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Fruit Tree adaptation to environmental stresses: new challenges for studying tree physiological responses and for breeding

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As all perennial plants, fruit trees must cope with multiple environmental stresses during their life. The current progressive increase in air temperature makes fruit trees particularly fragile because of their long life during which they might accumulate stresses and the long duration of the selection process to search for more adapted materials. The progressive temperature increase directly impacts the tree phenology, especially their flowering time which results from the regulation of dormancy duration. The ongoing changes endanger the flower quality and the synchronicity of flowering among varieties that is necessary for cross-pollination. Moreover, during summer, despite the irrigation of most orchards, trees must face periods of soil water deficit and/or high temperatures during which the regulation of stomatal closure may impact the tree water use efficiency. Fruit development also depends on the climatic conditions during formation and maturation whereas floral induction occurs for the next season. In this talk, we will briefly review the threats for fruit production and the physiological mechanisms possibly involved that would deserve deep investigations for providing a more comprehensive knowledge of fruit tree temperature perception and responses. This knowledge is indeed crucial to draw strategies for the creation of new plant material better adapted to future climatic conditions.