



FEED THE FUTURE

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

INNOVATION LAB FOR LEGUME SYSTEMS RESEARCH



Leveraging Technology for Effective Systematic Change

GLOBAL CONVENING REPORT

February 19-21, 2020 Saly, Senegal



USAID
FROM THE AMERICAN PEOPLE

MICHIGAN STATE
UNIVERSITY

Overview

5

Introduction

8

Convening Overview

31

Conclusions and Next Steps

35

Appendix



From the Director

UPDATE: Since this document was first prepared our world has been gripped by the COVID-19 pandemic. The Legume Systems Innovation Lab's first concern is, and always will be, the health and safety of all individuals. Although the full effects of the coronavirus are still yet to be seen, it is apparent that we will all be adopting a new "normal" as we learn to work and live in a post-COVID-19 world. We recognize that plans will change and that the ideas and strategies outlined in the following pages may need to be refined or completely reassessed as we move forward. Stay safe and healthy.

Greetings from the Feed the Future Innovation Lab for Legume Systems Research. Since the inception of the Legume Systems Innovation Lab we have been actively working to identify and support legume systems research that will have a lasting impact. In February 2020, we invited over 50 legume stakeholders to Saly, Senegal to share their expertise and engage in a conversation on how to contribute to the global strategy for identifying the best technologies for legume system scaling and impact.

The Legume Systems Innovation Lab goals are ambitious but timely. They include: inclusive and sustainable agriculture-led economic growth; strengthened resilience among people and systems; and a well-nourished population, especially among women & young children. In addition, the Legume Systems Innovation Lab will focus on opportunities that ensure greater resilience of people and systems under stress and shocks; identify gender issues including the unique needs of women and youth; and the development of human and institutional capacity for a resilient agricultural innovation system. This report further details the outputs of the Convening and serves as an outline for action.



Dr. Barry Pittendrigh, Director

Legume Systems Innovation Lab Overview

The Feed the Future Innovation Lab for Legume Systems Research is a five-year research capacity building development program managed by Michigan State University that focuses on grain legumes in West and Southern Africa. Legumes are a nutrient-dense staple crop that have multifunctional roles in smallholder farm systems in developing countries including food and nutrition security, generating income, providing livestock feed and fodder, and contributing to the sustainability of soil systems through their nitrogen-fixing capabilities. Cowpea and common bean are the focal crops of the Legume Systems Innovation Lab.

The strength of the Legume Systems Innovation Lab's design lies in its innovative and vibrant research to scaling strategy using a systems approach. Supported projects are diverse in research focus and address both the development and placement of innovative technologies with a thorough understanding of the system they will impact thus leading to successful adoption. Projects are focused on three areas of inquiry (AOI)

- AOI-1 Integration of legumes into sustainable smallholder farming systems and agricultural landscapes
- AOI-2 Integration of legumes within local and regional market systems, including trade
- AOI-3 Analysis of motivators or barriers to legume utilization within social and economic systems

The Legume Systems Innovation Lab is funded by USAID under the Feed the Future initiative.

Opening Remarks

Comments from selected Opening Session guest speakers

Developing Research Capacity & Strengthening links

"The development of research capacity has been an important component in these various research projects [and] has resulted in the training of researchers and technicians, and the provision of agricultural, laboratory, irrigation, greenhouse and rolling stock equipment. There no doubt for us that the ... "Legume System Innovation Lab" will strengthen the links already established between the different participants (American Universities, NARS, international systems) and ISRA."



Dr. El Hadji Traore
Scientific Director, ISRA



Scaling Technologies that Work

"Scaling up technology and innovation is a major issue in most research institutions, oftentimes because of the weak link between research and users....What makes scaling work? ... We need technologies that work..."

Dr. Abdou Tenkouano
Executive Director, CORAF

Opportunities for Collaboration

“Your research is a great contribution [to] the work we are doing because we have special concerns about [using] innovation, science and technology to bridge the gap ... to increase productivity, increase access to nutrition and the concept of nutritious food.

We see possibilities for collaboration, not just in Senegal but for West Africa and all of the missions... to scale up innovations we put in the hands of development workers.”



Mr. Abdoulaye Dia
Agriculture Specialist at the
Economic Growth Office,
USAID Senegal



**Dr. Professeur Ramtoulaye
Diagne Mbengue**
Recteur, l'Université de Thiès

Laying Foundations for Sustainable Approaches to Research

“The University of Thiès, which is a young university, is in a process of increasing momentum. The diversification of its training [offerings] and the strengthening and enlargement of its research teams are important strategic axes. The Feed the Future Innovation Lab for Legume Systems Research program, especially survey area 2, related to "Integration of legumes into local/regional market systems, including trade", ... comes at the right time to lay the foundations for an effective and sustainable approach to the issue of legume systems research. ”

Convening Overview

Program Objectives

Day I - Program Objectives

The Legume Systems Innovation Lab's Director Dr. Barry Pittendrigh shared the overall vision of the Lab and invited participants to consider how the Lab's vision applied to their own work and the projects the Lab supports. Participants were asked to provide feedback about what lab success would look like from their perspective and what an ideal experience collaborating with the Lab would look like. Several key themes emerged:

-  Networking & collaboration: success looks like integration across stakeholders; communication and collaboration at multiple levels (across past and present projects, partner institutions and state networks); and partnerships for scaling
-  Measurable impact: success looks like successful communication around lessons learned; the Lab's work is well represented and showcased at conferences, through publications, seminars, etc.; and the Lab contributes to improved productivity, leading to workforce development
-  Capacity building: success looks like program content being adapted to national team contexts and their capacity, building on what already exists; long and short-term training/capacity building is available to members

Visioning Activity

AOI I - integration of legumes into sustainable smallholder farming systems and agricultural landscapes

Business as Usual

- Traditional extension approaches, low use of improved varieties
- Low production / Little coverage by legumes compared to cereals,
- small margin to produce improved seed, poor quality grower seed, smallholder farmers will not buy seed
- Indiscriminate use of pesticides

Intermediary Strategies

- Farmers using improved seed systems growing new legume varieties 5-10 years old
- Self-regulating ecosystems that use biocontrol agents for pest control

Future State

- Strong public/private seed industry with with farmer access to high quality seed. Multiple resistant varieties based on end user demand
- Sustainable biological production, pest suppression by biocontrol

AOI 2 - Integration of legumes within local and regional market systems including trade

Business as Usual

- Low access to quality seeds, research not oriented to markets
- Limited value added products
- Poorly integrated markets with low market participation, low access to market by farmers
- Information asymmetry, lack of and/or transparency of and access to prices

Intermediary Strategies

- Improved market varieties that respond to consumer preference
- Better information systems and information flows in legume systems

Future State

- Improved varieties and yield for better nutrition
- Information for farmers and consumers
- Better integrated value chain (locally and regionally)
- Better financing and entrepreneurship

AOI 3 - Analysis of motivators or barriers to legume utilization within social and economic systems

Business As Usual

- Input subsidies on starchy staples vs legumes
- Consumers unconscious of new opportunities
- Low private sector involvement in seed production, mostly researchers in some countries
- Minimal technology adoption

Intermediary Strategies

- Cowpea producers including women and youth are empowered to meet consumer demand and contributing to resilient livelihoods
- Legume systems are integrated (policy, production, research)

Future State

- Improved processing & value chain addition
- Adapted to climate change
- Malnutrition is drastically reduced
- Legume systems are integrated (policy, production, research)

Gallery Walk

Day I - Gallery Walk

Taking part in an interactive gallery walk, participants were able to learn more about the six projects the Lab currently supports and gain a greater understanding of the Lab's overall vision for change and primary objectives. As a result, participants were able to identify potential synergies between projects and highlight important areas where additional research support could be provided by the lab.

Key Insights

- ❖ System-level synergies: We need a systematic approach to assessing tradeoffs and synergies of the components at the lab level. This includes agro-pastoral systems, crop-livestock tradeoffs, legume systems product diversification (links to livestock feed and fodder industry), agronomy, sustainability of production / legume cropping, technology driven reach / dissemination, post-harvest losses, soil nutrient management, legume processing
- ❖ Gender: Gender requires a clear strategy for vulnerable groups, women and youth
- ❖ Partners: Roles of partners should be more indicative
- ❖ Enabling environment: considering the policy environment to ensure there is uptake of innovations and project outputs, including:
 - Input subsidies (distortions)
 - Information systems digitized (support)
 - Impact assessments

Introduction to Research Technology Adoption

Day 2 – Research & Technology Adoption

Participants were given an overview of two research case studies as well as research outputs and phases per USAID guidelines

- Tanzania Case Study: S34D showcased a niche market business model designed by PABRA which uses a point of sale mobile application and processes for upgrading varieties.
- Guatemala Case Study: North Dakota State University tested release varieties in two locations within the country
- Research Rack Up: Reviewed programming phases, outputs, tools and resources available to teams (ASAM scoring, ASAT Technology Requirements). Further information can be found here:
 - <https://www.agrilinks.org/post/guide-agricultural-scalability-assessment-tool>



Resilience

Gender

Nutrition

Youth

**Capacity
Development**

Project teams discussed elements of five cross-cutting themes (resilience, gender, nutrition, youth, and capacity development) to identify outcomes, strategies, interventions, and practices that could be incorporated into projects.

Project Considerations on Cross-Cutting Issues

How Input Subsidy Policies Change the Legume Farming Landscape in West Africa

- **Gender:** Fertilizer project will look at intra household effects on women, market production, revenues
- **Nutrition:** Measure effects of fertilizer subsidy on dietary intake of family, women of reproductive age

Optimized Shrub System (OSS): An Innovation for Improving Cowpea Yields and Strengthening Smallholder Resilience in Senegal

- **Nutrition:** Testing cultivars, and how shrubs impact nutrition of cowpea
- **Youth:** Establishing nurseries, planting seedlings

Science-Driven and Farmer-Oriented Insect Pest Management for Cowpea and Agro-Ecosystems in West Africa

- **Gender:** Gender integration - targeting 50% women (through community based unit, PhDs)
- **Youth:** Involve youth in collection of grains

Project Considerations on Cross-Cutting Issues (Cont.)

Development of Market-Driven Improved Cowpea Varieties for West Africa using Mature-Markers

- **Youth:** Measurements to qualify youth interests e.g. in market selection for cowpea breeding

Quantifying the Scale and Scope of Nutritious Cowpea Produces in Local Markets in West Africa

- **Nutrition:** Working with nutritionists to identify which products are more nutritious than others

Promoting Trade Integration in Regional Legume Markets with Mobile Technology

- **Nutrition:** Project does not address nutrition-related outcomes directly but may need to identify pathways and closest proximate actors



Project Considerations on HICD

In groups, project teams discussed elements of Human Institutional and Capacity Development (HICD) and identified planned activities, training needs, and measurement tools and processes.

How Input Subsidy Policies Change the Legume Farming Landscape in West Africa

- **Human:** Training of MS and PhD students
- **Institutional:** Ministry of Agriculture (Mali), Ministry of Higher Education / University system in Burkina Faso
- **Systemic:** Comité Nationale de Recherche Agricole (Mali), Centre Nationale de la Recherche Scientifique et Technologie (Burkina Faso)

Optimized Shrub System (OSS): An Innovation for Improving Cowpea Yields and Strengthening Smallholder Resilience in Senegal

- **Human:** Setting up a WhatsApp group for farmers
- **Organizational:** Farmers, extension systems
- **Institutional:** NARS: training for extension researchers in giving evidence

Science-Driven and Farmer-Oriented Insect Pest Management for Cowpea and Agro-Ecosystems in West Africa

- **Human:** Capacity development in modeling to train institutes that train young scientists

Project Considerations on HICD (Cont.)

Development of Market-Driven Improved Cowpea Varieties for West Africa using Mature-Markers

- **Human:** Capacity to perform breeding, training PHD students and other institutions

Quantifying the Scale and Scope of Nutritious Cowpea Produces in Local Markets in West Africa

- **Organizational:** Organizational: Universities of Thies, University of Bamako - entry point for collaboration with MSU

Promoting Trade Integration in Regional Legume Markets with Mobile Technology

- **Human:** Graduate training at MSU, and incentives, measure this through pre- and post- assessments
- **Organizational:** Host country institutions, farm associations, looking for opportunity for private sector collaborations
- **Institutional:** Mentoring opportunities for research enumerators, and technology adopters



Strategic Planning

Day 3 – Strategic Planning

Participants revisited the intermediary strategies identified during the visioning session on Day 1 to synthesize and develop 6 strategic statements. These strategies were prioritized as proposed focus areas for the lab in the next 3-5 years. Additionally, a new Lab priority was identified through a presentation on The Bean Atlas given by Dr. Robin Buruchara, the Director of the Pan-Africa Bean Research Alliance (PABRA), an alliance of 31 agricultural research systems. Dr. Buruchara gave an overview of the revised Bean Atlas which covers 176 bean production areas, 85 spatial maps, 9 chapters and themes. Highlights of the Atlas include bean corridors, grain market classes, current and future bean suitability maps given climate change effects, constraints e.g. deficiencies in soil nitrogen etc. Further information on The Bean Atlas can be found here: <http://www.pabra-africa.org/the-bean-atlas/>

Participants also identified critical challenge areas to contend with should their proposed strategies be adopted. They included:

- Post-project sustainability: Difficulties getting project partners to adopt policies/practices after project completion
- Climate challenges (Drought, inability to distinguish between effects)
- Markets: low market prices affecting commercialization resulting in a need for new cowpea products
- Capacity building of scientists (creating legume specialists, topical areas, strengths vs weakness)
- Scaling: Companies for upscaling, sharing technologies, best practices for tech transfer, partnerships with private sector
- Collaboration: Communities of practice, connection, working with partners institutions
- Outputs: Clear tangible outputs, activity plans, integration of results of cross-disciplinary research, ownership tracking

Day 3 - Strategic Planning

Proposed Strategy I (AOI I)*

We aim to improve **sustainable intensification of cerealllegume farming systems** by improving

- *Soil fertility*
- *Agronomy*
- *Crop-livestock integration*
- *Pest management*

This will be achieved through **activities** in

- *Agroforestry: utilizing cultivars, screening and pilot testing*
- *Biologicals: community-based production of biopesticides and releases of biocontrol agents*
- *Dual purpose cowpea: feeding trials, evaluating quality of cowpeas*

This strategy would address **gaps** in:

- *Improved linkages between different cross-cutting themes under consideration by individual projects*
- *Entrepreneurship opportunities for youth organizations*
- *Gender consideration as impacted by our innovations*
- *Innovation fair/demonstration farms for technology transfer*

*These proposed strategies were developed by convening participants and do not necessarily reflect the strategies of the Legume Lab Management Entity or Technical Management Advisory Committee (TMAC)

Proposed Strategy 2 (AOI 2)*

We aim to improve **information systems for legume value chains** by:

- *Providing more information to actors in the value chain*
- *Linking the actors to the source of information*

This will be achieved through **activities** by:

- *Developing tailored information products for stakeholders*
- *Delivering information through ICT*
- *Enhancing market information systems*
- *Enhancing capacity for the use of information delivery methods*

This strategy would address **gaps** in:

- *Driving good policy actions*
- *Strong networking infrastructure*
- *Youth and gender participation in the value chains*
- *Coordination between actors and the value chain*
- *Economic value for farmers & others in the value chain*
- *Language barriers intra & inter-regional trade*

*These proposed strategies were developed by convening participants and do not necessarily reflect the strategies of the Legume Lab Management Entity or Technical Management Advisory Committee (TMAC)

Proposed Strategy 3 (AOI 2)*

We aim to **improve market varieties** by

- *International germplasm sharing*
- *Improving market knowledge*
- *Reducing trade barriers*

This will be achieved through **activities** such as

- *Expanding breeding program data exchanges*
- *Reducing import transaction time/cost*
- *Surveys of production / farmers/ local markets*
- *Survey consumer preferences (cooking time & taste)*
- *Providing content/composition of nutrition information*
- *Providing timely consumer information for products and traders*
- *Improve seed quality and information*
- *Create regional information platform for supply and demand*
- *Reduce barriers in policy and practice*

This strategy would address **gaps** in:

- *Knowledge gaps in varieties*
- *Quality seed*
- *Supply and demand*
- *Publicly available consumer/product data*
- *Consumer awareness of varieties' nutritional value*
- *Access to credit*

Proposed Strategy 4 (AOI 3)*

We aim to **improve empower legume cowpea producers, including women and youth, in order to meet consumer demand and contribute to resilient livelihoods**. We will do this by:

- *Raising productivity and promoting inclusive commercialization*
- *Promoting infrastructure investments including digitization of legume information systems*
- *Encouraging an enabling policy environment for legume systems throughout the value chain*

This will be achieved through **activities** such as:

- *Design and disseminate a public awareness campaign on nutritional benefits of cowpea*
- *Identify consumer-preferred nutritious legume varieties to achieve our goals*
- *Identify inclusive market opportunities for nutrient rice legume products*
- *Implement farming systems that double production and regenerates land*
- *Identify value chain stakeholders*
- *Monitor country-level policy documents for emphasis on legume value chain.*

This strategy would address **gaps** in:

- *Demand and supply constraints*
- *Promote production sustainability*
- *Public awareness on importance of the legume sector, including government and civil society*

*These proposed strategies were developed by convening participants and do not necessarily reflect the strategies of the Legume Lab Management Entity or Technical Management Advisory Committee (TMAC)

Proposed Strategy 5 (AOI 2)*

We aim to **develop and deliver improved bean and cowpea varieties** by

- *Developing breeding pipelines*
- *Increasing the scale of farmer adoption by 50%*

This will be achieved through **activities** in:

- *Optimization of breeding pipelines*
- *Improving seed systems*

This strategy would address **gaps** in:

- *HICD*
- *On-farm yield productivity and resilience with the prospect of climate*

*These proposed strategies were developed by convening participants and do not necessarily reflect the strategies of the Legume Lab Management Entity or Technical Management Advisory Committee (TMAC)

Proposed Strategy 6 (AOI 3)*

We aim to improve the **integration of legume systems stakeholders** in policy, production, research, etc. by

- *Encouraging government to create policies and facilitate the development of legume products*
- *Promoting public private partnerships and the break of silos between institutions (NARS, extension)*
- *Facilitating strong communication between subsystems and components*

This will be achieved through **activities** such as

- *The development of an observatory to capture and share information (e.g. through dashboards), taking into consideration the needs of illiterate target groups*
- *Community engaged scholarship – training of trainers*
- *Product research, development and diversification*

The strategy will address **gaps** in...

- *Connectivity/Communication*
- *Knowledge in policy, production, and research*
- *Resources*
- *Engagement of key actors*

Conclusions & Next Steps

Summary of Convening Conclusions

- There is a strong desire among funded and commissioned projects for joint learning and greater joint impact.
- Although time is limited, there should be a continued focus on the development, testing, and the identification of pathways for uptake of new varieties that respond to producer and consumer needs as a core activity of the lab.
- Improving the flow of information throughout the bean and cowpea value chains is essential for improved efficiency and effectiveness.
- The lab should support the move away from indiscriminate use of pesticides to judicious use including alternatives such as biocontrol agents.
- The goal (direct or indirect) of all lab activities should be to improve food security and nutrition through legumes and support for legume systems and to make legumes part of a nutritional response to food security.
- There must be a continued focus on policies that support the growth of the legume sector and facilitate regional legume trade integration.
- All research activities should seek to be aligned with resilience frameworks of USAID Missions, where applicable, and all cross-cutting issues (should be addressed in support of resilience).

Action Items for Strategy Implementation (2020)

- Review of awarded projects* by Resilience Resource Team
- Circulation and approval of strategy whitepaper summarizing Global Convening to the TMAC, Pls, Project Participants, and Convening Participants
- Publication of Strategy Statement as output of Global Convening
- Proposals from projects for Resilience Awards* due through PieStar portal
- First round of Resilience Awards* to existing projects
- First round of Collaborative Awards* and Commissioned Activities*
- Resilience Resource Team web page public launch
- FY2021 Annual Plans Due from projects
- Lab publishes FY2021 Annual Plan outlining implementation of strategy
- Proposals for Resilience Awards* due through PieStar portal
- Second round of Resilience Awards* to existing projects
- Second round of Collaborative Awards* and Commissioned Activities*



FEED FUTURE
LEVERAGING TECHNOLOGY FOR EFFECTIVE SYSTEMATIC CHANGE

INNOVATION LAB FOR LEGUME SYSTEMS RESEARCH
Leveraging Technology for Effective Systematic Change
GLOBAL CONVENING

February 19-21, 2020
Saly, Senegal

USAID ISRA MICHIGAN STATE UNIVERSITY

Acknowledgments

The Feed the Future Innovation Lab for Legume Systems Research would like to extend appreciation to the numerous partners, institutions and people who made this event a success. These include the U.S. Agency for International Development (USAID) - DC, USAID Senegal Mission, Institut Sénégalais de Recherches Agricoles (ISRA), Michigan State University (MSU), CORAF, The University of Thiès, PABRA, and Supporting Seed Systems for Development (S34D). This event would not have been possible with the support of our Technical Management Advisory Committee (TMAC). We are grateful for the Lab research teams who committed their time and energy not only to this Convening but also to their project work. As a result of your commitment, we have an exciting future ahead of us!

This work was funded in whole (or part) by the United States Agency for International Development (USAID) Bureau for Food Security under Agreement #7200AA18LE00003 as part of Feed the Future Innovation Lab for Legume Systems Research. Any opinions, findings, conclusions, or recommendations expressed here are those of the authors alone.

This report includes personal opinions, findings, conclusions, or recommendations from attendees of the Global Convening that are personal and do not necessarily represent the views or opinions of The Feed the Future Innovation Lab for Legume Systems Research, Michigan State University or USAID.

Appendix



Leveraging Technology for Effective Systems Change:
Full Convening Agenda

Convening Agenda: Day I

Opening Statements

The convening will commence with opening remarks from Dr. Alioune Fall, Director General of ISRA

- Dr. Professeur Ramtoulaye Diagne Mbengue – Recteur, l'Université de Thiès
- Dr. Abdou Tenkouano – Executive Director, CORA
- Dr. Barry Pittendrigh – Director, Feed the Future Innovation Lab for Legume Systems Innovation Lab
- Dr. Ndiaga Cisse – West Africa Coordinator, Feed the Future Innovation Lab for Legume Systems Research
- Mr. Abdoulaye Dia – Agriculture Specialist at the Economic Growth Office, USAID Senegal
- Dr. Douglas Buhler – AgBioResearch Director and Assistant Vice President of Research, College of Agriculture and Natural Resources, Michigan State University

Agenda Overview

Program Objectives

Legumes Systems Innovation Lab (LSIL) Director Dr. Barry Pittendrigh will introduce the global program objectives, after which research teams and partners will be invited to share their expectations from the program.

Vision Setting Activity

Participants will be guided through an exercise to visualize a shared vision for the program and begin identifying strategies to achieve it.

Gallery Walk

Participants will visit each project poster to assess alignment with the global strategy and identify synergies and gaps for the broader vision of the Lab.

Project Team Work Sessions



Convening Agenda: Day 2

Introduction to Technology Adoption

Dr. Barry Pittendrigh and Dr. Nikaj van Wees will provide participants with an overview of technology adoption approaches, tools, and cross-cutting issues.

Research Rack Up

Dr. Jane Payumo and Dr. Phil McClean will discuss working with USAID before presenting a Case Study illustrating how to determine when a technology is ready for scale.

Introduction to Technology Adoption (Cont'd)

Participants will be introduced to cross-cutting issues before joining their project groups to a) discuss the role of technology and how it can be leveraged to impact international systems.

Systems Change Theory

Dr. John Medendorp and Dr. Robin Buruchara will introduce participants to concepts on Human and Institutional Capacity Development (HICD) and Resilience. Participants will then discuss with their project groups how the areas presented impact their projects.

Group Presentations

Groups will present the conclusions of their discussions in a plenary session.

Administrative Procedures Overview

Project teams will be introduced to various administrative requirements while a concurrent session with other stakeholders is held by Dr. Pittendrigh.

Administrative Procedures Overview (Cont.)

Participants will be introduced to various administrative requirements.

Project Team Work Sessions

Project teams meet and discuss new questions/considerations arising from the day's activities.



Convening Agenda: Day 3

Day 2 Recap

This session will provide a brief overview of key themes and outputs of Day 2 for feedback and validation.

Next Steps and Action Planning Session

Participants will be divided into groups to further develop themes identified in Day 1 and 2 into key strategies, and to propose actions and high level timelines to deliver on these strategies.

Conference Declaration, Feedback, & Closing Comments

The convening will close with agreement on the conference declaration, feedback from participants and closing comments from host institutions.

