Integrated Pest Management (IPM)

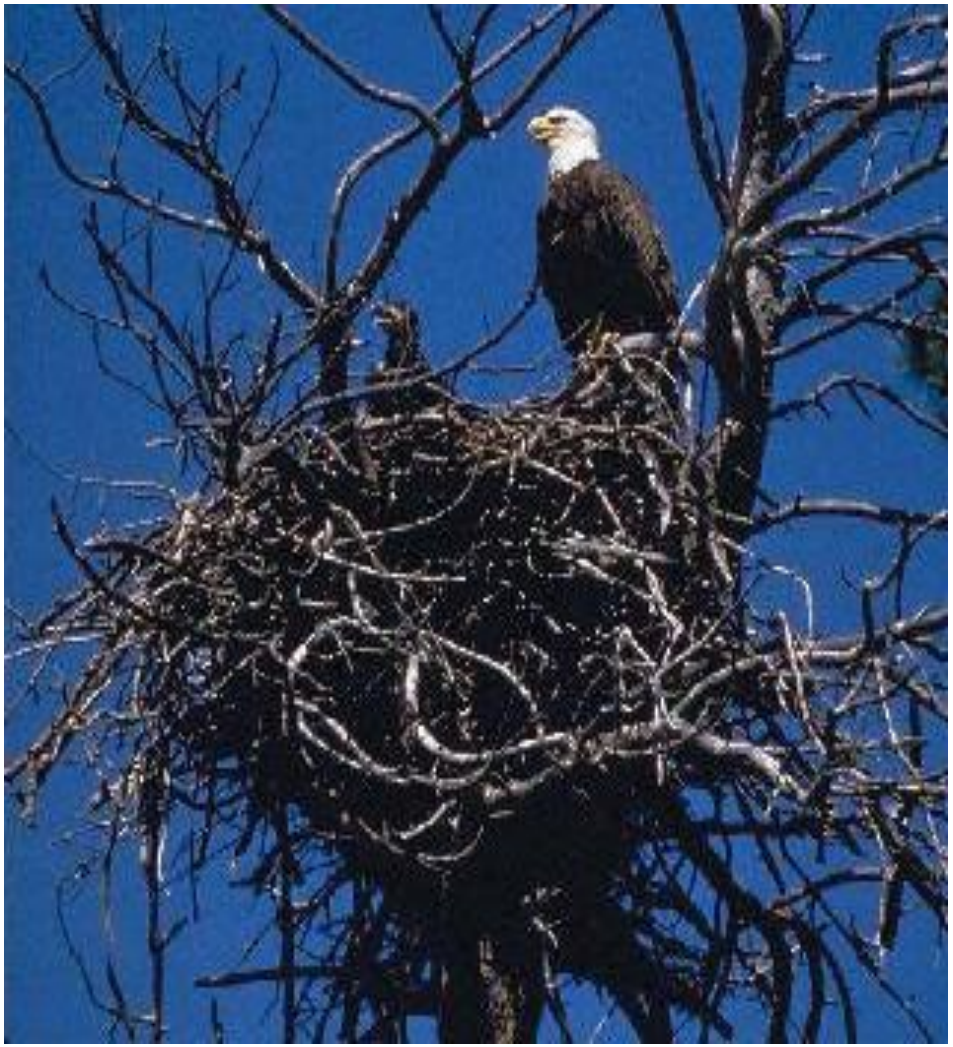
WHAT IS IPM ?

- It is a broad-based approach that integrate practices for economic control of pests. Aims to suppress pest population below the 'Economic Injury Level' (EIL).
- Ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties.

WHY IPM ?

- Chemical pesticides can impact the human health and ecosystems.

  Example: DDT, a pesticide, can accumulate in the fatty tissue of animals and affect bird reproduction.



- Insects can become resistant to chemical pesticides.

- Approximately 500 species of insects are resistant to one or more pesticides.

AIMS OF IPM

- Promote natural controls.
- Protect human health.
- Minimize negative impacts to non-target organism.
- Enhance the general environment.
- Be most likely to produce long-term, beneficial results.
- Be cost-effective in the short and long-term
- Be easily and efficiently implemented.

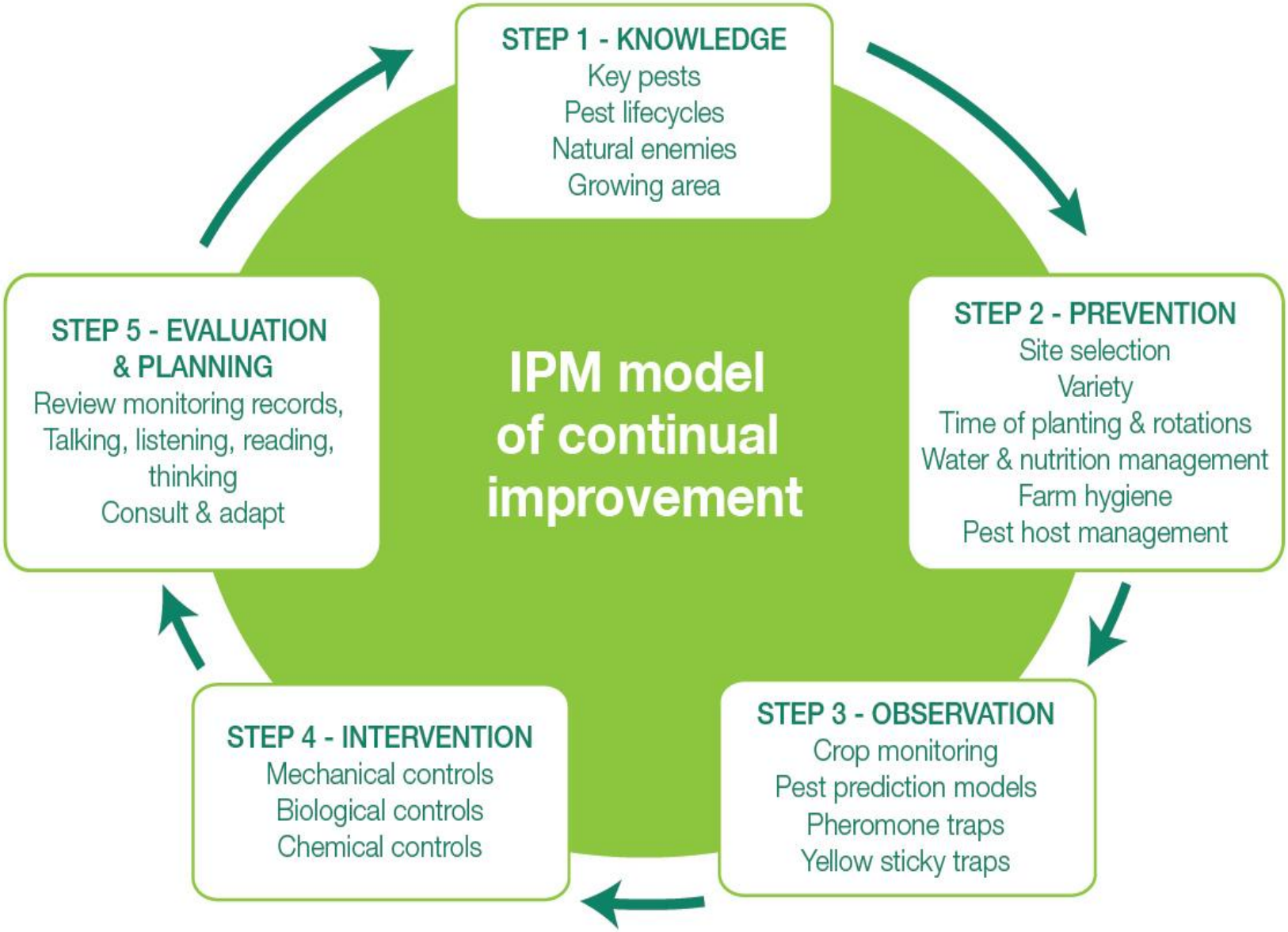
FOUR BASIC PRINCIPLES OF IPM

1. Thorough understanding of the crop pests, the environment and their interrelationships.
   - Understanding crop growth and development.
   - Understanding the pest.
   - Understanding the pest and their life cycle.
   - Understanding the environment.
2. Requires advanced planning.
3. Balances cost/benefits of all control practices.
4. Requires routine monitoring of crop and pest conditions.

BASIC COMPONENTS OF IPM

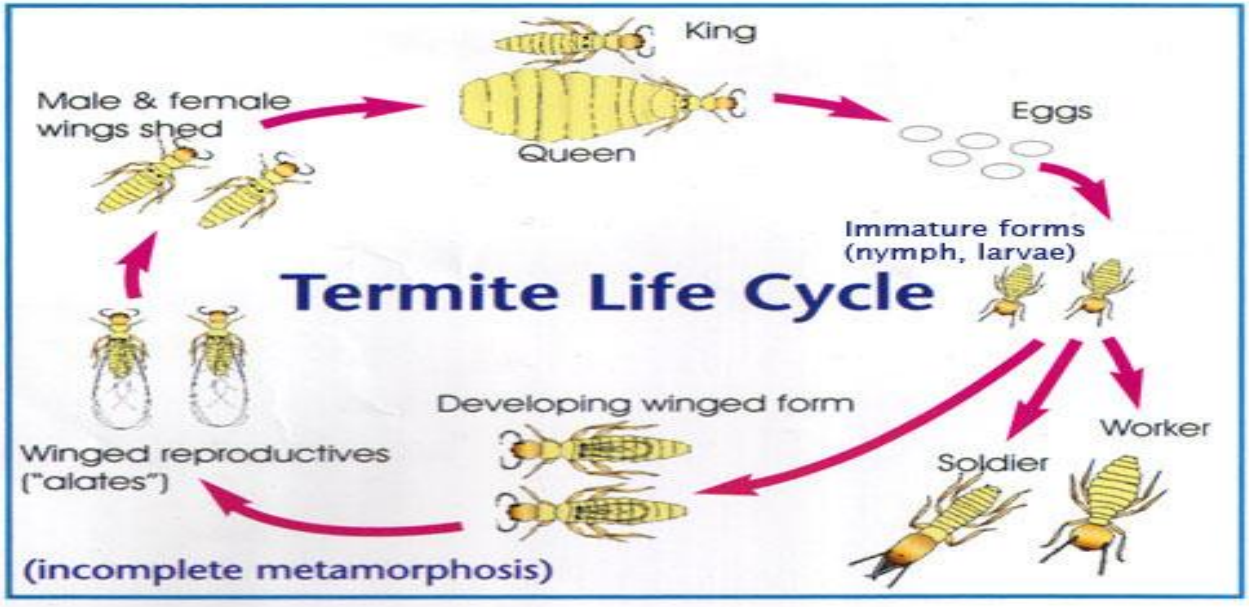
- Monitoring
- Establishing injury levels
- Planning for & integrating all controls
- Evaluating results (record keeping)

STEPS INVOLVED IN IPM



1.MONITORING

- Signs & symptoms
- Pest life cycles
- Growing degree days (average daily temperature).



2.ESTABLISH INJURY LEVEL

- Aesthetic
  - Appearance
- Economic
  - Plant replacement
  - Loss of crop

3.PLAN FOR CONTROL

- Cultural
- Physical & Mechanical
- Natural or biological
- Chemical

3a.CULTURAL CONTROL

- Sanitation
- Healthy pest-free plants
- Rogue out problem plants
- Pruning
- Soil and water management
- Weed control

EXAMPLES

- **Crop rotation**: Diamond back moth on cabbage can be controlled by rotating cabbage by a non cruciferous crop.
- **Ploughing the field**: Deep ploughing in the field exposes the hidden pupae or egg stages of insect and thus get killed.
- **Earthing up**: Sugarcane early shoot borer, potato tuber moth can be controlled by timely earthing up of the field. This prevents insects to lay their eggs.
- **Destruction of crop residue**: Pupae of insect remains inside the crop residue and can be controlled by destroying it.
- **Trap cropping**: Two crops of same family like cabbage; cauliflower, cotton, okra can be grown together and after attack of pest minor crop is removed which is trap crop.

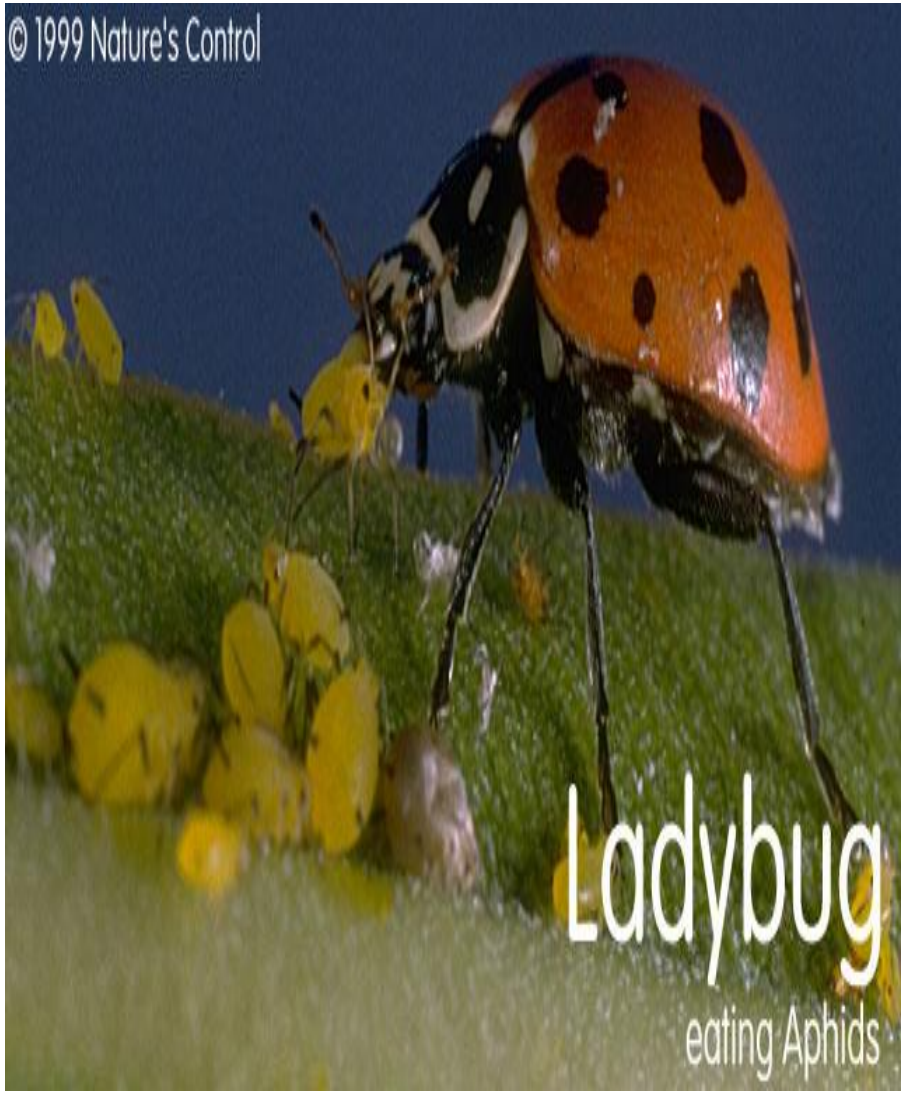
3b.PHYSICAL AND MECHANICAL CONTROL

- Hand picking pests
- Traps
- Crop isolation
- Destroy alternate host
- Barriers, screens, cloths

3c.NATURAL OR BIOLOGICAL CONTROL

1. Predators-Introduction of a natural enemy of the pest.

- Example – Lady bugs feed on aphids and can be introduced to reduce the aphid population on crops.



2.PARASITES

- Parasites : Those insects whose larvae feed internally or externally on the body of other insect is called parasites. This includes,
- i. Egg parasite: ***Trichogramma chilonis*** parasites egg of ***Helicoverpa armigera***.
- ii. Larval parasite: ***Habrobracon hebetor*** parasites larvae of ***H.armigera***.
- iii. Pupal parasite: ***Goniopthalmus halli*** parasites pupae of ***H.armigera***

Trichogramma chilonis (wasp)

Helicoverpa armigera(cotton bollworm)

Habrobracon hebetor **(wasp)**

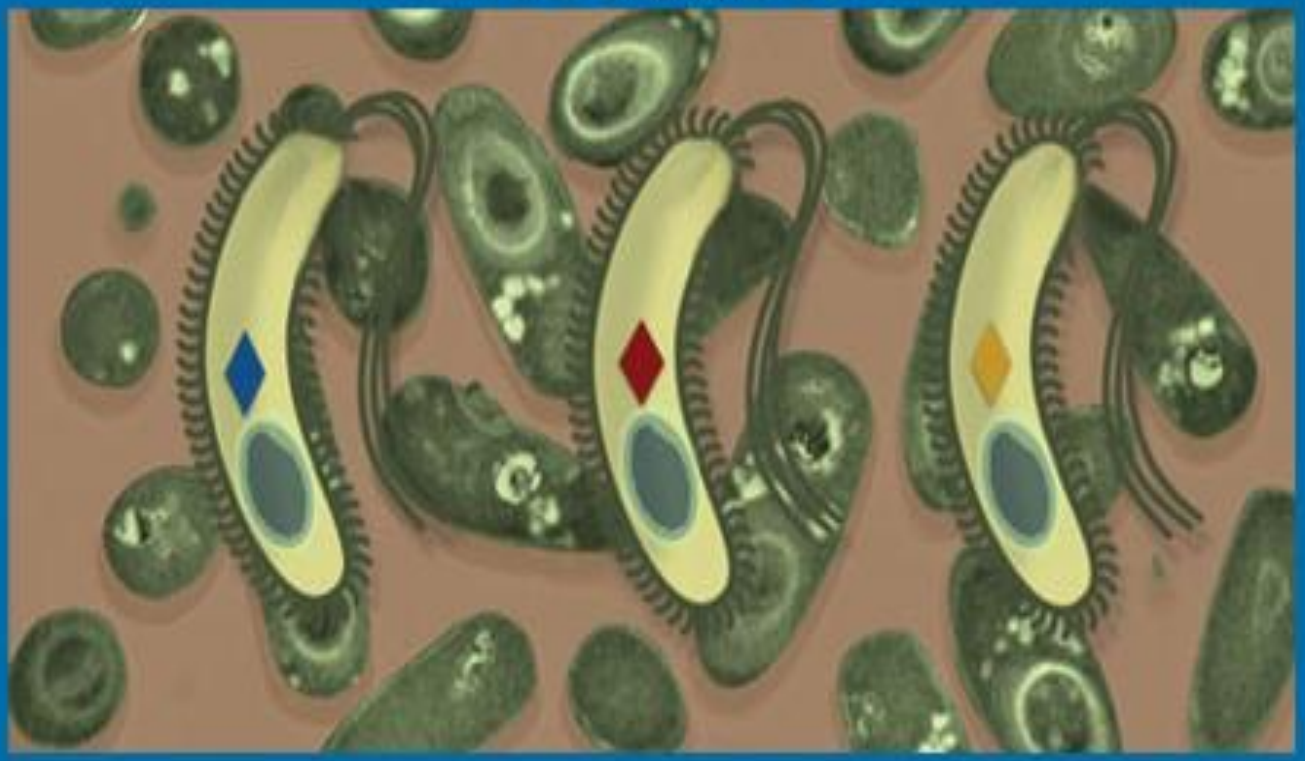
3.PEST SPECIFIC DISEASES

- Pathogens: Microorganisms like bacteria, viruses, fungi, protozoa and nematodes develop diseases to the pest and thus helps in killing pest. These includes;
- i. Bacteria: ***Bacillus thuringiensis*** develops disease in many **Lepidopterous** pests. ***B.papillae*** develops disease in **Coleopterous** pests.
- ii. Virus: There are many reports of entomopathogenic viruses, Nuclear Polyhedrosis Virus (NPV) and Granulosis Virus (GV) which are commonly used in insect pest control.
- iii. Fungus: ***Beauveria bassiana*** is used for control of **Lepidopterous** pests. ***Metarrhizum anisoplae*** develops green muscardine disease in silk Worm. ***Verticillium lecanii*** develops disease in **Lepidopterous** pests.

Beauveria bassiana

Metarhizium anisopliae

Bacillus



thuringiensis (Bt)

CHEMICAL CONTROL

- Pesticide applications that have minimal risks associated with their use.
- Using the least amount of chemicals that will still be effective.

DISADVANTAGES OF CHEMICAL CONTROL

- Repeated application of chemicals is required in this method.
- Non target species like natural enemies of insect get affected.
- Resurgence of minor pest is observed in this method.
- There is problem of residue in food.
- There is direct hazard to the applicator.
- Continuous application of chemicals develops resistance in insect.

EVALUATION

- Determine the program's effectiveness
  - What works?
  - What doesn't work?
  - How much chemical is being used?
  - Are chemicals being reduced?
- How should program be adjusted
- Keep records for future use.

ADVANTAGES & DISADVANTAGES OF IPM

- Reduce chemicals being used
- May reduce percentage of pesticide resistant insects
- Only uses chemicals if necessary
- Long term benefits (lower cost for chemicals, better for environment and human health).
- Individual using IPM must be educated about the options
- Takes more time to initiate than simply “spraying for pests”
- Must be closely monitored for best results
- Natural enemies of pests may become pests themselves .

CONCLUSION

- IPM is the wave of the future in agricultural pest control
- IPM is easy to implement using common sense and a little planning
- IPM is especially applicable in the pesticide dependent crops we grow in this area.


Thank
you