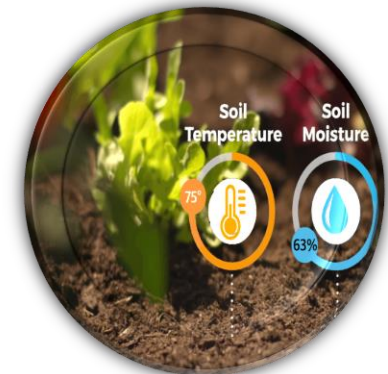




Integrated Pest Management (IPM) in Organic Agriculture



Dr. Arshad Yaseen Khoshnaw

What is IPM?

- A sustainable approach to pest control that uses a combination of techniques to reduce pest populations below economically injurious levels.
- IPM is based on the principles of prevention, monitoring, and intervention.
- In organic agriculture, IPM is essential for managing pests without the use of synthetic pesticides.

Why is IPM important in organic agriculture?

- IPM is important in organic agriculture because it can help to:
- Maintain soil health and fertility.
- Protect crops from pests and diseases.
- Conserve beneficial insects and other organisms.
- Produce food that is free from synthetic pesticide residues.

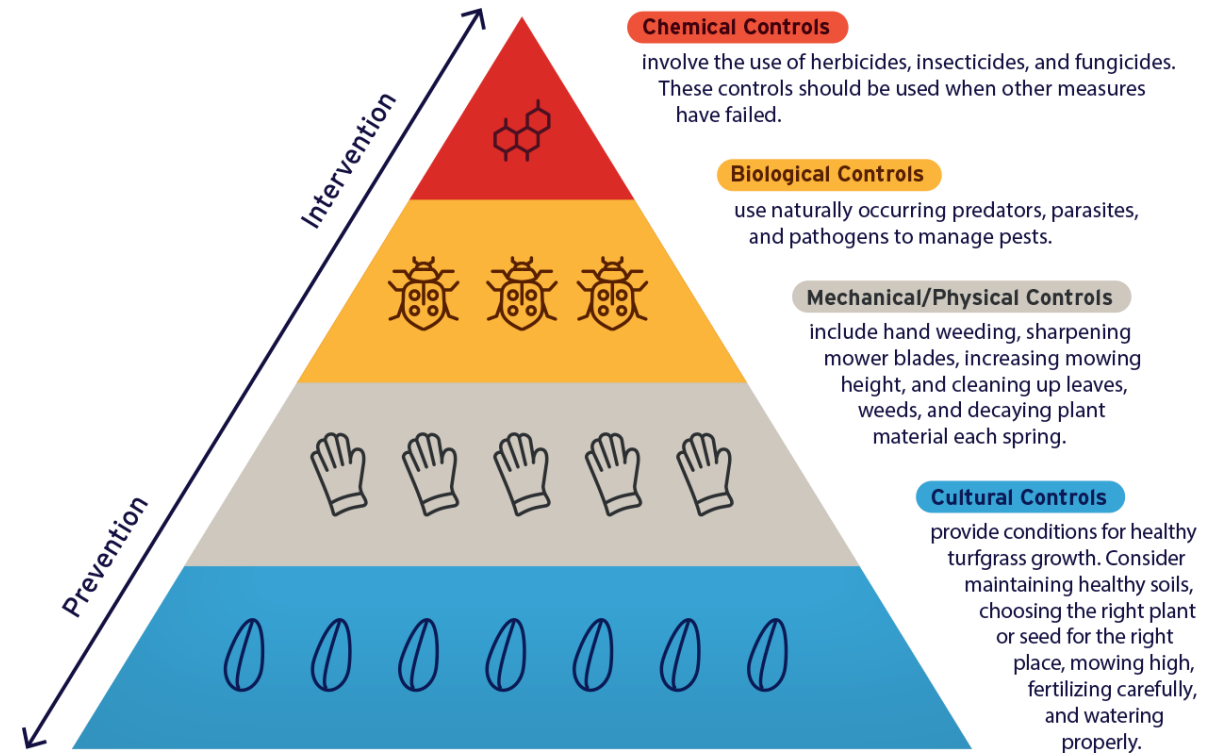


The IPM process in organic agriculture

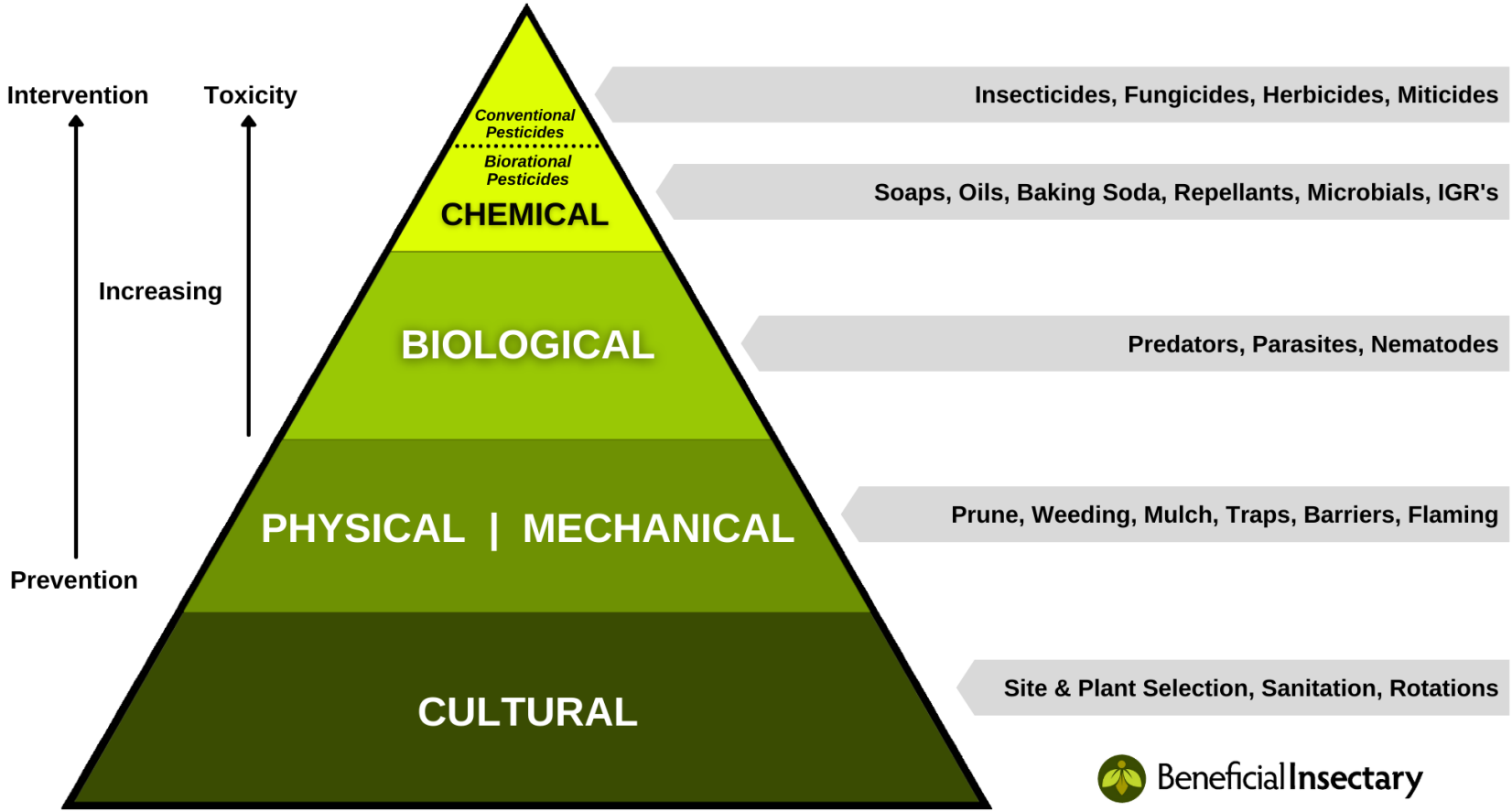
- The IPM process in organic agriculture is similar to the IPM process in conventional agriculture. However, there are some important differences:
- **Prevention:** In organic agriculture, prevention is even more important than in conventional agriculture because there are fewer tools available to control pests once they are present.
- **Monitoring:** Organic farmers must monitor their crops closely for pests and diseases. Early detection is essential for effective IPM.
- **Intervention:** Organic farmers use a variety of IPM techniques, including

IPM intervention methods

- Cultural control
- Physical control
- Biological control
- Biochemical/chemical control



IPM pyramid



Physical controls

- Handpicking: Removing pests by hand.
- Sticky traps: Using sticky traps to capture pests.
- Row covers: Using row covers to protect crops from pests.
- Light traps: are installed near or within the field where you want to trap the flying insects.



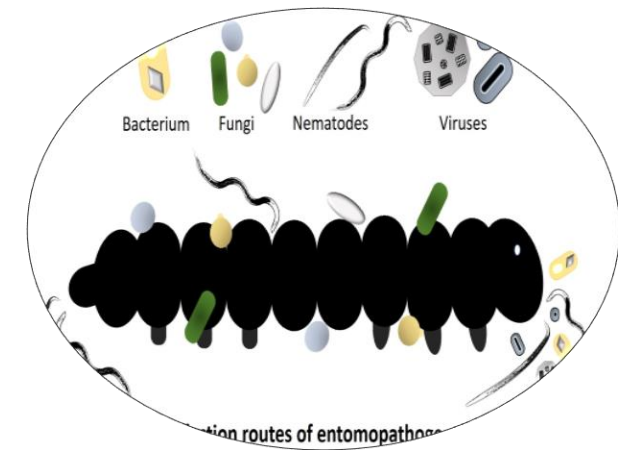
Cultural controls

- Rotating crops to disrupt pest life cycles.
- Planting pest-resistant varieties of crops.
- Using cover crops to suppress weeds and provide habitat for beneficial insects.
- Composting crop residues to improve soil health and fertility.



Biological controls

- Releasing beneficial insects into crops.
are living organisms that are natural enemies of pests. They are used to control pests below damaging thresholds. They can be predators, parasitoids, or pathogens.
- **Predators** such as ladybird beetles catch and eat insect prey.
- **Parasitoids** such as certain species of tiny wasps lay their eggs in the host, enabling the larvae to hatch into a food source.
- **Pathogens** used as biological control agents cause disease in the target pest.



Chemical control

- The use of toxic substances or pesticides to kill or reduce insect pest populations where other techniques couldn't solve the issue of pests and diseases.
- Naturally occurring pesticides are derived from compounds that are produced in nature, such as diatomaceous earth. In other words, natural pesticides are not synthetic. They tend to break down quickly in the environment, which reduces the risk of harm to non-target organisms but may require repeated applications to affect pests.
- Some confusion terms in IPM system:
- “synthetic,” “toxicity,” “natural,” “organic,” and “chemicals”

Examples of pesticides in organic farming

- Most pesticides that are allowed in organic agriculture come from natural origins, not synthetic. For example
- **Pyrethrins** are naturally occurring compounds extracted from chrysanthemum plants.
- **Spinosad** is a pesticide derived from a naturally occurring bacteria.
- **Neem oil:** Neem oil is extracted from the seeds of the neem tree. It is effective against a wide range of insects, and it is also a good fungicide.
- **Trichoderma:** Trichoderma is a fungus that is found in the soil. It is effective against a wide range of fungal diseases, and it can also promote plant growth.
- **Streptomyces:** *Streptomyces* is a bacterium that is found in the soil. It is effective against a wide range of fungal diseases, and it can also produce antibiotics that can kill insects.



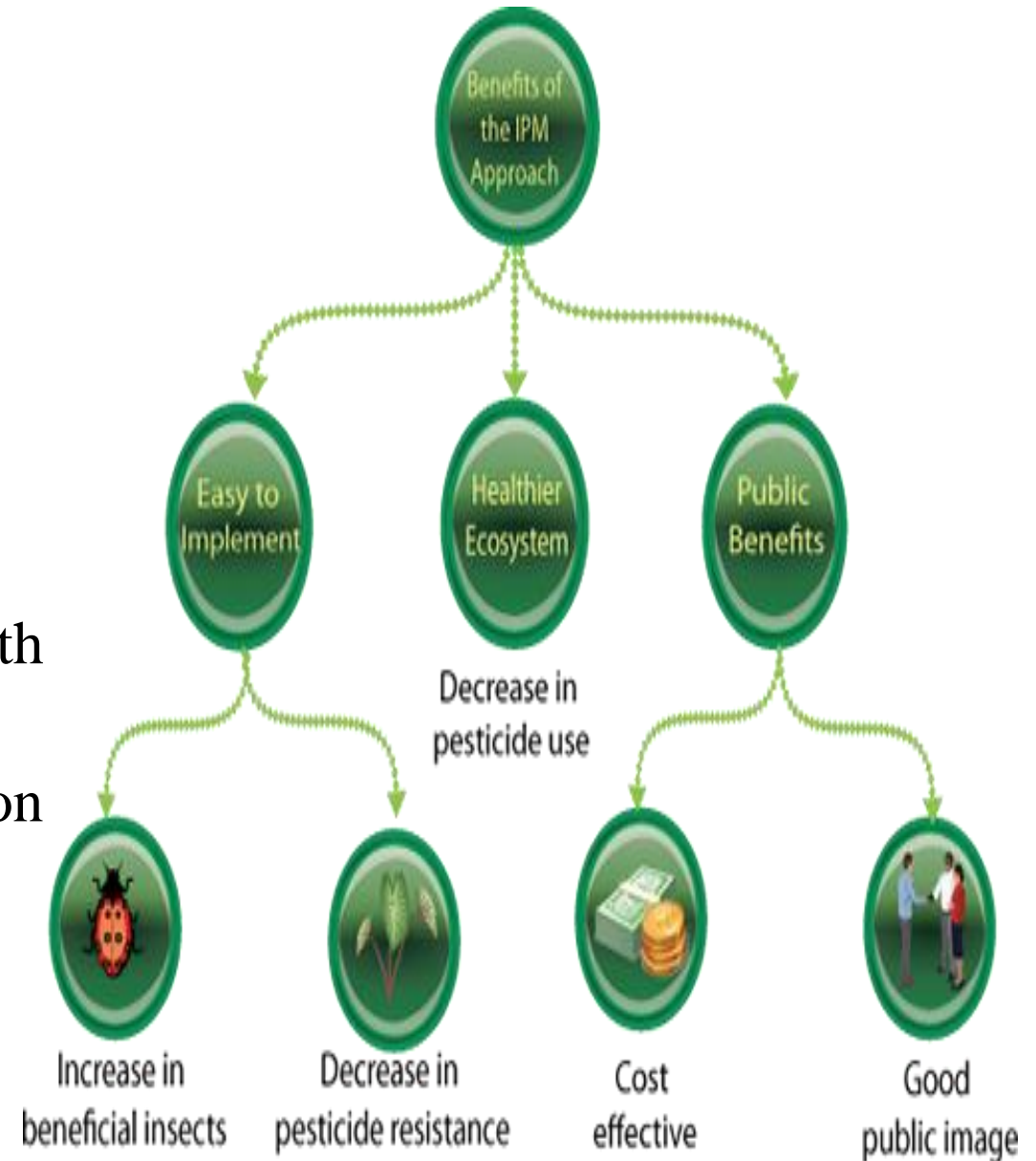
Biopesticides

- Biopesticides are derived from natural materials such as plants, animals, bacteria, or certain minerals. There are three categories of biopesticides:
 1. **Biochemical pesticides** control pests by non-toxic mechanisms such as pheromones that interfere with insect mating.
 2. **Microbial pesticides** contain microorganisms that kill pests, such as the bacterium *Bacillus thuringiensis*, aka Bt.
 3. **Plant-incorporated-protectants** are pesticidal substances that genetically modified plants are able to produce (EPA).

For instance, scientists can take the gene that codes for the pesticidal protein in Bt and transfer it into plant DNA, which allows the plant to make the protein itself.

Advantages of IPM

1. Healthier plants.
2. Reduces contamination of environment.
3. Reduces input cost.
4. Reduces use of pesticides.
5. Reduces contamination of the crop with chemical residues.
6. Reduces risk of farmer from contamination with chemical.
7. Better use of natural resources.
8. More regular crop quality and quantity.



Disadvantages of IPM

1. IPM systems are extremely complex and require a higher level of understanding to utilize.
2. An IPM system of pest control involves a lot more time and is sometimes more costly than the traditional method of spraying pesticides to eliminate pests.
3. In order for an IPM to work effectively, it needs constant monitoring.
4. The natural enemies of pests used in some IPMs can later become pests themselves.