

Physiological Disorders in Solanaceous Vegetable Crops

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Introduction –

Physiological disorders refer to the breakdown of tissue that is not caused by mechanical damage. They may develop in response to an adverse preharvest and postharvest environment, especially temperature, or to a nutritional deficiency during growth and development. There are some disorders in vegetable crops where there is no pathogen involved and they are more or less due to the unfavourable environmental conditions like nutrition, water, light, soil etc.

1. Blossom end rot –

Causes:- Blossom end rot is caused by a lack of calcium in the developing fruit.

Symptoms: Blossom end rot is one of the most common tomato disorders seen in Minnesota. Affected fruit have a tan to black flattened spot at the blossom end of the fruit. Secondary fungi and bacteria can enter the blossom end rot area, resulting in further decay of the fruit. Blossom end rot can appear on fruit in any stage of development, but it is most common when fruit are in any stage of development, but it is most common when fruit are one third to one half grown.

Management - Blossom end rot can be managed by proper fertilization, water management and planting cultivars tolerant to blossom end rot. Soil testing is recommended to determine if there is a shortage of calcium before planting can alleviate blossom end rot. If calcium deficiency occurs, foliar spray of anhydrous calcium chloride 0.5% @ time of fruit developed was an effective control.

2. Fruit Cracking –

Cause:- Boron deficiency. Irrigation or rainfall after long dry spell. Exposure of fruits to sun due to pruning and stacking. Genetic factor which is reported to be inherited polygenically.

Symptoms - Four types of fruit Cracking.

- a) Radical (very severe)
- b) Concentric (very severe)
- c) Burst
- d) Cuticular



Radical cracking, where surface of the mostly full ripe fruits cracks radially from the stem end of the fruit and concentric cracking, where surface of mostly mature green fruit cracks concentrically around the shoulder of the fruit.

Control -Irrigation at regular intervals. Spraying seedlings before transplanting with 0.3-0.4% borax solution. Growing resistant varieties like Sioux, Punjab chubara, Pusa ruby, Roma, Arka Saurabh, PantT1 etc. .

3. Sun Scald or Sun burn:-

Causes:- High fruit pericarp temperature 40⁰c. In bright sunlight, surface temperature may be more than 10⁰c highest than the air temperature.

Symptoms - Green fruits exposed to direct sunlight ripen unevenly so that yellow patches appear on the side of the tomato fruit when it ripens, symptoms are most likely to appear at the mature green to breaker stage of development. The lesions are infected by secondary infection of fungus which shows black dark spots making tomatoes unfit for consumption.



Control - To grow cultivars with heavy foliage provide protection to fruits. Training and pruning in summer Months should be avoided. Crop are planted at higher densities are less susceptible. Cultivation of indeterminate /semi determinate varieties without staking.

4. Blotchy Ripening:

Causes - Severe water stress, poor potassium uptake and distribution in plants.

Symptoms - This disorder also known as graywall is recognized as grayish appearance caused by partial collapse of the wall tissue hence the term gray wall. Irregular ripening, green blotches over red skin.



Management - Regulated water supply during fruit development. Foliar spray of 0.05% Potassium chloride. Use of balanced fertilizer dose in the crop prevents the occurrence of blotchy ripening. Adjust planting date to achieve favourable light intensity for good fruit development.

5. Cat Face –

Causes: unfavourable climate condition during flowering causes distortion of growth of the pistil cells.

Symptoms - Cat face tomatoes are misshapen with enlarged scars and holes in the blossom end of the fruit. Cold weather at the time of blossom set distorts and kills certain cells that should develop into fruit, resulting in the deformities. This disorder is most often observed among first formed fruit. The cells at blossom end of the ovary die and turn black and forms leathery blotch.



Management - Grow varieties free from this distortion. Grow tomatoes in the ample growing condition. Maintenance of sufficient soil moisture balance. Recommended cultural practices should be adopted.

6. Puffiness –

Causes - Puffiness is associated with poor pollination and abortion of ovules due to adverse environmental conditions (low and high temperature), excessive nitrogen fertilizer.

Symptoms - The outer wall of the fruit is normal, but the tomato is hollow inside. One of the seed cavities is usually empty. But the growth of internal tissues is retarded.



Management - Maintaining optimum soil moisture. Avoid over irrigation. Maintenance of normal temperature. Spraying of borax or solubor 10-15 ppm at the peak flowering time.

7. Good Fleck –

Causes - Excess calcium oxalates. Higher supply of calcium and phosphate fertilizers.

Symptoms - Gold fleck are often observed around the calyx and should of mature fruit particularly in a summer season. In green fruit, the flecks decrease is White and less abundant tiny yellow spots appear on the fruits surface around the caylx and fruit shoulder.



Management - Apply recommended dose of calcium and Potassic Fertilizers. Provide shade during summer season.

Chilli and sweet pepper

1. Flower and fruit drop (unfruitfulness) –

Causes - High temperature and low humidity at flowering cause excessive transpiration resulting into abscission of buds, flower and fruits. Conditions of pollination and fertilization. **Symptoms** - Flower drop is also known as blossom drop, is a relatively common problem faced not only by chilli growers but by gardeners growing all kinds of fruit and vegetables. It happens when plant flowers then each flower fall off without any fruit forming.



Control - Spray with NAA @50ppm or Tricentanol @2ppm at full blossom stage. Provide light and frequent irrigation at flowering and fruit set stage.

2. Chilling injury –

Causes - Expose of fruits to low temperature

Symptoms - chilling injury symptoms include dead, water soaked tissue in part or all the pericarp surface pitting, premature loss of firmness. Fruits fail to ripen and poor color development.



Management - Maintains the optimum growing conditions. Modified atmosphere storage may also reduce chilling injury in some commodities.

3. Blossom end rot –

Causes - Heavy application nitrogenous fertilizer . Heavy irrigation after a dry spell.

Symptoms - water soaked Spots appear on blossom end of the fruits. The spots become light brown, papery and finally lesions dry out.



Control - Supply light irrigation regularly . Avoid heavy application of N Fertilizers. Adding lime to the soil or spray anhydrous calcium chloride.

Potato:-

1. Hollow heart –

Causes - It is due to excessive nitrogen.

Symptoms - Irregular cavity in the center of tuber might contribute to damage, decrease respiration is probable cause.



Control - Maintain soil moisture conditions to the optimum level. Avoid over fertilization particularly N. Grow those varieties which are less prone to this defect.

2. Chilling injury –

Causes - Caused by low temperature of about 0°C .

Symptoms - This results in discoloured blotches in the flesh of tubers which vary from light reddish brown to dark brown diffused brownish black patches on skin and reduced or completely inhibited sprouting of affected tubers when planted.



Control - Maintain the optimum growing conditions. Modified atmosphere storage may also reduce chilling injury in some commodities.

3. Black heart –

Causes - Due to poor ventilation, high temperature ($>33^{\circ}\text{C}$) during storage and transportation.

Symptoms - Black discoloration occurs in the central tissues of the tuber.



Control - Provide proper ventilation. Keep potato tubers in layers. Do not store tubers in the heap.

4. Greening –

Causes - Due to excessive exposure to sun rays.

Symptoms - Appearance of green colour of the tuber due to presence and accumulation of solanin (20mg/100g) is not harmful.



Control - Avoiding exposure of tubers to direct sunlight (Earthing up at 40 DAP). Store tubers in darkness after digging up.