Monitoring Temperature Variability and Its Implications for Agricultural Biodiversity

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Abstract

Temperature variability, driven by climate change, signiýcantly a ects agricultural biodiversity, with implications for crop yields, pest dyna, ƫ
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farming systems to climate-related stressors. Using long-term climate data, remote sensing technologies, and ýeld-based assessments, this study identiýes regions most vulnerable to temperature-induced stresses and examines the associated risks for agricultural biodiversity. The results suggest that temperature variability has the potential to reduce genetic diversity in key crops, increase vulnerability to pests and diseases, and threaten ecosystem services critical for sustainable agriculture. These ýndings underscore the need for adaptive agricultural strategies and policies to mitigate the impact of temperature variability on agricultural biodiversity and food security.

Keywords: Temperature variability; Agricultural biodiversity; Climate change; Crop resilience; Ecosystem services; Agroecosystems; Genetic diversity

Introduction

Climate change, primarily driven by human-induced greenhouse gas emissions, has introduced signi cant shi s in global temperature patterns. ese changes are characterized not only by rising average temperatures but also by increased temperature variability, including more frequent heatwaves, temperature extremes, and uctuations between warmer and cooler periods. is variability, while a ecting natural ecosystems, poses particularly acute risks for agriculture, which is highly sensitive to temperature changes. As agricultural systems increasingly depend on a stable climatic environment, uctuations in temperature can disrupt plant growth, reproduction, and resilience, with cascading e ects on agricultural biodiversity.

Agricultural biodiversity includes the variety of crops, livestock, and wild species that support food production and ecosystem services. In many regions, farmers rely on genetically diverse crop varieties, adapted to local climatic conditions, to ensure food security and sustainable agricultural practices. Temperature variability can alter the growth cycles of these crops, reduce genetic diversity by favoring certain varieties over others, and exacerbate vulnerabilities to pests, diseases, and soil degradation. In addition, agricultural systems with higher biodiversity tend to be more resilient to temperature extremes, as they bene t from natural pest regulation, improved soil fertility, and better resistance to climate stress [1].

Understanding how temperature variability impacts agricultural biodiversity is crucial for developing adaptive strategies to protect crops, maintain genetic diversity, and safeguard food security in the face of climate change. is study aims to monitor temperature variability across agricultural regions and assess its implications for biodiversity in these ecosystems, focusing on the resilience of crops, the preservation of genetic diversity, and the long-term sustainability of farming practices [2].

Results

e analysis of temperature data from various agricultural regions reveals signi cant variability in temperature patterns, with distinct

Citation: Elena I (2024) Monitoring Temperature VariaqTƫI IAgricul.S0 Earth Sci Clim Change, 15: 864.