



GHCP & PHHT20: 15 & 16 Pest & Disease Control

**Presented to the Participants of the
SHEP Training of Trainers(ToT) in
Jimma**



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1. Introduction



- **Pest & disease** can dramatically reduce **crop yield, quality** and **subsequent returns**
- **Appropriate pests & diseases** management can protect the farmers' investment from **avoidable losses**



Farmer applying fertilizer

2. Objectives



Pests & Diseases Control/Management
aims:

- To keep crops in a **healthy** and **productive condition**
- To obtain **high yields** and **good quality produce**

3. Pest



What is Pest?

- A pest is any organism that **causes damage to crops**
- Insect pests cause **direct injury** by feeding or **indirect injury** through transmission of bacterial or viral infection

3.1 Types of Pests



- **Insects:** Beetle, Caterpillar, Aphids, Fly etc.
- **Insect-like Organisms:** Mite, spiders, ticks, etc.
- **Microbial Organisms:** Bacteria, Fungi, Virus
- **Weeds:** plants growing where it is not wanted
- **Molluscs:** Snail, slug etc.
- **Vertebrates:** Rat, Mice, Bird etc.
- **Namatodes:** Root knot nematode, etc.

3.2 Pest Control/Management



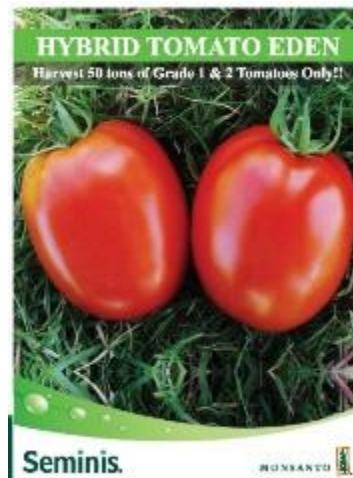
- It involves various techniques whose aim is to reduce pest population to levels where they cannot cause economic damage
- Pest management techniques can broadly be classified as **Cultural**, **Biological**, **Mechanical**, and **Chemical**

3.2.1 Cultural Control

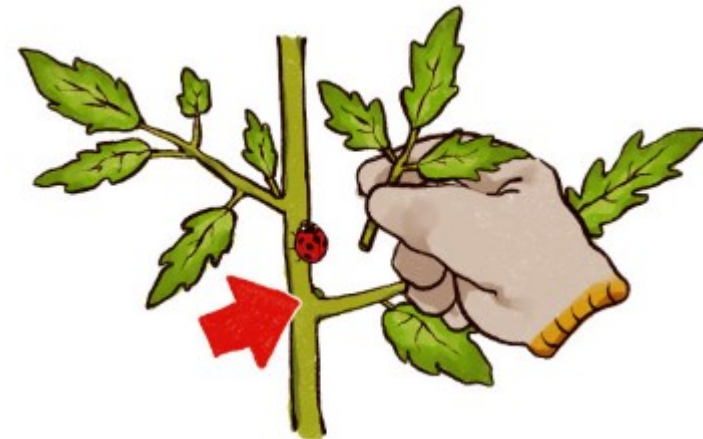
- The control method **easily available to farmers**
- It involves **creating good conditions for crops** and **adverse condition for pests**



Crop rotation



Resistant / tolerant varieties



Pruning

3.2.1 Cultural Control Cont'



- The main forms of cultural control are:
- **Quarantine to prevent pests and diseases**
- **Crop Rotation:** breaks the life cycle of the organisms and prevents their numbers from building up
- **Using resistant plant varieties**
- **Good field management and work practices** e.g.) tillage, timely planting, field sanitation, mulching, washing farm tool etc.

3.2.2 Biological Control



- Use of living organisms as a control method
- The main objective of this method is **to reduce pest population with minimal harm to the environment**



Parasitic wasp



Hoverfly



Lady beetle

3.2.2 Biological Control Cont'



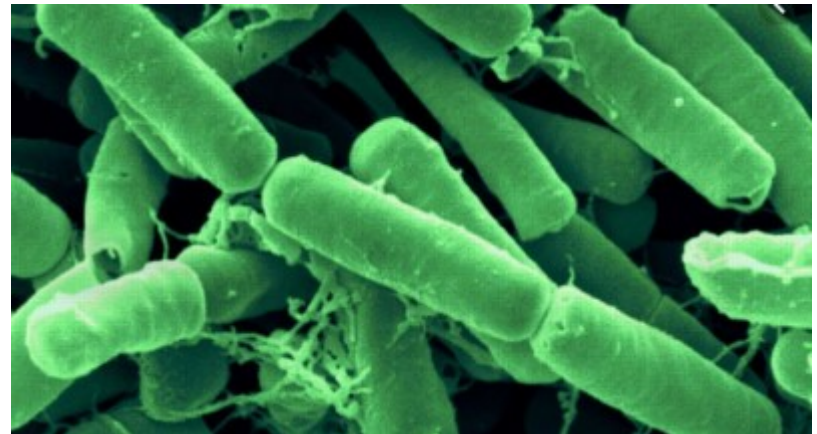
The main methods of biological control are:

- **Predators:** e.g.) wasp, lacewing, Hoverflies, lady bird etc.
- **Parasitic wasps:** lay eggs in or on the caterpillars, leaf miner, white fly, larvae and eggs of moth
- **Parasitoids:** are parasites whose larvae develop inside another organisms' body

3.2.2 Biological Control Cont'



- **Pathogens:** Some pathogens (bacteria, fungi & virus) infect crop pests e.g.) *Bacillus thuringiensis*(Bt) is used to kill caterpillars
- Bt can be found almost everywhere in the world



3.2.2 Biological Control Cont'



- **Advantages:**
- Biological control methods do not **involve chemicals**, so **they leave useful insects unharmed**
- One established, biological control is **cheap, cost-free** and **does not harm the environment**

3.2.2 Biological Control Cont'



Disadvantage:

- Biological control **takes time to work** and usually the pest populations are high before there are significant numbers of predators and parasites
- It is **costly to develop** and **manage**

3.2.3 Mechanical/Physical Control



- This include both **using mechanisms designed to prevent pests** and physical removal of pests from reaching your plants in the first place



3.2.3 Mechanical/Physical Control Cont'



The main activities of mechanical/physical control are:

- Hand picking of pests
- Use of insect traps
- Ploughing
- Erecting Barriers: e.g.)screen house

3.2.4 Chemical Control



- It involves use of chemicals (**pesticides**) to reduce pest population
- **Pesticides** are substances or mixture of substances which are intended to kill or incapacitate pests



Different kinds of Pesticides

3.2.4 Chemical Control Cont'



- **Deciding which pesticide to use is determined by:**
- **Type of pest** that needs controlling
- **Type and value of the crop**
- **Presence of any beneficial insects**

3.2.4 Chemical Control Cont'



Example of pesticides are:

- **Herbicides** (e.g. glyphosate: Roundup)
- **Insecticides** (e.g. lambda-cyhalothrin: Karate)
- **Fungicides**(e.g. chlorothalanil: Daconil/ Mancozeb: Dithane M45)
- **Nematicides** (e.g. azidarachtin: Achook)
- **Rodenticides** (e.g. difethialone: Baraki pellets)
- **Miticides/Acaricides** (e.g. abamectin: Abalone)

3.2.4 Chemical Control Cont'



Advantages:

- Appearance and quality of produce maintained
- **Quick-acting**
- Usually **cost-effective**
- **Increased yields:** important for economic reasons

3.2.4 Chemical Control Cont'



Disadvantages:

- **Can leave toxic residues**
- **Can be expensive** if calendar spraying is used
- **Beneficial insects** may be killed
- **Pests can develop resistance** with repeated use
- **Can harm the person** applying them

4. Integrated Pest Management (IPM)



- **IPM** is a strategy which uses as many methods as possible **to minimize problems caused by pests**
- Due to **limitation of a single control strategy**, use of IPM is **a more recommended strategy**
- When combining various methods, attention must be paid **how one method may affect the other**

4. IPM Cont'



- **IPM is attractive due to the following benefits:**
- **Effective control**
- **Lower costs**
- **Safer to farmers and families**
- **Protects the environment**
- **Prevent the build up of pesticide resistance**

5. Natural Enemies



- Insects or diseases that kill pests are called “**Natural Enemies**” or “Farmers’ Friends”
- They are of **3 types**:
 - **Predators**: they eat the pest
 - **Parasitoids**: they lay eggs in the pest which hatch and the young ones eat up the pest
 - **Pathogen**: cause disease in the pest that kills it

5. Natural Enemies Cont'



1) Predators:



Lady Birds



Lacewing

5. Natural Enemies Cont'



2) Parasitoids:



The wasp "*Hyposoter ebeninus*"
lays its eggs in a caterpillar

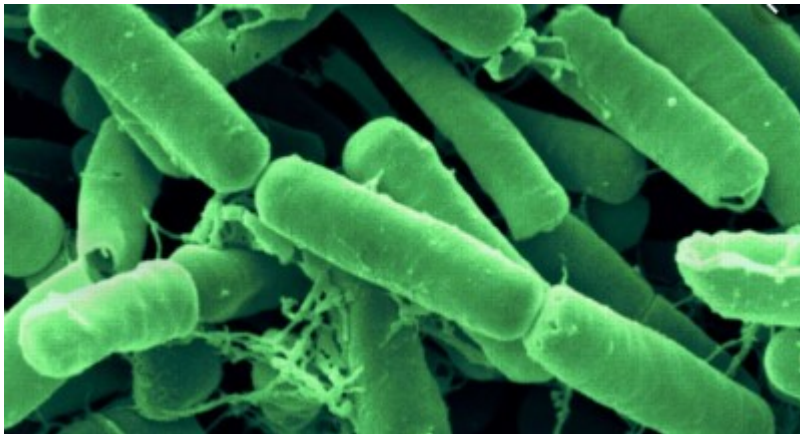


Parasitoid "*Aphidius megourde*"
attacking the aphid

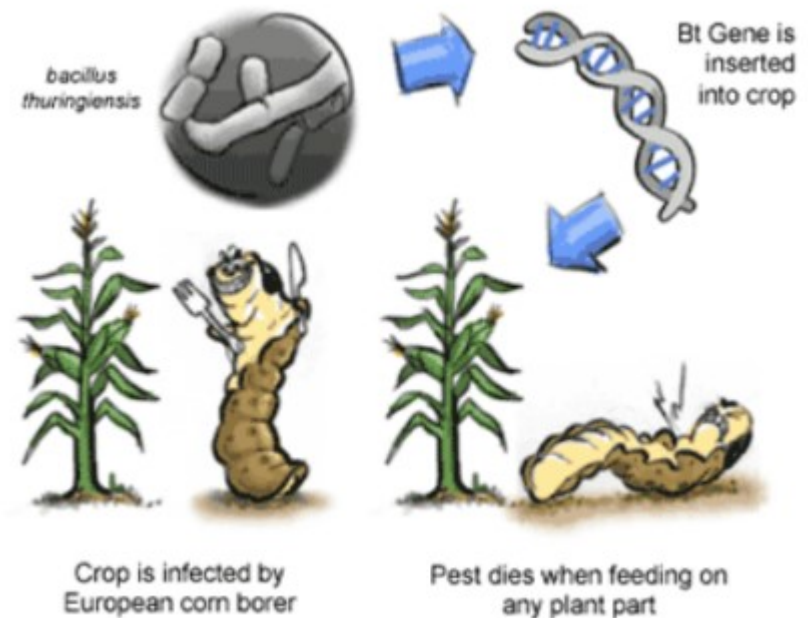
5. Natural Enemies Cont'



3) Pathogen:



**Bacillus thuringiensis
(Bt)**



**Bt gene for
insect control**

5. Natural Enemies Cont'



- Pest attack **do not always result in economic injury**
- Certain insect management practices can be used to ensure **cost-effective control decisions**
- **Over use of insecticides** often creates more favorable conditions for **the development of harder-to-control insect pests**, thus increasing the cost of production

6. Insect Scouting



- To avoid spraying **“Natural Enemies”** and **pests**, it is important to do **scouting**



Scouting insects in the field

6. Insect Scouting Cont'



- **Study pests** carefully and **notice** other living things feeding on them
- **Identify** the pest and **understand** its potential for damage is necessary when selecting **appropriate control method**
- **Monitor** the field **regularly**

7. Pesticide Application



- **Pesticide application** should be done **only when necessary** and combined with **other pest management practices** in order to reduce need for frequent applications
- **Minimizing the amount of pesticide use** **reduces cost** and **helps protect the environment**



Spraying in the field

8. Pesticide Precautions



- 1. Observe** all directions, restrictions and precautions on pesticide labels
- 2. Store** all pesticides in original containers with labels intact
- 3. Keep** pesticides out of reach of children
- 4. Use** pesticides at correct label dosage and intervals to avoid building up resistance or injury to plants and animals

8. Pesticide Precautions Cont'



- 5. Apply** pesticides carefully to avoid drift or contamination of non-target areas
- 6. Surplus** pesticides and containers should be disposed of in accordance with label instructions
- 7. Follow** directions on the pesticide label regarding restrictions as required by Laws and Regulations

8. Pesticide Precautions Cont'



- 8. Change** the type of pesticide active ingredient regularly to prevent pest resistance building up
- 9. Only use** pesticides that are recommended for vegetables, and that mention the crop on the label

9. Applying Pesticides

Protective Clothing:

- A farmer should wear clothes that cover the body before spraying
- Recommended protective clothing are:
 - Overall
 - Boots/Shoes
 - Hat
 - Gloves
 - Eye cover and mask



Preparing for spraying

9. Applying Pesticides Cont'



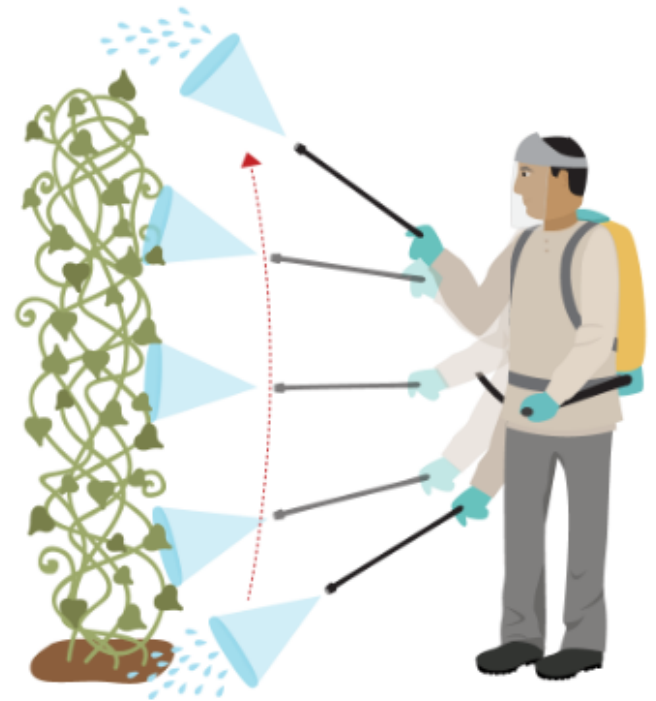
- Have **soap & water available** to wash off pesticide that accidentally got onto skin
- **Strongly recommended** to rinse off the protective clothes and wash your hands and body **very well** after application



9. Applying Pesticides Cont'



- **Spray Volume:**
- Many insects can survive under the “umbrella” of leaves if farmers only spray leaf tops by holding the nozzle above the crop
- In excessive applications, the spray runs down the tops of leaves and drips onto the soil



9. Applying Pesticides Cont'



- Simple changes in farming practices like **directing the nozzle to spray where the pest is located** on the **undersides of leaves** or **controlling spray pressure** can improve crop protection product coverage and better control pests

10. Conclusion



- **Control** pests only when it is causing or is expected to cause **more harm than is reasonably acceptable**
- **Use** a **control strategy** that will reduce the pest numbers to an acceptable level
- **Cause as little harm as possible** to everything except the pest

IPM Components

IPM requires competence in three areas: prevention, monitoring and intervention.

PREVENTION

Prevent the build-up of pests

Includes a range of practical strategies that suit local conditions.

MONITORING

Monitor crops for both pests and natural control mechanisms

Involves scouting for pests (insects, diseases and weeds) to determine if, when and how intervention should occur.

INTERVENTION

Intervene when control measures are needed

Involves physical, biological and chemical methods to preserve the economic value of crops with minimal effects on the environment.



11. Post Training Evaluation Exercise



Question	Yes	No
1. If properly managed, pests & diseases can dramatically reduce yield.		
2. Countinuou cultivation of horticultural crops means a large concentration of food for pests & diseases in one place.		
3. In pest control, we use a strategy that will cause as little harm as possible to everything else except the pest.		
4. A healthy and strong crop will have more pest and disease problems.		
5. Damage done by pests and diseases can never be completely avoided.		
6. Proper identification should be the last step in controlling a pest problem.		
7. Pest management techniques can broadly be classified as: cultural, biological, mechanical and chemical.		
8. Biological control is use of living organisms as a control method.		
9. In chemical control, pests cannot develop resistance even after repeated use.		
10. In IPM, scouting for pests is not important.		

Thank you for your attention



THANK YOU

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