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Physiological disorder management in tropical fruit crops

The productivity as well as quality of fruit crops is affected to a greater extent due to the physiological and nutritional disorders. Various pre and post-harvest disorders not only reduce the market yield and quality of fruits but may also become hazardous to human health. Therefore in order to get the maximum benefits from fruits, one should produce healthy fruits and follow appropriate post harvest practices so that fruits can be available for a longer time with optimum yield and desirable quality.

IN this article, the physiological disorders and their management particularly of tropical fruits viz., Mango, Banana, Pineapple, Guava, Sapota, Cashewnut and Custard apple are discussed.

Mango

Mango spongy tissue

- It is a physiological disorder particularly in Alphonso variety of mango causing losses up to 35-55%. The affected fruits flesh has pale yellow colour and is of soft leathery or spongy nature, with or without air pocket accompanied by off flavour. Fruit pulp remain unripe because of unhydrolysed starch due to physical and bio-chemical disturbances, high temperature, convective heat and post-harvest exposure to sunlight.

Management

- Protect the mango orchard with tall growing shade plants on borders.
- Do mulching with paddy straw, mango leaves, dry grasses or black polyethylene sheets on soil surface covering whole canopy of tree.
- Pre-harvest dipping of fruits in calcium chloride solution has been reported to reduce the chances of this disorder.
- Harvesting of fruits at 3/4th maturity stage.
- Post harvest exposure to low temperature between 10-15°C for 10-18 hours.
- Grow resistant varieties like Ratna, Arka Punnet, Arka Aruna.

Black tip

- This is a serious disorder of mango, and coal fumes of brick kilns containing sulphur dioxide, ethylene and carbon monoxide are responsible for this disorder. The distal end of the affected fruits exhibit etiolation patches of mesocarp which turn black and spots get hardened. Affected fruits become ripe prematurely, drop and have no market value. Dashehari variety of mango is highly susceptible to this disorder while Lucknow Safeda is least. The disorder is quite common if the fruiting orchard fall in the direction of the wind from the brick kiln side. The incidence of black tip is inversely proportional to the distance of the orchard from the brick kilns.

Management

- Planting of mango orchards in north-south direction and 5 to 6 Km away from the brick kilns.
- Increase the chimney height to 15-18 meter.

Tropical Fruit

Black tip of mango

- Spraying borax (1%) or sodium carbonate (2%) positively at pea stage followed by 2 more sprays at 15 days interval.

Fruit drop

In mango there is heavy drop of hermaphrodite flowers and young fruits amounting to 99% or more. The commercial grown varieties *i.e* Langra and Dashehari are more susceptible to drop at three stages i.e. pin head drop, post setting drop and May month drop. The fruit drops in first two phages are insignificant but the third phase affects the final yield and significantly needs more attention.

Management

- Regular irrigation during fruit setting and development period can reduce the problem.
- Spray of 20 ppm of 2,4-D (2 in 100 liters of water) or NAA 40 ppm (4 in 100 liters of water) in the last week of April or in the first week of May reduces the fruit drop considerably.

Clustering (Jhumka)

This disorder is characterized by the development of fruitlets in clusters at the tip of panicles and such fruits cease to grow beyond pea or marble stage and drop down after a month of fruit set. Absence of sufficient population of pollinators in the orchard is the main reason of this disorder. The other reasons including old and over-crowding of trees, indiscriminate and unwarranted use of pesticides, monoculture of Dashehari variety and bad weather during flowering.

Management

- Introduction of bee hives in orchard during flowering season for enhancing the number of pollinators.
- Judicious use of pesticides as per recommendation.

Mango malformation

Mango malformation

- Spraying of NAA 300 ppm during the month of October-November is recommended.
- Practice of monoculture of a particular variety should be avoided.

Mango malformation

Malformation is a major malady of mango in India causing heavy losses to the orchardists in almost all the commercial varieties of mango of North India which are highly susceptible to mango malformation. It is of two types i.e. Vegetative and Floral malformation. The vegetative malformation generally affects seedling of young plants in which there is a swelling of buds and formation of small shoots with short internodes at the apical end that give appearance of broom like structure. Whereas in case of floral malformation 'panicles and axes' become deformed, short and rachis thick due to this inflorescence look like a cluster. Malformed panicles have bigger flowers than normal flowers and are mostly male.

Probable causes of malformation are Fungal (*Fusarium moniliformis*), Mango hopper vector, Acarological, Physiological and biochemical causes (Nutritional, Soil moisture, Hormonal imbalance, Inhibitors).

Management

- Spray NAA (200 ppm) in the first week of October.
- Remove all affected fruits and inflorescence 15-20 cm below the point attachment and then spray the plants with mixture of 0.2% captan and 0.1% malathion.
- Adopt timely operations to make plant healthy and more stout to bear good crop.

Biennial/Alternate bearing

This is one of the most burning problems and renders mango cultivation less remunerative. It indicates yield variation in alternate years i.e. any year of optimum or heavy fruiting followed by a year of little or no fruiting. There are various reasons for this disorder like genetic makeup of variety, climatologically factor, age and site of shoot, C/N ratio and hormonal imbalance.

Management

- Proper management and upkeep of the orchard.
- Soil drenching every year with Paclobutrazol @5-10 g/tree result in minimum outbreak of September to October flushes, which results in early and profuse flowering.
- Ringing of branches is recommended in the month of August or early September. It involves removal of 1 cm wide ring of bark on a branch of about 15 cm thickness, resulting in accumulation of carbohydrates and other metabolites thereby creating physiological conditions for flowering.

Scorching of leaves

It resembles potassium deficiency but actually it is due to chloride deficiency. The colour of the leaves become brick red towards the tip and ultimately the full leaf dry and fall down.

Management

Potassium chloride should be avoided and spray of potassium sulphate @ 0.5% should be applied.

Sapota

Fruit drop

Sapota has the problem of low fruit setting and shedding only about 10-12% of the total fruit set develop and retained until maturity. Most of the fruit drop occurs immediately after fruit setting.

Management

Increase in fruit set and retention are possible by spraying NAA and $GA_{3,}$ 25-100 ppm during flowering and at 15 days interval.

Flattening of branches

Branches become flattened and produce leaves of smaller size. The branches have been found to recover to a normal growth during summer. Affected branch produce small dry and shriveled fruits.

Management

- Phytosanitory measures are beneficial.
- Pruning and destroying the affected branches is the effective control measure.

Die back

It is common where sapota cultivation is being extend to traditionally rice growing regions. Due to anaerobic conditions in monsoon and post monsoon wilt is common appearance aggravated by *Fusarium* spp.

Management

Effective drainage facility will check the die back under rice grown regions effectively.

Guava

Die back

The typical symptom of die back includes withering of lower most branch of the tree from top downwards. The growing tip turn dark brown and necrotic area extends backward. A typical lesion develops at the junction of the diseased and healthy area which advances down the healthy areas. The infected branches defoliate giving them a barren appearance.

Boron deficiency in guava

Management

Application of lime or gypsum reduces the mortality of trees by maintaining soil *p*H.

Bronzing

This is a complex nutritional disorder in guava when fruiting starts in a soil marginal in P and K, the nutrients are mobilized from older leaves to the fruits causing bronze coloured leaves, which results in the reduced photosynthate transfer to the roots and reduced uptake.

Management

Mixture of 20 Kg of farm yard manure, 1 Kg of SSP, 0.5 Kg MOP and 100 zinc sulphate per tree should be applied in soil.

Boron deficiency

This disorder is identified with appearance of red spots on the newly emerged leaves. Leaves become dry and brittle.

Management

Spraying of 0.3% boric acid along with 0.5% zinc sulphate spray before flowing effectively manage the zinc and boron deficiency.

Papaya

Boron deficiency

It is one of the serious disorder affecting the yield in papaya due to malformed fruits.

Management

Spraying of boric acid @ 0.1% at three months interval from 6^{th} month after planting onwards manage the deficiency.

Skin Freckle

Due to this disorder, freckle like blemishes occur in ripe fruits and the diameter of the fruits increase.

Management

Wrapping of fruits in white paper bag reduce the fruit freckle.

Pineapple

Sunscald

Due to this disorder sometime the peduncle bearing fruit fall on one side exposing fruit direct to sunlight and the cells under skin of export surface get damaged.

Management

Care should be taken and fruit should be covered with banana leaves during April-May to avoid the direct sun heat.

Black heart

It is also called internal browning. An initially brown spot develop on fruitlet base to the core and in several cases entire core of the fruit shows brown colouration.

Management

- Control of Black heart was reported to be achieved by pre-harvest applications of chemicals such as parachlorophenoxyacetic acid (PCPA), naphthaleneacetic acid (ANA), potassium and calcium.
- New hybrids resistant to Black heart have been produced from conventional breeding while a genetic engineering approach has also shown promising development.

Black heart of pineapple

Banana

Chlorosis

Due to this disorder, marginal chlorosis of leaves takes place that result in reduction in leaf size and thinning of petiole.

Magnesium deficiency on guava leaves

Management

Spray of nutrient nitrogen or zinc time-to-time help in managing this disorder effectively.

Blue disease

It mainly occurs in banana due to magnesium deficiency. Purple blotching of petioles and necrotic patches on the older leaves has been observed.

Management

Spray of magnesium micronutrient @ 0.5% corrects the deficiency of this disorder.

Custard Apple

Cracking of fruits

It is caused due to sudden and high fluctuation in water supply to the plants. Usually cracking occurs from heavy rainfall or irrigation after a prolonged dry spell.

Cracking of fruits in custard apple

Management

Appropriate scheduling of irrigation can reduce the problem of fruit cracking.

Stone fruits

Fruits remain very small and become brown. They retain on the tree even after harvest. Competitions among the developing fruits have been suggested to be the cause of stone fruits.

Management

Thinning of fruits at initial stage is recommended.

Decline

The abrupt decline of custard apple trees may result due to water logging in sandy or rocky soils causing huge losses to the trees.

Management

The stagnation of water in the orchard should be avoided.

Cashwenut

Yellow leaf spot

The appearance of yellow leaf spot, a possible disorder is perhaps due to molybdenum deficiency.

Spotted leaves

Management

The trees should be sprayed with the solution of 0.03% solution of ammonium molybdate once during pre-monsoon and another after cessation of monsoon.

Little leaf

It is characterized by the small rolled leathery leaves resulting in poor yield due to poor photosynthesis.

Management

Foliar spray of 0.3% zinc sulphate is useful to manage this disorder.

For further interaction, please write to:
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