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Optimizing Agrobiodiversity for Nutritional Diversity: An Analysis of Spatial Patterns and Sustainable Interventions in South Asia

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Background

Managing production diversity at species and functional levels is crucial for optimizing agricultural biodiversity

Methods

- Data and indicators: sub-national crop production data (2016-2021) at district level, MDD-W (Minimum Dietary Diversity for Women), HDDS (Household Dietary Diversity Score), and national food composition tables.
- Used Shannon Diversity Index for crop diversity calculations.
- Applied Global Moran's I and Optimised Hotspot Analysis (Getis-Ord Gi*) to analyze the spatial pattern and to identify the hotspots and coldspots.

Results

Spatial Clustering

- Non-food crops exhibited the strongest clustering (Moran's I = 0.54). Cereals and oilseeds showed moderate clustering (~0.35)

Diversity score

- Bangladesh had the highest median crop varietal diversity (0.63). Nepal led in crop species diversity (0.72).
- Pakistan led in functional dietary diversity (0.54) and nutritional diversity (0.52), while Bangladesh had the lowest scores.

Hotspot and coldspot output and parameter

- Identified significant districts using a 229-km distance band for variety, species, and functional dietary diversity.
- 455 significant districts for crop variety diversity, 384 for species diversity, and 277 for functional dietary diversity.
- Functional nutritional diversity hotspots: 705 significant districts identified using a 332-km distance band after FDR correction.

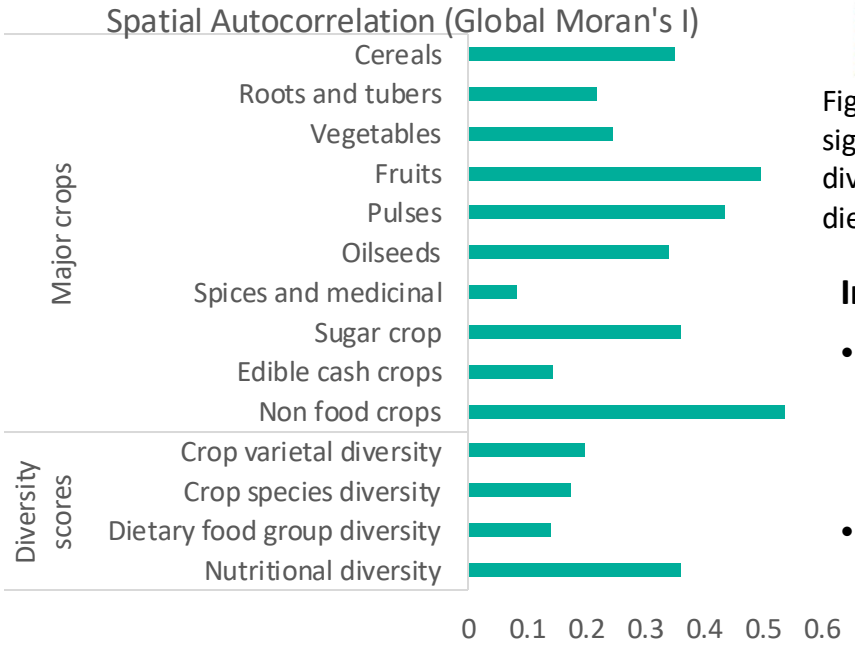

Fig 1: Global Moran's I statistics for major crops (production area fraction) and agrobiodiversity components reveals patterns of clustering or dispersion among similar features

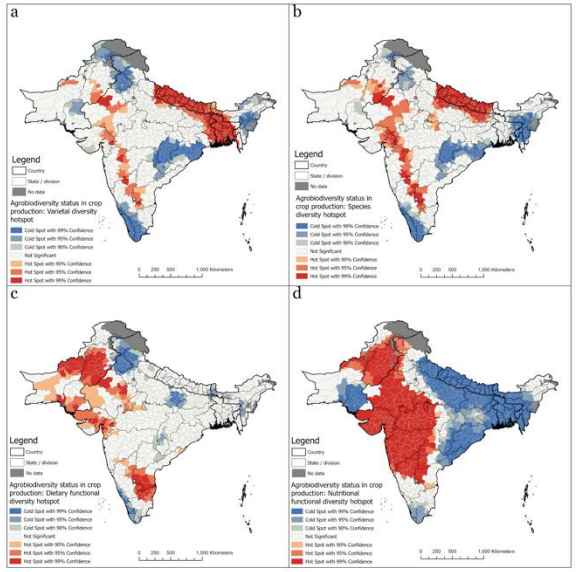

Fig 3: Diversity hotspot (red), coldspot (bule) and non-significant clusters (light grey) for a) Crop varietal diversity, b) Crop species diversity, c) Functional dietary diversity and d) Functional nutritional diversity.

Implications

- District level key regions were identified in Bangladesh, India, Nepal and Pakistan for improving agrobiodiversity and functional diversity.
- Identified hotspot and coldspot can help optimize agrobiodiversity to boost dietary and nutritional sufficiency in targeted areas for policymakers and researchers