



## Diseases of Most Rabi Crops in Rajasthan and Their Management

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Rabi crops, also known as winter crops, are grown during the winter season and harvested in the spring. Major Rabi crops in Rajasthan include wheat, mustard, barley, chickpea (gram), and cumin. The semi-arid climate of Rajasthan, along with fluctuating temperatures and moisture stress, makes these crops vulnerable to various diseases. Below is a detailed discussion of the types of diseases affecting Rabi crops in Rajasthan and their management practices.

### 1. Wheat (*Triticum aestivum*)

Wheat is one of the most important Rabi crops in Rajasthan, but it is susceptible to several diseases, primarily of fungal origin.

#### Major Diseases:

##### • Rust Diseases (Stem, Leaf, and Stripe Rust):

• Pathogen: *Puccinia* spp.

##### • Symptoms:

• Stem rust: Reddish-brown pustules on stems and leaves.

• Leaf rust: Small, round, orange-red pustules on leaves.

• Stripe rust: Yellow, linear streaks on leaves.

##### • Management:

• Use rust-resistant wheat varieties (e.g., HD-2967, WR-544).

• Apply fungicides like propiconazole or triadimefon at the early stage of infection.

• Practice crop rotation and avoid continuous wheat cropping to reduce inoculum levels.

##### • Karnal Bunt:

• Pathogen: *Tilletia indica*

##### • Symptoms:

• A blackish, foul-smelling mass replaces the grain content inside the wheat kernels.

• Infected grains have a fishy odor and are unfit for human consumption.

##### • Management:

• Use disease-free seeds or certified seeds.

• Seed treatment with fungicides like carboxin or thiram before sowing.

• Maintain field hygiene and practice crop rotation.

##### • Powdery Mildew:

• Pathogen: *Blumeria graminis*

• Symptoms: White powdery fungal growth on leaves and stems, which can lead to reduced photosynthesis and lower yields.

##### • Management:

• Use resistant varieties like PBW-343.

- Spray fungicides like sulfur or hexaconazole when symptoms appear.
- Avoid excessive nitrogen fertilization, as it increases susceptibility.

## 2. Mustard (*Brassica juncea*)

Mustard is a significant oilseed crop in Rajasthan. It is vulnerable to several fungal and bacterial diseases that can drastically reduce yield.

### Major Diseases:

- **White Rust:**
  - **Pathogen:** *Albugo candida*
  - **Symptoms:** White pustules on leaves and stems, leading to leaf deformation and stunted growth.
  - **Management:**
    - Use resistant mustard varieties like RH-749 and NRCDR-2.
    - Apply foliar sprays of metalaxyl or mancozeb at the first sign of infection.
    - Avoid waterlogged conditions and maintain proper field drainage.
  - **Alternaria Blight:**
    - **Pathogen:** *Alternaria brassicae*
    - **Symptoms:** Circular dark brown spots with concentric rings on leaves, stems, and pods, leading to premature defoliation and reduced seed formation.
    - **Management:**
      - Use disease-free seeds or treat seeds with fungicides like captan or thiram.
      - Spray mancozeb or difenoconazole during the flowering stage to control infection.
      - Practice crop rotation and destroy infected crop residues.
  - **Downy Mildew:**
    - **Pathogen:** *Peronospora parasitica*
    - **Symptoms:** Yellowing of leaves and downy white fungal growth on the undersides of leaves.
    - **Management:**
      - Use resistant varieties like Kranti and Pusa Bold.
      - Foliar sprays of metalaxyl and mancozeb.
      - Ensure good air circulation by spacing plants properly.

## 3. Barley (*Hordeum vulgare*)

Barley is grown in some parts of Rajasthan as a Rabi crop and is mainly used for animal fodder and brewing industries. Diseases affecting barley can lead to significant yield losses.

### Major Diseases:

- **Loose Smut:**
  1. **Pathogen:** *Ustilago nuda*
  2. **Symptoms:** Infected spikes are filled with black, powdery fungal spores instead of grains. Infected plants often appear normal until heading time.
  3. **Management:**
    4. Use certified, disease-free seeds.
    5. Seed treatment with fungicides like carboxin or tebuconazole.
    6. Grow resistant varieties like RD-2503.
- **Stripe Rust:**
  - **Pathogen:** *Puccinia striiformis f. sp. hordei*
  - **Symptoms:** Yellow stripe-like pustules on leaves and stems.
  - **Management:**
    - Use rust-resistant varieties like RD-2715.
    - Spray propiconazole or triadimefon at the early stages of infection.
    - Maintain proper field sanitation by removing infected crop residues.

#### 4. Chickpea (*Cicer arietinum*)

Chickpea is a major pulse crop in Rajasthan's Rabi season and is often impacted by fungal diseases due to moisture stress or improper irrigation.

*Major Diseases:*

- **Ascochyta Blight:**
- **Pathogen:** *Ascochyta rabiei*
- **Symptoms:** Dark, circular lesions on leaves, stems, and pods, leading to wilting and drying of plants.
- **Management:**
- Use resistant varieties like GNG-1581 and JG-74.
- Treat seeds with fungicides like thiram or carbendazim.
- Apply foliar sprays of chlorothalonil or carbendazim at regular intervals.
- **Fusarium Wilt:**
- **Pathogen:** *Fusarium oxysporum f. sp. ciceri*
- **Symptoms:** Sudden wilting of plants, yellowing of leaves, and brown discoloration of vascular tissue.
- **Management:**
- Grow wilt-resistant varieties like JG-315 and GNG-1958.
- Practice crop rotation with non-host crops like cereals.
- Solarize soil by covering it with plastic sheets during the hot summer to reduce the pathogen load.

#### 5. Cumin (*Cuminum cyminum*)

Cumin, an important spice crop grown in Rajasthan, is highly susceptible to fungal and bacterial diseases, especially under moisture stress conditions.

*Major Diseases:*

- **Fusarium Wilt:**
- **Pathogen:** *Fusarium oxysporum f. sp. cumini*
- **Symptoms:** Yellowing and wilting of plants, followed by root rot and death of plants.
- **Management:**
- Use disease-free seeds and grow wilt-resistant varieties.
- Treat seeds with fungicides like carbendazim before sowing.
- Solarize soil to reduce pathogen population.
- **Alternaria Blight:**
- **Pathogen:** *Alternaria burnsii*
- **Symptoms:** Small black or brown spots on leaves, stems, and umbels, leading to poor seed formation and lower yield.
- **Management:**
- Use resistant varieties and treat seeds with fungicides.
- Foliar spray of mancozeb or chlorothalonil during early infection stages.

#### General Disease Management Practices for Rabi Crops in Rajasthan

1. **Cultural Practices:**
2. **Crop Rotation:** Practice rotation with non-host crops to break the disease cycle.
- **Sanitation:** Remove and destroy infected plant residues to reduce the inoculum source for future crops.
- **Resistant Varieties:** Use disease-resistant or tolerant varieties as a first line of defense against crop diseases.
3. **Seed Treatment:**
- Treat seeds with appropriate fungicides (thiram, carbendazim, or captan) to prevent seed-borne diseases.

**4. Fungicide Application:**

- Timely foliar sprays of fungicides like mancozeb, carbendazim, chlorothalonil, or propiconazole can help control fungal infections.

**5. Soil Management:**

- **Soil Solarization:** Use plastic mulch during summer to solarize the soil, killing soil-borne pathogens.
- **Balanced Fertilization:** Avoid excessive nitrogen fertilization, which can make crops more susceptible to diseases.

**6. Water Management:**

- Avoid over-irrigation, as waterlogged conditions favor the development of fungal diseases.
- Use proper irrigation techniques to maintain optimal soil moisture levels.

**7. Field Hygiene:**

- Maintain field sanitation by removing weeds and controlling alternate hosts that may harbor pathogens.

**Conclusion**

The management of diseases in Rabi crops in Rajasthan is critical for ensuring optimal yields and quality of produce. Effective disease management strategies include the use of resistant varieties, proper seed treatment, crop rotation, and timely application of fungicides. By adopting these integrated disease management practices, farmers can significantly reduce the incidence of diseases and enhance the productivity of Rabi crops in the region.