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Wheat crop yield forecast with climate change impacts using local and regional levels by crop simulation models in some case studies

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Abstract

As the world's population grows, food consumption is reaching a breaking point. Consequently, the importance of agricultural production has increased. But in addition to its significance now, a lot of environmental issues have surfaced. Climate change has the potential to significantly affect agricultural productivity by changing crop growth conditions and planting, harvesting, and storage dates. Unfortunately, there is no turning back from the current unfavorable climatic situation that the world is currently facing in terms of ecosystems and economics. Farmers must adjust to changing weather patterns as a result of the expanding effects of climate change on agricultural systems. For this reason, many scholars have tried a variety of approaches to gauge agricultural output at different levels of detail. Observing how extremely big agricultural areas are affected and assessing scientific predictions are two ways to gauge how much climate change affects agricultural production and to take action. In several nations, crop simulation models (CSMs) have been employed as a versatile instrument for a wide range of applications. Numerous scientific techniques are currently being researched for effective model yield simulations under heterogeneous climatic and soil conditions, as DSSAT conducts homogenous field-based simulations but CRAFT uses a cell-based simulation technique instead of a field-based simulation. DSSAT includes dynamic crop growth simulation models for more than 42 crops, including wheat crops. DSSAT has addressed numerous real-world concerns and broad agricultural problems, including genetic modeling, precision farming, on-farm management, regional evaluations of the effects of climate variability and change, economic and environmental sustainability, and food and nutrition security. DSSAT application for climate change in agriculture that enables variable input data for crop masks, weather, soil, and management at varying resolutions. In order to prepare diverse spatial local data sets, these tools may also require to make use of decision support systems like Geographic Information Systems (GIS), Remote Sensing (RS), and Machine Learning (ML) techniques.

Keywords: