



Feed the Future Innovation Lab  
for Collaborative Research on  
Grain Legumes



#### SO4.1 Impact Assessment of Dry Grain Pulses CRSP and Legume Innovation Lab Investments in Research, Capacity Building and Technology Dissemination

##### Team members:

Mywish Maredia (Lead PI), Eric Crawford and Byron Reyes  
Department of Agricultural, Food and Resource Economics  
Michigan State University

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## What is Impact Assessment/Evaluation?

- It is the systematic acquisition and assessment of information gathered on specific questions to provide useful feedback on program relevance, efficiency, effectiveness, and impact
- It utilizes many of the same methodologies used in social science research
- Provides evidence of success (or failure)
- Deepens our understanding of how and why things work (or don't work)
- Provides strategic directions to policy makers, funders and program implementers for scaling up



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## Why a project on 'impact assessment'?

- Legume Innovation Lab is a **publicly-funded 'Research for Development' (R4D)** program and is accountable for showing results, demonstrating impacts, and assessing the cost-effectiveness of its implementation strategies
- This project (along with the broader monitoring and evaluation—M&E component) serves two strategic goals:
  - Accountability
  - Learning



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*"Where are we going?" asks the passenger as the vehicle races across the desert.*

*"I don't know," replies the driver, "but we're getting great gas mileage."*

*- Excerpt from the film "Sahara"*



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## Why a project on 'impact assessment'? (cont'd)

- Integrating the culture of 'impact assessment' and M&E in publicly funded programs helps:
  - **Address the question of 'where we are going'** with relevant data to help **make informed and evidence-based decisions**
- In doing so, it helps
  - Make the case for **continued public investments**
  - **Increase the overall effectiveness/impact** of investments in R4D



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## SO4.1 Project Objectives

1. Provide technical leadership in the design, collection and analysis of data for strategic input and impact evaluation
2. Conduct ex ante (i.e., potential) and ex post (i.e., realized) impact assessment of the Legume Innovation Lab's investments in research, institutional capacity building and technology dissemination in Africa, Latin America and the U.S.
3. Build institutional capacity and develop human resources in the area of impact assessment research



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## Approaches, Methods and Achievements to date



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## Impact Assessment/Evaluation Methodology

- Is concerned with establishing a **causal link** between realized impacts (the effect) and an intervention (the 'cause') which could be a program, technology adoption, policy change, etc.
- The goal of the analysis is to **'rule out' other possibilities / explanations** for the observed effects (internal validity)



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## The Challenge of Missing Data

- Impact evaluation (IE) is concerned with measuring the ‘effect size’ of an intervention ( $ES_Y$ ), defined as the difference in the outcome with intervention ( $Y_i^T$ ) vs. without the intervention ( $Y_i^C$ ) for the same unit of analysis  $i$  (i.e., the **counterfactual**)

$$ES_{Y_i} = Y_i^T - Y_i^C$$

- Problem: The same unit of analysis cannot simultaneously be observed ‘with’ and ‘without’ intervention
- This is the classic challenge of estimating the counterfactual – the **problem of missing data**



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## The Challenge of Missing Data (cont'd)

- Solution to the problem of missing data: Estimate the **expected average effect in a population** as:

$$E[Y^T - Y^C]$$

- The credibility with which the counterfactual  $Y^C$  is identified to estimate the expected average effect is at the heart of ‘**evaluation designs**’



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## Methodological innovations in IE to address the challenges...

- Use and promotion of rigorous **quantitative methods** for estimating counterfactuals
  - **Experimental designs or Randomized Control Trials**
  - Pipeline comparisons
  - Other methods/approaches (using econometric techniques to form credible comparison groups)
    - Propensity score matching (PSM)
    - Instrumental variables (IV)
    - Regression discontinuity (RD)
    - **Difference in differences (DiD)**



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## Impact Assessment Methodology: Randomized Control Trial (RCT)

- Based on the principle of random assignment of treatments (i.e., interventions)
- Sometimes referred to as “field experiments”
- The “gold standard” of impact evaluation
- Becoming *extremely* popular among development economists
- Difficult to set up, (relatively) easy to analyze and to defend results



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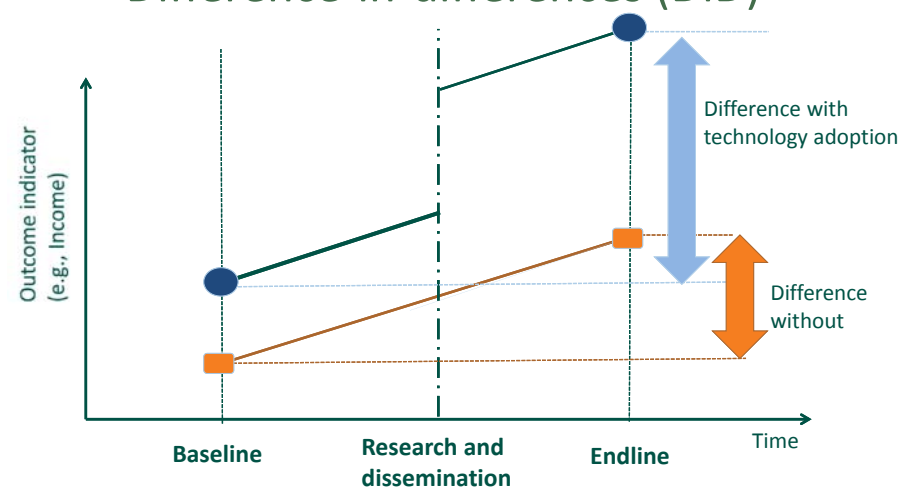
## Challenges of Randomized Designs

- Requires **ex ante** planning and integration with program implementation – full support and cooperation of program implementers
- **Costs** (data collection, monitoring and transaction costs)
- External Validity Issues: scalability and general equilibrium effects
- People act/respond differently as a result of ‘experimentation’
- Randomization can affect the way the program operates
- Lack of information on processes influencing outcomes
- Experiment can only last a certain time--limited duration bias and inability to capture longer term effects
- Ethical concerns and political sensitivities
- Compliance issue
- Spillover effects



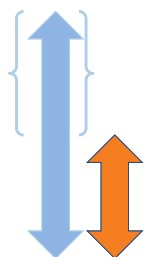
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## Impact Assessment Methodology: Difference-in-differences (DiD)



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## Impact Assessment Methodology: Difference-in-differences (DiD)



- Blue arrow is the difference for the ‘adopters’
- Red arrow is the difference for ‘non adopters’
- Brackets indicate difference between the differences, i.e., **DiD estimate of impact**
- Assumes parallel trends!



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## Method of data collection/evidence gathering

- Designing instruments
- Training enumerators
- Conducting structured interviews with human subjects (HH surveys, farm level surveys, field observations, measurements)



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## Method of data collection/evidence gathering

- Key informant interviews
- Focus group discussions

Sample size based on power calculation



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## Objective 1: Collection and analysis of data for strategic input and impact evaluation

### Approach:

- Provide technical leadership in the form of human resources and professional expertise in evaluation design, data collection (i.e., sample design, designing data collection instruments, training enumerators, data entry templates, etc.) and analysis.
- Joint activity with the relevant research team and reliance on the logistical support from the host country partners
- Resources for data collection is budgeted by the relevant research project team and/or leveraged through supplemental Legume Innovation Lab and/or other funding opportunities



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## Objective 1: Collection and analysis of data for strategic input and impact evaluation

### Achievements to date:

- Baseline assessment of the economic effects of pest problems on cowpea growing areas in Burkina Faso (potential application of DiD method of impact assessment of the Biocontrol strategy to control *Maruca* on cowpea)
- Impact evaluation to test the effectiveness and impacts of methods of extension using animation videos to disseminate information on cowpea storage pests (application of RCT)
- Case study of the bean seed multiplication and distribution system in Central America (using beneficiary survey data and key informant interviews)



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## Objective 1: Collection and analysis of data for strategic input and impact evaluation

### Tentative list of planned research over the next 3.5 years (1)

*(subject to mutual interest from relevant LIL projects and availability of resources)*

- Socio-economic baseline study on the constraints and opportunities for research to contribute to increased productivity of climbing beans in Guatemala (technical support to SO1.A1 project team)
- Study on the market potential of biopesticides in Benin: This will be a collaborative activity with the SO1.B1 project team and will serve as a baseline to assess the market potential for biopesticides



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## Objective 1: Collection and analysis of data for strategic input and impact evaluation

### Tentative list of planned research over the next 3.5 years (2)

- Baseline assessment to measure potential impact of bruchid resistant varieties in Tanzania. This will be a joint activity in collaboration with SO1.A4 team
- Baseline assessments in Uganda and Zambia in collaboration with SO1.A3 team
- Baseline assessments of the adoption of IVs by cowpea farmers in Burkina Faso in collaboration with SO1.A5 team
- Before and after surveys of farmers to be impacted by the dissemination of diagnostic and decision tools/outputs (collaboration with the SO2.1 project team in Uganda and Mozambique)



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## Objective 2: Conduct ex ante and ex post impact assessments

### Approach:

- **Assess the realized (ex post) impact** of the Legume Innovation Lab (and the predecessor CRSP program's) investment in technologies/outputs where there is evidence of adoption
- Enhance future impacts by engaging in innovative and evidence-based (**ex-ante assessment**) research that will serve as an input in making strategic research priority decisions by the Legume Innovation Lab program, and in developing strategies for technology dissemination for maximum impact



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## Objective 2: Conduct ex ante and ex post impact assessments

### Achievements to date (1):

- Developed an inventory of past documented outputs, outcomes and impacts of investments by the Bean/Cowpea and DGP CRSP:
  - [http://legumelab.msu.edu/achievements/outputs\\_outcomes\\_and\\_impacts](http://legumelab.msu.edu/achievements/outputs_outcomes_and_impacts)
- Completed two ex post impact assessment of Bean/Cowpea and Dry Grain Pulses CRSP Investments in Research, Institutional Capacity Building and Technology Dissemination efforts
  - Impact assessment of bean breeding research in Latin America (5 countries)
  - Impact assessment of cowpea breeding research in Senegal



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## Objective 2: Conduct ex ante and ex post impact assessments

### Achievements to date (2):

- Started the series on 'Impact Briefs' in 2012



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## Objective 2: Conduct ex ante and ex post impact assessments

### Tentative list of planned research over the next 3.5 years (1)

- Impact assessment of biocontrol IPM strategy in Burkina Faso using the Differences-in-difference approach
- Ex post IA of improved bean/cowpea varieties
- Assessment of factors that contribute to the success and sustainability of seed systems for grain legumes in different socio-economic and agricultural systems contexts



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## Objective 2: Conduct ex ante and ex post impact assessments

### Tentative list of planned research over the next 3.5 years (2)

- Systematic analysis of existing datasets (e.g., LSMS-IAS) in FTF and Legume Innovation Lab focus countries to develop profiles of potential research clients and beneficiaries, and to understand the constraints and potential impact of the adoption of new technologies by grain legume growers



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## Objective 3: Capacity building

### Approach:

- Field activities conducted in collaboration with HC PIs and partners
- Graduate students
- Post-Doc
- Short-term training for NARS socio-economists



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Short-term training workshop for NARS researchers held in April 2014 at CIAT in collaboration with SO4-1 project



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## In addition to the three project objectives under SO4.1...

The Lead PI also serves as an 'impact assessment expert' as part of the Management Office (MO) to:

- Guide in the program **monitoring and evaluation (M&E)**
- Help the MO in developing instruments and guidelines for **FTF Performance Indicators data collection**; and
- Work with each project team to develop and complete the '**impact pathways**' worksheet--**A tool to help build the bridge between research OUTPUTS and IMPACTS AT A SCALE**



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## Remember...



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## Uncle Sam has given each one of you (i.e., the LIL project teams) an opportunity to design your car...



## Depending on the journey ahead, you may have designed different types of cars...



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The Management Office has given you  
the keys to these cars and funds for  
fuel and maintenance...



The role of M&E and Impact  
Assessment research is to make sure...

- When someone asks the question “Where are you going?” And “How far you have driven towards the goal of your journey?” we are able to provide **relevant and accurate data / information**
- We are here to serve as a resource team to help you think about what you need to plan and **what type of data needs to be collected** and **explore rigorous methods of doing so** to be able to answer these questions



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Thank You



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