Photo: G. Smith/The Alliance

CGIAR | Standing Panel on Impact Assessment

Targeting of Technologies

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Focusing on *who adopts* in addition to aggregate reach

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Aggregate Reach

- Country studies provide a comprehensive picture
- Focus on careful measurement and attribution to the CGIAR

Who adopts

- Benefits to agricultural innovation are heterogeneous

→ Benefits from adoption not the same across individuals

- For some innovations, country studies can answer whether they naturally reach people with highest expected benefits

Interventions

- Causal impact studies can simultaneously answer targeting question when evaluating interventions designed to boost adoption

This presentation

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1. Salt tolerance in Vietnam
   - Country-level evidence on the spatial distribution of adopters
2. New rice varieties in Bangladesh
3. Supply and demand side interventions on mechanization in Ethiopia
   - Gendered impacts of mechanization subsidies
4. Agrodealers and flood-tolerant rice in India
   - Targeting adoption to the most flood-prone farmers

SPIA Country-Level Study: Vietnam

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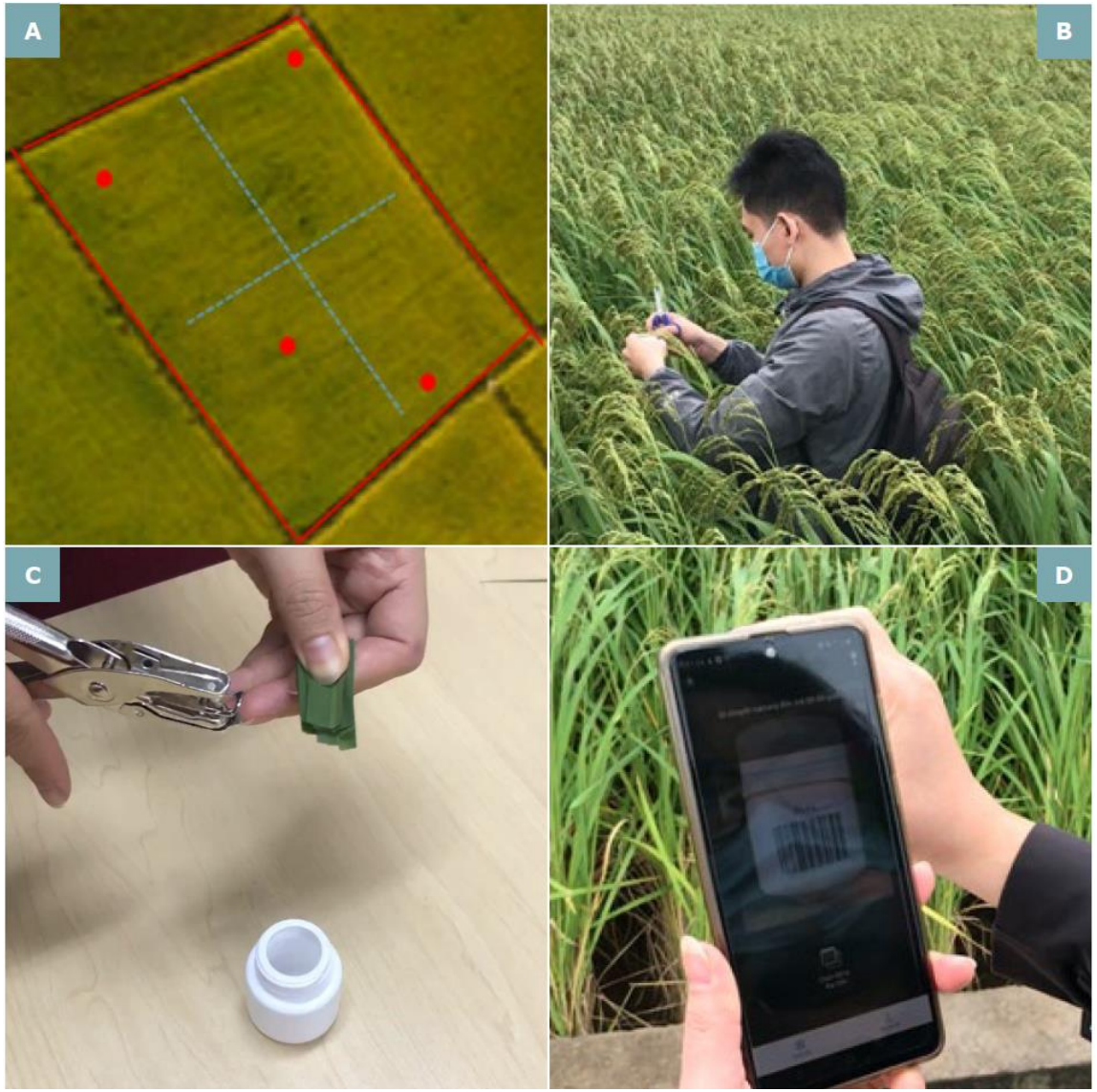
Rice DNA Fingerprinting

- Designed a new questionnaire component
  - Administered to randomly selected rice-growing households and plots
- On each plot:
  - Four plot quadrants demarcated
  - One rice plant randomly selected in each quadrant



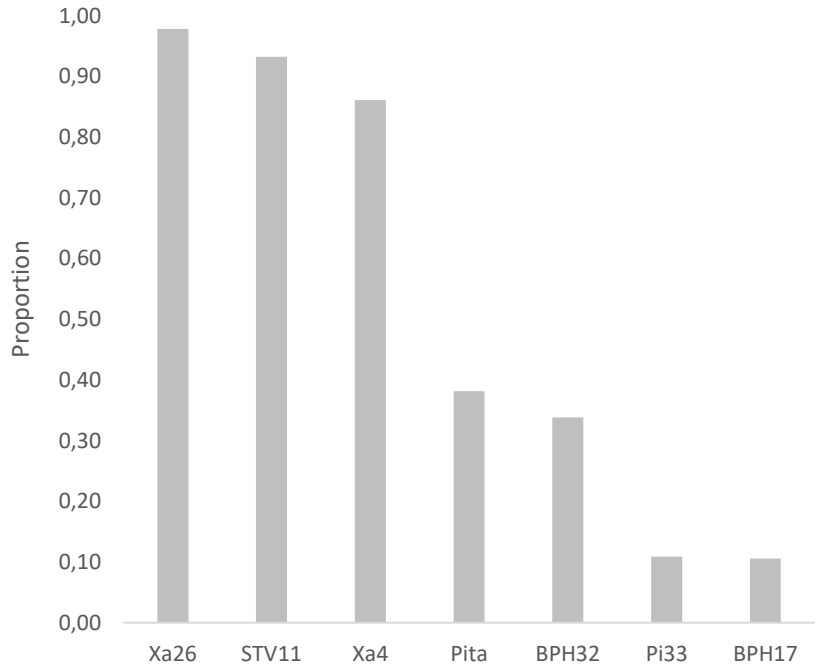
Rice DNA fingerprinting

→ Rice breeding efforts at IRRI have focused on biotic and abiotic stresses

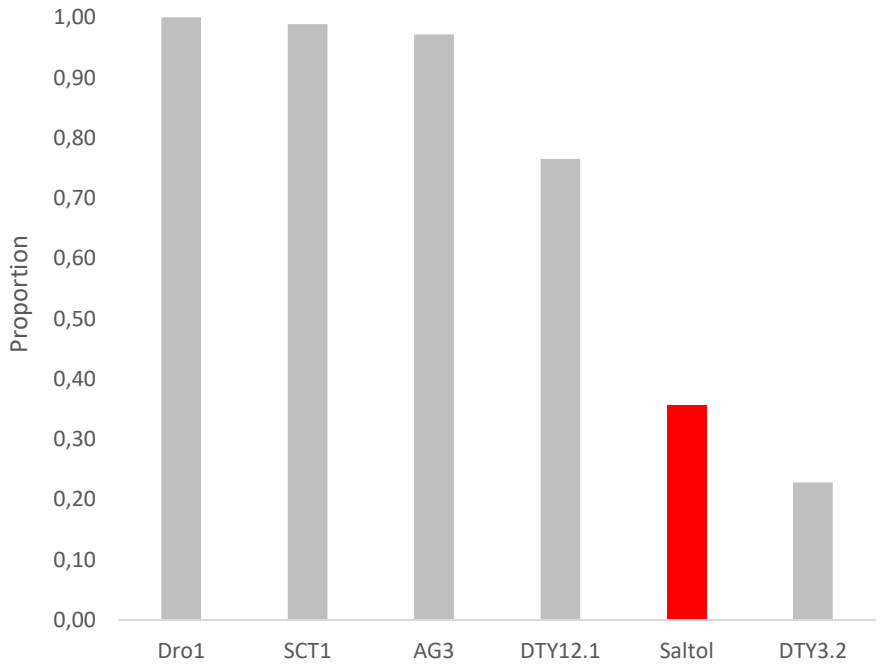
→ Several markers, potentially IRRI-related, are found on farmer's plots

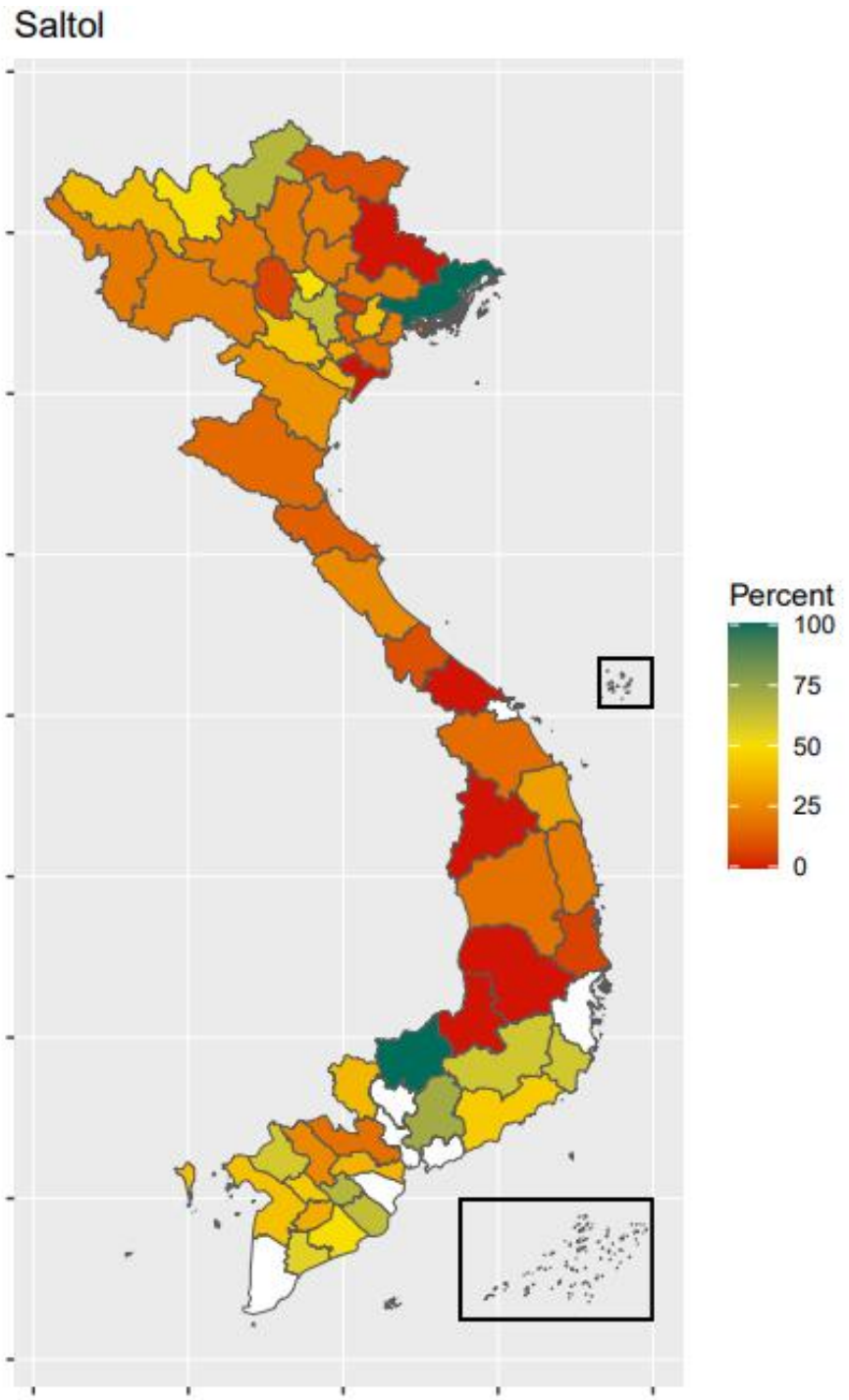
- Bacterial blight (Xa26, Xa4), Blast (Pita, Pi33), Brown Planthopper (BPH32, BPH17)
- Drought (Dro1, DTY12.1, DTY3.2) and salinity tolerance (saltol)

(A) Biotic stressors



(B) Abiotic stressors





Rice DNA fingerprinting

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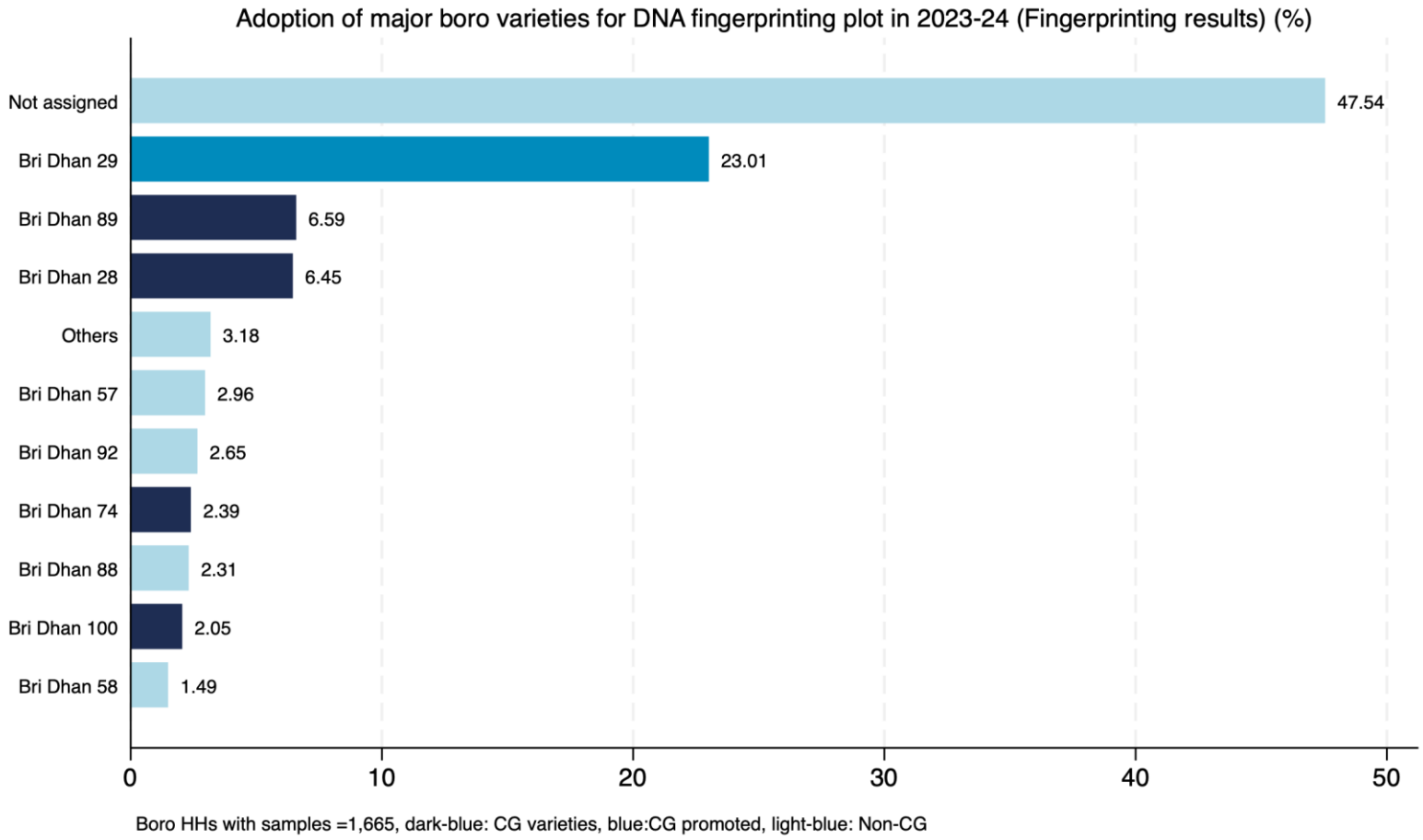
→Salinity tolerance in higher in coastal areas

→but also in less vulnerable places

SPIA Country-Level Study: Bangladesh

Adoption rates from DNA fingerprinting

- 28 and 29 both have CG linkage and remain popular
- But both are old (1994 releases)
- 3 New varieties w/ CG linkage released in last decade account for >10%
  - BRRI 89 (2018)
  - BRRI 74 (2015)
  - BRRI 100 (2021)



The geographic distribution of older mega varieties in Bangladesh from DNA fingerprinting

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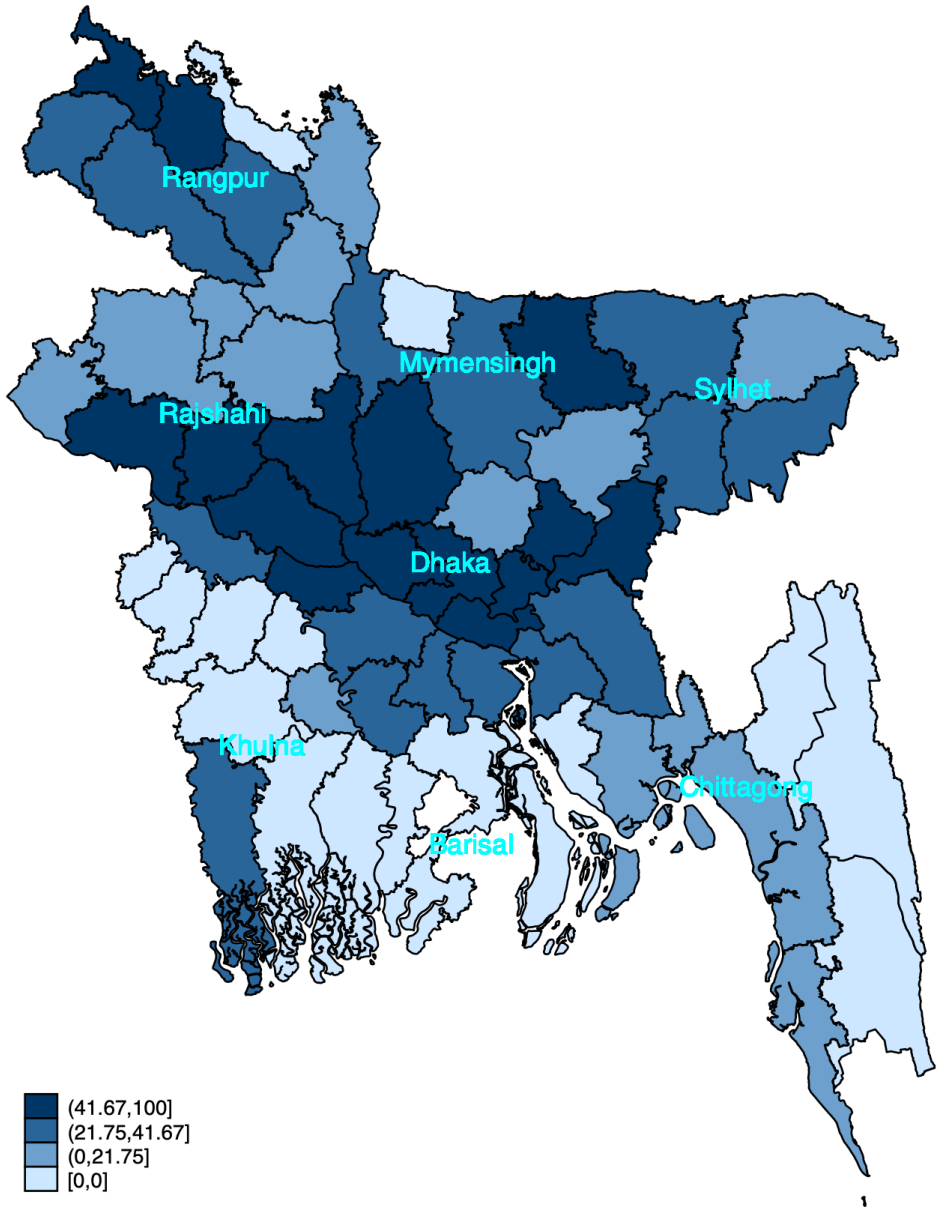
- BRRI Dhan 28 and 29 still very popular
  - Especially in the middle of the country
- Boro cultivation less widespread in southern Bangladesh
- Not much reach in Northern Khulna

District-wise proportion of BR-28 and BR-29 paddy varieties (DNA fingerprinted plots)



DNA fingerprinting Boro HH:1,665.

Newer varieties released more recently have reached some other areas

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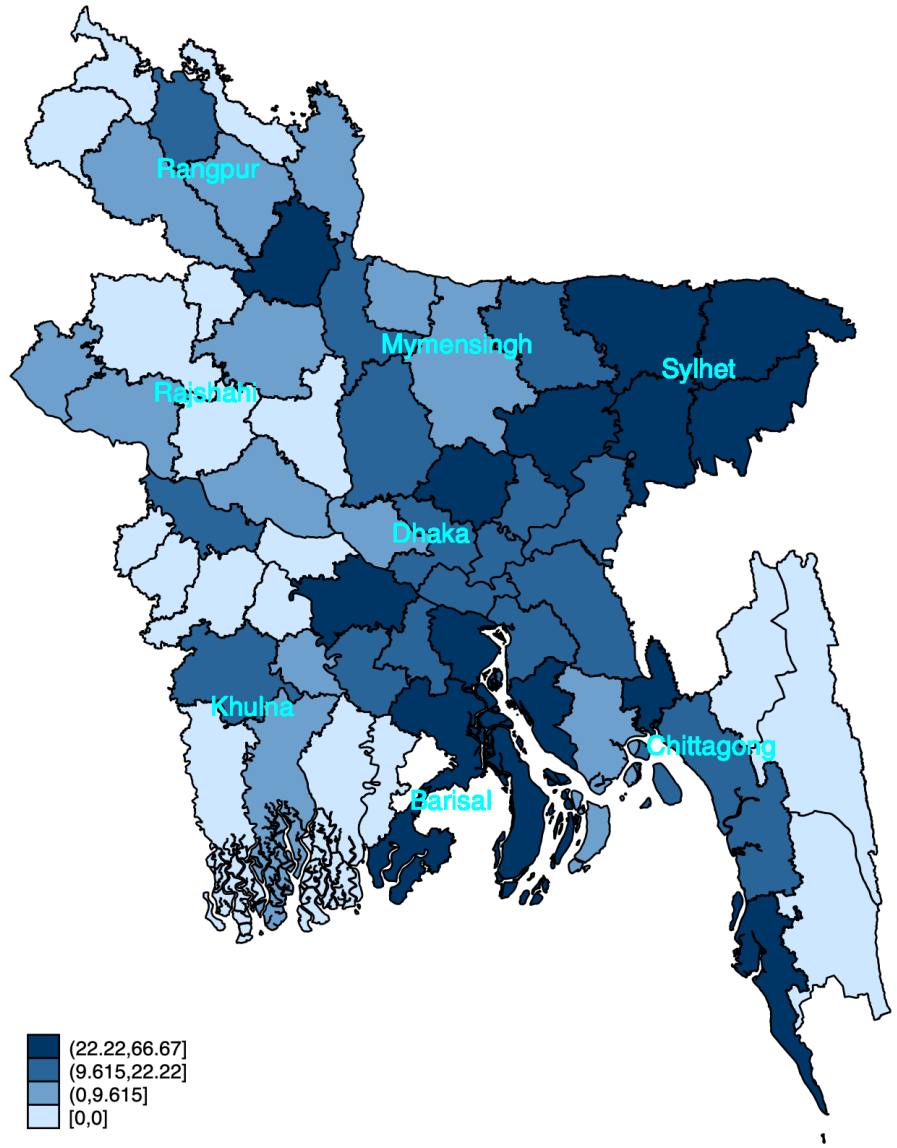
- Northeastern region (Sylhet) has seen spread of BRRI Dhan 89
- BRRI Dhan 75 accounts for lots of CG reach in Southern Bangladesh (Barisal)
- Less reach of newer varieties in Dhaka and Rajshahi divisions

District-wise proportion of CGIAR paddy varieties released post 2005 (DNA fingerprinted plots)



DNA fingerprinting Boro HH:1,665.
These varieties include BR-49,BR-67,BR-74,BR-75, BR-89, BR-100,BR-140,BR-147

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Study design

Both supply and demand side interventions

- Two Wheel Tractor (2WT) Service Providers (supply side)
  - Technical training (phase 1)
  - Subsidized access to mechanic services (phase 2)
- Smallholder farmers (demand side)
  - Voucher distribution to stimulate demand for 2WT service use

*Godlonton, S., Gebresilasse, M., & Jaleta, M. (2024, August 2). *Small scale farm mechanization: Evidence from Ethiopia*. Presented at SPIA Fest, Dehli
Paper on this work is a **preliminary draft** and has not yet been formally published. The findings and conclusions presented may be subject to change.

Study design

Firm Level Randomization

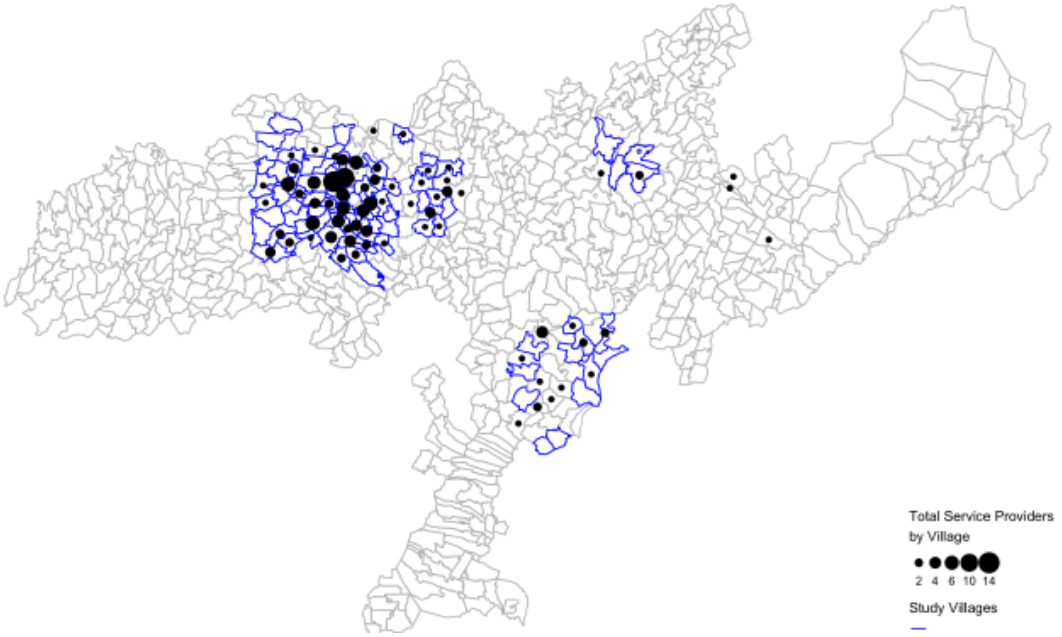
- Phase 1: Randomization of firms into training
- Phase 2: Randomization of firms to receive mechanic services voucher for maintenance

Household Level Randomization

- Farm mechanization vouchers
- High and low voucher amounts

Results

- Significant concentration of providers in Oromia region.
- Limited usage of tractors on agricultural plots.
- Market is fragmented with numerous providers.
- Mechanized services are mainly adopted for threshing.



Results

Firm level:

- Suggestive noisy effects on firm exit, service diversification, and changes to pricing structures.

Household level:

- Adoption of farm mechanization both on the intensive and extensive margin, stronger for female-headed households,
- but limited impacts on adult labor and disparate impacts on child labor
- value of the voucher did not appear to make a difference on the adoption of mechanized services.

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Results

- Suggestive noisy effects on firm exit, service diversification, and changes to pricing structures.
- Firms receiving **training** are more likely to engage with CIMMYT initiatives (Valuable capacity-building actions).
- Offering trial subsidy vouchers significantly **boosted the adoption** of 2WT mechanized services. (Demand increased)
- Higher adoption rates among **female-headed households.**
- Social impact enhanced through **reduction in child labor, especially through female headed HH.**

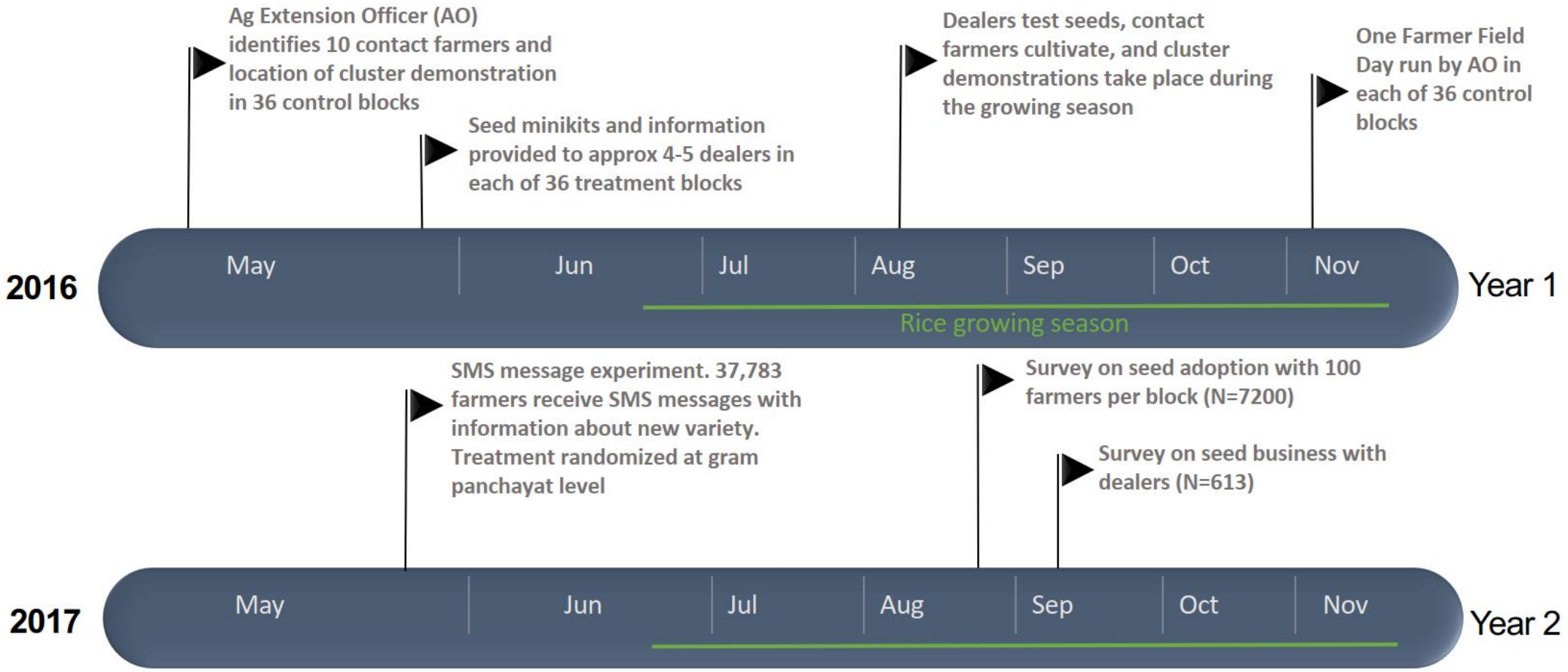
Study design

- **Control group:** Supported government extension service to carry out normal extension activities
  - Seed minikits distributed to contact farmers
  - Cluster demonstrations
  - Farmer field day

- **Treatment group:** Agrodealers were targeted to receive Swarna-Sub1 seeds and information
  - Seed minikits and informational pamphlet on Swarna-Sub1 distributed to 5 dealers in each treatment block

*Dar, M. H., Emerick, K., Sadoulet, E., de Janvry, A., & Wiseman, E. (2022, November 23). *Private input suppliers as information agents for technology adoption in agriculture.*

Study design



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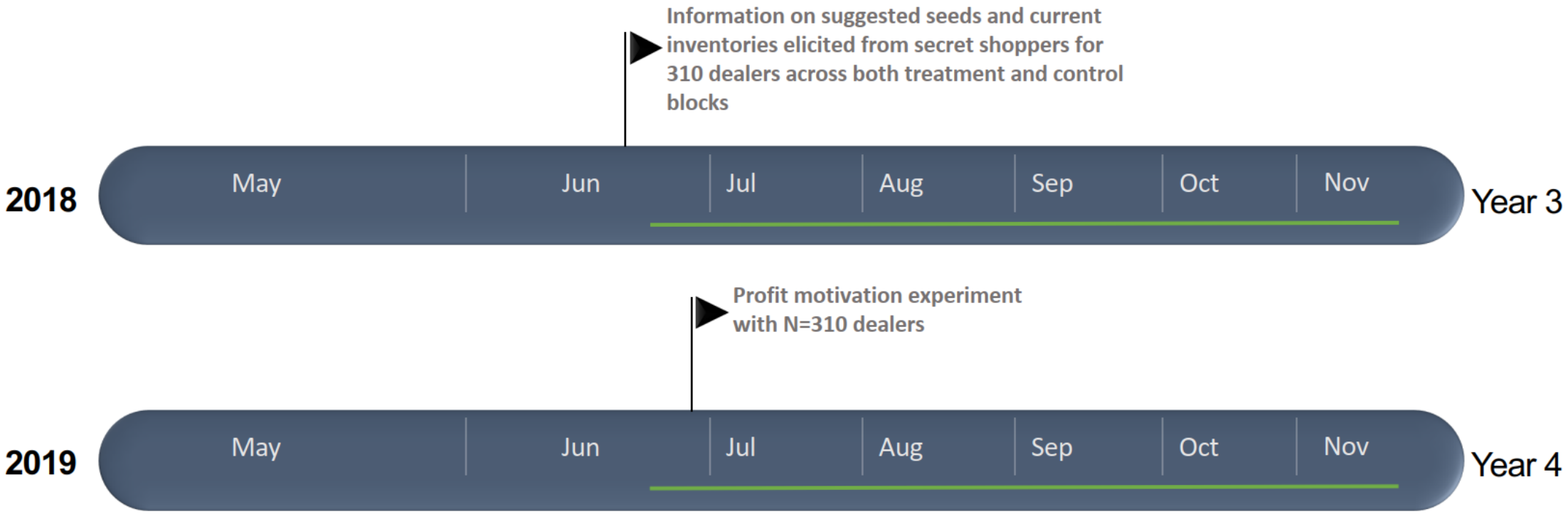
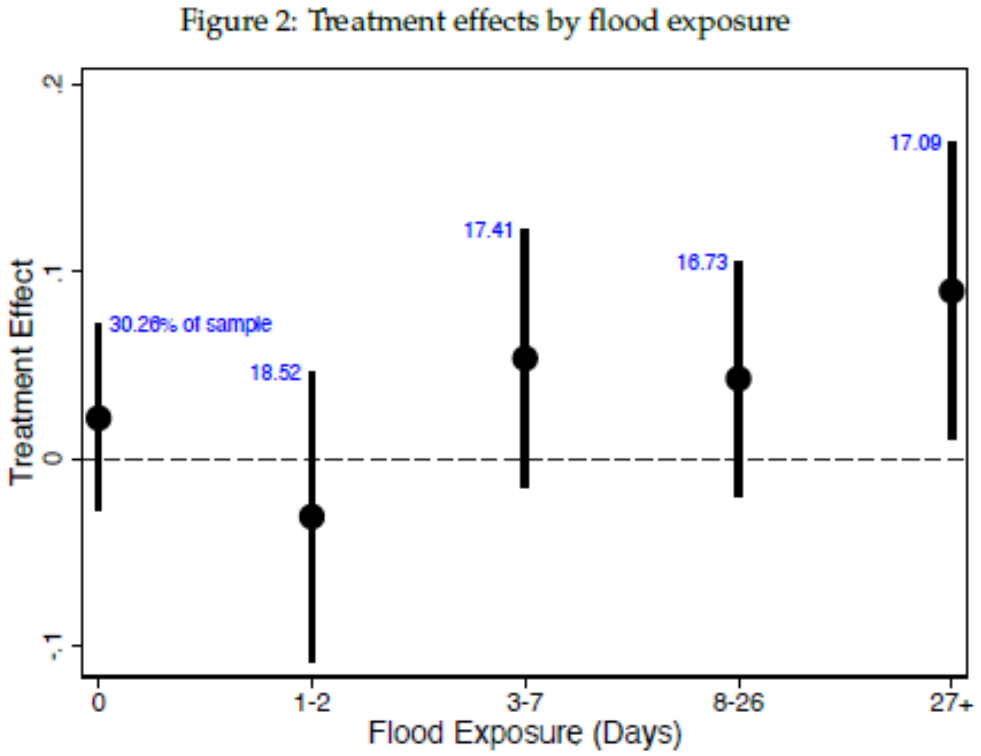
Study design



Results



- Treatment effects only exist in flood prone places
- Treatment effect close to zero for households with no flood exposure.
- Private partnerships with agrodealers more effective at getting seeds to flood-prone farmers
- Increased adoption among farmers with higher expected benefits from technology innovations.

Results

- Direct distribution to the agrodealers, **increased** farmer-adoption over 50%
- Private sector partnerships efficiently target new technologies.

Main takeaways

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- Impact evaluations in agriculture often focus on steps in the theory of change to increase adoption
- But heterogeneity is fundamental to the overall calculation of benefits:

$$Benefits = Adoption\ x\ \boldsymbol{Benefits\ per\ Adopter}$$

- Some interventions increase adoption, but do so for farmers **with larger benefits**
- Combing estimates of how returns vary across farmers with adoption effects can help to prioritize interventions
- Moving ahead, country studies will likely identify opportunities for studying targeting of technologies


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