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Climate change's impact on crop adaptation and response strategies.

Dr. Saskia D. Keesstra*

Department of Environmental Sciences, Wageningen University, Wageningen, Netherlands

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Editorial

Climate change has direct, indirect, and socioeconomic implications. Agriculture and climate change are intrinsically linked in numerous ways, as climate change is the primary cause of biotic and abiotic pressures, both of which have negative consequences for a region's agriculture. Climate change affects the land and its agriculture in a variety of ways, including variations in yearly rainfall, average temperature, heat waves, and changes in weeds, pests, or microbes, worldwide changes in atmospheric CO_2 or ozone levels, and sea level oscillations. Climate-smart agriculture is the only method to mitigate the negative effects of climate change on crop adaptability before it has a significant influence on global crop production. In order to develop climate resilient crops, we summarise the causes of climate change, the stressors caused by climate change, the impacts on crops, modern breeding technologies, and biotechnology ways to cope with climate change. By creating transgenic plants, advances in genetic engineering techniques can help overcome food security challenges in extreme environmental settings. Devastating environmental changes have had a negative impact on natural systems, human health, and agricultural production. Because of concerns about the global economy's stability, food consumption is increasing in lockstep with the world's population growth. Agriculture productivity is heavily influenced by water availability, air pollution, and soil fertility. Due to direct and indirect effects of abiotic stressors, harsh repercussions on plant productivity are intensifying in response to rapid changes in environmental circumstances. The number of stress episodes, their influence on daily living, and damage to agricultural crops are used to quantify the effects of climate change and environmental variation. Agricultural yields in poor nations are primarily harmed by adverse environmental circumstances, therefore high temperatures and CO_2 accumulation led scientists to find new techniques to deal with fewer predictable difficulties. Climate variability has altered plant physiology in a variety of ways. Multiple stressors on plants have increased as a result of environmental on agricultural output, as mentioned. Climate change-related catastrophes (droughts, floods, extreme heat, storms, and so on) are also on the rise, according to the Food and Agriculture Organization (FAO). Growing stress-tolerant plants and understanding their reactions under various stress situations are essential for sustainable agriculture and food security for the world's growing population. Plants respond differently to diverse climatic conditions in terms of gene expression, physiology, and metabolism. Plants have been reported to be able to detect any variation in surrounding environmental signals, however after several studies, only a few reputed sensors have been identified. Increased CO_2 levels in the leaf under drought conditions stimulate the formation of reactive oxygen species (ROS), which cause numerous stressors in crops. Under dry conditions, the transport of CO_2 inside the leaf is impeded by locked stomata, and ROS are formed as a result of increased oxygen levels. Membrane breakdown caused by ROS generation disrupts the frequency of plant development, photosynthesis, and respiration.

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***Correspondence to:**

Saskia D. Keesstra
Department of Environmental Sciences
Wageningen University
Wageningen
Netherlands
E-mail: saskia.keesstra@wur.nl