



## Physiological disorders in perennial woody tropical and subtropical fruit crops: A review

RAJESH KUMAR<sup>1</sup> and VINOD KUMAR<sup>2</sup>

ICAR-National Research Centre on Litchi, Muzaffarpur, Bihar 842 002

Received: 14 December 2015; Accepted: 17 March 2016

### ABSTRACT

The productivity as well as the quality of fruit crops is affected to a greater extent due to various physiological disorders. The extremes of environmental variables like temperature, moisture, light, aeration and nutritional imbalances result in disturbances in the plant metabolic activities leading to these disorders. While the symptoms may appear disease-like, they can usually be prevented by altering environmental conditions. In fruit crops, the deficiency of micronutrients causes many more disorders than that of macronutrients. These disorders have become widespread with diminishing use of organic manures, adoption of high density planting, use of rootstocks for dwarfing, disease and salt tolerance, unbalanced NPK fertilizer application and extension of horticulture to marginal lands. To get high quality fruit and yields, micronutrient deficiencies have to be detected before visual symptoms are expressed. This article presents a critical review on cause and characteristics of physiological disorders in important woody perennial fruit crops, viz. mango, litchi, guava, citrus, aonla, pomegranate, sapota, cashew, coconut, bael, ber and jackfruit, besides providing an insight into the gaps and researchable issues. The critical analysis of the nature, origin and causative factors of these non-pathogenic disorders will help in formulation of management strategies, reducing the loss to a significant level.

**Key words:** Abiotic factors, Nutrient deficiency, Perennial fruit, Physiological disorders

India ranks second in fruit production in the world after China. Diverse types of perennial fruits are grown in India, among which mango, litchi, guava, citrus, aonla, pomegranate, coconut, sapota, bael, ber, cashew, jackfruit are major ones having high economic values and export potential as well. They also provide livelihood security to the fruit growers and nutritional security at national level. Hence, greater attention is required towards increasing the quantum and quality of production by preventing the losses due to various factors. As per an estimate, worldwide approximately 70% of crop yield reduction is the direct result of abiotic factors (Acquaah 2007). Though, India is the second largest producer of fruits in the world, the productivity in India is dismally low. The physiological ecology of woody perennial fruit crops are very much influenced by hereditary characters and environments (Kozłowski *et al.* 2000, Acquaah 2007, Kumar 2015). Reasons for low productivity of fruit crops in India are primarily physiological or stress related disorders such as alternate bearing, unfruitfulness, fruit drop, fruit cracking, sun-burn or scorching, malformation, wilt, granulation, deformities, etc. rather than biotic and other related factors (Sharma

2006, Sandhu and Gill 2013). Abiotic factors negatively affect the crop productivity worldwide, leading to a series of morphological, physiological and biochemical changes that adversely influence plant growth and development (Chattopadhyay 1994). This is further complicated by climate change scenario involving an array of ecological stress factors like increased atmospheric temperature and decreased soil osmotic potential caused due to uneven, irregular and unpredictable rainfall pattern. If we look at production of tropical and subtropical perennial fruit crops, we find that the adverse climatic conditions singularly or in combination induce cellular damage and change in physiological processes in plant body ultimately affecting the fruit production. The plant architecture above the ground and the root system below interact with the environmental, edaphic and genetic factors causing physiological disorders.

### *Cause and characteristics of physiological disorders*

Physiological or abiotic disorders are mainly caused by changing environmental conditions such as temperature, moisture, unbalanced soil nutrients, inadequate or excessive soil minerals, extremes of soil pH and poor drainage. It is important to manage physiological disorders which often require background and characteristic studies from the consequences of past event (nature origin) that results in

<sup>1</sup>Principal Scientist (e mail: rajeshkr\_5@yahoo.com), Horticulture; <sup>2</sup>Senior Scientist, Plant Pathology (e mail: vinod3kiari@yahoo.co.in)