

Recent Advances in Physiological Disorders of Strawberry

Bhumikaben Parmar¹, Nikita Patel¹ and Susmita Subba²

¹Ph.D. Research Scholar, Department of Fruit Science, ASPEE College of Horticulture, Navsari Agricultural University, Navsari 396450, Gujarat, India

²Ph.D. Research Scholar, Department of Forest Biology and Tree Improvement, College of Forestry, Navsari Agricultural University, Navsari 396450, Gujarat, India

Introduction

Strawberry is one of the most important fruit crops of the world. Basically, it is a fruit plant of temperate regions, but it grows profitably well in tropical and sub-tropical climates. Strawberry cultivation suffers from various physiological disorders like albinism, fruit malformation, fasciation and button berry. Among these, albinism is considered to be the most important. Physiological disorders of strawberry plants are caused by plant responses to non-biological factors, like adverse weather events, improper planting density, poor maintenance of transplants and interaction of fertilizers or pesticides. Loss of yield due to various physiological disorders in strawberries is reported to be 20-30 per cent.

Physiological Disorder

It is defined as abnormal growth pattern or abnormal external or internal condition of fruits due to deviation from normal state of temperature, light, moisture, nutrients, harmful gases and inadequate supply of growth regulators. Loss of yield due to various physiological disorders in strawberries is reported to be 20-30 per cent (Kirschbaum et al. 2014). Physiological disorders of strawberry plants are caused by plant responses to non-biological factors. Like, Adverse weather events, Improper planting density Poor maintenance of transplants etc.

List of physiological disorders of strawberry:

1. Albinism
2. Fruit malformation
3. Fasciation
4. Button berry

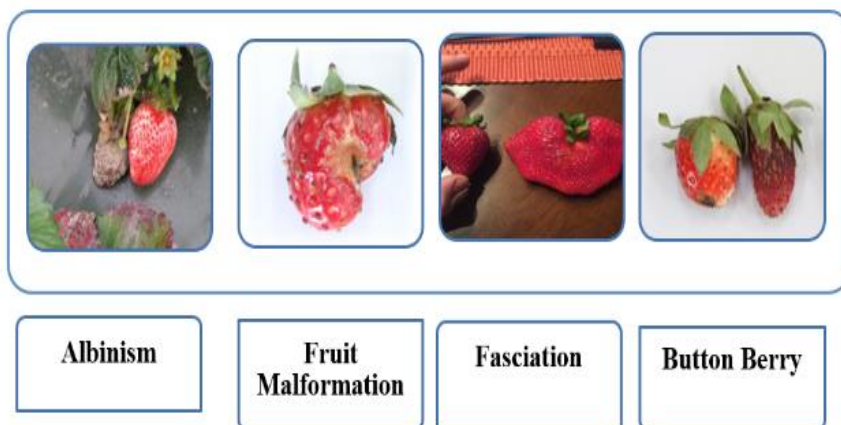
1. Albinism

It is the most common and serious disorder of strawberry, occurring primarily at the time of ripening. The red colour in strawberry originates from two main anthocyanin pigments, cyanidin-3-glucoside and pelargonidin-3-glucoside. (Wesche-Ebeling and Montgomery 1990). The marketing of such a fruit is very difficult, and if marketed, it fetches a very poor price, giving to farmers fewer return for their investment. It is particularly serious in greenhouse grown strawberries. It has alarming situation in USA, Belgium and the Netherlands.

Symptoms of Albinism: Bloated appearance, develop white or pink areas on the fruit surface the pulp remains pale and poor flavour.

Occurrence of Albinism: Serious in greenhouse grown strawberries and Field grown strawberries under sub-tropical climates

Impact of Albinism on Fruit Quality: Tend to be acidic, highly susceptible to fruit-rot during storage and Do not ripen uniformly, show waxy appearance.


Albinism
Fruit Malformation
Fasciation
Button Berry

Causes of Albinism in Strawberry: Low light intensity (Low light intensity increases the incidence of albinism possibly by decreasing the supply of sugars in fruit.), Soils of Sandy texture with high pH (Due to high pH or alkaline condition, strawberry may not establish properly), Dense planting (Dense planting may affect the light interception inside the canopy and thus increases the albinism incidence.), Soil with high N,P and K contents, Use of black film mulch (Release convective heat which absorb higher solar radiation as compared with other mulch materials such as white polyethylene and paddy straw which Promote N mineralization), High concentration of Silicon (There is positive correlation exist between nitrogen content with incidence of albinism in strawberry) and it may be Genetical (Cytoplasmic or a 'maternal effect' has been observed in some crops as a cause of albinism. Incompatibility between the plastid and nuclear genome is believed to be an important cause of albinism in hybrids. Albinism is generally a recessive nuclear trait governed by one or two genes with low heritability. It can also be due to deletions of plastid DNA).

Management of Albinism in Strawberry:

Plant runners of Sweet Charlie or Chandler variety of strawberry at a spacing of 20 cm x 25 cm on the raised beds during mid-October, Beds must be mulched with paddy straw in November after the proper establishment of plants and A spray of GA₃ (75 ppm) is given in the mid-November, avoid excessive application of

fertilizers especially N and K and Grow varieties showing lower incidence of albinism such as a Sweet Charlie

2. Malformation of Fruit

Symptoms: Deformed or misshapen fruit, Deformed or misshapen fruit, under developed achenes at the distal end of receptacle and Primary and secondary flowers produce more malformed fruit.

Causes: Planting of more vigorous runners, Insufficient pollination and Lack of growth-promoting substances.

Management of fruit malformation: Provision of adequate pollinizers, Provision of Honey-bee hives, Planting of young and less vigorous plants, Avoidance of excessive application of nitrogenous fertilizer.

3. Fasciation

Symptoms: Abnormal flattening of fruits, Enlargement of stems of fruits, Witch's broom appearance of the plant, Flower bud broaden and in severe case no fleshy fruit develop in the spring at all and the plants are barren, Berries sometimes develop in cox comb shape and More seen in cv. Howard 17 and cv. Redstar.

Causes: causes are still remained unclear but Short-day length varieties requiring short day length are highly susceptible and In Southern hemisphere the incidence of fasciation is reported to be more.

Management of Fasciation: Proper selection of variety, Provision of light in short day length region and Selection of variety which are day neutral in nature

4. Button Berries

Symptoms: Misshapen berries and Small sized berries

Causes: Frost, Boron or calcium deficiency, Inadequate pollination and Abnormally high temperature that make pollen non-viable

Management of Button Berry: Avoid boron or calcium deficiency, Provision of adequate pollinizers and Provision of honey-bee hives

Conclusion

Physiological disorder in strawberry cause serious decline in yield of production. To control or manage it many management strategies are used such as use of paddy straw mulch is

beneficial for the management of albinism than other mulch material and the Sweet Charlie variety is found to be resistant to albinism. Substitution of inorganic fertilizers with vermicompost is effective for management of both albinism and malformed fruits in strawberries. Strawberry varieties requiring short day length should be avoided to reduce the fasciation. Redstar and Howard 17 are very susceptible varieties to fasciation and proper Ca and B nutrition in strawberry facilitates in reduction of button berry formation.

