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Physiological disorder and their management in temperate vegetable crops

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CABBAGE

Tip burn:

- **Symptoms:** leaf margins scorching with papery appearance which eventually turn brown or black.
- **Causes:** lack of adequate calcium, particularly at the margins of inner leaves. Solar radiation contacts with soil moisture.
- **Control measures:** spraying of calcium carbonate @ 2kg in 4 splits. Use of resistance or tolerant cultivars.

Black petiole:

- It is also an internal disorder of cabbage.
- As the heads approach maturity, the dorsal side of the internal petiole or midribs turn dark grey or black at or near the point where the petiole attaches to the core.
- This is a complex physiological disorder in which environment plays an important role in symptoms expressions.

Black speck:

Symptoms: it characterized by dark spots that occur on outer or sometimes throughout the head. Its symptoms may not appear at harvest but the initial damage or predisposition likely occur in the field with the typical symptoms developing during storage at low temperature.

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- **Causes:** the actual cause is not known, but it is presumed that high rates of fertilizers.
- **Control measures:** high rates of potassium in soil have been shown to reduce the severity of this disorder. Varieties tolerant to disorder tend to be promoted.

CAULIFLOWER (*Brassica oleraceae var botrytis*)

Browning:

- It is also called red rot or brown rot.
- It is caused due to the boron deficiency.
- The soil may be deficient in boron or it is not available to the plant due to unfavourable soil reaction and salinity.

Symptoms:

- The symptoms in cauliflower first appear as water soaked lesions in the stem,leaf and the surface of the curd which later turn rusty brown in colour.
- The affected curd is bitter both in cooked and fresh condition.

Control measures:

- soil application of borax at the rate of 10-15kg/ha.

Whip tail:

- This disorder is caused due to the deficiency of molybdenum.

Symptoms:

- Plants become chlorotic and may turn white, along with leaf margins.
- In severe cases, only the midrib develops which accounts for the name “Whip tail”.

Control measures:

- Application of 1.5 kg sodium or ammonium molybdate/ha.

Buttoning:

Several causal factors of this disorders are

- Nitrogen deficiency,
- Planting of over aged seedlings,
- Planting of early variety in late season.

Symptoms:

- Development of small curd or button.
- Button is exposed as soon as its development begins.

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Control measures:

- Right selection of variety.
- Age of seedlings to be transplanted should not be more than 6 weeks.
- Maintenance of adequate supply of nutrients and good plant protection.

Blindness:

- Terminal buds may be due to
- Prevalence of low temperature reaching subzero when the plants are still small.
- Mechanical injury of the terminal bud during handling of seedling.
- Injury caused by insect such as cut worms.

- **Symptoms:**
  - Blind plants lack in terminal buds. Blind cauliflower does not produce curd.
- **Control measures:**
  - Careful handling of the plants and good plant protection measures so that
  - Terminal buds may not be injured.
  - Exposure of plants to very low temperature should be avoided.

Ricyness:

- These disorders may occur due to higher or lower temperature than the optimum required for a particular cultivar during curd development.
  - **Symptoms:**
- Pre emergence initiation of floral buds on curds.
  - **Control measures:**
- By reducing the nitrogen doses.
- Exposure of curds to extremes of temperature should be avoided.

BROCCOLI:

Internal tip burn:

Tip burn causes leaf margins to turn brown and **leaves** to be buried in the head. This has been ascribed to poor water movement with the plant.

Broccoli heart injury:

High temperature causes the heads of broccoli to be rough, with uneven head size. Several parameters for screening of heat varieties have been developed.

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BRUSSELS SPROUTS

Loose sprout:

This may be due to several causes, such as high temperatures or excessive fertilization with N.

LETTUCE:

Red heart of lettuce:

Symptoms: the chestnut discoloration and breakdown of small, inner heads leaves.

Causes: the causes appear to be lack of sufficient oxygen, ring which results from poor aeration or prolonged exposure to low temperatures during shipment and storage.

Control measures: it can be providing adequate aeration and prompt and continuous cooling of lettuce to 3.8^0C to 4.9^0C.

Premature yellowing:

Symptoms: premature yellowing is associated with poor development of the root system and the production of small infirm heads resulting in the low yields of poor quality.

Causes: poor aeration, excessive soil moisture and the accumulation of salts in the root zone. This adverse condition due to untimely application of irrigation water and the compactness of the soil formed by the farm machinery.

Control measures: the losses can be reduced by avoiding use of heavy machinery, especially in wet soils. Avoid application of excessive irrigation water.

Russet spotting

It is primarily a post-harvest disorder.

Symptoms: this disorder is characterized by the occurrence of reddish, tan, olive, and/or brown elongated pit like spots on the mid rib of leaves. Russet spotting is expressed as small, sunken, rust-brown spots, which appear on ribs of outer head leaves and may progress to inner leaves.

Causes: russet spotting is induced by ethylene produced either by the lettuce itself of by other ripening produce, or from outside sources.

Control measures: this disorder can be prevented by storing at 0-2.5^0C and away from ethylene.

CELERY

Cracked stem:

Symptoms: Brownish mottling along the leaf margins, followed by the brittleness of the petiole.

Causes: this disorder is due to the boron deficiency.

Control measures: this disorder can be controlled by soil application of 1.25-2.5kg of boron per ha before planting.

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Black heart:

Symptoms: young leaves show the tip burn symptoms first, then spreads quickly to most of heart tissues. This is followed by drying, blackening.

Causes: this is caused by the calcium deficiency.

Control measures: this disorder can be controlled by spraying of calcium chloride @ the rate of 6.5-12.5kg in 1136.5litre of water.

Chlorosis:

Symptoms: this is characterized by yellowing of older leaves.

Reasons: due to the magnesium deficiency.

Control measures: spraying of magnesium sulphate at 25kg per ha on the foliage every two weeks.

ASPARAGOUS:

Tip rust or false rust: this gives rice to long reddish streaks along the stems and is the result of a metabolic disorders in cold moist weather.

Die back of the young shoots: this is attributed to several causes, such as boron deficiency or insufficient water absorption.

POTATO:

Hallow heart:

Symptoms: rapid growth of tuber and oversized tuber development.

Control measures: maintaining proper soil moisture and avoid application of excess quantity of nitrogen.

Greening of potato:

Reasons: when the tubers are exposed to the direct sunlight either in the field or in the storage house, greening of will occur.

Control measures: avoid exposure of tubers in direct sunlight.

BEET ROOT

Brown heart: Symptoms: it is characterized by the irregular black spot throughout the interior of the root.

Reasons: due to the boron deficiency.

control measures: application of 25kg borax/ha.

Tip burn

- Necrosis appears along the margin of the blade. the leaf blade may cup upward or downward. In extreme case the chlorotic or necrotic spot may develop.

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- The symptoms are blackening of the tips of apical flowering shoot.

CARROT:

Cavity spot:

Symptoms: cavity appears in the cortex and in most cases the subtending epidermis collapses to form a pitted lesion.

Causes: it is due to the calcium deficiency.

Control measures: increasing calcium accumulation reduced the incidence of cavity spots in carrots.

Splitting or Cracking

Symptoms: a common disorder noticed in carrot, in which roots.

Causes: heavy side dressing of nitrogen fertilizer at early stages of growth and boron deficiency are responsible for triggering this disorder.

Control measures: apply a balanced quantity of nitrogen.

Bitterness:

It is a storage disorder, where ethylene produced an increase in the total phenol content in carrot roots, resulting in the formation of new compounds like isocoumarin and engenin, which are responsible for the formation of bitter flavor.

TURNIP:

Whiptail:

This is due to Mo deficiency in acids soils. Young leaves become narrow, cupped, showing chlorotic necrotic around the leaf margins.

Control measures: the affected plant should be removed by thinning. Application of 1.2kg/ha of sodium or ammonium molybtate.

RADISH:

Pungency: Due to this radish loose its salad nature.

Reason: high temperature and water stress.

Control: proper irrigation management.

PEAS AND BEANS:

Marsh spot:

Due to Mn deficiency, the leaves show internal Chlorosis. Necrotic area develops in the plants and become hallow.

Control: application of MnSo4 at kg/ha or foliar application of 2% at 2-3 times.

KALE (*Brassica oleraceae var acephala*)

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- Corky petiole in kale - boron deficiency
- Hooking and death of young leaves – calcium deficiency

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