



IIT KHARAGPUR



NPTEL ONLINE  
CERTIFICATION COURSES

# Organic Farming for Sustainable Agricultural Production

**Dr. Dillip Kumar Swain, Associate Professor**

**Agricultural and Food Engineering Department**

**Lecture 18 : Pest and Disease Management in Organic Farming**

# Levels of Pest and Disease Management

## Level A (Preventive)

- The first line of defense in managing insect and disease is a systems based approach.
- Well-designed and healthy organic system will naturally have fewer pest problems.
- System is designed to prevent pest and disease outbreaks.

## Level B (Physical & Mechanical)

- The second line of defense is utilized if the practices of level A are not sufficient to control the weed insect or disease problem.
- Level B generally includes mechanical and physical practices that are tradition in organic farming.

## Level C (Allowed biopesticide)

- The third line of defence is used if the level of pest control required is not achieved after A and B.
- Level C practices include the use of inputs such as biologicals and botanicals pesticides to control pests.

# Practices in LEVEL- A

## 1. Selection of adapted and resistant varieties

- Choosing varieties which are well adapted to the local environment
- This allows them to grow healthy and makes them stronger against pests and diseases  
e.g. Tomato varieties advertised as VFN are resistant to Verticillium, Fusarium and nematodes.



Leaf Folder Moderately Resistant varieties

## 2. Selection of clean seed and planting material

- Use of pathogen and weed free, safe seeds at all stages of production.
- Use of planting material from safe sources

### 3. Use of suitable cropping systems

- **Crop rotation:**

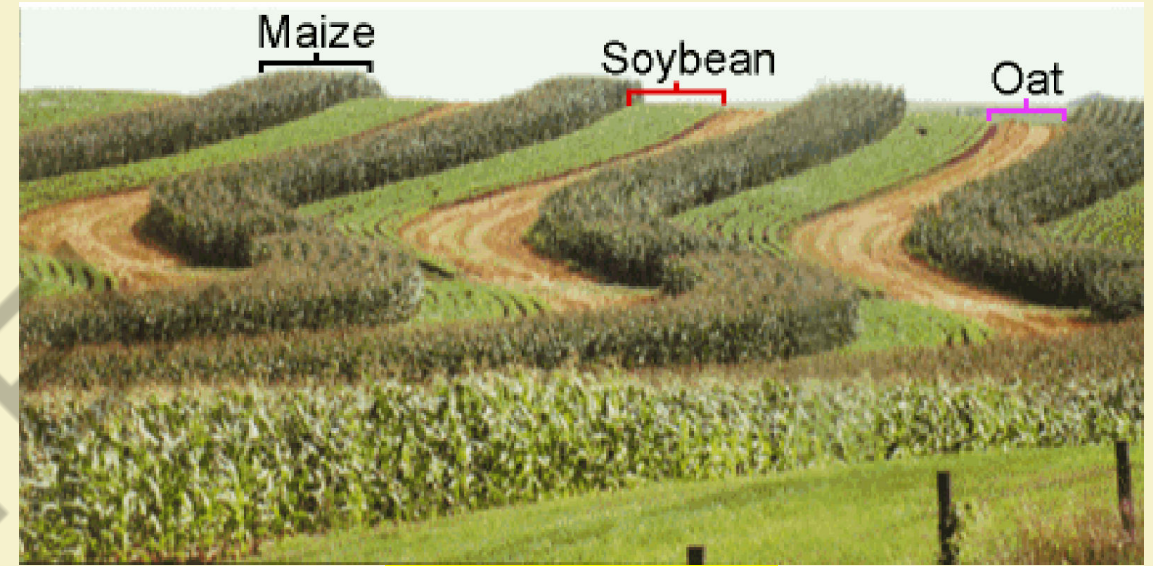
- Crops of different families are taken up in rotations.
- This minimises the risk of the incidence of a family specific disease

e.g. cereal crops like wheat, barley, etc are taken up in rotation with legumes.

This breaks the disease cycle of Fusarium Blight.

- **Intercropping:**

- Growing of two or more crops simultaneously in the same field is called as intercropping.
- This increases biodiversity and decreases pest outbreaks.



Intercropping



## 4. Use of balanced nutrient management

Moderate fertilisation:

- Steady growth makes a plant less vulnerable to infection.
- Too much fertilisation results in salt damage to roots, paving the way for secondary infections
  - e.g. Excess nitrogen fertilizer makes the plant succulent and hence more susceptible to attack of diseases and pests
- Balanced potassium supply makes the plant hardy to various infections.



Lodged plants due to excess nitrogen

## 5. Supply of organic matter

- Increases the density and activity of microbes in soil, thus decreasing density and activity of micro pathogens in soil.
- Stabilises soil structure
- Improves aeration and water holding capacity of soil
- Strengthens the plants defence mechanism by the secretion of certain substances

## 6. Application of suitable soil cultivation methods

- Facilitates the decomposition of infected plant parts.
- Regulates weeds which serves as hosts for pests and diseases
- Protects the beneficial soil micro flora

## 7. Use of proper water management

- Avoid water-logging: causes ambient conditions for different pests and diseases
- Avoid water on the foliage: water borne diseases spread with droplets and fungal disease germinate in water.

## 8. Conservation and promotion of natural enemies

- Providing an ideal habitat for the growth and reproduction of natural enemies
  - Avoiding products that may harm the natural enemies
- e.g. Growing of some plants that attract ladybugs or other natural predators will help reduce populations of plant pests.



Water-logged field



Ladybug

## 9. Selection of optimum planting time and spacing

- Most of the pests and disease attack the plant at a certain growth stage, called as the “Critical stage”. This vulnerable stage should not coincide with the period of high pest density, thus optimal planting time should be chosen.
- Optimum spacing reduces the spread of a disease
- Good aeration of the foliage hinders pathogen development.

## 10. Use of Proper Sanitation Measure

- Remove infected plant parts (leaves, fruits) from the ground to prevent the disease from spreading.
- Discard the infected plant residues after harvest.

e.g. a) Apple and pear growers remove branches infected with fire blight (strikes). The strikes are removed from the orchard and burned to kill the bacteria that cause fire blight.

b) Mushroom growers pasteurize the bedding material to kill fungi that would compete with the mushroom crop.



## 11. Cover crops:

Some cover crops like Sudangrass, Rapeseed and mustard are effective at suppressing nematodes.

## 12. Trap crops:

- These are small plantings of a crop or crop variety intended to draw a particular pest away from the main crop.  
e.g. Alfalfa planted in strips amid cotton attracts lygus bugs away from the cotton crop
- Trap crops must be destroyed to kill the pests that have been attracted to them



Marigold used as Trap Crop



# Practices in Level-B

## 1. Mulching

- Mulching can reduce disease to some extent by reducing soil contact and maintenance of an even soil moisture  
e.g. Mulching in tomatoes can reduce certain diseases.



Organic Mulch

## 2. Canopy Management:

- By training and pruning trees, there is increased airflow and decrease in outbreak of diseases.  
e.g. Viticulturists practice leaf removal to control Botrytis bunch rot of grapes.

## 3. Solarisation:

- Covering the soil with plastic during summer allows the soil to get hot enough to kill many pathogens



Artificial Mulch



## 4. Mass Trapping of Insects

### a. Light Trap

- Used to catch moths viz; armyworms, cutworms, stem borers and other night flying insects
- Most efficient when placed before the adult moths start laying eggs.

### b. Yellow Sticky Trap

- Yellow sticky traps can be used to control whiteflies, aphids and leaf mining flies.
- Yellow colour attracts many insects, even beneficial ones. So, it should be used only when needed.
- Motor oil or transparent car grease are used
- Placed around 10 cm above foliage
- 02 to 05 sticky traps per 500 m<sup>2</sup> field area

### c. Pheromone Trap

- Uses pheromones to lure insects
- Successful in mating disruption



Light Trap



Pheromone Trap



Yellow sticky Trap

## 5. Fruit bagging

- prevents fruit flies from laying eggs on the fruits
- the bag also provides physical protection from mechanical injuries (scars and scratches)
- works well with melon, bitter gourd, mango, guava, star fruit, etc.



Fruit Bagging