



Physiological Disorder of Vegetable Crops and Their Curative Measures

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What is physiological disorder?

Any deviation from the normal behaviour of the plant is known as disorder, which is caused either due to the deficiency or excess of any of the nutrients essentially required by the plant for its normal growth and development or due to exposure of the plant to any of the factors i.e. nutritional, environmental and cultural, in suboptimal or supra-optimal range. Separately from living organisms, there are a number of non living factors that contribute disorders of vegetable crops. These are the biotic factors such as environmental extremes, nutrient deficiencies and toxicities, damage crop production steps, soil and water conditions. (Graham, 1990)

Difference between physiological or abiotic disorders from disease

The difference between physiological or abiotic disorders from other disorders is that they are not caused by living organisms (viruses, bacteria, fungi, insects, etc.), but they are the result of abiotic situations (inanimate) which causes deviation from normal growth. Non-infectious disorders in some cases are easy to identify, but others are difficult or even impossible to recognize. Physiological disorders not only cause damage themselves but also serve as the 'open door' entry for pathogens. The damage caused due to physiological disorders may be reversible or irreversible depending on time and extent/intensity. Most of them are non-reversible once they have occurred.

Physiological disorders can be divided into four general categories:

1. Nutritional physiological disorder
 - Eg. blossom end rot in water melon and tomato.
2. Temperature physiological disorder (low and high)
 - Eg. sunburn on the shoulders of tomato and mango, (high-temperature injury occurred prior to harvest).
3. Respiratory physiological disorder
 - low oxygen and or high carbon dioxide concentrations in and/or around harvested produce in CAS and MAP. Eg. black heart of potato (low-oxygen injury).
4. Miscellaneous disorders which are product-specific in terms of symptoms expressed.
 - Eg. a) Bitterness (isocoumarin accumulation) in carrot.
 - b) Greening of potatoes exposed to light
 - c) Rooting of onions exposed to high humidity
 - d) Russet spotting on the midrib of lettuce leaves (exposure to ethylene)



Cause of Physiological disorder

1. Preharvest environment conditions

- Temperature
- Nutrition
- Water regimes
- Crop development factors (e.g. yield or crop load, position on the plant and carbohydrate, water and /or nutrient partitioning)

2. Postharvest environment conditions

- Temperature regime
- Gas atmosphere
- Storage time

Optimum Storage temperature

	Produce	Safe low temperature, °C	Symptoms if stored
1	Cucumber	7	Dark-coloured, water-soaked areas
2	Eggplant	7	Surface scald
3	Melon	7-10	Pitting, surface rots
4	Tomato	10-12	Pitting, Alternaria rots

Crop	Disorder	Cause and symptoms	Management
Tomato	Chilling Injury	Chilling sensitive at temperatures below 10°C. Consequences are failure to ripen and develop full colour and flavour, irregular/blotchy colour development, premature softening, surface pitting, browning of seeds and increased decay.	Early, mid, late type cultivar should be used according to the season. Growing of resistant variety
	Freezing Injury	Freezing injury will be initiated at -1°C. Symptoms of freezing injury include a water soaked appearance and excessive softening of fruits with dull colour.	Storage of crop above 4° C
	Blossom end rot	Lesions appear at blossom end of the green fruit. Water soaked spots appear at the point of attachment of the senescent petals. The affected portion of the fruit	Balance irrigation & staking Foliar spray of calcium chloride 0.5 % at fruit



		becomes sunken, leathery and dark coloured.	development stage
	Cat face	Fruits are characterized by the distortion of the blossom end. Affected fruits have ridges, furrows, indentations and blotches.	Use of cultivar which is suitable to climate Use of resistant variety
	Cracking	Three types – concentric, radial and cuticular. Common during rainy season when temperature is high, especially when rain follows long dry spell.	Cultivar like pusa ruby, Sioux, roma are resistant. Proper scheduling of irrigation
Capsicum	Blossom-end rot	Deficiency of calcium in fruit	Foliar spray of calcium chloride 0.5 % at fruit development stage
Onion	Freezing Injury	Soft water-soaked scales rapidly decay due to subsequent microbial growth.	Proper storage at optimum temperature
	Translucent Scales	Resembles freezing injury. 3-4 week delay in cold storage increases risk significantly.	Should be sent to storage after harvesting
Garlic	Sprouting of bulbs	Excessive moisture or winter rains and supply of nitrogen.	Curing should be done at time of harvesting Moisture level should be low at time of harvest
	Splitting	Delayed harvesting or irrigation after long spell of drought.	Proper scheduling of irrigation
Bhindi	Chilling injury	Discoloration, pitting, water-soaked lesions and increased decay.	Proper agronomic practice Use of resistant cultivar
	Freezing injury	Occurs at temperatures lower than - 1.8°C.	Proper storage at optimum temperature
Cucumber	Freezing injury	Freezing injury will be initiated at - 0.5°C (31°F). Symptoms include a watersoaked pulp becoming brown and gelatinous in appearance over time.	Proper storage at optimum temperature
Peas	Freezing injury	Freezing injury will be initiated at - 0.6°C resulting in water soaking followed by rapid decay due to soft-rot	Proper storage at optimum temperature



		bacteria.	
Potato	Greening	Surface of the tuber turns green on exposure to light.	Earthing up should be done
	Black heart	Sharply defined, purplish-grey to black area in center or cavities due to oxygen starvation.	Proper ventilation during storage
	Chilling injury	Gray to red-brown areas or black heart.	Proper Storage condition
	Freezing injury	Vascular tissue turns black and tubers leak when thawed.	Proper storage at optimum temperature
	Blackspot	Internal black spots due to bruising.	Proper handling of crop
	Internal Brown Spot	Brown Center / Hollow Heart and Translucent End Dry, corky reddish-brown or black spots appear on the tissue of the potato.	
Brinjal	Chilling Injury	Chilling sensitive at temperatures below 10°C. Symptoms are <i>Alternaria</i> rot, pitting, surface scald and blackening of seeds.	Use of resistant cultivar
	Freezing Injury	Freezing injuries are caused at - 1°C. Symptoms appear as water soaked pulp which finally turns brown.	Proper storage at optimum temperature
Cabbage	Yellowing	Gradual loss of green chlorophyll pigment and yellowing of the outer leaves. Sensitive to ethylene, which causes both leaf yellowing and leaf shedding.	Apply proper dose of manure and fertilizer
	Physical Injury	Damage to the midribs often occurs during field packing and causes increased browning and susceptibility to decay.	Proper handling practices
	Chilling injury	Occurs during storage at 0°C for 3 months or longer. Symptom is midrib discoloration, especially on outer leaves	Use of resistant varieties



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