Household-Level Impacts of *System of Rice Intensification* (SRI) in Haiti

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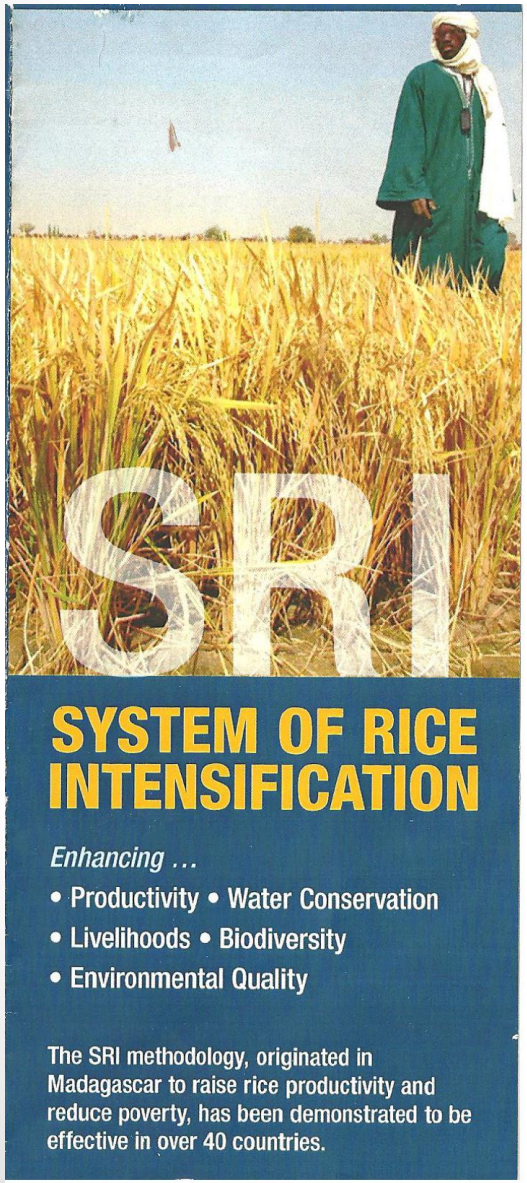
Outline

- Introduction to SRI: Claims & controversy
- From agronomics to economics: More questions & controversy
- SRI in Haiti: The Oxfam Barr bloc project
- Evolving evaluation strategy
  - Bloc selection and matching for rollout
  - Quasi random exposure intensity
  - Impact heterogeneity & plot position
  - Power analysis
- Outcome variables and other measures
- Fine-tuning the intervention

SRI Rice: Agronomic Controversy



- Developed as a high yielding, low input way of cultivating rice
- Agronomic field trials in study area of Haiti show the following:

	SRI	SRT	t-Test
Yields (MT/Ha)	5.8 (0.20)	3.5 (0.14)	9.8
Costs ($US)	$1505 (71)	$1144 (74)	3.6

SRI Rice: Agronomic Controversy

- Saves on inputs of seed, fertilizer and water
- Basic elements are:
  1. Early transplanting of seedlings 8-12 days old
  2. Shallow (1-2 cm) planting of seedlings
  3. Sparse planting of single seedlings on a 20x20 cm grid
  4. Intermittent irrigation
- Because it is both green and pro-poor, SRI has attracted substantial attention by NGOs and others
- However controversial amongst rice scientists who speak of the ‘rice wars’ and UFOs (Unsubstantiated Field Observations)

SRI Rice: Economic Questions

- Aside from its agronomic controversy, the economics of SRI remain murky
- While saves on some inputs, requires more labor:
  - Field trial data on labor
  - Poor women in Artibonite Valley saying cannot afford to cultivate more than a small amount of SRI
  - Takahashi & Barrett show that despite 64% yield increase, no net income increase for families
- In addition, SRI puts a premium on irrigation control
- Our rough calculations on input requirements and profitability from Artibonite show the following:

SRI Rice: Economic Questions

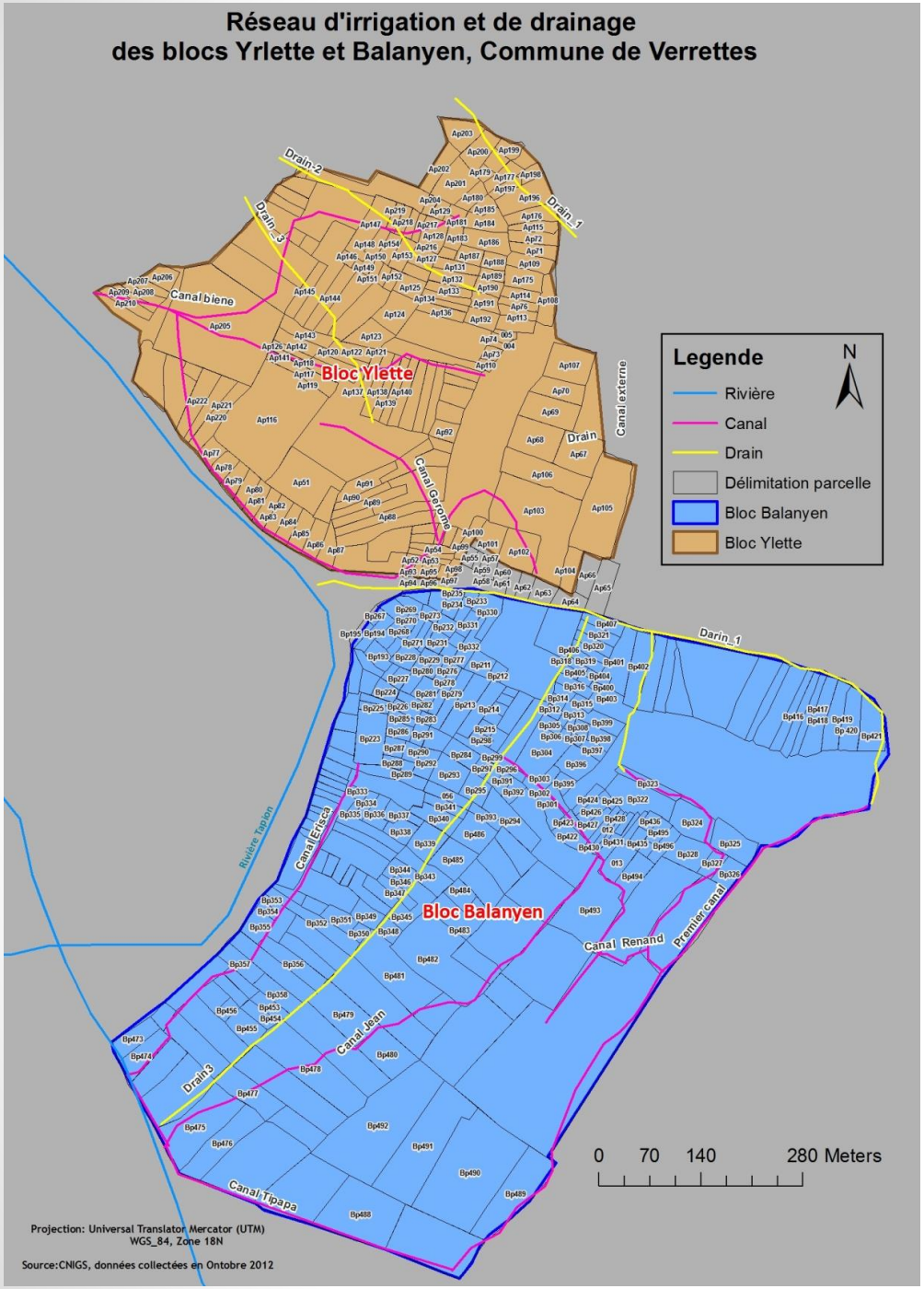
Calculation of "service credit" for 0.25 ha	SRT	SRI	SRA
seeds (TCS10) in lbs	1 sack (80 lbs)	3 lbs	18 lbs
seeds in HTG	**1,000**	**40**	**225**
soil preparation (mototiller services)	**2,000**	**2,000**	**2,000**
seedling nursery preparation	**750**	**500**	**375**
soil preparation for nursery	250		
labor: gathering and transport of seedlings	500		
line tracing ("rayonnage") required?	no	yes	yes
transplanting	**1,000**	**3,250**	**2,000**
number of times weeding required	1	2 or 3	2
labor cost per weeding	1,000	2,000	700
total cost of weeding	**1,000**	**5,000**	**1,400**
type of fertilizer	chemical	compost	chemical
number of 50-kg sacks of fertilizer used	4	3	2
cost per sack	900	300	900
fertilizer cost	**3,600**	**900**	**1,800**
cost per 0.25 ha, in HTG	***9,350***	***11,690***	***7,800***
cost per hectare, in HTG	***37,400***	***46,760***	***31,200***
cost in USD	***$860***	***$1,075***	***$717***
YIELD	**2-3 MT/ha**	**6-7 MT/ha**	**4-5 MT/ha**

SRI Rice: Economic Questions

Calculation of "service credit" for 0.25 ha	**SRT**	**SRI**	**SRA**
cost in USD	***$ 360***	***$ 1,075***	***$ 717***
YIELD	**2-3 MT/ha**	**6-7 MT/ha**	**4-5 MT/ha**
Avg Yield	2.5	6.5	4.5
Gross revenue (60% decortage' rate x 21,500	32250	83850	58050
Profit / ha	(5,150)	37,090	26,850
Profit / ha in USD	**(118.39)**	**852.64**	**617.24**

Oxfam Bloc-level SRI Program

- In an effort to relax public good/coordination problems around water control, Oxfam introduced an irrigation bloc level SRI adoption program in Haiti <<see map>>
- Also provides credit subsidy & training
- Oxfam, which has supported SRI in many countries, wants to know if this bloc level SRI approach is indeed a green, pro-poor strategy



Bloc-level Program

- Logistically feasible
- Possibly higher adoption rates
- Public goods problem
  - Leverage Oxfam's investment in irrigation infrastructure
  - Coordination among farmers over maintenance

Evaluation Strategy

- Bloc-level program creates unique challenges and opportunities
- Scale up on small geographic scale and within single irrigation association to reduce variation across blocs
- Need to match treatment and control blocs carefully due to small number of blocs
- Blocs create natural variation in treatment intensity as households vary by the amount of land in treatment: dose-response impact of SRI on key outcome variables

Treatment Bloc Selection

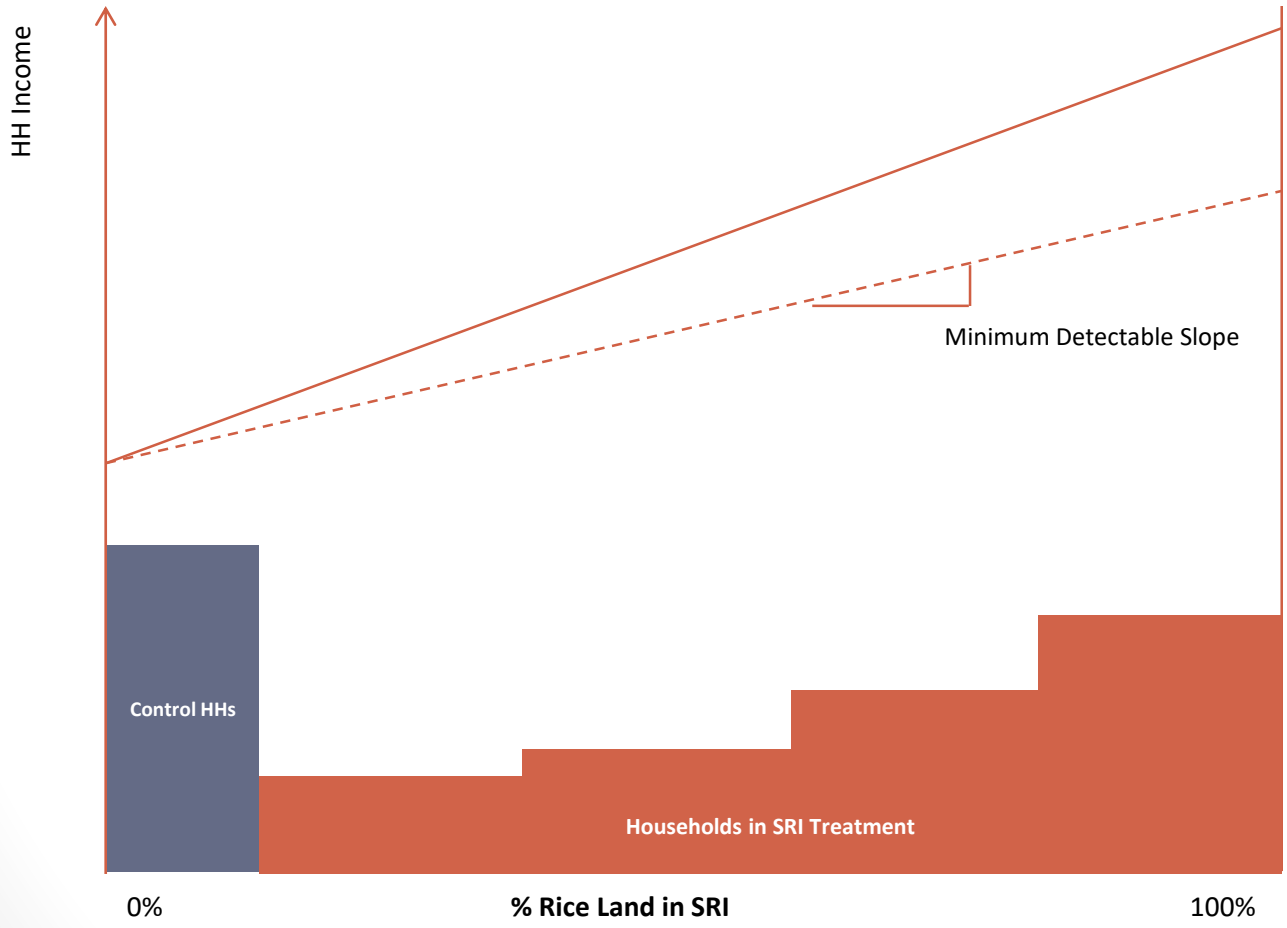
- Two primary criteria for selection
  1. Institutional context
  2. Physical characteristics
- Local irrigation association rated all blocs within small geographic zone on three physical features needed to make SRI viable
  1. Slope (average score 3.6 on a 1-10 scale)
  2. Canal quality (average score 5.7)
  3. Drain quality (average score 4.4)
- We also looked for matches on presence and participation in two farmer associations

Treatment Bloc Selection (Top Scoring Blocs)

Bloc	Pair	Canal Quality	Drain Quality	Slope
Castera *	B	8	7	7
Chandel I		6	5	7
Eroi	B?	7	5	4
Haut Zin *	A	6	5	4
Mme Mede	B?	6	5	5
Potri	A	8	7	7
Sans Limite Michel		6	5	6

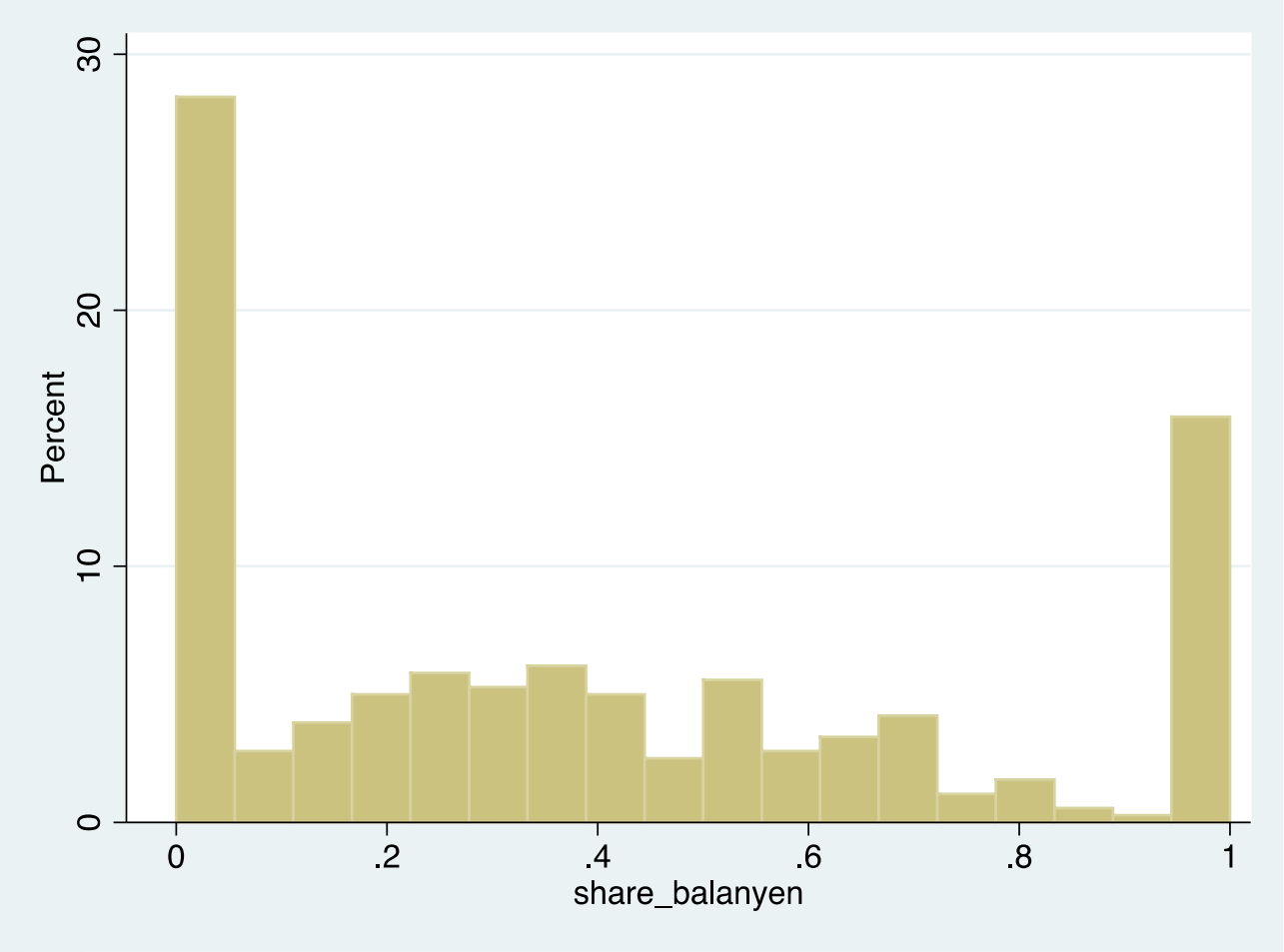
*Indicates substantial membership in MAF, the secondary farmer association;
All blocs have similar active participation rates in irrigation association (~10%)

Variable Intensity of Treatment



Variable Intensity of Treatment

Percent of land in Balanyen, households in Barr project



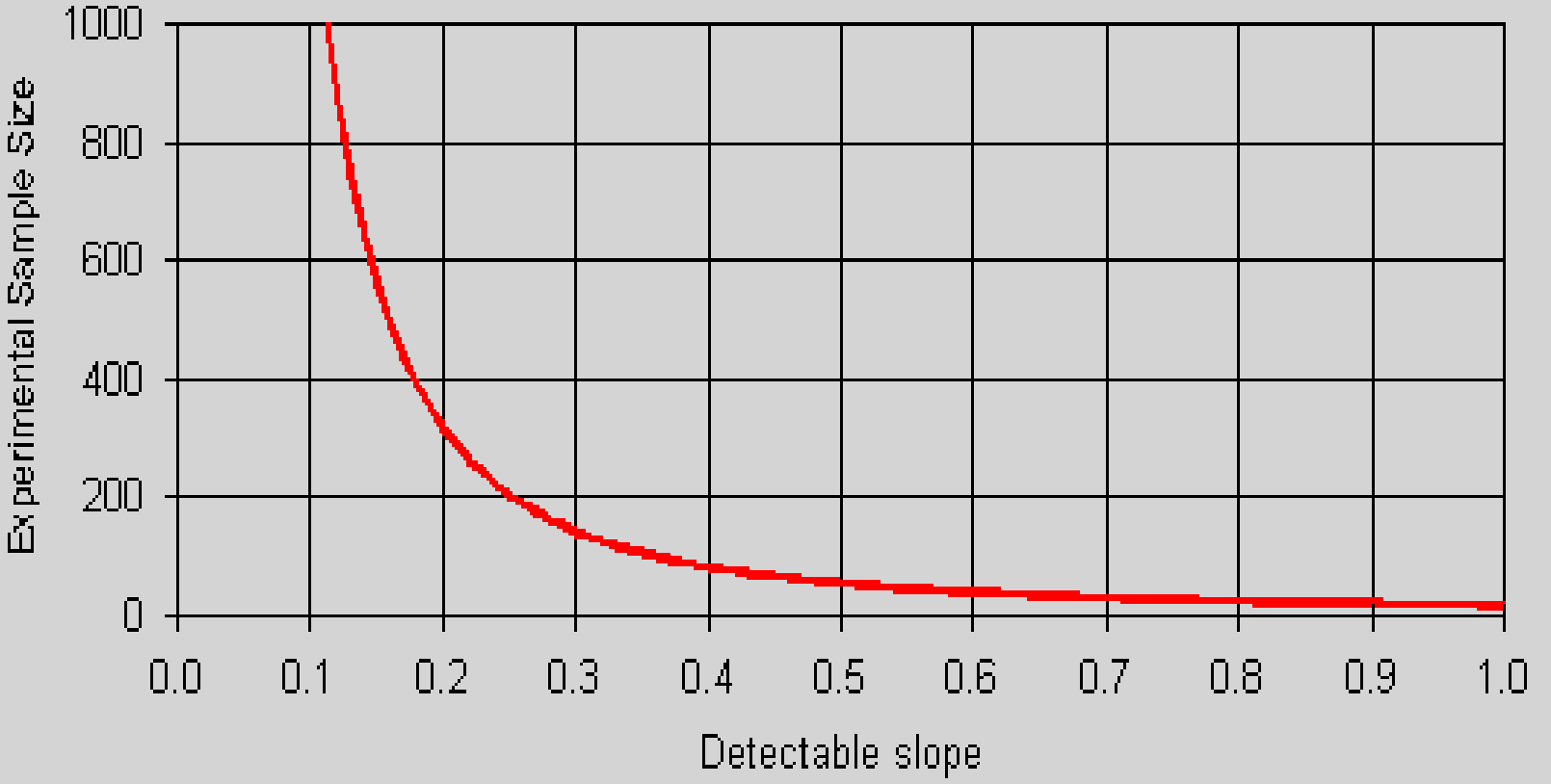
Impact Heterogeneity

- Plot position impacts adoption decisions and ultimate outcomes due to water management issues
- Two-part decision
  1. Whether to adopt SRI
  2. How much to contribute to canal and drain maintenance
- Adoption decision, success of SRI, and contribution to public good vary depending on plot position

Power Analysis

- Dose response approach tests marginal effect of increasing treatment level
  - Power calculations based on minimum detectable slope
- Need to assume exogenous variation in treatment level: proportion of land in SRI blocs uncorrelated with anything important
  - Initial data from Barr project support this, once we control for total number of parcels
- Use FAMV trial data for power calculations
- What would constitute success for this program:
  - Increased yields
  - Increased income

Power Analysis



Outcome variables and other measures

- Household Impacts
  - Yield
  - Profit
  - Household income
- Heterogeneous Impacts
  - Geography and water control affect adoption decisions and outcomes
- Adoption and public goods contributions

Fine-tuning the Intervention

- Money-back guarantee credit arrangement
  - Credit arrangement with repayment waived if average SRI yields are not sufficiently high compared with yields from traditional methods
  - Replaces last year's 50% subsidy
  - Requires precise land measurement and yield calculations
- Training changes, including farmer field visits
  - Proof of concept: reduces need for subsidy

Summary & Next Steps

- Learning from the Barr project
  - Lessons for scale-up
  - Initial evaluation of yield and profit impacts
- Continue to investigate questions about exogeneity of treatment level
- Public goods coordination questions
- Plot mapping and baseline survey