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# Management of Physiological disorders, Pest and Diseases of Crucifers

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**Physiological Disorders**:

Physiological disorders in crucifers are Browning, Whiptail, Buttoning, Riceyness, Blindness, Multiple curds. By managing nutrients and irrigation to minimize plant stress and using stress tolerant varieties are key to avoid many of these physiological disorders.

**1. Browning: Boron deficiency**

Water-soaked lesions in the leaf, stem and curd surface appear, which turn rusty brown in colour. In knolkhol, splitting of tuber occurs. Potassium deficiency aggravates splitting. Leaves change in colour and thicken. Older leaves curl down ward. In cabbage, browning in stem appears due to this disorder along with thickening and brittleness of leaves. Control measures include soil application of borax @ 10-15 kg/ha. Four sprays of 0.25 - 0.50% solution of borax at the rate of 1-2 kg/ha along with 0.1% Teepol.

**2. Molybdenum deficiency (whiptail):**

Young cauliflower plants become chlorotic and turn white along leaf margins. They become cupped and wither. Sometimes only the mid rib develops thereby giving the name "whiptail' to this syndrome. In cabbage and other Cole crops, distortion of growing point along with reduction of leaf area is the symptoms. Molybdenum availability is low on very acidic soil, raising the pH to 6.5 by liming makes molybdenum available. Apply 1.5 kg Sodium or Ammonium molybdate per hectare mixed with fertilizers to control this disorder.

3. **Buttoning**

Over aged seedlings, poor nitrogen supply, wrong cultivars etc. or any check in the vegetative growth of seedlings. The check may be insufficient nutrition or biotic stress are the causes for this disorder

**Remedy:** To avoid all kinds of biotic and a biotic stress.

**4. Riceyness:**

Premature initiation of floral buds is called Riceyness, mainly due to temperature fluctuation higher or lower than the optimum. We can control it by choosing proper variety and good seed stock.

**5. Blindness:**

The cauliflowers lack terminal bud. The leaves are large dark green, thick a leathery. It does not produce curd. It was caused through Subzero temperature when plants are small, mechanical injury of terminal

bud or injury caused by insects such as cutworms. By doing careful handling of plants, avoiding exposure of plants to very low temperature with these methods we can control it.

**Control:** Spraying of Monocrotophos (0.05%) or Malathion (0.1%) at 10-15 days interval control aphid population effectively. To prevent recurrence of the pest granular insecticides like Phorate @ 1.0 kg a.i. ha should be applied to soil.

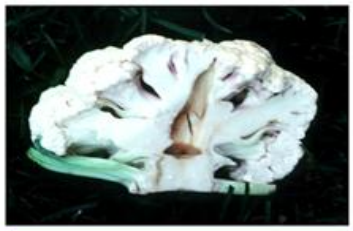

Fig.1. Browning in cauliflower

Fig.2. Whip tail in cauliflower

Fig.3. Buttoning in broccoli

Fig.4. Riceyness in cauliflower

Fig.5. Blindness in cauliflower

Fig.6. Multiple heads in cauliflower

**6. Multiple curds:**

A number of small button-like curds appear in a bunch. It happened due to terminal bud injury and resultant branching before curd initiation. It can control by avoiding of very low temperature exposure and careful handling of plants.

**Pests**

**Aphids (*Brevicoryne brassicae*):** The aphids are g enerally observed on lower surface of the leaves. The Yellowish green nymphs and adults suck cell sap and devitalize plants. Affected plant parts become discolored, malformed and weakened.

**Cabbage Diamondback Moth (*Plutella xylostella*):** The green or brownish coloured caterpillars feed the inner leaves by making holes, rendering transparent cuticular patches. Severely affected leaves are completely skeletonized.

**Control:** Spraying of neem-based formulations @ 4 ml or Bt product like Delfin 3G @ 1 g per of water gave good control on pest or spraying crop with Malathion (0.1%) or Profenofos (0.25-0.5 kg a.i./ha) gives excellent control of the larvae.

**Cabbage Head Borer: *Hellula undalis***

**Damage symptoms:** The newly developed caterpillar usually bores into the leaves near the veins. The holes are often of a bright colour, in which the faeces of the insect are clearly visible. Fully grown caterpillars feed on plants by boring into the centre of the stem, preventing the formation of flower heads. In the event of severe outbreak, many long tubes are seen in the tops of the flowers. Infected tops rot and give off a foul smell. This pest mostly infects young plants of the main crop and nursery plants.

**Management:** In infected crops, one of the following insecticides should be sprayed at the rate of per hectare. Indoxacarb 14.5SC - 200-250ml Spinosad 45 SC - 125-150 ml

**Major Diseases:**

**Black Rot (*Xanthomonas campestris*):** The typical symptoms of infected tissue turn pale green-yellow and then turns brown and dies. Affected areas are usually **wedge or V-shaped**. These areas enlarge as the disease progresses and severely affected leaves may drop off. The veins in infected leaves, stems and roots sometimes become black. The heads of the infected plants remain small and its quality is reduced making it unfit for marketing

**Control:** Seed treatment with Agrimycin-100 (100 ppm) or Streptocycline (100 ppm) is effective in controlling disease. Planting should be done on raised beds to facilitate drainage.

**Downy Mildew (*Perenospora parasitica*):** The disease is very serious in nursery and may also appear in field planting. During periods of high humidity, light grey powdery patches appear on undersurface of the leaves and shoots. The first symptom observed are small, light green-yellow lesions on the upper leaf surface, later showing on the undersurface. The spots turn yellow as they enlarge.

**Control:** All the weeds serving as alternate host to the fungus should be destroyed. Spraying seedlings as well as transplanted plants with Copper Oxychloride 0.3 and 0.5%, respectively is effective in controlling the disease.

**Club root (*Plasmodiophora brassicae*):** Symptoms of this plant condition typically emerge within six weeks of planting, with soil temperatures exceeding 15°C. In oilseed rape, signs appear in late autumn, characterized by swollen, distorted roots forming small, irregular, white galls on taproots and lateral roots. These galls may enlarge, discolor, and eventually rot. Above-ground symptoms, such as stunting and yellowing, usually manifest later in the season. Severe galling, particularly under dry conditions, can lead to plant wilting, visible patches of poor growth, and potential loss of

plants in heavily affected areas. In extreme cases, entire fields may fail.

**Control:** Avoid excessive irrigation, use seedlings from disease-free fields, increase soil pH to 7.2 by adding hydrated lime (2.5T/ha) six weeks before planting, Treat seed bed areas with chloropicrin, methyl bromide, or vapam two weeks before planting. Alternatively, drench the soil with Brassicol (Pentachloronitrobenzene) solution.

spots ranging from pale to dark brown on various brassicas and related weeds. Chinese cabbage, turnip, and cabbage are particularly susceptible. Infected leaves develop dark brown spots, varying in size (1–2 mm to 20 mm) with concentric circumferences and a yellow chlorotic halo. Mature lesions often have a raised center, and they may span major leaf veins. Immature lesions show limited sporulation.

Fig.7. Diamondback moth

Fig.8. Cabbage aphid

Fig.9. Cabbage head borer

Fig.10. Black rot in cabbage

Fig.11. Downey mildew in Cabbage

Fig.12. Club root of Cabbage

Fig.13 Alternaria leaf spot in cabbage

Fig.14 Powdery mildew in cabbage

Fig.14 White rust in cabbage

**Alternaria leaf spot: (*Alternaria brassicola, A.brassicae, A.raphani*)**: Symptoms appear as circular and zonate leaf

**Control:** Hot water treatment at 50 c for 30min, Seed treatment with agrosan, foliar

spray with Mancozeb@0.2% or COC@ 0.3% twice.

**Powdery mildew (*Erysiphe polygoni*):** Powdery mildew initially appears as small, almost translucent white fungal colonies on both upper and lower leaf surfaces and petioles. As the infection progresses, the characteristic white powdery appearance develops, covering most plant surfaces and leading to yellowing and premature leaf loss. Resistant varieties exhibit smaller, greyish colonies or fine black speckling. On Brussels sprouts, powdery mildew can create colonies in the stem between buttons and cause black speckling on outer button leaves.

**`Control:** Application of Dinocap@0.2%

**White rust:** Characteristic symptoms include white, shiny raised blisters (pustules) on leaves, stems, and flowers. These pustules merge to create irregular patches. Ruptured epidermis reveals a powdery white spore mass. Floral parts, including petals, pistils, and anthers, undergo distortion due to hypertrophy and hyperplasia. Severe cases lead to plants becoming malformed beyond recognition.

**Control:** Proper sanitary measures, crop rotation, destruction of weeds, spray 0.8% B.M or any copper fungicide.