



Feed the Future Innovation Lab
for Collaborative Research on
Grain Legumes



Feed the Future Innovation Lab for Collaborative Research on Grain Legumes: Technical Vision for 2013 - 2017

Irvin Widders
Michigan State University

2012 External Review of Dry Grain Pulses CRSP

- The Dry Grain Pulses CRSP is commended for significant achievements in bean and cowpea research, outreach, dissemination, capacity building and impact.
- The EET recommends that the Dry Grains Pulses CRSP be funded for another phase with “equal or greater total funding”.



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USAID Decision

- To extend for 4.5 years
- Based on relevance of grain legumes in Feed the Future
- Re-brand as **Feed the Future Innovation Lab for Collaborative Research on Grain Legumes**



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Technical Vision of Legume Innovation Lab

- Provide **international leadership** in bean and cowpea research
- Align with USAID's **Feed the Future** Research Strategy
- Pursue an **innovative refocused research agenda** that builds upon past research advances in grain legumes
- Invest in research with **high potential for impact**
- **Complement** legume research of CGIAR, USDA/ARS and USAID
- Engage a **new generation of scientists** in international research
- Contribute to FTF agriculture sector development programs of **USAID country and regional missions**



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International Research Leadership

- Innovative approaches to problem solving
- Applying cutting edge science
- Multi-disciplinary research collaboration
- Addressing knowledge and technology gaps
- Forming strategic partnerships to achieve objectives



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Grain Legumes are **priority crops** in USAID's Feed the Future "Global Food Security Research Strategy"



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Multi-functional Roles of Grain Legumes



- Nutrient-dense staple foods
- Generate income as a profitable cash crops
- Increase sustainability of cropping systems (BNF)
- Enhance livelihoods of women
- Improve child growth, nutrition and health



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Legume Innovation Lab Alignment with Feed the Future

- Prioritization of Strategic Research Objectives
- Focus on FTF Countries and Cropping Systems
- All-of-Government Approach
- Advancing Gender Equity
- Establishing Impact Pathways and Monitoring Performance Indicators



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Legume Innovation Lab Strategic Objectives (2013-17)

SO1. *Advancing the Productivity Frontier for Grain Legumes*

SO2. *Transforming Grain Legume Systems and Value Chains*

SO3. *Enhancing Nutrition*

SO4. *Improving Outcomes of Research and Capacity Building*



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SO1. Advancing the Productivity Frontier for Grain Legumes

A- To enhance the **genetic yield potential** of grain legumes by exploiting new research tools afforded by genomics and molecular breeding approaches with a focus on improving resistances to economically important abiotic and biotic constraints

SO1.A1- NDSU (Juan Osorno)
SO1.A3- MSU (James Kelly)
SO1.A4- UPR (James Beaver)
SO1.A5- UCR (Phil Roberts)



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SO1. Advancing the Productivity Frontier for Grain Legumes

SO1.B1- UIUC (Barry Pittendrigh)

B- To sustainably reduce the **yield gap** for grain legumes crops produced by smallholder, resource-poor farmers in strategic cropping systems.



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SO2. Transforming Grain Legume Systems and Value Chains

To sustainably improve smallholder farmer production management **decision-making** and the **performance of grain legume value-chains** for the benefit of stakeholders

SO2.1- ISU (Robert Mazur)
SO2.2- KSU (Vincent Amanor-Boadu)



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SO3. Enhancing Nutrition

To improve the **nutritional quality of diets** and enhance the nutritional and health status of the poor especially **young children and women** through the consumption of grain legumes



SO3.1 WUSTL (Mark Manary)



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SO4. Improving Outcomes of Research and Capacity Building

Impact assessment of CRSP and Legume Innovation Lab investments in research, institutional capacity building and technology dissemination for **improved program effectiveness**



SO4.1 MSU (Mywish Maredia)



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Salient Features of LIL Portfolio

- Fewer (9) higher funded projects
- Focus on FTF countries and cropping systems
- Balance of continuing (7) and new (2) projects
- Refocused projects
- Strengthened project teams



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Partnering U.S. Institutions

- Iowa State University
- Kansas State University
- Michigan State University (ME)
- **North Dakota State University**
- University of California-Riverside
- University of Illinois
- **University of Hawaii**
- **University of Nebraska - Lincoln**
- University of Puerto Rico
- **Washington University in St Louis**
- USDA-ARS



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Legume Innovation Lab Cropping Systems, Regions and Countries

West Africa Sahel cowpea-cereal cropping system

Benin, Burkina Faso, Ghana, Mali, Niger, Senegal

Eastern/Southern Africa bean-maize cropping system

Malawi, Mozambique, Tanzania, Uganda, Zambia

Latin America/Caribbean bean-maize cropping system

Haiti, Honduras, Guatemala and Ecuador



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“Game-Changing” Research with High Impact Potential

- Molecular markers developed for **drought tolerance**, **CBB resistances**, and **cooking time** in the Andean common bean gene pool (SO1.A3)
- QTLs identified for **nitrogen fixation** and associated traits in the Andean common bean gene pool (SO1.A3)
- Genetically improved **teparty beans** for improved seed and agronomic traits (SO1.A4)
- **Bruchid resistance** genes introgressed into commercial common bean seed types for Central America, Haiti and Eastern Africa (SO1.A5)
- Genetically improved **middle-American climbing-bean** lines for highland agro-ecologies of Guatemala (SO1.A1)
- Resistance traits and genes identified for increased resistances to **aphids**, **thrips** and **pod-sucking insects** in cowpea (SO1.A5)



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Game-Changing Research with High Impact Potential

- **Sustainable cowpea IPM solutions** utilizing biological controls validated for scaling-up in West Africa (SO1.B1)
- **Diagnostic tools and decision support aids** developed to improve smallholder farmer soil fertility management (SO2.1)
- Factors influence food choices understood and **performance of grain-legume value chains** improved (SO2.2)
- Influence of common bean and cowpea in diets of children on **growth**, amelioration of **Environmental Enteropathy**, and on the intestinal **micro-biome ecology**



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Tepary Bean- A solution to climate change



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New Trait Discovery and Molecular Markers

Biological Nitrogen Fixation in Common Bean

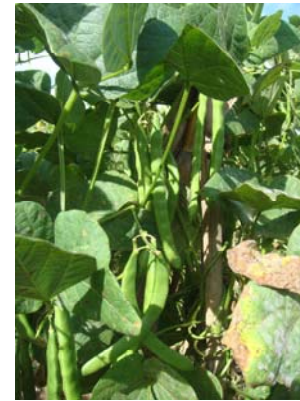


Thrips and Pod-Sucking Insect Resistance in Cowpea



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Improving Yield and Productivity of Middle American Climbing Beans



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Strategic Partnerships

- U.S. universities & NARS
- CGIAR Grain Legume Program
- USDA-ARS
- USAID Climate Resilient Legumes Programs
- Foundations (BMGF, McKnight, etc.)



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**RESEARCH
PROGRAM ON
Grain Legumes**

***Leveraging legumes to combat poverty, hunger,
malnutrition and environmental degradation***

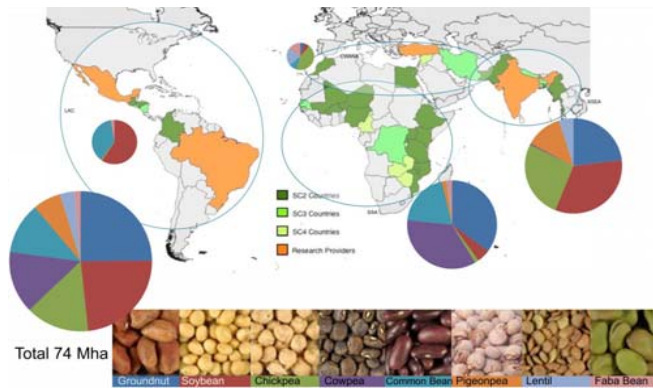
In collaboration with

Generation Challenge Program (GCP)
Brazilian Agricultural Research Corporation (EMBRAPA)
Ethiopian Institute of Agricultural Research (EIAR)
Indian Council of Agricultural Research (ICAR)
Turkish General Directorate of Agricultural Research (GDAR)
Dry Grain Pulses Collaborative Research Support Program (Pulse CRSP)
National agricultural research and extension systems in Africa, Asia and Latin America and the Caribbean
National and international public and private sector research and development partners



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Global Scope of CG Grain Legume Program



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Achieving Synergies between LIL and CG Grain Legume Program

- **Collaborative research** toward common goals
- **Complementary research** to address strategic constraints and priorities
- **Beneficial research** by Legume Innovation Lab projects to address knowledge and technical gaps and opportunities

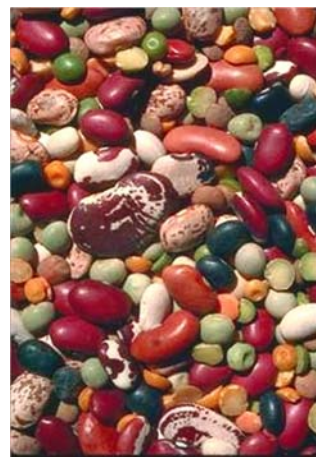


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Legume Scholars Program

Objectives-

- To build human resource capacity of NARS in applying cutting-edge science to address future challenges facing the legume sector
- To facilitate greater collaboration in research between CGIAR and U.S. university scientists



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Features of Legume Scholars Program

- Support for PhD and MSc graduate study at U.S. universities in disciplines of strategic need
- Identify bright young developing country professionals with interest in grain legumes
- Nominations made by CGIAR, Innovation Lab, or NARS scientists
- Field research to be conducted at CG center or in home country



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Contribute to USAID Country and Regional Mission FTF Ag Sector Development Programming

Associate Awards

- Dissemination of improved varieties
- Seed systems
- Integrated crop management
- Integrated pest management
- Value-chain governance
- Nutrition education
- Institutional strengthening



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Bean Technology Dissemination (BTD) Project- Honduras, Guatemala, Nicaragua, Haiti

- Beneficiaries reached with 5-20 lb sacks of bean seed
- Number of varieties disseminated
- Number of farmer organizations benefitted
- Number of farmers trained in seed production
- Productivity increased (%)
- >100,300
- 24
- 416
- 3,687
- 15 – 30%



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BTD Seed Multiplication and Dissemination Strategy

“Community Seed Banks”

- Leader farmers identified to receive training in seed production
- Provided “registered” seed to plant 0.5 – 1.0 ha
- Produced “Quality-Declared” seed for 20 – 40 smallholder farmers in a community
- Stored seed for future planting seasons



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“MasFrijol”- Guatemala

Linking Agriculture to Nutrition

Increasing Bean Productivity

- Promote locally adapted and preferred varieties
- Establish community seed banks (“Almacenes”)
- Access to PICS sacks for household storage

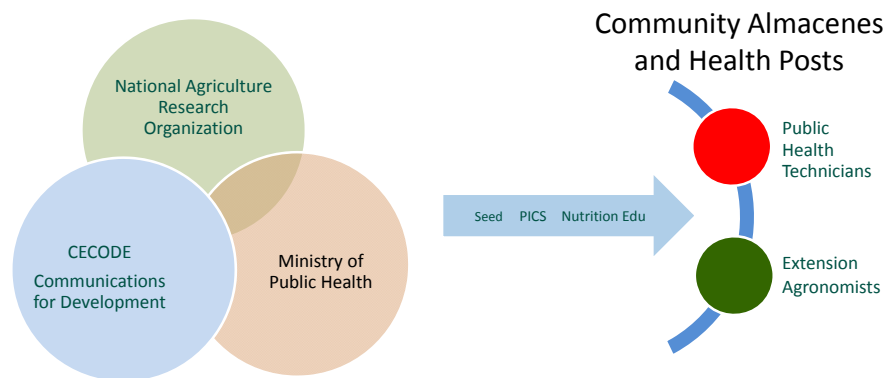
Improving Nutrition through Increased Bean Consumption

- Increase appreciation of beans as an “ancestral” staple crop and food
- Nutrition education focused on womens groups
- Recipe competition, videos, mobile education units



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MasFrijol Partnership



Expectations for Global Meeting

- Collective execution of LIL vision
- Team planning and coordination of projects
- Strengthening strategic partnerships
- Scaling-up for increased impact
- Contemplating future research agendas



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Irvin Widders, Director
Cynthia Donovan, Deputy Director
Legume Innovation Lab
Phone: (517) 355-4693
Email: widders@anr.msu.edu

www.legumelab.msu.edu/



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