Physiological & Nutritional Disorders in Agricultural & Horticultural Crops

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Introduction

Physiological plant disorders are caused by non-pathological disorders such as poor light, weather damage, water-logging or a lack of nutrients, and affect the functioning of the system. Physiological disorder is distinguished from plant disease caused by pathogen, such as a virus or fungus. Whilst the symptoms of physiological disorders may appear disease-like, they can usually be prevented by altering environmental conditions. However, once a plant shows symptoms of nutrient deficiency it is likely that that season's yields will be reduced.

Any kind of abnormality in economically important part of vegetables or other parts that contribute to yield and quality of vegetable is termed as physiological disorder. Reasons of physiological disorders are environmental / a biotic factor. Physiological disorders are caused because of

¨ Deficiency of micronutrient
¨ Sudden fluctuation in temperature
¨ Poor soil conditions and
¨ Improper moisture availability during cultivation

Major Physiological Disorders

Pore extent or Pore development or Pithiness in Radish

Pores are formed in the root. The quality of radish is reduced, destroying its commercial value. It is caused by excessive root growth in comparison

with the corresponding assimilation ability of leaf tissue. Varieties forming early pores have larger parenchymatous cells in roots, more tender basal tissue and lower starch content. When harvesting is delayed, this disorder is more pronounced. Some genes indirectly influence these physiological characteristics. To avoid the pore extent, harvesting should be done at appropriate time. As long term strategy, it is suggested that a variety with early root enlargement and late pore development might be bred by crossing between varieties that had high assimilation ability and early growth.

Forking in Radish and Carrot

Symptoms

There is secondary elongating growth in the roots that gives a look of fork like structure to the root. It occurs in heavy soil due to the soil compactness. Un-decomposed organic manure favours elongated root in radish. It can be corrected by reducing the moisture from the field, by balanced irrigation and also by sowing the radish and carrot in sandy loam or light soil having soils of loose and friable in nature. (Fig.1)

Root splitting in Carrot

Splitting or cracking of carrot roots is a major problem in many carrot growing areas. It is reported that this tendency towards is controlled by genetic factors but a number of other factors are also involved. As clear by its name, roots get splitted making it unfit for market. Long drought followed by heavy rainfall is major reason for root splitting in carrot. In soils with high content of N, splitting of roots is increased. High soil concentrations of ammonium compounds caused more serious splitting than by other forms of nitrogen. If roots are large,

there are chances of splitting as compared to small ones. Follow proper management practices like proper irrigation, right spacing and optimum amount of N application. Prefer other forms of N fertilizer source than ammonium compounds. (Fig.2)

Cavity spot in Carrot
Symptoms

This disorder appears as a cavity in the cortex, in most cases the subtending epidermis collapses to from a pitted lesion. The cavity spot disorder is induced by deficiency of Ca. This is associated with an increased accumulation of K which leads to a decreased accumulation of Ca. Increase in Ca level in the growing medium leads to significant reduction in the incidence of cavity spot. (Fig.3)

Spongy Tissue in mango

It is a major problem in Alphonso mango, where a pulp patch fails to ripen. This malady is caused due to inactivity of ripening enzymes due to high temperature, convective heat and post harvest exposure to sunlight. (Fig.4)

Mango Malformation

The malformed panicles remain unproductive and are characterized by a compact mass of male flowers, greenish in colour and stunted in growth. The malformed panicles remain intact on the trees for a considerable long period. The complexity of the disorder is attributed to cultural, nutritional and factors like, mites, fungal, viral, hormonal imbalance etc. The exact cause and control of the malady is yet to be established. Spraying of Planofix (200 ppm) during the first week of October followed by deblossoming at bud burst stage is recommended as a remedial measure against malformation.(Fig.5)

Biennial bearing in mango

The term biennial, alternate or irregular bearing generally signifies the tendency of mango trees to bear a heavy crop in one year (On year) and very little or no crop in the succeeding year (Off year). Most of the commercial varieties of north India, namely, Dashehari, Langra and Chausa are biennial bearers, while south Indian varieties like Totapuri Red Small, Bangalora, and Neelum are known to be regular bearers. When a tree produces heavy crop in one season, it gets exhausted nutritionally and is unable to put forth new flush thereby failing to yield in the following season. The problem has been attributed to the causes like genetical, physiological, environmental and nutritional factors. For overcoming biennial bearing, deblossoming is recommended to reduce the crop load in the 'On' year so that it is balanced in the 'Off year.

Fruit Drop

The intensity of fruit drop varies from variety to variety. Among the commercially grown varieties, Langra is more susceptible to drop, while Dasheri is the least. The fruit drop is more or less a continuous process and can be classified into three phases, viz. (i) pinhead drop, (ii) post-setting drop and (iii) May-month drop. The fruit drop in first two phases is insignificant compared to the third phase which affects the final yield significantly and needs more attention. Embryo abortion, climatic factors, disturbed water relation, lack of nutrition, attack of disease and pest and hormonal imbalances are the major factors that lead to fruit drop. The foliar application of Alar (B-nine) @ 100 ppm or NAA 20 ppm at pea stage of fruit was found effective in controlling fruit drop in mango.

Black Tip in mango

Black tip is a serious disorder, particularly in the cultivar Dasheri. The affected fruits become unmarketable and reduce the yield to a considerable extent. The damage to the fruit gets initiated right at marble stage with a characteristic yellowing of tissues at distal end. Gradually, the colour intensifies into brown and finally black. At this stage, further growth and development of the fruit is retarded and black ring at the tip extends towards the upper part of the fruit. Black tip disorder has generally been detected in orchards located in the vicinity of brick kilns. It has been reported that the gases like carbon monoxide, sulphur dioxide and ethylene constituting the fumes of brick kiln are known to damage growing tip of fruits and give rise to the symptoms of black tip. (Fig.6)

Planting of mango orchards in North-South direction and 5-6 km away from the brick kilns may reduce incidence of black tip to a greater extent. The incidence of black tip can also be minimized by spraying borax (1%) or other alkaline solutions like caustic soda (0.8%) or washing soda (0.5%). The first spray of borax should be done positively at pea stage followed by two more sprays at 15 days interval.borax (1%) or other alkaline solutions like caustic soda (0.8%) or washing soda (0.5%). The first spray of borax should be done positively at pea stage followed by two more sprays at 15 days interval.

Greening of Potato

Greening of potato is a consequence of exposure to light, which may occur at various stages throughout the life of a potato. For example, exposure to sunlight can occur as a result of inadequate soil coverage

during the growth stage or exposure to artificial light during storage or while on the retail store shelf. When a potato is exposed to light, metabolic activity in the skin increases as it prepares to send out shoots. As a result, chlorophyll is formed, which causes the green color. Chlorophyll, a natural plant pigment, is tasteless and harmless. Health concerns associated with green potatoes are not related to chlorophyll but to solanine, a potentially toxic alkaloid that develops in the same area as the chlorophyll. (Fig.7)Green potatoes often contain higher levels of solanine than normal potatoes, and the amount of solanine increases with the length of exposure to and the intensity of light. The bitter taste associated with green potatoes comes from solanine, which can also irritate the gastrointestinal tract. If enough solanine is eaten, it may cause symptoms such as vomiting and diarrhea. However, because of the bitter taste, it is rare for someone to eat enough solanine to actually get sick.

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