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Shifting spotlight from crop yield to crop diversity for climate resilient agriculture system

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Abstract

Diversification – a key practice in agroecology – plays a crucial role in shaping resilient agricultural systems. It focuses on transitioning from monoculture practices to multiple crop systems thereby enhancing soil health and promote livelihood diversification for farmers. Compounding to the adverse impacts of climate change, the extensive use of pesticides and herbicides (usually in monocultures), lead to the deterioration in soil fertility and ultimately impacts the crop yields. Thus, to optimise the crop yield and to make crop system resilient enhancement of crop diversity is suggested. Enhanced crop diversity allows farmers to rely on multiple crops, mitigating risks associated with crop failures, reducing risks from pests, climate events, and market fluctuations and supports biodiversity conservation. This study aims to assess the crop diversity in 20 agroecological zones of India using indices like the Shannon Index, Simpson Index, and Margalef Index and to understand the spatiotemporal trend of crop diversity. The data ranges from 1997–2017 on yield and production of 56 crops grown in 711 districts of India. The goal is to identify the regions with increasing or decreasing patterns of crop diversity. Mann–Kendall (MK), modified Mann–Kendall (MMK), bootstrapped Mann–Kendall (BMK), innovative trend analysis (ITA), and detrended fluctuation analysis (DFA) tests were employed in this study to analyse the trends. The results of the study will help in identifying the leading and the lagging zones which need immediate interventions to improve crop diversity. Further, the zones are classified on the basis of low crop diversity-high yield (loss-win), high diversity-high yield (win-win), low diversity-low yield (loss-loss) and high diversity-low yield (win-loss) to unravel the trade-offs and understands pathways for creating win-win conditions across all agro-ecological regions.

Keywords: Agrobiodiversity, agroecological zones, India, Margalef index, Shannon index, Simpson index