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Climate Change and Citrus

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Abstract

Climate change is the change in the statistical distribution of weather patterns that lasts for an extended period. Climate change and agriculture are interrelated processes and affect in many ways. Citrus fruits are one of the largest fruit crops in the world. Yield loss at a drastic level due to abiotic stress annually in which temperature and water stress are the main environmental factors. These factors cause biochemical, anatomical, physiological, and genetic changes in plant structure and lead to defective growth, development, and reproduction, which ultimately cause a reduction in the economic yield of the crop. An increase in temperature and water stress at critical phenological stages of citrus results in reduced tree fruit set, decrease in fruit growth and size, increase in fruit acidity, low tree yield, reduced fruit peel thickness, and pre-harvest fruit drop. Stomatal conductance and net carbon dioxide assimilation in citrus leaves can be reduced by super optimal leaf temperature. Water deficit reduces the transpiration rate, stomatal conductance by stomatal closure associated with ABA content and causes an abrupt decrease in photosynthesis and CO₂ assimilation in citrus which reduce trees overall growth and production. Interventions in agronomic practices, breeding strategies, and biotechnological approaches can mitigate climate change effects on citrus. The groundwork against climate change is compulsory for better global livelihood and food security.

Keywords: Citrus fruits, environment, global warming, abiotic stress, genetic improvement, climatic adaptation

1. Introduction

Citrus and its related genera i.e., Poncirus, Eremocitrus, Fortunella, and Microcitrus belong to the family Rutaceae [1, 2]. Citrus is a prominent fruit tree of tropical and sub-tropical regions that require a suitable climate for quality production. Citrus fruit quality and quantity are inclined by multiple factors including climatic conditions [3]. Change in optimum climate elements like low temperature/freezing, heat stress/heatwaves, CO₂ assimilation, drought/water scarcity, intensive rainfall, and relative humidity, may affect directly and indirectly citrus production [4].

Citrus tree (rootstock and scion) growth, development, fruit production, and fruit quality is reduced under the biotic and abiotic stresses [5]. Citrus with tolerant rootstocks against biotic and abiotic factors improve the growth and productivity of the trees [6]. The potential citrus yield is 18–20 tones ha⁻¹, which goes up to

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