Impact of climate change on water requirement and yield of tomato over different agro-climatic zones of Tamil Nadu

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The AquaCrop model was utilized to assess the impact of climate change on tomato cultivation in different agro-climatic zones of Tamil Nadu. The study examined variations in water requirement, yield and water-use efficiency (WUE) from 1980 to 2022. Results indicated that rising temperatures led to decreased tomato yield, with a 9% average decrease at a 2°C temperature increase, highlighting the crop's sensitivity to heat stress. Furthermore, areas with lower rainfall demonstrated higher WUE, emphasizing the importance of efficient water use. The study underscores the need for adaptive strategies such as developing heat-tolerant varieties and optimizing irrigation practices to address the challenges of climate change on tomato cultivation.

Keywords: AquaCrop, climate change, tomato yield, water-use efficiency, water requirement.

tonnes of tomatoes were produced from 5.05 million ha in 2020 globally[3].

According to the First Advance Estimates of the Ministry of Agriculture and Farmer Welfare (2022–23), Govt of India, the area under tomato cultivation in Tamil Nadu is 0.34 lakh ha, with a production of 11.99 lakh tonnes of tomatoes. According to recent data (2022–2023) from the National Horticulture Board of India, tomato is the third most important vegetable crop, following potato and onion. Heat stress poses a serious threat to the production of tomato, impacting food and nutritional security. High temperatures reduce flower production and fruit set, leading to fewer fruits. Additionally, extreme heat impairs fruit growth and quality, resulting in smaller, misshapen tomatoes. This stress also disrupts nutrient uptake, further hindering fruit development. Urgent action is needed to mitigate these effects on tomato crops. Tomato plants respond to