

**Adoption and Diffusion of Agricultural Technology in developing countries:  
Lessons from field experiments among farmers in Bangladesh**

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# Introduction

- Adoption of new agricultural technologies key for improving labor productivity, food security and economic growth in developing countries.
- Agricultural productivity in South Asia and Sub-Saharan Africa: very low.
- Adoption and diffusion of new and improved cultivation method have been sluggish.
- Number of constraints for the adoption of new technologies:
  - lack of knowledge,
  - risk/uncertainty and
  - costs of learning.

# Introduction

- How to disseminate information about new practices?
- Targeting everyone directly is costly
- Can we target a small number of potential beneficiaries?
  - Ask them to train others or
  - use them to identify others who most benefit from such training?
- Relevance for a wide range of applications: e.g.,
  - introduction of *new technologies* to producers;
  - dissemination of better *business practices* to firms;
  - *training* workers on firm-specific equipment and practices; and
  - introduction of *new products* to consumers.

## Wider Context: Training Program

- The trainee needs to have a specific combination of ability, interest, and need in order to put the imparted skills to use.
- Agencies are often unable to identify all potential beneficiaries
- Self-selection into treatment is ineffective
  - if members of the target population are unable to assess beforehand whether they would benefit from the training .i.e.,
  - they do not know what they do not know
- Mistargeting results in wasted training resources, and wasted time for the trainees.

**Can Referral Improve Targeting?  
Evidence from a Agricultural Training Experiment**

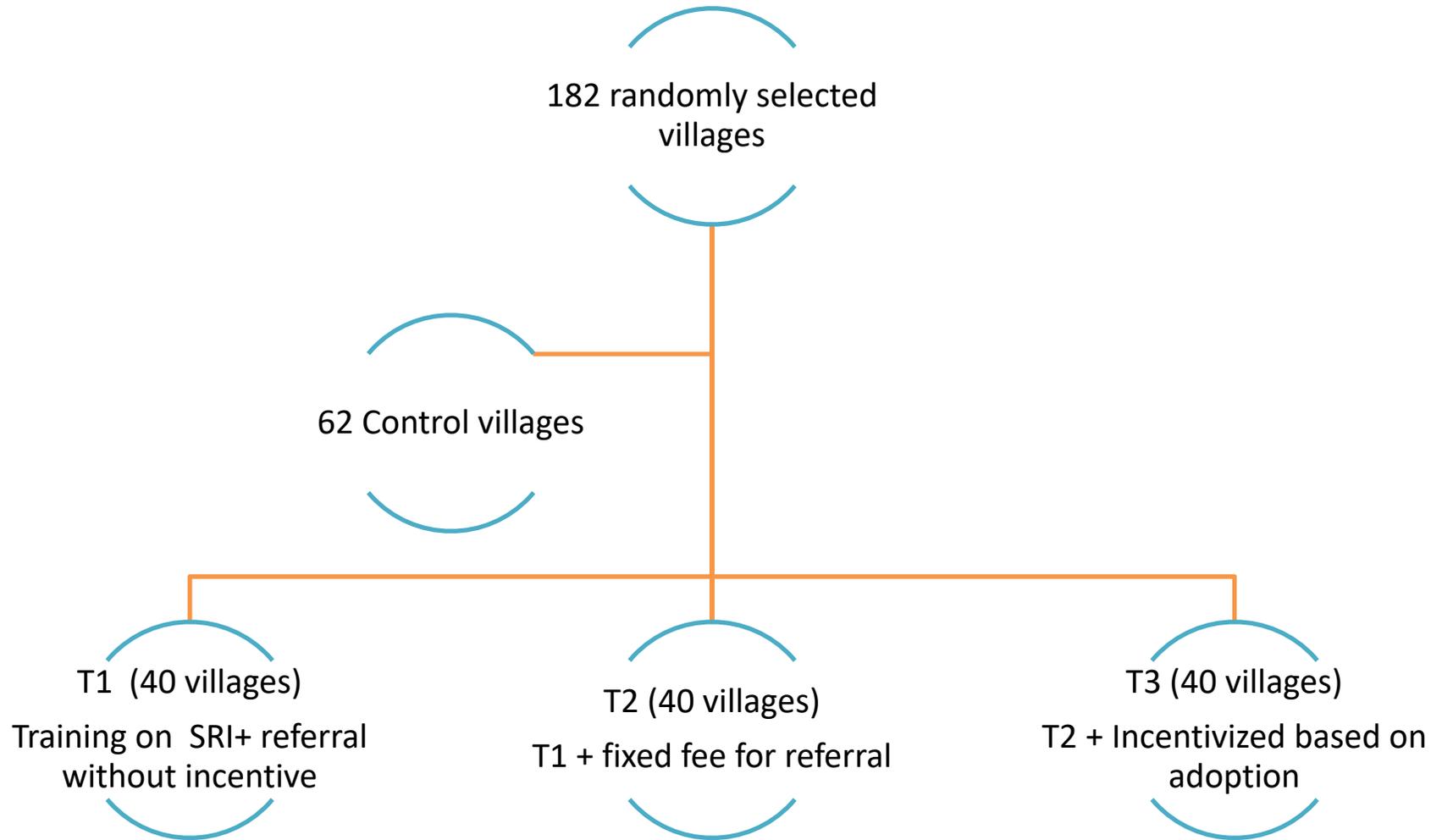
## What do we do?

- Inviting past trainees to select future trainees from a candidate pool.
- Some referees are rewarded or incentivized.
  - past trainees are better able to assess usefulness of training
  - identify individuals who would benefit more from the training.
- Investigate whether a payment is necessary or even useful
- Use a randomized controlled trial in Bangladesh.
  - On a new and improved rice cultivation method offered to farmers.

## Intervention

- A short training course on a System of Rice Intensification (SRI) offered to rice farmers in rural Bangladesh
- Previous studies find that SRI increases yields but requires more time and attention from the farmer.
  - Not well suited for *all* farmers because it requires superior farming management skills.
  - makes it suitable to investigate whether referral can help target SRI training towards farmers capable of adopting it.
- Training course was developed by BRAC.
- follows the standard BRAC curriculum for SRI, ensuring the external validity of our results.

# Experimental Design



## Experimental Design

- **Referees in T1:** received NO compensation in addition to their participation fee.
- **Referees in T2:** received an additional fixed payment of BDT 300
- **Referees in T3:** received a payment of BDT 600, but only if the referred farmer subsequently adopted SRI practices

## **Results: Treatment Effects**

- Training significantly raises the likelihood of SRI adoption,
  - Spillover to untrained farmers in treated villages.
- Treated villages have higher yields, revenues, and profits per area (15-25%), as well as higher input costs.
- 40-50% of trainees adopt SRI and many adopters do not follow all recommended practices
- Does referral improve targeting?
  - Referred trainees are only 3.7% more likely to adopt

## **Does Incentive to referral matter?**

- Rewarding or incentivizing referees does not improve referral quality.
  - When referees are rewarded or incentivized, average adoption increases by 12% points, for both referees and referred farmers.
- Increase in adoption rate in T2/T3 does not translate into increased performance for all.
  - experience a fall in performance.
  - the additional adoption is reversed a year later.
  - Incentivizing referees appears to have reduced targeting efficiency.
  - When incentivized, the referral process generates peer effects.

**Mobilizing P2P Diffusion for New Agricultural Practices:  
Experimental Evidence from Bangladesh**

# What do we do?

- Farmers who receive SRI agricultural training *are invited to teach what they have learned to two other farmers selected by us.*
- Experimentally vary these two student farmers such that *one farmer nominated the teacher and other did not.*
- Also test.
  - If we can improve information dissemination by incentivizing the teacher farmer.
  - whether information diffuses better from teacher to student when they are socially proximate.

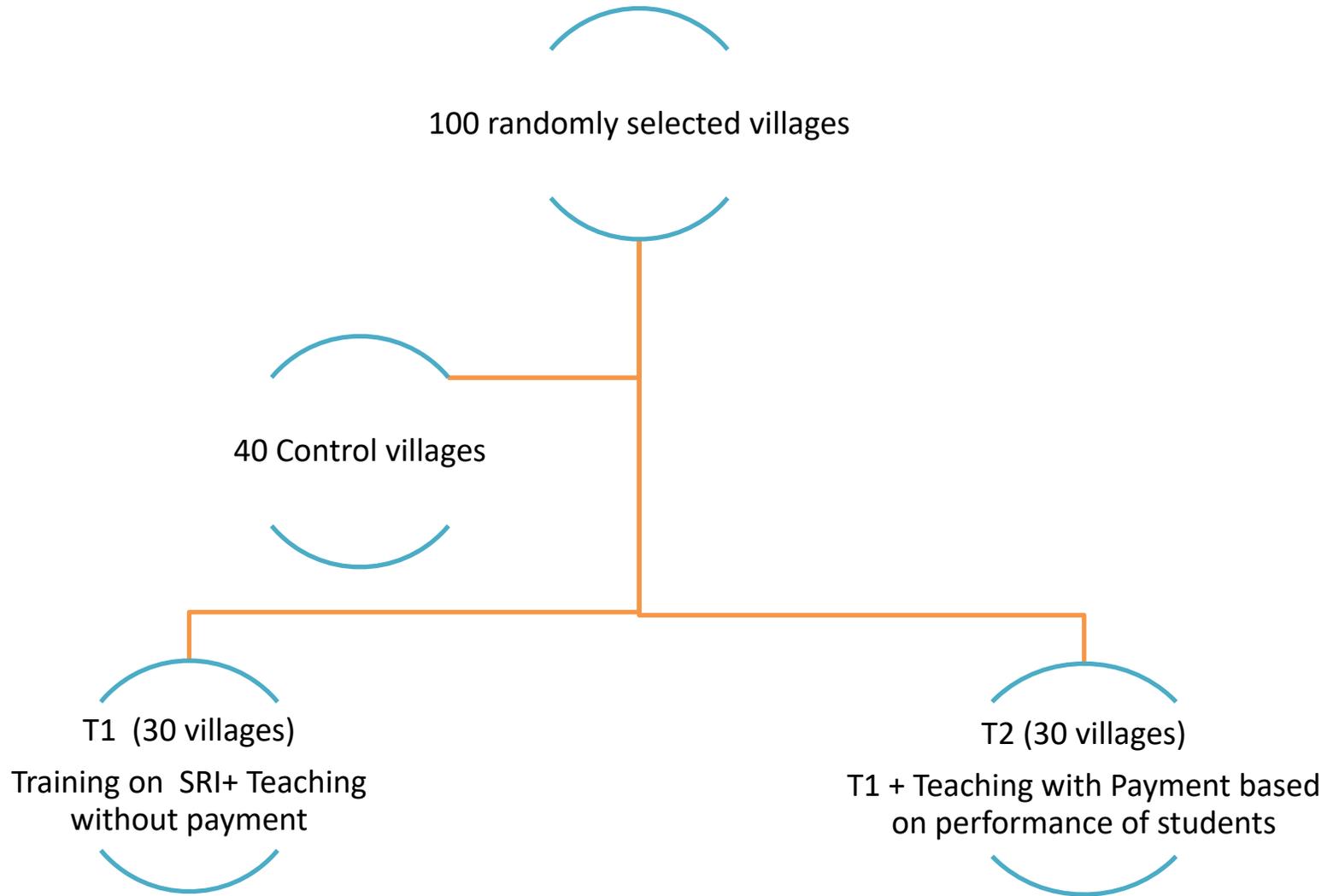
## Experimental design

- In each village, BRAC first identifies a set of suitable farmers for SRI adoption and
- We then select a small number of farmers to be trained.
- These trainees are then asked to teach two other farmers from the BRAC set.
  - we call the trainees 'teachers' and the two selected farmers 'students'.
  - Unselected farmers are not targeted for training and are referred to as 'non-students'.
- Treatment design is randomized across villages, with control villages not receiving any SRI training from BRAC.

## Experimental design

- All farmers are asked to nominate another farmer from whom they would like to learn or regard as role model.
- We then assign half of the students to a teacher they nominated, while the other half are taught by a teacher they did not nominate.
- Half of the `teacher' subjects are offered a monetary payment conditional on the performance of their `students' at a quiz on SRI knowledge.

# Experimental Design



# Results

- Incentivization improves learning, but it has NO significant effect on adoption:
- Incentivizing `teachers' does not significantly improve diffusion.
- Students matched with a teacher they nominated do better on the test.
  - However, matching `teachers' with people who nominated them does not improve dissemination
- SRI knowledge predicts the subsequent adoption.
- Adoption by `teachers' helps predict adoption by their `students', suggesting that students follow the example of their teacher.

## Results: Referral Vs P2P

- Compared to earlier findings by Fafchamps et al. (2018), farmers invited to serve as 'teacher' are 37 percentage points more likely to adopt SRI practices than farmers who only receive SRI training.
- Teacher farmers are quite effective at spreading SRI knowledge and at inducing SRI adoption:
  - student farmers are only 7 percentage points less likely to adopt SRI practices than farmers who receive SRI training from BRAC in the Fafchamps et al. (2018) experiment.
- BRAC trainees are capable of teaching the new practices to other farmers.