



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



FY 2017 SEMI-ANNUAL REPORT INNOVATION LAB FOR COLLABORATIVE RESEARCH ON SUSTAINABLE INTENSIFICATION



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Feed the Future Innovation Lab for Collaborative Research on Sustainable Intensification

FY 2017 Semi-Annual Report

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I. Executive Summary

Improvements were made to the reporting hub for enhancing networking, data sharing, data collection and reporting target and indicators. Updates on the reporting hub, data-management platform and use of sustainable intensification (SI) assessment framework were presented and highlighted at the annual meeting. All subawards established research programs and initiated collecting data on critical indicators. Geospatial consortium supported activities to build capacity to collect remote sensing and environmental data. Mechanization consortium completed collection of baseline data, conducted short-term trainings in all four countries, and are developing curriculum for a new degree option in agricultural mechanization in Ethiopia. The SI assessment team completed the first draft of the manual and workbook; and provided training to partners from Cambodia, Senegal, Burkina Faso, Ethiopia and Tanzania. All research subawards completed first season of data collection and results were presented at the annual meeting and data will be submitted in the final report. Significant progress was made with national partners towards knowledge sharing and networking to leverage resources and add value to ongoing research and capacity building activities. Focus was on engagement and ownership with national partners [e.g. Bangladesh Agricultural Research Council (BARC) institutions in Bangladesh; and Agence Nationale De Conseil Agrcole et Rural (ANCAR), extension program in Senegal). Short-term trainings were provided to 1518 participants; and 24 students were enrolled for long-term degree training.

II. Research Progress Summary

A. Research progress made during the reporting period

I. Management Entity Operations

- a. Reporting Hub Improvements: During this reporting period, the management entity placed significant emphasis on transforming the SIIL Reporting Hub into a more dynamic and collaborative online platform. The key modifications are listed below:
 - i. A new People feature was developed to improve the documentation of project contacts, which will enable better measurement and analysis of the social reach of the SIIL. The network of SIIL contacts is available for investigators to contribute to and leverage partnerships in research and development.
 - ii. The Reporting Hub has been adapted to allow project team members to see all other data submitted for their project. Lack of knowledge sharing *within* projects was a key concern for PIs and co-PIs in prior reporting periods, and this modification addresses the issue.
 - iii. Feed the Future Monitoring System (FTFMS) target indicator data will now be collected in the Reporting Hub. This complements the existing Reporting Hub function that collects actual indicator data.
- b. Research Uptake Study Survey: The SIIL led a USAID-initiated study to assist the Bureau for Food Security (BFS) in gaining a better understanding of how research outputs of Innovation Labs are being transferred or taken up by organizations such as the private sector, non-governmental organizations, or local governments that will facilitate adoption and use by farmers. This study is an effort to improve the measurement and communication of the impact of BFS-funded research investments.
- c. Knowledge Sharing Platform: The SIIL team actively engaged to develop a knowledge-sharing platform targeted to bring all actors working in the coastal zone of Bangladesh. These efforts will also ensure alliance with the new efforts of Bangladesh government and research institutions strategies for the coastal zone.

2. Geospatial and Farming Systems Research Consortium (GFC)

- a. International Center for Tropical Agriculture (CIAT) developed a Python tool for ArcGIS that maps the suitability of SI interventions using a Tanzania-specific spatial database with 50+ indicators covering five sustainable intensification indicator domains. An introductory training was completed.
- b. International Food Policy Research Institute (IFPRI) developed an improved database on travel time to major towns for Tanzania to perform farm-level analysis of agricultural input-use profitability using spatial price modeling. High spatial resolution (10 km² or finer) maps of crop production statistics was also developed.
- c. Stanford University developed an algorithm to merge different remote sensing satellite data with different spatial, spectral and temporal resolution to monitor crop phenology for individual fields and to compare with crop simulation results.
- d. The Rural Household Multiple Indicator Survey (RHoMIS) and analysis framework has been applied to more than 10 projects in over 15 countries, and it includes more than 7,000 farm household responses. The tools is now being disseminated for use by other researchers (<http://rhomis.net>).
- e. The consortium's members at University of California (UC) Davis made the following achievements:
 - i. The researchers purchased multiple unmanned aerial vehicle (UAV) systems and sensors for monitoring crop field experiments. They are developing best practices for UAV use with and calibration of new crops in agricultural research.
 - ii. UC Davis worked with the USAID Geocenter to access recent (February 2017) high resolution remote sensing data for Polder 30 in Bangladesh.
 - iii. UC Davis is also supporting sub-recipient organizations with the installation of weather stations for field experiment monitoring, including five in Senegal and three in Tanzania.
 - iv. Multiple crop growth simulation models have been implemented in an R-package and tested for different countries. Multiple GFC subaward recipients have been identified to use and calibrate these models using region-specific parameters.

3. Appropriate Scale Mechanization Consortium (ASMC)

- a. The ASMC has completed baseline surveys in all four of their focus countries: Burkina Faso, Bangladesh, Cambodia, and Ethiopia. The survey data is currently being analyzed, and final reports from the surveys are expected in May 2017.
- b. Equipment evaluation or prototype development has been initiated in all four project countries. These activities are based at the Appropriate Scale Mechanization Innovation Hub (ASMIH) in each country.
 - i. Bangladesh: Efforts in FY 2017 have focused on evaluating rice transplanting and harvesting equipment and techniques. Additionally, the ASMIH has conducted short-term trainings associated with both transplanting and harvesting.
 - ii. Cambodia: The ASMIH has focused on evaluating performance of existing direct seeders and broadcast seeders of rice and adapting new prototypes based on the performance evaluation findings. The new prototypes were developed in January 2017 and will soon undergo field testing.

- iii. Burkina Faso: The ASMIH in Burkina Faso conducted training for 52 farmers in March 2017 on the construction and proper use of ripper and planter equipment. A team of three undergraduate students at Michigan State University (MSU) has started collaborating with two students at the Universite Polytechnic de Bobo-Dioulasso (UPB) to develop a solar-powered irrigation system which is design phase.
- iv. Ethiopia: Development and testing of a mechanically driven maize sheller has been conducted by a Bahir Dar Institute of Technology (BiT) graduate student. Activities related to the improvement of conservation agriculture vegetable production will be initiated in Q3/Q4 of FY 2017.
- c. Five long-term trainees have begun their academic programs, including three students in Bangladesh, one in Burkina Faso, and one at the University of Illinois.
- d. The ASMC has assisted the Bahir Dar Institute of Technology in creating a curriculum for a recently developed Agricultural Mechanization Engineering graduate degree program in Ethiopia, which is currently under national review. Dr. Gajendra Singh, Chair of ASMC's science committee, leads these efforts. Similar tertiary capacity building activities are underway in Burkina Faso. A committee of four faculty members at UPB was formed in March 2017 to develop a curriculum for a new degree option entitled "Agricultural Mechanization".

4. Research Prioritization and Subawards

- a. Finalizing the sustainable intensification assessment framework
 - i. In March 2017, a draft of the SI assessment framework methods manual was completed. Prior to completion of the draft, input on the indicators was obtained from a wide range of scientists through a SI indicator meeting that took place at Michigan State University in December 2017.
 - ii. Trainings on the implementation of the SI assessment framework for Africa RISING scientists took place in East/Southern Africa (October 2016). Initial training of SILL subawardees took place at the annual meeting in January 2017. A complete comprehensive training of PI and Co-PI of SILL sub-awards in Cambodia, Senegal and Burkina Faso occurred in April.
- b. Unlocking the production potential of "polder communities" in coastal Bangladesh
 - i. In the project's first season, most farmers who opted to grow high-yielding rice varieties and were able to harvest rice early were able to establish a rabi crop (only 28% fallow), while most farmers growing the traditional long duration rice had their land fallow (70% fallow). This demonstrates the opportunity in the challenging polders to introduce a rabi crop with improved and moderately mechanized rice management.
 - ii. In polder 30, the target community for this subaward, there was significant excitement surrounding the introduction of the mechanical rice transplanter and reaper. A few farmers are interested to potentially purchasing the reaper and assume the role of service providers. The project also engaged with the private company ACI Motor Limited to introduce additional machinery to the polder.

- c. SI integration of crop and livestock production systems in the Sahelian zone of Burkina Faso
 - i. The project's baseline study of 400 households in the Dori and Ouahiguya regions was completed during this reporting period.
 - ii. Participatory on-farm testing of sustainable crop and livestock intensification innovations took place. Initial results suggest that utilization of improved crop varieties in addition to soil conservation, manure, and fertilizer application promotes the highest grain and fodder yields.
 - iii. A tradeoff analysis of productivity enhancing interventions was initiated. Preliminary results showed that for the most vulnerable group, the severely food insecure farm households, the best options are to increase sorghum productivity and to increase possibilities to generate further off farm income.
- d. Women in Agriculture Network (WAgN) Cambodia
 - i. A "Wild Garden" concept and research plan was developed in collaboration with Kasetsart University and ECHO Asia to complement large-scale SI using cover crops and small-scale SI with vegetables.
 - ii. An in-depth training was conducted on soil assessment tools and development of a robust research strategy for 2017-2018 to assess soil improvement on rain-fed paddy rice land using SI technologies and practices.
- e. Sustainably Intensified Production Systems Impact on Nutrition (SIPSIN) in Ethiopia
 - i. Field studies under the ASMC have been initiated, and Bahir Dar University has been contracted by Texas A&M University to collect data from the studies. IFPRI is also positioned to collect nutritional data in the latter half of FY 2017 through household surveys.
 - ii. The collected data will be analyzed by Texas A&M's Integrated Decision Support System (IDSS). While awaiting data from the field studies and surveys, work has been done to extend the FARMSIM analysis to include a more comprehensive nutritional component.
- f. Adoption of SI in dual-purpose millet – leguminous crops – livestock systems in Senegal
 - i. Five millet accessions were multiplied and tested in the field. The project held three field days on dual-purpose millet and invited local farmers, including women and youth, to attend. Various media outlets, including local television, radio, and newspaper, also attended the events and disseminated information about the prospect of dual-purpose millet in Senegal.
 - ii. Several graduate students have been recruited to study and work under the project. They are currently conducting research that is essential to the project, including the study of root physiological functions of dual-purpose millet and analysis of sheep feeding trials.
 - iii. A team of U.S. and Senegal socio-economists completed the household surveys for the project.
- g. Raising crop response: bidirectional learning to catalyze SI at multiple scales in Tanzania
 - i. A baseline survey of 630 farmers and maize or maize-legume fields was conducted in collaboration with CIMMYT and the Tanzania national ministry of agricultural

scientists. Socio-economic parameters and soil samples were also collected and are 90% analyzed by the project, and yield data is currently being analyzed by CIMMYT.

- ii. A baseline survey of 224 village based advisor farmers (VBAs) was completed, as well as a two-part training of the VBAs on agronomy and participatory extension methodology.
- iii. Thom Jayne (co-PI) and Sieg Snapp (PI) participated in the Tanzania 3rd Annual Agricultural Policy Conference on March 1-3, 2017. The conference served as a platform to engage Tanzania government officials and academics in conversations about the implications of agricultural policy recommendations.
- h. Center of Excellence on Sustainable Agricultural Intensification and Nutrition in Cambodia (CE SAIN)
 - i. Staff members of the CE SAIN were recruited (program manager, developmental manager, business manager, center secretary and all farm managers).
 - ii. Hosted meetings with 12 projects members funded from different Innovation Labs to discuss and establish collaboration. Also supported site visits for the Climate-Smart Agriculture Global Learning an Evidence Exchange (CSA-GLEE).
 - iii. Initiated and completed 16 lectures from scientists from multiple countries on diverse topics. A total of 255 students and scholars participated in these lecture series.

5. Crosscutting Impacts on Gender and Nutrition

- a. The ASMC has started to develop the scientific design for a time and motion study in Cambodia. An undergraduate student at the University of Illinois will conduct an image processing study of videos of women vegetable farmers working in the field. This will aid in better adaptation of tools to female farmers' needs in conservation agriculture systems.
- b. The WAgN subaward in Cambodia has initiated a series of gender-sensitive trainings on SI. In March 2017, a training was conducted to introduce women smallholder farmers to IPM principles and practices, including vegetable grafting. Twenty-seven M.S. students also received a one-day training on SI and gender.
- c. In March 2017, a training on millet flour enrichment for the improvement of maternal and child nutrition in Koussnar, Senegal was led by SIIIL collaborators. Twenty-three of the 38 participants were women (about 61%), and similar trainings are planned for other project sites in Senegal.

B. Issues or concerns encountered during the reporting period

- 1. A primary issue that arose during the current reporting period was the provision of new ADS 252 implementation guidance in February 2017. This guidance has significantly changed SIIIL protocols for the attainment of visas for Exchange Visitors, and it may, in some cases, delay the arrival of foreign students and scholars to their U.S. host institutions.
- 2. Common platform and guidance on the data management, data upload, data curation, and open data policy was discussed at the annual meeting. All partners agreed in principle, however, were seeking more guidance on the place, methods and process of data curation. These issues are being considered and will be finalized this year.

III. Human and Institutional Capacity Development

A. Short-term training

Country of Training	Brief Purpose of Training	Who was Trained	Number Trained		
			M	F	Total
Bangladesh	Hermetic storage and a community seed bank model	Producers	66	41	107
Bangladesh	Nutrition awareness	Producers	0	187	187
Bangladesh	Mechanical harvester: use of reaper for harvesting rice	Producers, civil society	84	66	150
Bangladesh	Power tiller operated seeder for sowing seeds of rabi crops	Producers	15	6	21
Bangladesh	ASM training on harvesting machines	Private sector, civil society	4	0	4
Bangladesh	ASM demonstration of reaper and mini-combine harvester	Producers, government, private sector	24	2	26
Bangladesh	ASM training and demonstration of seedling care techniques in Dumuria	Producers, civil society	7	2	9
Bangladesh	ASM training and demonstration of seedling care techniques in Barishal	Producers, private sector	9	2	11
Bangladesh	Training on conservation agriculture machinery for mungbean planting	Producers, government	12	7	19
Burkina Faso	Training on reduction of postharvest losses in maize	Producers, government, civil society	16	4	20
Burkina Faso	Workshop and training of students and local artisans on rippers and planters	Producers, private sector, civil society	20	18	38
Burkina Faso	Workshop and training session on conservation cropping systems	Producers, government, private sector, civil society	5	9	14
Burkina Faso	Farmers' Field School	Producers, government, civil society	16	4	20
Burkina Faso	Training workshop on Farming Systems Analysis	Government, civil society	8	8	16
Cambodia	Concepts of Sustainable Agricultural Intensification and Gender	Civil society	13	7	20
Cambodia	Promotion of neglected and underutilized perennial vegetables for improved nutrition	Producers, private sector, civil society	9	8	17
Cambodia	Use of green manure cover crops and relay crops to diversity rainfed rice and upland cassava production	Producers, government, private sector, civil society	33	15	48
Cambodia	Vegetable Grafting: An Important IPM Tool for Cambodia	Producers, government, civil society	10	6	16
Cambodia	Machinery demonstration at Kbal Po Agricultural Engineering Center	Producers, government, private sector, civil society	9	8	17
Cambodia	Mechanization in conservation agriculture training	Government, private sector, civil society	32	7	39

Cambodia	Vegetable grafting for rainy season tomato production	Producers, civil society	11	10	21
Cambodia	Employing SI technologies to improve small farm profitability	Producers, civil society	29	26	55
Ethiopia	Farmers' postharvest loss training	Producers, government	136	21	157
Malawi	Training of Africa RISING scientists on the use of SI indicators	Civil society	12	4	16
Senegal	Effective silage making training	Civil society	19	6	25
Senegal	Millet flour enrichment training	Producers, government, civil society	15	23	38
Senegal	Millet variety field day	Producers, government, civil society	115	70	185
Tanzania	Village based advisor farmer training on participatory extension methodologies	Producers, government, civil society	154	68	222
Total			883	635	1518

B. Long-term training

Name (first, last)	Sex	University	Degree	Major	Program End Date (month/year)	Degree Granted (Y/N)	Home Country
Ayesha Sarker	F	University of Illinois	Ph.D.	Agricultural and Biological Engineering	September 2019	N	Bangladesh
Katian Napon	F	University of Ouagadougou	Ph.D.	Gender and Nutrition	September 2019	N	Burkina Faso
Ngang Channaty	F	University of Battambang	M.S.	Sustainable Agriculture	December 2018	N	Cambodia
Ry Saren	M	University of Battambang	B.S.	Agriculture	November 2020	N	Cambodia
Rechaney Sel	F	University of Philippines Los Banos	M.S.	Conservation Agriculture and Gender	December 2018	N	Cambodia
Sujat Ahmed	M	Sher-e-Bangla Agricultural University	M.S.	Agronomy	December 2017	N	Bangladesh
Nasiba Aktar	F	Bangladesh Agricultural University	Ph.D.	Gender Research	February 2019	N	Bangladesh
Monoj Biswas	M	Khulna University	M.S.	Agricultural Economics	June 2017	N	Bangladesh
Umme Habiba	F	Bangladesh Agricultural University	M.S.	Socio-economics	February 2018	N	Bangladesh

Shakhawat Hossain	M	Sher-e-Bangla Agricultural University	M.S.	Agronomy	August 2017	N	Bangladesh
Deb Nath	M	Bangladesh Agricultural University	Ph.D.	Water Governance	February 2019	N	Bangladesh
Mohammed Rokonuzzaman	M	Bangladesh Agricultural University	Ph.D.	Agriculture Extension	February 2019	N	Bangladesh
Puja Roy	F	Khulna University	M.S.	Agricultural Economics	December 2017	N	Bangladesh
Priyanka Saha	F	Khulna University	M.S.	Agriculture Economics	December 2017	N	Bangladesh
Awa Faye	F	Cheikh Anta Diop University	Ph.D.	Agronomy	March 2019	N	Senegal
Tala Lo	M	University of Thies	M.S.	Ruminant Nutrition	April 2017	Y	Senegal
Marie-Therese Mofini	F	University of Thies-ENSA	Ph.D.	Agronomy	September 2019	N	Central African Republic
Fatou Tine	F	University of Thies	Ph.D.	Agronomy	September 2019	N	Senegal
Said Hamad	M	Sokoine University of Agriculture	Ph.D.	Soil Science	December 2020	N	Tanzania
Ali Nord	F	Michigan State University	Ph.D.	Agroecology	December 2019	N	United States
Md. Kamrul Hasan	M	Bangladesh Agricultural University	Ph.D.	Agricultural Engineering	September 2019	N	Bangladesh
Md. Abdul Motalib	M	Bangladesh Agricultural University	Ph.D.	Agricultural Engineering	September 2019	N	Bangladesh
Surajit Sarkar	M	Bangladesh Agricultural University	Ph.D.	Agricultural Engineering	September 2019	N	Bangladesh
Boureima Sayaogo	M	Polytechnic University of Bobo-Dioulasso	M.S.	Agricultural Engineering	July 2017	N	Burkina Faso

IV. Future Work

- A. The SI Assessment Framework Manuals (workbook and methods) will be completed.
- B. Guidelines for common platform and data uploading (curation) will be finalized.
- C. Knowledge sharing platform for coastal zone in Bangladesh will be formalized with BARC.
- D. The next steps on the phase II of uptake study will be pursued with USAID.