

Productivity and farmers' perceptions of rice-maize rotations under conservation agriculture, mixed and full tillage alternatives in marginal environments of S. Bangladesh



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T.J. Krupnik, S. Yasmin, Md. Shahjahan, A. McDonald, K. Hossain, E. Baksh, F. Hossain, A.S.M.A. Kurishi, A., A.A. Miah, Md. A.-Al Mamun, B.M.S. Rahman, and M. Gathala.





In this presentation:

1. Southern Bangladesh – a unique environment
2. The CSISA Program
3. On-farm, adaptive trial design
4. Results
5. Concluding remarks

Does CA have a role in the sustainable intensification of southern Bangladesh's marginal environments?

On-farm performance of CA relatively unstudied

Rice based system, but farmers are increasingly interested in maize.

Government requests \$7 billion of investment for sustainable intensification

Rainfed cropping and limited irrigation availability

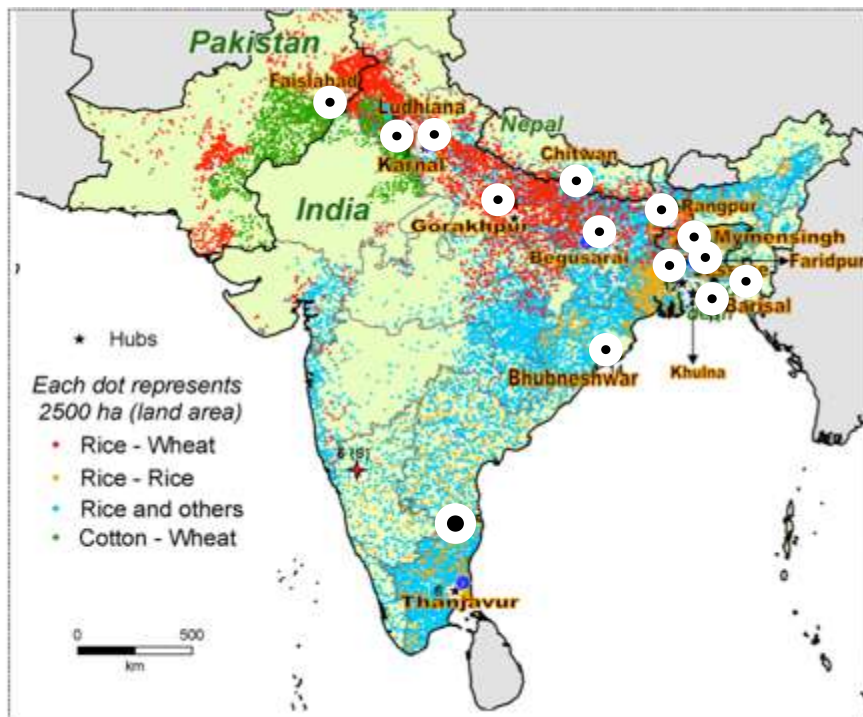
New crop systems must address labor constraints & boost income



How does tillage and crop establishment affect system productivity and what farmers' preferences in these marginal environments?

The Cereal Systems Initiative for South Asia (CSISA)

Spanning the S. Asian bread basket, with a focus on E. India, Nepal and Bangladesh



Goal: Increase food & income security at scale through sustainable intensification of cereal-based agricultural systems.



USAID
FROM THE AMERICAN PEOPLE

BILL & MELINDA
GATES foundation

A multi-country R4D project comprising a partnership of CGIAR centers, NARS, international NGOs, and extension organizations with emphasis on CA based cropping systems



On-farm, farmer managed but researcher backed adaptive tillage and cropping systems trials established in 2011.

Monsoon rainfed *T. Aman* rice rotated with dry season *rabi* maize

Two marginal environments

Distributed across the coastal region

Rainfed trials:

Khulna ($n = 10$) and

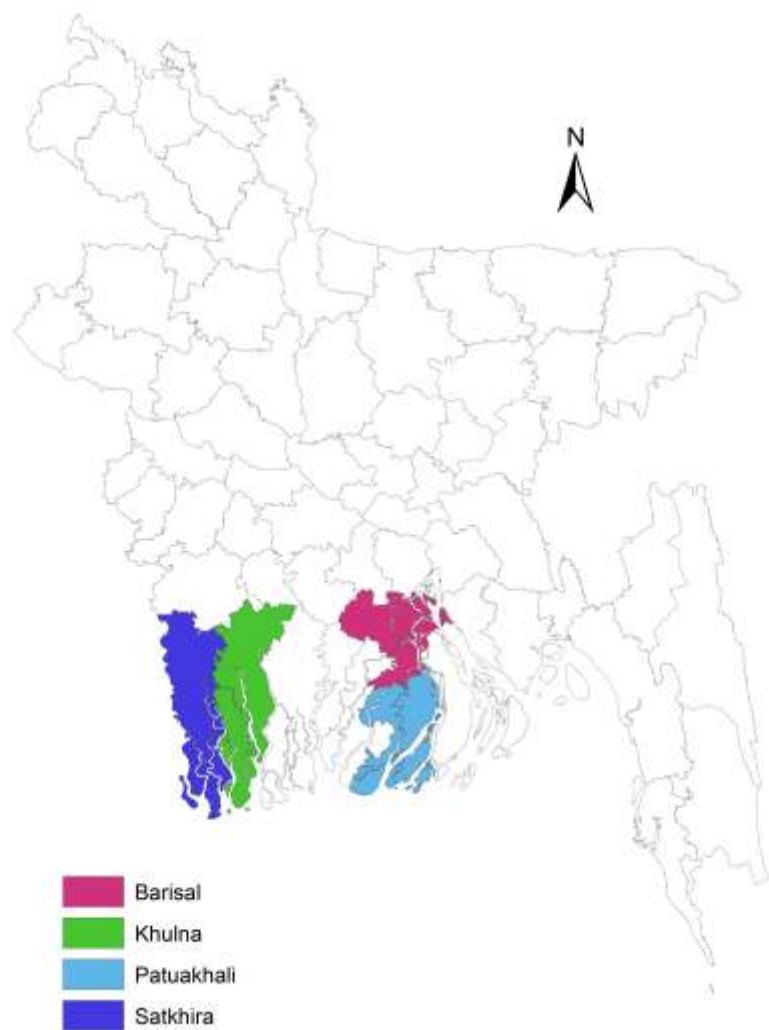
Patuakhali ($n = 5$)

Limited irrigation trials:

(2 irrigations for maize)

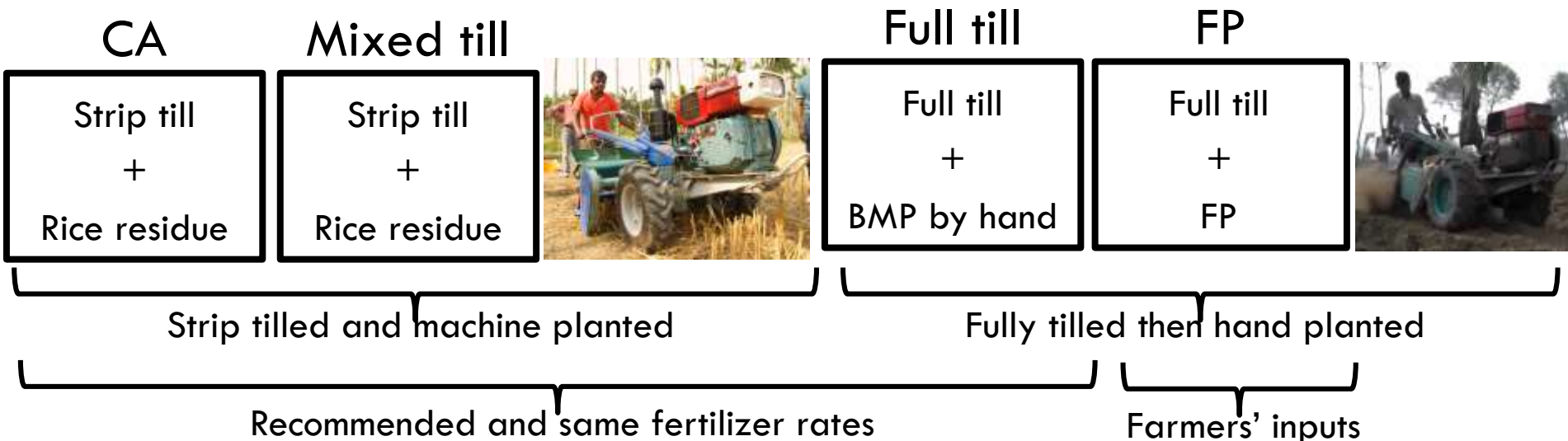
Shatkira ($n = 10$), *Barisal*

and *Putakhali* ($n = 5$ each)

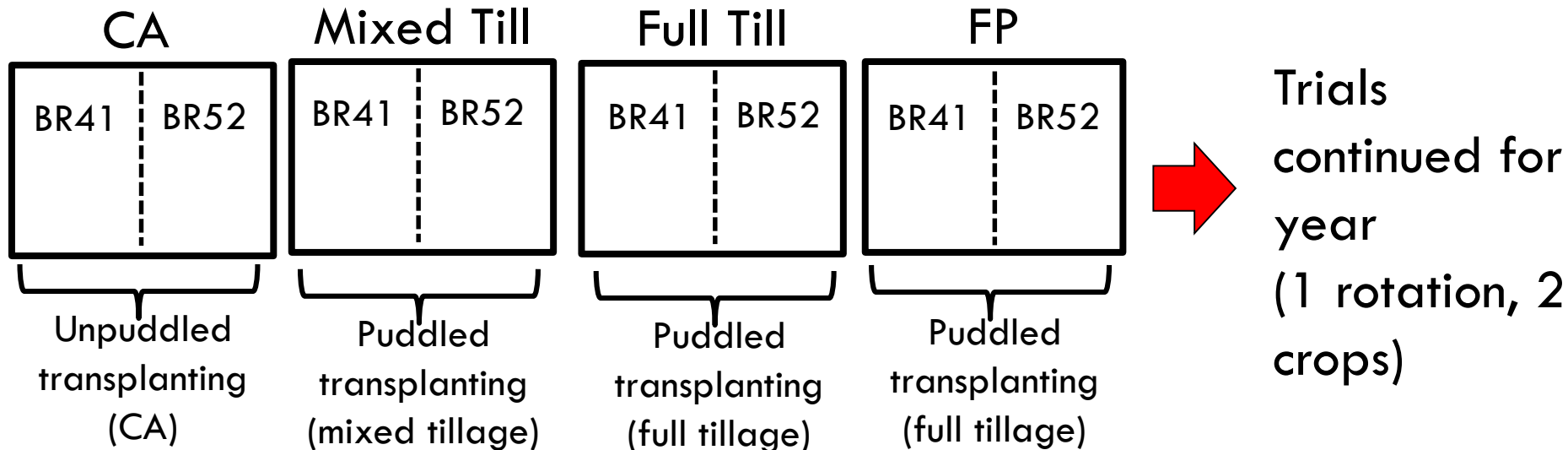


Experimental layout, rotation, and variety structure

2011-12 Dry rabi maize season: Variety NK40



2012 Monsoon T. Aman rice season: Variety BR 41 (Salt) and 52 (submergence)



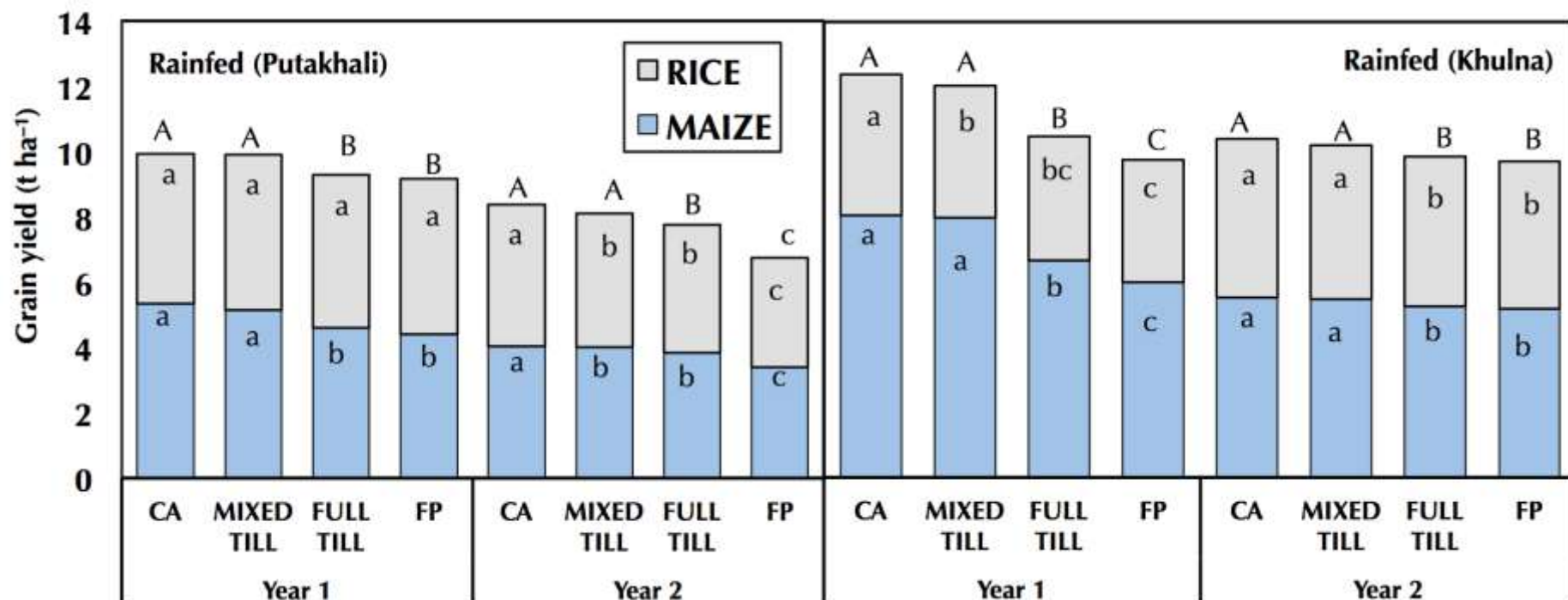
Yield Patterns:

Tillage and crop management system consistently significantly different

Varieties consistently significantly different

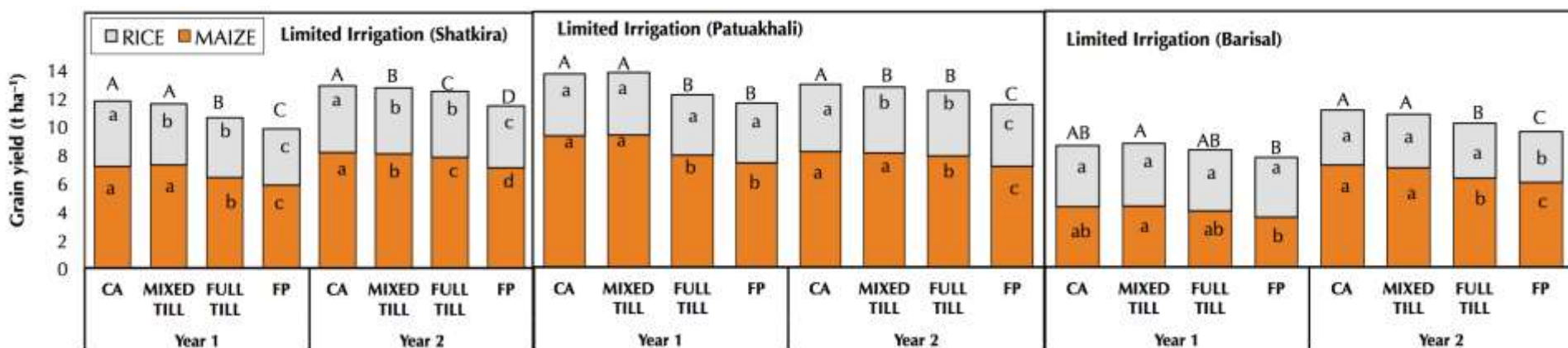
No tillage/management by variety interactions

Rainfed system (maize + rice) main-plot results:



- High 'rainfed' maize yields are possible – further study of shallow water tables and sub-surface hydrology is needed
- Strip tilled maize boosts yields – following puddled or unpuddled rice.
- Unpuddled rice does not result in a yield penalty.

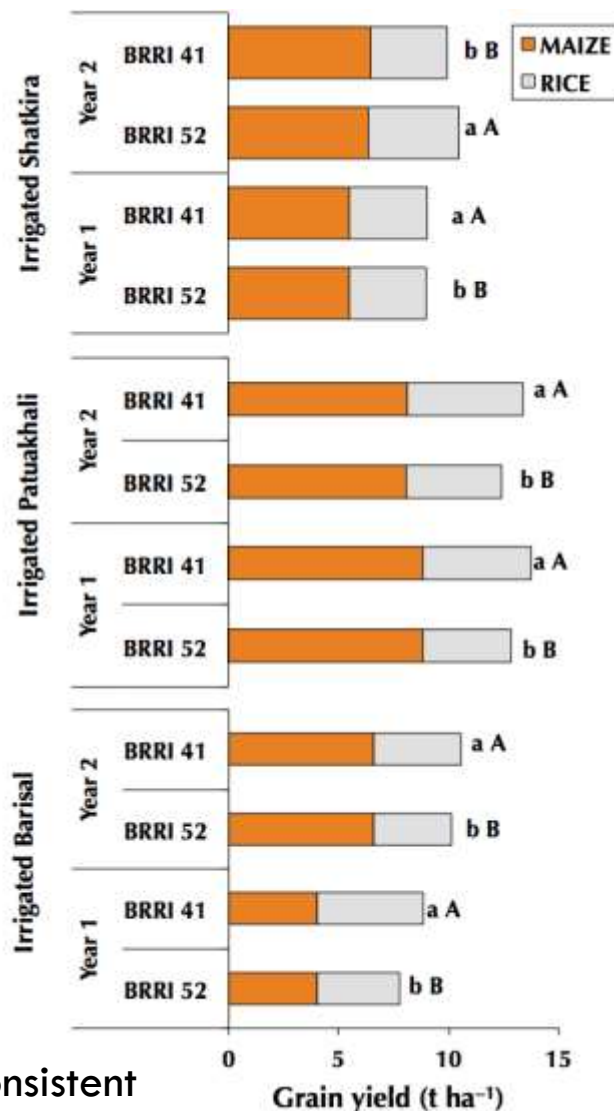
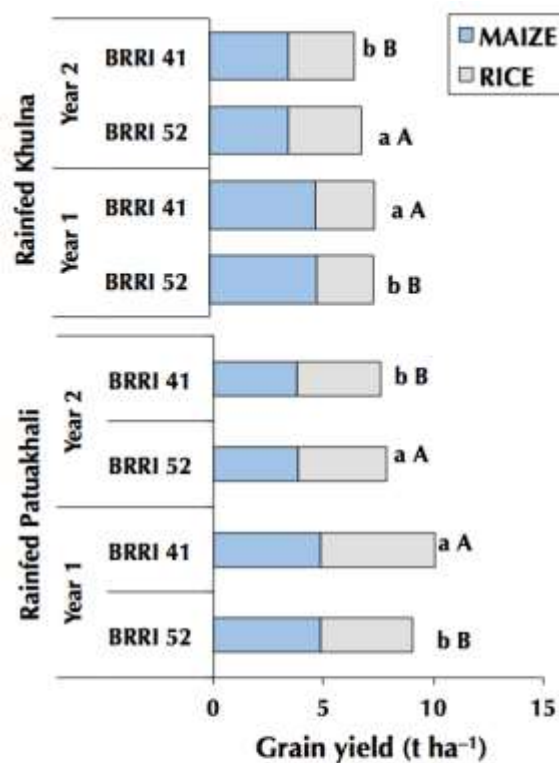
Irrigated system (maize + rice) main-plot results:



- Strip tilled maize again boosts yields – following puddled or unpuddled rice.
- Higher maize yields in Shatkira and Patuakhali (3 irrigations possible) than Barisal (2 only)
- Again no penalty for unpuddled rice transplanting.
- FP usually lower than all other treatments – result of farmers inability to invest in intensification.

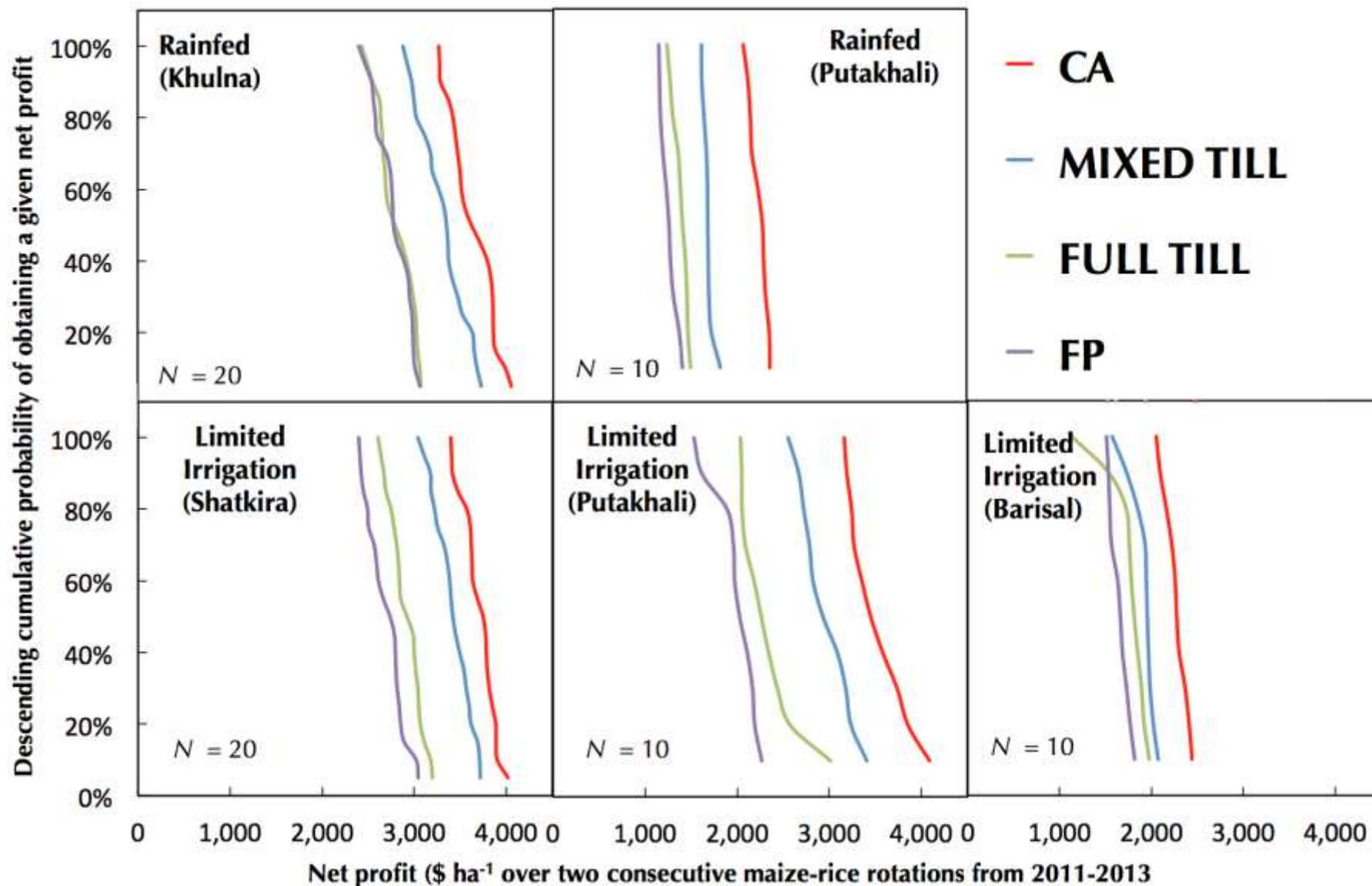


Varietal system (maize + rice) sub-plot results:



- Rice variety performance inconsistent
- Submergence tolerant rice not always best in Barisal tidal flooding zone

Main-plot tillage system economic performance (2 years of maize + rice rotation with pooled sub-plots):

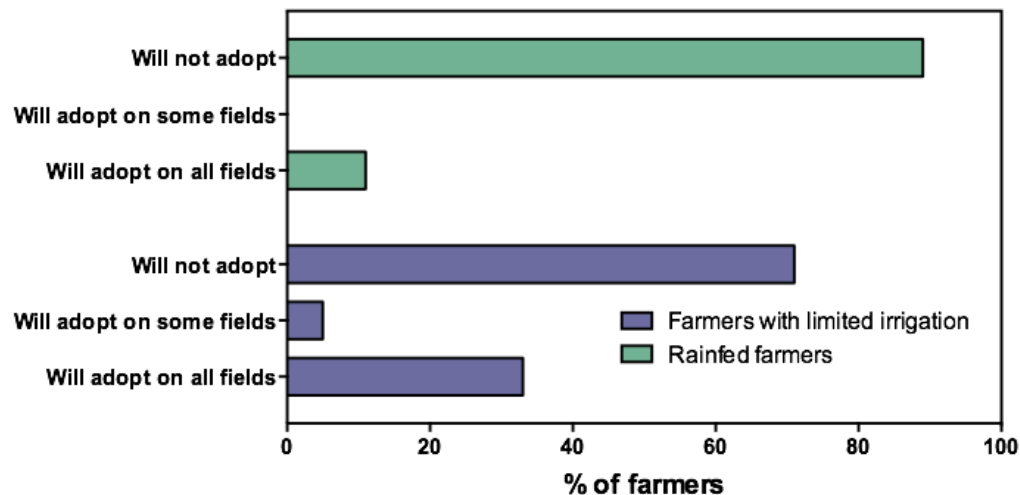




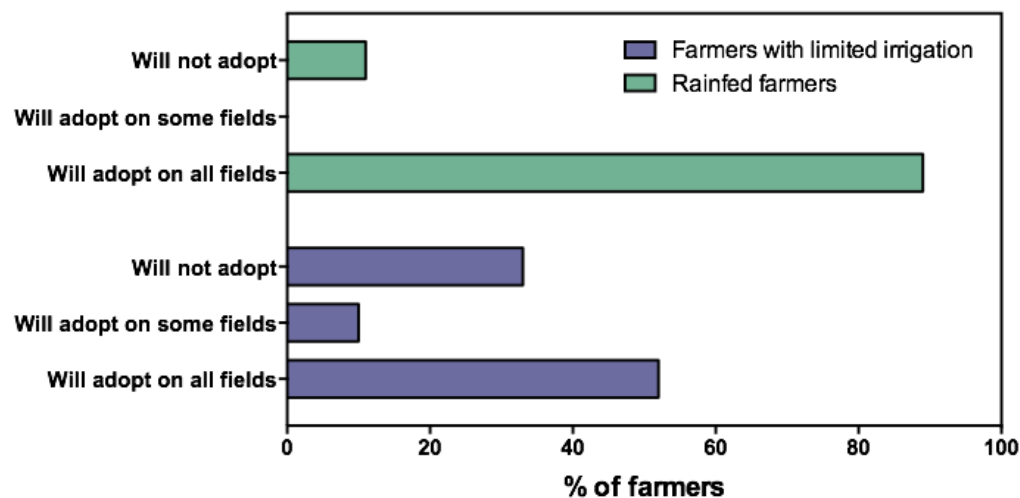
But what do farmers value?

- High profits not always enough: Difficulty of labor (unpuddled transplanting) must be considered.

Adoption interest for 'complete' CA (T1)



Adoption interest for 'mixed tillage' (T2)



Concluding remarks

- Both 'complete' CA and 'mixed' tillage offered immediate yield & profitability gains in Southern Bangladesh.
- Despite the probability of high profits, farmers prefer mixed tillage to 'complete' CA.
- Farmers' preferences for 'mixed' tillage (results from their dislike of unpuddled manual transplanting).
- Mechanical transplanting may be a potential solution.
- Our results highlight the importance of maintaining a flexible interpretation of CA, as farmers should be encouraged to adapt crop management systems to suit their own needs and socioeconomic circumstances.



Thank You – Any Questions?



Participating farmers and researchers in Barisal

Email: t.krupnik@cgiar.org