Diseases of Crucifers

Downy mildew of crucifers

Symptoms: The purplish brown spots are observed on the underside of the leaves with thin downy growth of the fungus. The upper surface of the leaf on the lesion is yellowish. Infected leaves dry up, shrivel and fall off. Swelling of the stem becomes evident.

- **Causal organism:** *Peronospora brassicae Gaum*

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- **Etiology-**The mycelium is coenocytic and intercellular with large finger shaped branched haustoria. Sporangiophores are dichotomously branched. The sterigmata are long, slender and pointed at acute angle with each other. The sporangia borne singly at the tip of each branch those are ovate hyaline, readily fall off and germinate by lateral germtube. The fungus is an obligate parasite.
- **Perpetuation**-The fungus perpetuates in the soil through oospores. The primary infection is through contaminated seeds. Sporangia are responsible for secondary spread of the disease.

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- **Control Measures-**

1)Maintain sanitation.

2)Follow crop rotation for 2-3 years.

3)Destroy weed hosts.

4)Hot water seed treatment at 50°C for 30 minutes or

5)Seed treatment with metalaxyl 35 WS @6 g/kg seed.

6) Spray the crop with 0.25 per cent mancozeb or chlorothalonil or copper oxychloride or B. M. (0.5 to 0.6%) 2-3 times at 10 days interval. Metalaxyl MZ-72 or fosetyl AL (0.25%) are the best systemic - selective fungicides for the management of downy mildew of crucifer

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CLUB ROOT OF CRUCIFERS

- **Symptoms**-The above ground plant parts show stunting, reduction in the size of the head, or Symptoms: chlorosis and other general non-specific unhealthy symptoms. When such plants are pulled out and the roots are examined, the characteristic club-root symptoms may be seen. The roots are malformed into club-like structure, due to thick fleshy growth of the roots. In general, the root tips are malformed, leaving the basal portion of the root mostly normal. Malformed tissues may rot and turn black due to secondary organism like bacteria.
- **Causal organism**: *Plasmodiophora brassicae* Woronin

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- **Etiology-**

The vegetative structure of the fungus is a plasmodium. It is a multinucleate naked protoplast. The plasmodia are always formed within the host cells. The fungus produces numerous resting spores inside the host cells by division of the plasmodium into uninucleate portions. When resting spores germinate, they produce anteriorly biflagellate zoospores those are naked, devoid of cell wall with uninucleate protoplasm, irregular or amoeboid in shape. The resting spores are capable of germinating immediately after formation and may be viable for two to three years. It is an obligate endoparasite. Temperature, moisture, soil reaction (pH rang 5.0 to 7.0) and aeration play an important role in the development of the disease

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- **Perpetuation**-The disease is soil -borne. The spores can live in the soil for 2 to 3 years. Secondary infection by zoospores.
- **Control measures**:

1. Eradication of Cruciferous weeds from around the field
2. Use of well drained disease free plots
3. Use of seedlings raised in disease free soil
4. Very long rotations avoiding any type of cruciferous crop
5. Soil fumigation with Vapam (2-2.5 litre/ten sq.m) or methyl bromide 0.5 to 1 kg/10 sq. m or formalin 3-4% @ 10L/m^2, two week before planting)
6. Raising the soil pH to 7.2 by adding lime (hydrated lime) six weeks before planting, a soil with pH 5 may require about 2.5 tons of lime/ha 7. Soil drenching with a systemic fungicide, benomyl (Benlate).
8. Seedlings dip treatment in solution of benomyl or carbendazim or thiophanate methyl (0.5%) for 15 to 20 minutes before transplanting.

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WHITE RUST

- White rust disease affects many species of crucifers and causes loss. Cabbage, mustard, radish and turnip are severely attacked in India.

Symptoms-

- The effects on the host plants result from two types of infections, local and systemic.
- In case of local infection, isolated pustules or sori develop on leaves and stem. Sori are closer and merge to form larger patches. The host epidermis ruptures after the maturity of pustules.

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- When young stems and flowering parts are infected the fungus becomes systemic in the tissue and stimulates hypertrophy and hyperplasia. The distortion and abnormal development are conspicuous on flower parts. Sepals become enlarged to several times than the normal sepals. Petals enlarge and become green. Pistils and anthers are also distorted. Normal seed development is arrested.
- **Causal organism:** *Albugo candida (Lev.) Kunze*. (Albugo cruciferum)
- **Etiology:** The fungus is an obligate parasite. Mycelium is intercellular producing knob-shaped haustoria in the host cells. Sporangia are formed in basipetal succession in chains. Sporangia are hyaline, spherical and 14 to 16 x 16 to 20 µm. Each sporangium has 4 to 8 zoospores. Oogonium is globose and terminal or intercalary. Antheridium is clavate and paragynous. Oospore wall is thick and tuberculate.

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Perpetuation-

- It attacks cabbage, cauliflower, mustard, radish and turnip. Overwintering may be through oospores in plant debris in the soil and mixed with seeds and perennial mycelium in seed hosts are primary source of inoculum. Secondary spread is by means of sporangia carried by air currents.

- **Epidemiology:** Moisture on the host surface is essential for germination of sporangia. Optimum temperature for sporangial germination is 20°C. Moist and cool (20 to 25°C) weather favours the disease development.

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- **Management:**

1. Spraying with Bordeaux mixture 0.8 per cent is effective.
2. Seed beds should be dry and laid out in open.
3. Diseased plant debris should be destroyed or ploughed.
4. Spraying with Difolaton 0.3 per cent or chlorothalenil or metalaxyl 0.1. per cent or mancozeb 0.2 per cent effectively controls the disease.

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ALTERNARIA LEAF SPOT/BLIGHT

- **Symptoms:**The chief symptom is blight or rot at leaf bases and around nodes, which are girdled. Spots on leaves are ashy white. The centres of old spots are covered with dark brown to black fungal growth. Leaves may be constricted and twisted and the tip may be killed. Branches die back at the girdled area and black crusts of conidia are formed on the cankers.
- **Causal organism**: *Alternaria dianthi* Stevens and Hall.

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- **Etiology**-Conidiophores are straight or flexuous, geniculate (bent like a knee), olivaceous-brown, conidia multi celled, muriform (with several transverse and longitudinal septa), constricted at septa, smooth, beaked, beak swollen at the tip and measure 18 to 110 x 7 to 30.4 µm.
- **Perpetuation**-Conidia spread through irrigation or rains, enter through wounds, stomata or directly through the cuticle. The conidia are carried on cuttings. The disease is widespread in humid weather.

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- **Management**-1. To reduce the disease incidence, humidity may be kept low by providing proper air circulation.

2. Disease free planting material should be used.

3. Planting material should be sterilized with formalin 5.0 per cent solution.

4. During propagation of planting material, spraying with carbendazim 0.1 per cent or mancozeb 0.2 per cent controls the disease.

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