Regulatory/legal method

1. Plant/animal quarantine
2. Eradication and suppression programme

### Why Pest Management Or What is The Need for Pest Management

1. Development of resistance in insects against insecticides e.g. OP and

synthetic pyrethroid resistance in *Helicoverpa armigera*.

2. Outbreak of secondary pests e.g. Whiteflies emerged as major pest when spraying insecticide against *H. armigera*.
3. Resurgence of target pests e.g. BPH of rice increased when some OP chemicals are applied.
4. When number of application increases, profit decreases.
5. Environmental contamination and reduction in its quality.
6. Killing of non-target animals and natural enemies.
7. Human and animal health hazards.

### Elaboration of need for Pest Management

#### 1) Collapse of control system:

After World War II the use of pesticides mushroomed, but with all the benefits of the use pesticides, it has adverse side effects not just on humans but also in animals. During the massive use of pesticides, **Rachel Carson, an American biologist (1962)**, warned the people about the side effects of the use of pesticides through her book entitled, *Silent Spring*. Through her book, she raised a lot of questions about the real benefits of the use of pesticides as well as the risks of pesticides rendered in the environment and public health. An over-reliance on chemical pesticides led to

development of pesticide resistance, development of multiple resistance, emergence of secondary pest as major pests, resurgence of pests, elimination of natural enemies of pests, hazards to nontarget species, hazards to agricultural workmen and deleterious effects on the environment.

## 2) Phases of crop protection (Collapse of control systems)

**Smith. R.F (1969)** has classified Worldwide patterns of crop protection in **cotton agro ecosystem** into the following phases which are also applicable to other crop ecosystems -

### A) Subsistence phase

The crop is usually grown under **non irrigated conditions**. Crop does not enter the world market and is consumed in the villages or bartered in the market place. Crop yields are low. Crop protection is through natural control, hand picking, host plant resistance, other cultural practices and rarely insecticides are used.

### B) Exploitation phase

The agricultural production increased from subsistence level to higher so as to reach the market. Pest control solely depend on chemical pesticides. These are used intensively, often at fixed intervals. Chemical control measures were exploited to the maximum extent wherein new synthetic insecticides, new methods of application,

intensive use of pesticides resulted in higher yields.

### C) Crisis phase

After few years in exploitation phase, more frequent applications of pesticides and higher doses are needed to obtain effective control. Insect populations often resurge rapidly after treatments and the pest population gradually becomes tolerant to the pesticide. Another pesticide is substituted and pest population becomes tolerant to it too. Occasional feeders become serious pests. Excessive use of insecticides over a number of years led to serious problems like-

- i) Pest resurgence
- ii) Pest resistance to insecticides
- iii) Change of pest status
- iv) Increase of production costs, etc.

### D) Disaster phase

As a result of all deleterious effects, the cost of cultivation got increased and the crops were not grown profitably. There were frequent encounters of crop failures and produce not acceptable at market (rejection of the produce due to residues), and finally collapse of the existing pest control system.

### E) Integrated control phase

In this phase it is aimed to give the control measures to the optimum and not to the maximum. Pest management concept is followed to avoid crisis and disaster phases by

- a. Combination of the resources

- b. analysis of eco- factors
- c. optimization of techniques
- d. recognizing or restoring the pest at manageable level

Flint MC & Bosch RV. 1981.  
*Introduction to Integrated Pest Management.*  
1st Ed., Springer, New York.

### 3) Environmental contamination

Presence of residues in foods, feed and organisms caused widespread concern about contamination of Environment

### Summary and Conclusion

Though it is not generally recognized, evolution of the concept of pest management spans a period of more than a century. Many components of integrated pest management (IPM) were developed in the late 19th and early 20th century. The rapidly developing technologies and changing societal values had their impact on the pest control tactics also. The modern concept of pest management is based on ecological principles and involves the integration and synthesis of different components/control tactics into a pest management system. IPM, in turn, is a component of the agro-ecosystem management technology for sustainable crop production.

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