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Physiological Disorders in Fruit Crops

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SUMMARY

Diseases and environmental fluctuations are major constraints which reduce productivity and quality of fruit crops. Physiological disorders are the outcome of different uneven climatic parameters like rainfall, temperature, humidity and various nutrient deficiencies which leads to crop loss. Different fruits suffer from varieties of symptoms which are more or less similar while some are less, moderately and highly susceptible. Adoption of timely and proper package of practices is the need of hour to overcome such situations.

INTRODUCTION

Fruits are an important part of balanced diet and a rich source of nutrients. Cultivation of fruits plays a major role in development of farming community and overall upliftment of nation. The position of India is next to china in fruits and vegetables production. As per National Horticulture Database, during 2019-20, India produced 99.07 million metric tonnes of fruits under cultivation area of 6.66 million hectares (Anonymous, 2022a). The productivity as well as the quality of fruit crops is affected to a greater extent due to the physiological and nutritional disorders. Disturbance in the plant metabolic activities resulting from an excess or deficit of environmental variables like temperature, light, aeration and nutritional imbalances results in crop disorders. The problem that arises due to un-favorable environmental conditions and improper cultural practices which affect the normal growth and development of plant can be termed as physiological disorders. There lies major difference between physiological disorders from other disorders in terms of causal agents i.e. they are not caused by living organisms (viruses, bacteria, fungi, insects, etc.), but they are the consequence of abiotic factors (inanimate) which inhibit normal growth and functioning. These result in physical and chemical changes in plants which is beyond normal and is generally caused by an external factor. Non-infectious disorders are somewhat easy for identification, while others are difficult or even impossible to recognize. The occurrence in most cases are non-reversible.

For the identification of physiological disorders, Singh *et al.* (2018) have put forwarded some points which are as follows:

1. Physiological disorders are often caused by the deficiency or excess of something that supports life or by the presence of something that interferes with life.
2. Physiological disorders can affect plants in all stages of their growth and development.
3. They are non-transmissible because they occur without or in absence of infectious agents.
4. Plant reacts differently to the same agent and sometimes response is seen as a little reaction to death.
5. Dealing with physiological disorders often means dealing with the consequences from a past event.
6. Damaged and undamaged tissue is clearly differentiated.
7. Physiological disorders not only causes damage themselves but also serve as the ‘open door’ (entry) for pathogens.

The deficiency of micronutrients in fruit crops is a matter of concern than that of macronutrients resulting in occurrence of disorders. Minimizing use of organic manures, adoption of high-density planting, use of root stocks for dwarfing, disease and salt tolerance, unbalanced NPK fertilizer application and extension of horticulture to marginal lands leads to nutritional deficiencies. In order to increase the yield as well as quality, micronutrient deficiencies have to be detected before expression of visual symptoms (Anonymous, 2022b). The physiological disorders in different fruit crops can be categorized in various types on the basis of causal factors in Table 2. Deficiency symptoms of Zn, Mn and B are familiar in sweet orange, acid lime, banana, guava and papaya in India. To rectify both visual and hidden micronutrient deficiencies, appropriate foliar and soil applications are necessary. The description of physiological and nutritional disorders in crops includes a number of technical terms and it is essential to understand the terms for better identification of symptoms.

Table 1: Some common terms of physiological and nutritional disorders in fruit crops

Sl. No.	Terms	Description
1.	Bronzing	Appearance of bronze or copper colour on the tissue
2.	Chlorosis	Loss of chlorophyll resulting in loss of green colour leading to pale yellow tissues
3.	Decline	Beginning of general weakness as indicated by loss of vigour, poor growth and low productivity
4.	Die-back	Falling off the growing tip affecting the younger leaves
5.	Firing	Burning of tissue followed by dark brown or reddish brown colour
6.	Lesion	A localized wound of the leaf/stem tissue accompanied with loss of normal colour
7.	Necrosis	Death of tissue
8.	Scorching	Burning of the tissue accompanied with light brown colour resulting from faulty spray, salt injury

Table 2: List of important physiological disorders and their relative cause in fruit crops

Relative cause	Disorders	Affected fruit crop	Reference
Nutrient related disorders	Internal nacrosis	Anola	Ram *et al.*, 1976
	Cracking	Bael	Saini *et al.*, 2004
	Leaf scorch	Mango	Panday and Sharma, 1979
	Gummosis	Mango	Bhargava *et al.*, 2011
	Scorching	Litchi	Bhargava *et al.*, 2011
	Brown or black flesh	Pineapple	Paull and Reyes, 1996
Temperature related disorders	Unfruitfulness	Anola	Bhargava *et al.*, 2011
	Spongy tissue	Mango	Katrodia *et al.*, 1988
	Purple spot	Loquat	Gariglio *et al.*, 2003
	Premature defoliation	Grapes	Satyanarayana, 1982
Moisture related disorders	Granulation	Citrus	Zong *et al.*, 1979
	Fruit cracking	Litchi	Huang *et al.*, 2003
Harmful gas related disorders	Black tip	Mango	Zhang *et al.*, 1995
Disorder due to genetic factors	Fruit cracking	Ber	Bhargava *et al.*, 2011
	Alternate bearing	Mango	Singh, 1990
Disorder due to lack of pollination	Jhumka	Mango	Negi, 1999
	Fruit drop	Mango	Panday, 1998
Disorder due to phenolic oxidation	Husk scald	Pomegranate	Defilippi *et al.*, 2006
	External browning	Pomegranate	El-Rhman, 2010

CONCLUSION

The change in climatic conditions is affecting the incidence of physiological disorders in many fruit crops resulting in huge losses to growers. There is a need for long-term quantitative documentation of tree phenological patterns in diverse climatic zones of India. Recent advances in physiology and genetics may help in solving problems of fruit production. There is a dire need for exhaustive studies to know the precise physiological significance of radiation effect in climatic fastidious fruit crops. Advance management strategies and their adaptation will be the critical component for successful and sustainable quality fruit production. Therefore, it is necessary that the growers should learn to identify the various physiological disorders that occurs in their agro-ecological zones or areas and should be able to manipulate the environment and use locally available resources to control the particular disorders. Evaluating the cultivars suitable to different agro-ecological zones/ areas along with incorporating valid horticultural practices can control the devastating effects of physiological disorders in fruit crops.

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