



# Trajectories of crop intensification in rice-based systems of coastal Bangladesh

Md. Amirul Islam<sup>1,2\*</sup>, Shyam Pariyar<sup>1\*</sup>, Mathias Becker<sup>1</sup>, Timothy J. Krupnik<sup>2</sup>

<sup>1</sup> University of Bonn, Germany, and <sup>2</sup> International Maize and Wheat Improvement Center (CIMMYT), Bangladesh



ma.islam@uni-bonn.de

## Background

- Understanding the dynamics of farmers' adoption of agricultural practices is essential for developing site-responsive intensification strategies.
- Land-use intensification reported in some districts, but changes in agronomic practices remain less understood.
- Prior research (2 coastal districts) showed distinct change trajectories in crop management.
- However, the study on whether other coastal districts do follow similar or divergent pathways due to local resources and constraints are very limited?

## Objectives

- Assess temporal trends in agronomic practices across coastal sites in Bangladesh.
- Identify similarities and differences in agronomic practices adoption.



Coastal zone of Bangladesh; a) Dry fallow (Patuakhali); b) Dry rice (Jashore).

## Materials and methods

### Study sites

**Favorable:** Jashore, Narail, Gopalganj, and Shariatpur; **Marginal:** Bagerhat, Satkhira, Barguna, and Khulna; **Reference:** Barishal (favorable) and Patuakhali (marginal)

### Data collection

**Diachronic household survey** covering:

- Socio-demographic characteristics
- Agronomic practices and productivity

### Cropping system studied

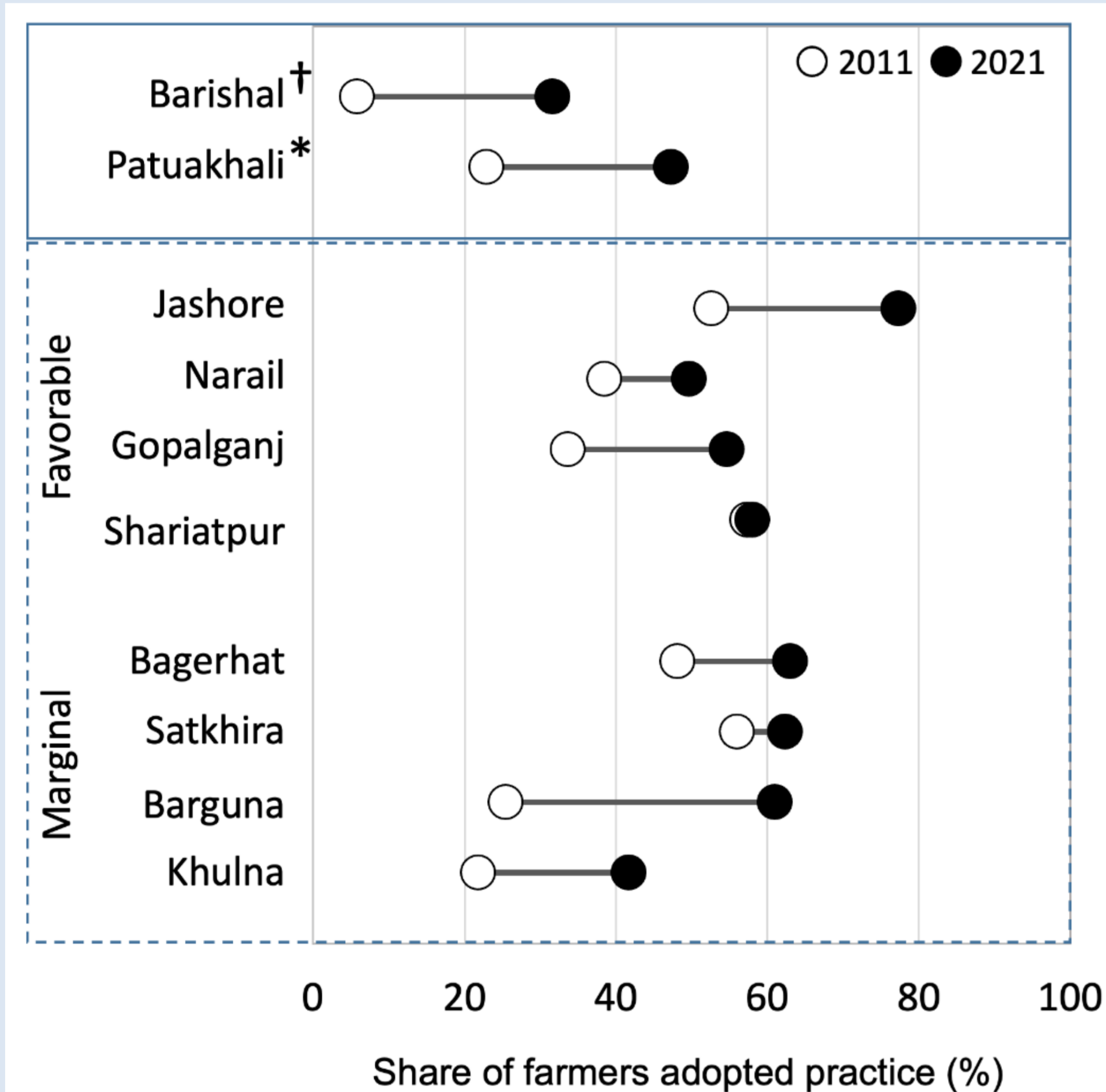
- Single rice
- Double rice
- Rice-mixed (upland crop).

### Data analysis

**Approaches:** Descriptive statistics, hierarchical cluster analysis, principle component analysis

**Software:** SPSS, R.

## Aggregated changes in practices

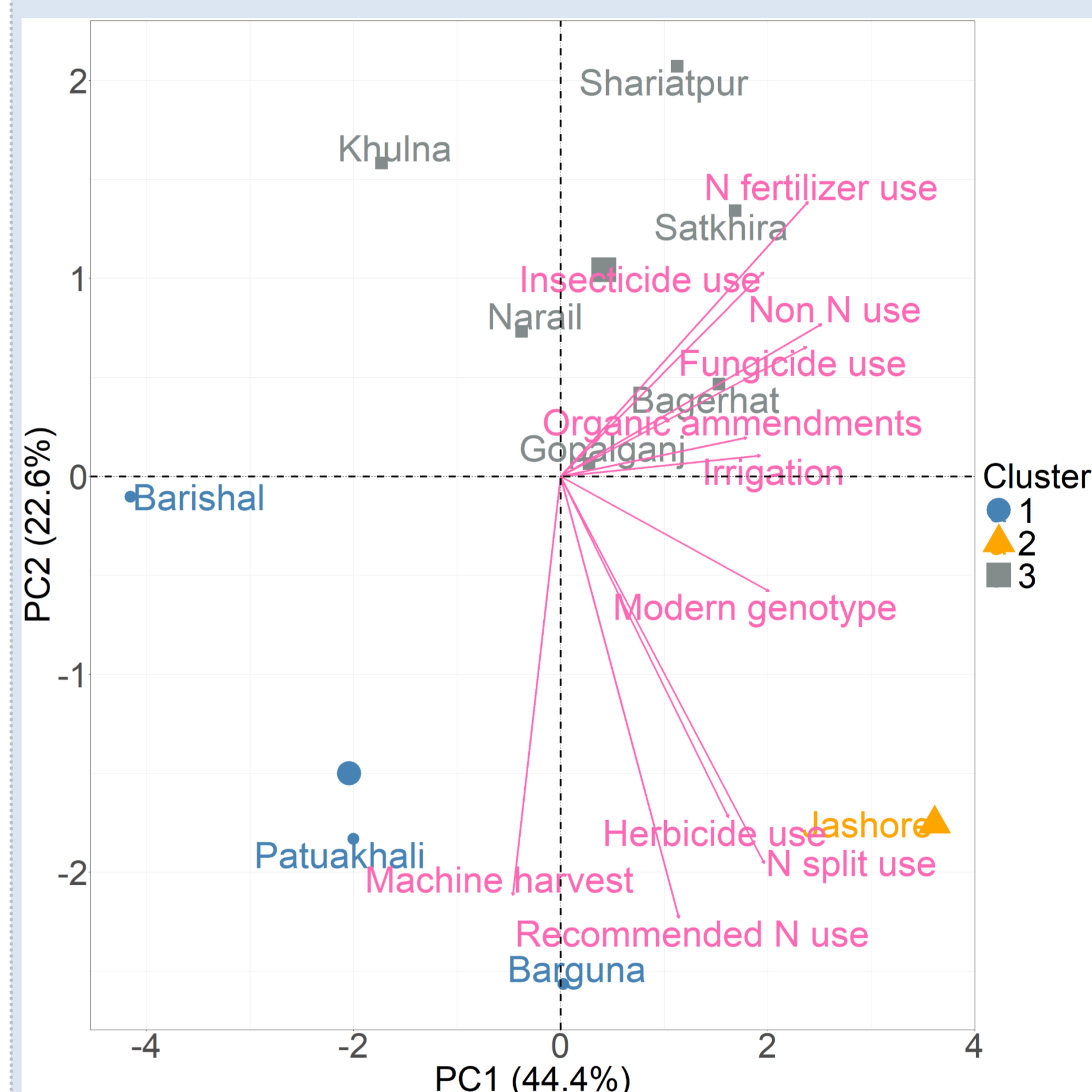


**Fig 1.** Aggregated changes across intensification related crop agronomic practices between 2011 and 2021 at different districts in coastal Bangladesh. † Favorable \* Marginal

## Conclusions

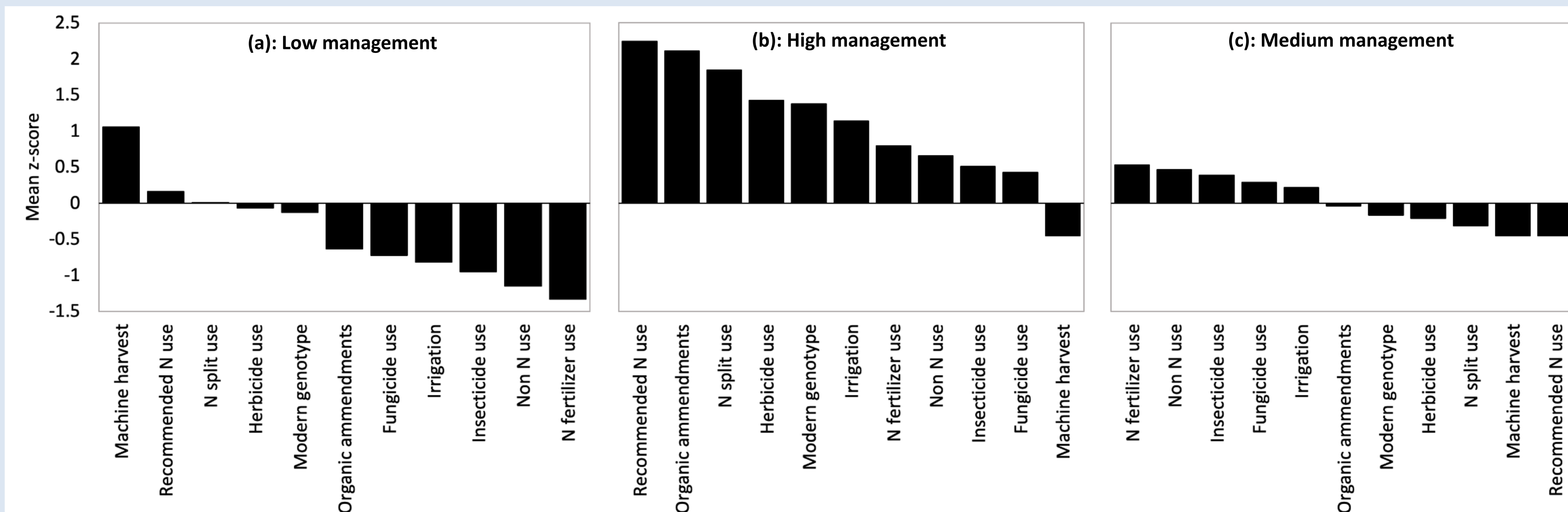
- Coastal Bangladesh is experiencing a heterogeneous intensification pathways to boost yields, save labor, and manage risks.
- Modern agronomic practices widely adopted, with largest yield gains in Jashore and Barguna.
- Strongest transformation observed in Jashore (Cluster 2), but Barishal & Patuakhali converged in a similar adoption pathway (Cluster 1).
- Principle component analysis (PCA 1) linked to yield-enhancing, whereas PC2 to labor-saving practices.
- Site-responsive interventions are essential for equitable and sustainable intensification.

## Agronomic practices across sites



**Fig 3.** PCA-biplot illustrating sites difference in management practices in coastal Bangladesh. Cluster 1: Low management; Cluster 2: High management; Cluster 3: Medium management

## Variables contributing to the clusters



**Fig 2.** Cluster-wise profiles of management practices expressed as z-scores, highlighting variables that most distinguish the clusters. (a) Cluster 1 (low input/management): Patuakhali, Barishal and Barguna; (b) Cluster 2 (high input/management): Jashore; and (c) Cluster 3 (average or medium input/management): Bagerhat, Satkhira, Shariatpur, Gopalganj, Khulna, and Narail