Organic Agriculture

3rd lecture for BSc students

Organic Pest and Disease Management

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Pest and disease management in organic agriculture

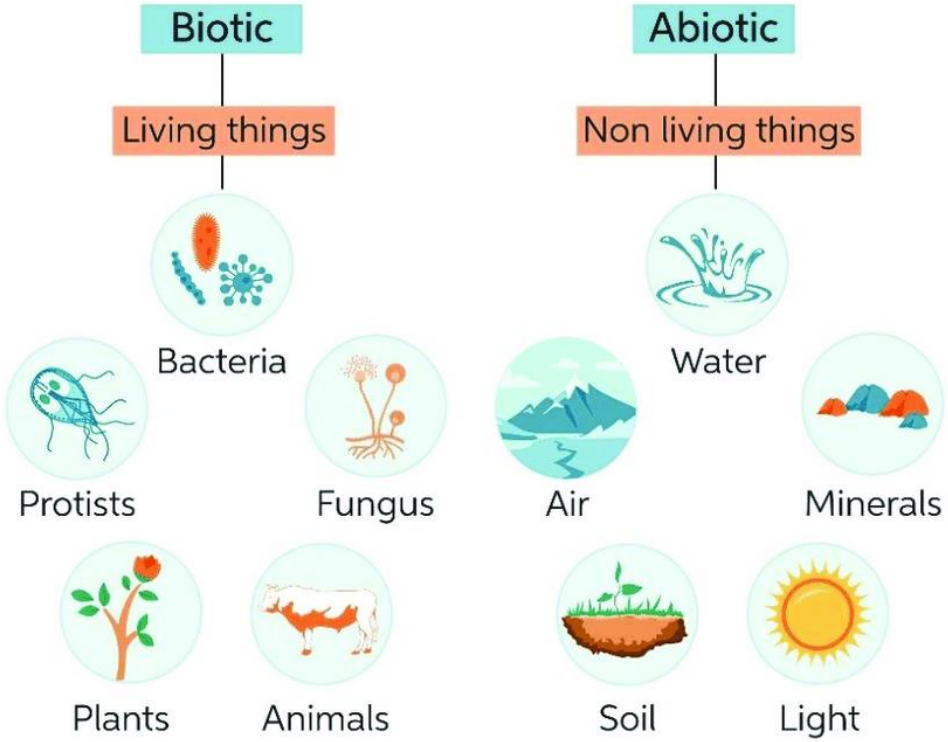
- Pest and disease management consists of a range of activities that support each other. Most management practices are long-term activities that aim at preventing pests and diseases from affecting a crop. Management focuses on keeping existing pest populations and diseases low. Control on the other and is a short-term activity and focuses on killing pest and disease.

An overview of typical pests and diseases in organic agriculture

- Pests and diseases are facing plants in two ways:

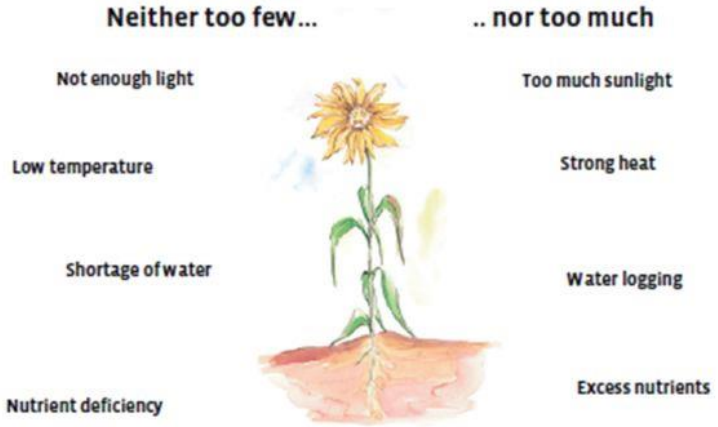
- **Abiotic factors**: abiotic stress is an environmental element that is placed on plants as a result of variations in physical or chemical stress.

- **Biotic factors**: biotic stress, which is caused by biological agents like fungus, viruses, insects, and other pests that come into contact with crop plants.



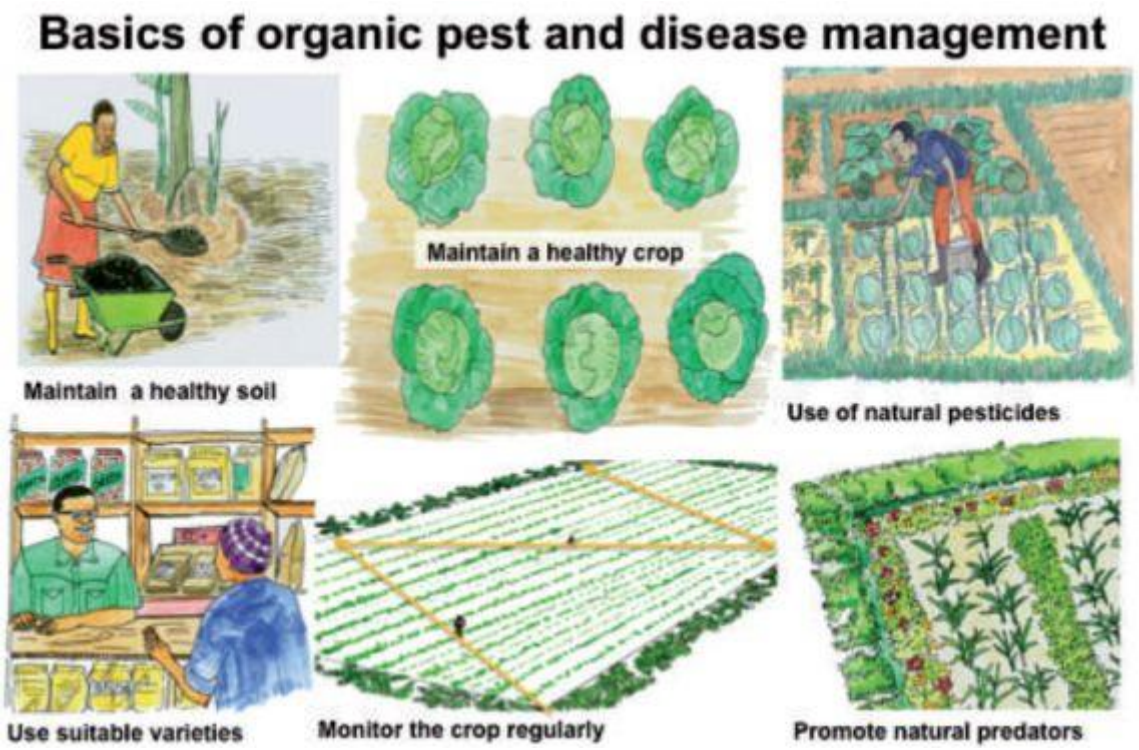
The principles of pest and disease management in organic agriculture

•The interaction between living organisms and their environment is crucial for a plant's health.
•A plant's health is more at risk in monocultures and on-farm diversification provide a balanced interaction between different plants and pests and predators.
•The health condition of a plant depends to a large extent on the fertility of the soil (nutrition and pH).
•Climatic conditions, such as suitable temperatures and sufficient water supply causes stress problems
•Growing diverse and healthy plants.



Basics of organic pest and disease management

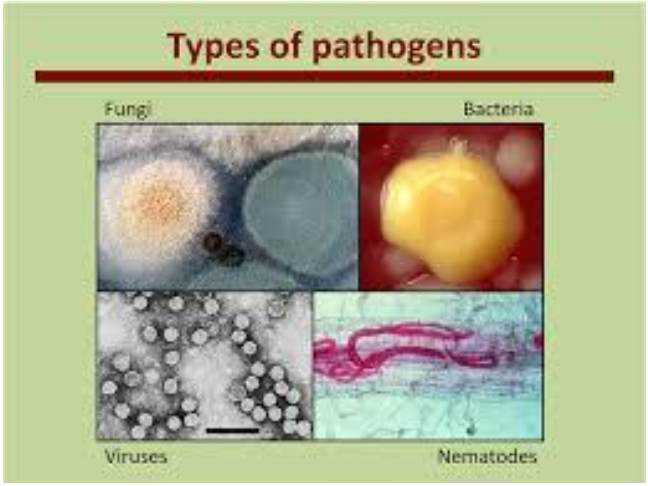
- Maintain a healthy soil
- Maintain a healthy crop
- Use of natural pesticides
- Use suitable varieties
- Monitor the crop regularly (zig-zag or M shape)
- Promote natural predators



Typical signs of disease attacks on crop plants

Most crop diseases are caused by **fungi**, **bacteria** or **viruses**.

- **Fungi** cause the great majority, estimated at two-thirds, of infectious plant diseases.
  - They include all white and true rusts, smuts, needle casts, leaf curls, mildew, sooty moulds and anthracnose.
- **Bacteria** cause any of the four following main problems.
  - parts of the plant to start rotting (known as 'rot').
  - early death of the plant.
  - Others produce large amounts of very sticky sugars
  - mimic plant hormones.
  - overgrowth of plant tissue and form tumors.
- **Viruses** mostly cause systemic diseases.
  - Generally, leaves show chlorosis or change in colour of leaves and other green parts.
  - Light green or yellow patches of various shades, shapes and sizes appear in affected leaves.
  - These patches may form characteristic mosaic patterns, resulting in general reduction in growth and vigour of the plant.



Typical signs of insect attacks on crop plants

1. **Holes** in the leaves of your plants are one of the most common signs of a pest infestation.
2. Pests could also be the reason your plants have **wilting or dropping leaves**. Sap-sucking insects don't just create holes, they can also cause wilting.
3. If **discoloration** is occurring, you'll want to keep your eyes open for pests. Spots are one of the main types of discoloration that pests can cause. Yellow spots can result from pests like thrips, spider mites, aphids, and scale insects feeding on plants.
4. If your plants **aren't growing** like they should, insects could be the problem. As pests feed on plants, whether by sucking sap or chewing on leaves, the plant is weakened.
5. When insects feed on plants, they often secrete a sticky substance called **honeydew**. If your plants have areas covered with a clear, sticky substance, pests are likely responsible. Aphids, mealybugs, whiteflies, and scale insects are some of the pests that are known for leaving behind honeydew. This substance is usually found on the leaves of plants
6. A sudden **increase in insect activity** in your yard could be a warning sign of garden pest problems.

Natural repellents and barriers

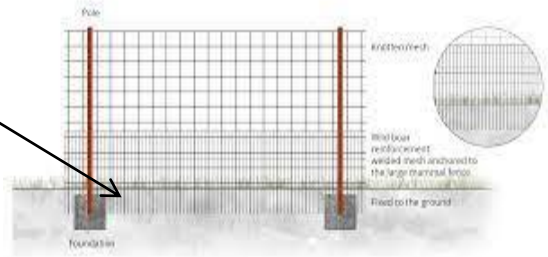
'Prevention is better than cure’

How can we prevent our agricultural field from pests and diseases?

1. Use scarecrow or similar tools
2. Make metal or degradable fences
3. Use shelters or nets to protect sunlight burning, hail damages or reducing evaporation
4. Weed management
5. Grow fence crops or windbreaks
6. Proper irrigation and water management

Colourful clothing or materials

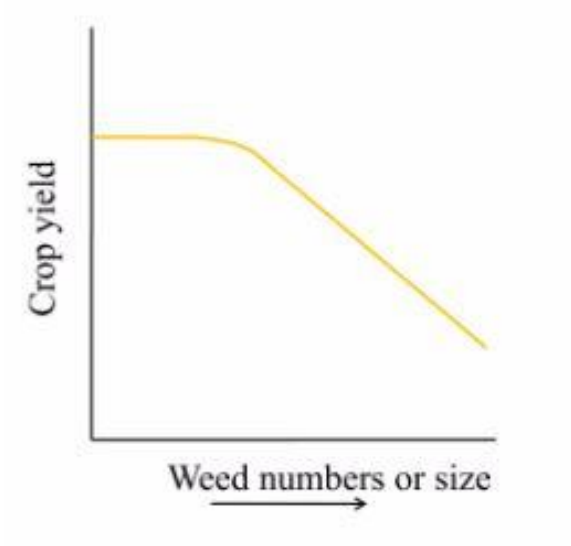
Bottom narrow spacing

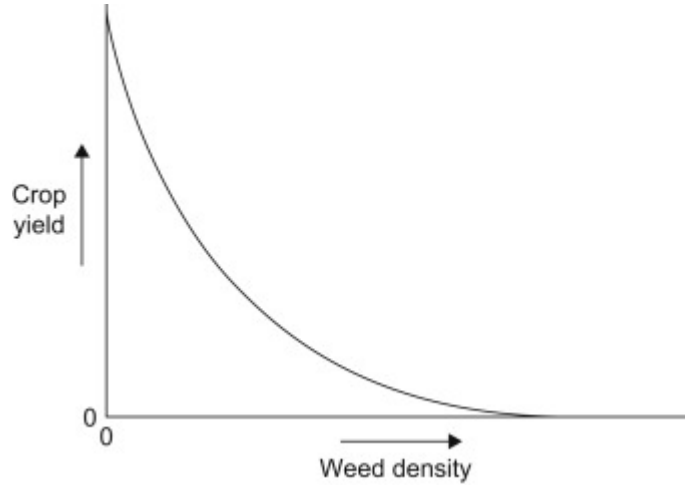


3. Use shelters or nets to protect sunlight burning, hail damages or reducing evaporation

4. Weed management

Practice	**Effect**
Tillage Kills growing weeds	damages perennial roots & rhizomes; buries seeds too deeply to emerge; brings weed seeds to surface.
Organic fertility sources	Favor crops over faster-growing weeds due to slow release of nutrients
Drip irrigation	Directs water to the crops rather than to weeds
Mulch	Smothers weeds: delays emergence of weeds
Using transplants	Competitive advantage to crop
Competitive cultivars	Improves competitive ability of crop against weeds.
Increase plant density	Suppress weeds by shading
Cover crops	Suppress weeds, improves soil health
Rapid cleanup after	Prevents seed set by residual weeds. harvest





5. Grow fence crops or windbreaks

Wind has both direct and indirect effect on plant growth. High wind speed (up to 5-8 km h^{-1}) lead to steam damage, leaf stripping, flower and fruit dropping, plant uprooting, change appearance of the plant. However, low wind speed below (5-8 km h^{-1}) have a positive effect on many plants such as increasing pollination, increase leaf area in Broccoli, longer vines and early flowering in Melones..etc.

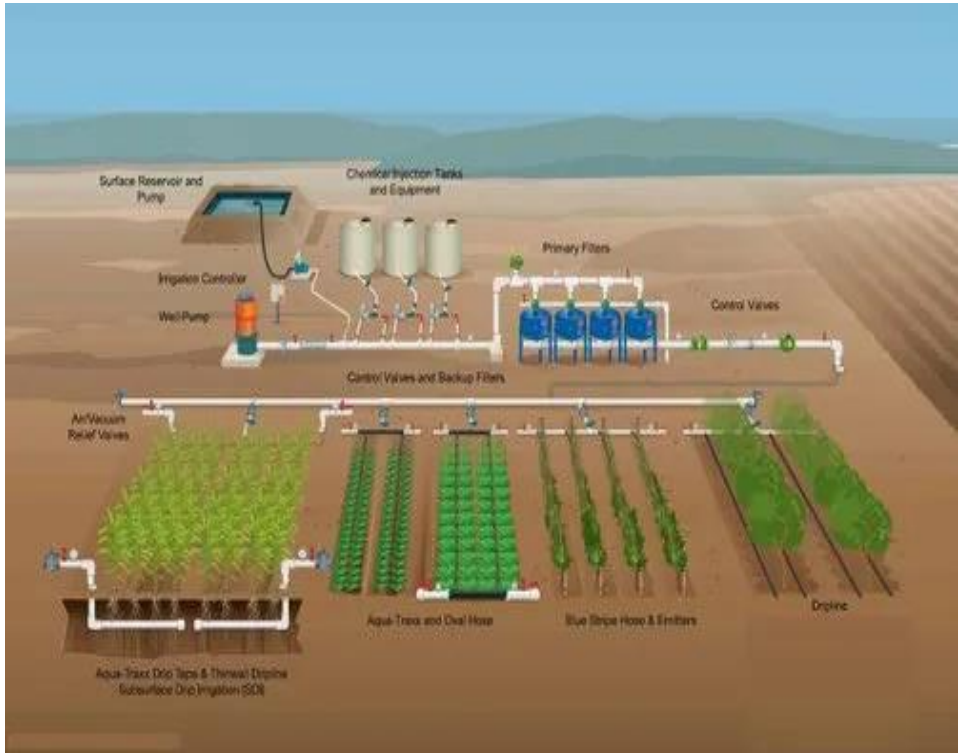
6. Proper irrigation and water management

Efficient irrigation occurs when design and management enable producers to apply enough water consistently to almost completely fill the effective crop root zone with minimal runoff.

- Principles of irrigation

1. Water must be clean
2. Irrigation system must be set up based on type of plant

3. Irrigation schedules depends mainly on environmental factors and plant growth stage



Other effective actions can protect your crops from damage (mechanical or biological)

- Grow resistant varieties
- Use clean and sterilize gardening tools
- Controlling visitors in your garden, orchard or field
- Grow your plants in homogeneous rows
- Grow your plants on time
- Controlling activities in your garden

Grow your plants in homogeneous rows

BEST FOR *You*

Thank you

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