INTEGRATED PEST MANAGEMENT (IPM)

- It is a 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 (FAO, 1967)
- It is the intelligent selection and use of pest control tactics that will ensure favourable economical, ecological and sociological consequences (Luckmann & Metcalf, 1994)

Why pest management?

- Development of resistance in insects against insecticides e.g. OP and synthetic pyrethroid resistance in DBM.
- Outbreak of secondary pests e.g. whiteflies emerged as major pest when spraying insecticide against *Heliothis armigera*.
- Resurgence of target pest e.g. Brown planthopper of rice increased when some OP chemicals are applied.

Why pest management? Cont.

- When number of application increases, profit decreases.
- Environmental contamination and reduction in its quality.
- Killing non-target animals and natural enemies.
- Human and animal health hazards.

Stages in crop protection leading to IPM

1. Subsistence phase: Only natural control, no insecticide use.
2. Exploitation phase: Applying more pesticides, growing high yielding varieties and get more yield and returns.
3. Crisis phase: Due to over use of pesticides, problem of resurgence, secondary pest outbreak, increase in production cost.

Stages in crop protection leading to IPM CONT.

4. Disaster phase: Due to increased pesticide use-No profit, high residue in soil-Collapse of control system.

5. Integrated Management phase: IPM integrates eco-friendly methods to optimize control rather than maximize it.

Objectives of pest management

- To reduce pest status below economic injury level. Complete elimination of pest is not the objective.
- To manage insects by not killing them but by preventing feeding, multiplication and dispersal.
- To use eco-friendly methods, which will maintain quality of environment (air, water, wild life and plant life)

Objectives of pest management cont.

- To make maximum use of natural mortality factors, apply control measures only when needed.
- To use component in sustainable crop production.

Requirements for successful pest management programme

- Correct identification of insect pests
- Life history and behaviour of the pest
- Natural enemies and weather factors affecting pest populations
- Pest surveillance will provide above data
- Pest forecasting and predicting pest outbreak
- Finding out ETL for each pest in a crop
- Need and timing of control measures-Decision

Requirements for successful pest management programme Cont.

- Selection of suitable methods of control
- Analysis of cost/benefit and benefit/risk of each control measure
- Farmer's awareness and participation
- Government support
- Consumer awareness on use of pesticides free products

Tools or components of IPM

1. Cultural control: manipulation of cultural practices to the disadvantage of pests.

I. Farm level practices

S. No.	Cropping Techniques	Pest Checked
1.	Ploughing	Bean leaf beetle
2.	Pest free seed material	Potato tuber moth
3.	High seed rate	Sorghum shoot fly
4.	Earthing up	Bean stem maggot
5.	Plant density	Rice brown planthopper
6.	Destruction of weed hosts	Citrus fruit sucking moth
7.	Destruction of alternate hosts	American bollworm
8.	Timely harvesting	Sweet potato weevil
9.	Intercropping	Maize stem borer
10.	Trap cropping	Diamondback moth

Tools or components of IPM cont.

II. Community level practices

i. Synchronized sowing : Dilution of pest infestation e.g. wheat, cotton
ii. Crop rotation: Breaks insect life cycle
iii. Crop sanitation
    a. Destruction of insect infested parts e.g. mealybug in eggplants
    b. Removal of fallen plant parts e.g. citrus fruits
    c. Crop residue destruction e.g. cotton bollworm

1. Cultural control

Advantages

- No extra skill
- No costly in[puts
- No special equipment
- Minimal cost
- Good component in IPM
- Ecologically sound

Disadvantages

- No complete control
- Prophylactic nature
- Timing decides success

2. Physical control

- Modification of physical factors in the environment to minimize or prevent pest problems.

A. Manipulation of temperature

i. Hot water treatment (50-55°C for 15 min) against nematode

ii. Sun drying the seeds to kill the eggs of stored product pests

iii. Cold storage of fruits and vegetables to kill fruit flies (1-2°C for 12-20 days)

Physical control cont.

B. Manipulation of moisture

i. Drying seeds (<10% moisture level) affects insect development

ii. Flooding the field for the control of cutworms

C. Manipulation of light

Physical control cont.

D. Manipulation of air

Increasing the CO_2 concentration in controlled atmosphere of stored grains to cause asphyxiation in stored product pests

E. Use of greasing material

Treating the stored grains particularly pulses with vegetable oils to prevent the oviposition and the egg hatching e.g. bruchid adults

F. Use of abrasive dusts

Diatomaceous earth: injury to the wax layer resulting in loss of moisture leading to death. It is used against stored product pests.