Introduction to Innovation Labs (Part 1 of 117)

Jeffrey K. Griffiths, Chair
Innovation (formerly CRSP) Council

March 10, 2014, Kathmandu Nepal

Key Messages

- Extraordinary US University expertise, experience, and history of achievement
- We deliver. We are in this for the long haul.
- Decades of developing innovations (research), training, and engagement for the long run in people and in institutions in what are now generally Feed the Future countries. USAID has identified key long-term targets → funds high-impact research which will pay off over time.

Funded Innovation Labs

- Adapting Livestock Systems to Climate Change
- Aquaculture & Fisheries
- Assets and Market Access
- Grain Legumes
- Horticulture
- Integrated Pest Management
- Nutrition in Africa
- Nutrition in Asia
- Peanut Productivity & Mycotoxin Control
- Sorghum & Millet
- Sustainable Agriculture & Resource Management
- Applied Wheat Genomics
- Climate Resilient Beans
- Climate Resilient Chickpea
- Climate Resilient Cowpea
- Climate Resilient Millet
- Climate Resilient Sorghum
- Climate Resilient Wheat
- Food Security Policy
- Genomics for Improved Poultry
- Reduction of Post-Harvest Loss
- Rift Valley Fever Control in Ag
- Small-Scale Irrigation
- Soy Value Chain Research
- Soy Bean Research Lab

Global Nutrition Innovation Lab

- Two Leader with Associate Awards – Africa and Asia; focused in Uganda and Nepal
- Unlike traditional CRSPs (now Inno Labs) with multiple small projects we focus in one country and study large-scale programming
- Associate Awards: Malawi, Mali (others anticipated: Egypt)
- Human and Institutional Capacity Building

‘Deep Dive Research’

Delivery Science

Empirical <u>evidence</u> base for agricultural, health & nutrition programming

Outputs

- Publish and disseminate research findings on "what works" and "why" – to guide programming
- Development of core metrics for Agriculture and Nutrition programming
- Support to Mission and implementing partners
  - Indicator reporting to USAID Uganda and partners
  - Providing support via tool development and technology used for data collection

Approach

- Operational research focus. Integrated programs.
- Use ‘real-world’ rigorous epidemiological study designs: randomized site selection with counter-factuals, serial panels, observational (longitudinal) birth cohorts – focus on women and infants
- Process & outcomes (agriculture, health, nutrition) analyzed to understand causal pathway linkages
- Country Ownership – support local needs
- Linked to country missions, implementers, Govt.

Research

1

Agriculture-Health-Nutrition Pathways

- Clarity on what are the real causal pathways

2

Program Impact Pathways

- What design/processes support success at scale? How? Why? What is the effect of external factors on program success?

3

Integrated Programming Pathways

- What combinations of interventions work best, in what context? What efficiency gains exist with integration (and costs)?

Advancing the productivity frontier for sorghum

Our primary goal, advancing the productivity frontier through ***improved drought and heat tolerance of sorghum****, is a major strategy for alleviating threats of drought to food security.*

In parallel with advancing the productivity frontier, we will work to ***transform production systems to reverse losses of ecological capital through multiple crops from single plantings****.*

Project Director: Andrew Paterson, Univ GA
(paterson@plantbio.uga.edu)

Climate resilience of agriculture:

Increase options for coping with fluctuating conditions

Increase *net* capture of limiting resources (energy, water, nutrients)

Increase conversion efficiency of limiting resources into product

Maintain or increase 'ecological capital' (topsoil, organic matter, beneficial biota) essential to ongoing productivity

Sorghum:

is arguably the most drought tolerant of the major cereal crops

is a highly-productive multipurpose C4 grass with rich diversity…

and with a 'yield gap' relative to more intensively bred cereals…

that is native to some of the most vulnerable regions of the world and essential to sustaining human populations in those regions

Feed the Future Innovation lab: Improved Wheat for Heat Tolerance and Climate Resilience

Kulvinder S. Gill

Washington State University

Project partners

- **Washington State**
- DWR, Karnal
- Kansas State
- Metahelix
- Dupont-Pioneer
- RAU, Pusa

CCSU, Meerut
GBPU, Pantnagar
Krishidhan
NBPGR
PAU, Ludhiana
IARI

Project Goal

Develop high-yielding, heat-tolerant wheat cultivars for the Indo-Gangatic Plains

Specific Objectives

1. **Develop heat tolerant varieties using marker assisted background selection and forward breeding approaches**: Acurate phenotyping, QTLs, enzymatic markers, fast breeding methods
2. **User-friendly markers for heat tolerance**: QTLs, physiological markers, biochemical markers
3. **Pyramid genes with complementary mechanisms of heat tolerance**: Doubled-haploid approach, Objective 4 critical for this objective
4. **Understand physiological mechanisms of heat tolerance**: Study genetic, physiological, biochemical, and epigenetic mechanisms controlling heat tolerance
5. **Scientist training and exchange**: Exchange and collaboration (senior scientists), training (younger scientists), and PhD student training.. Younger scientists are a major focus of the project.

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Feed the Future Innovation Lab for Genomics to Improve Poultry

H. Zhou
D. Bunn
R. Gallardo
E. Kebreab

S.J. Lamont
J.C.M. Dekkers

C. Schmidt

B. Kayang
G. Aning
A. Naazie

A. Muhairwa
P. Msoffe

Improving food security in Africa by enhancing resistance to Newcastle disease and heat stress in chickens

Potential Chicken & Eggs for Rural Develop

Household Nutrition

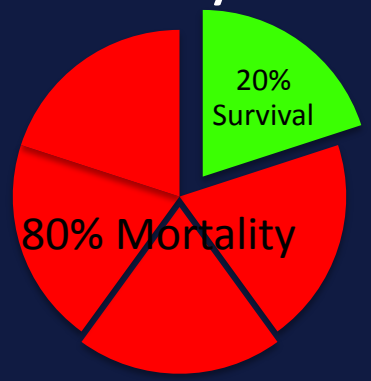
Income

Income for Women

Food Security

Newcastle Disease Virus

- Newcastle Disease Virus (NDV) is the number one constraint to rearing poultry in Africa in most rural communities.
  - 80% mortality among village flocks.
  - Quickly devastate community colonies when left untreated.
  - Easily transmitted between birds.



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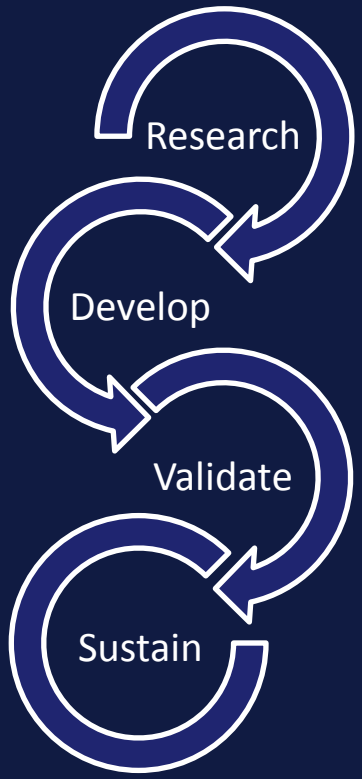
Feed the Future Innovation Lab for Genomics to Improve Poultry



- Use genomic technologies to identify genes and/or genetic markers associated with NDV resistance and heat stress in African indigenous chicken ecotypes.
- Develop an economical, low-density SNP panel for genetic selection.
- Validate genetic enhancement of resistance in African indigenous chicken ecotypes.
- Develop a sustainable chicken breeding and distribution plan.

Improving food security in Africa by enhancing resistance to Newcastle disease and heat stress in chickens

IPM package for vegetable crops

- Seed or seedling treatment with *Trichoderma*, *Pseudomonas fluorescens,* and *Bacillus subtilis*
- Use of neem cake and other organics
- Selecting resistant varieties and disease-free seeds
- Grafting on resistant rootstock for bacterial wilt, *Fusarium,* nematodes and others
- Staking and mulching
- Yellow sticky traps for thrips, leafminers, whiteflies, etc.
- Pheromone traps for *Helicoverpa, Spodoptera* and fruit flies
- Rogueing and host-free period adoption for control of virus diseases
- Use of biopesticides such as neem
- Multiplication of parasitoids and predators for inundative releases
- Production and use of microbial pesticides such as NPV, *Metarhizium*, and *Beauveria*

IPM technologies privatized and scaled up

- **Eggplant and tomato grafting** in Nepal, Bangladesh, India, and others
- ***Trichoderma*** in Nepal, India, Kenya, Bangladesh, Cambodia and others
- **Bio and microbial pesticides** in Nepal, India, Indonesia,, Bangladesh, and others
- **Pheromones traps** in Nepal, India, Bangladesh, Kenya and others
- **Parasitoids and Predators** in India, Bangladesh, Tanzania, Honduras and others

Selected Impacts of the IPM IL

Country and Authors	Crop	IPM Practice(s)	Net Benefits (millions)
Uganda, Moyo et al, 2007	Peanuts	Virus resistant variety	$33-36
Mali, Nouhoheflin, et al, 2011	Tomato	Cultural	$21-24
Uganda, Debass, 2000	Beans and maize	Cultural	$36-202
Bangladesh, Debass, 2000	Eggplant, cabbage	Cultural practices	$26-29
Bangladesh, Rakshit et al, 2011	Cucurbits	Pheromone traps	$3-6
Ecuador, Baez, 2004	Plantain	Cultural	$59-63
Ecuador, Quishpe, 2001	Potatoes	Resistant variety	$50
Albania, Daku, 2002	Olives	Cultural	$39-52
Honduras, Sparger, et al, 2011	Eggplant, onion, tomato, and pepper	Cultural practices	$17
India, Myrick, et al, 2014	Mulberry, papaya, cassava	Papaya mealybug parasitoid release	$500 - 1,300

Invasive Species Management: Papaya mealybug

- Native to Mexico
- First described in 1992
- Caribbean: 1995-2000
- Pacific: 2000-2005
- Asia: 2008
- West Africa: 2009

IPM Innovation Lab prevented its introduction to Nepal by controlling it in southern India.

Benefit to India: $500 million to $1.37 billion.

Innovation Lab for Small-Scale Irrigation

Cooperative Agreement

THE BORLAUG INSTITUTE for International Agriculture

TEXAS A&M AGRILIFE RESEARCH

USAID FROM THE AMERICAN PEOPLE

IWMI International Water Management Institute

IFPRI® INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

sustainable solutions for ending hunger and poverty

Supported by the CGIAR

NORTH CAROLINA A&T STATE UNIVERSITY

ILRI INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

THE TEXAS A&M UNIVERSITY SYSTEM

Major Elements
Small Scale Irrigation Coop Agreement

- Identifying promising, context appropriate, small-scale irrigation interventions, management and practices for poverty reduction and improved nutrition outcomes

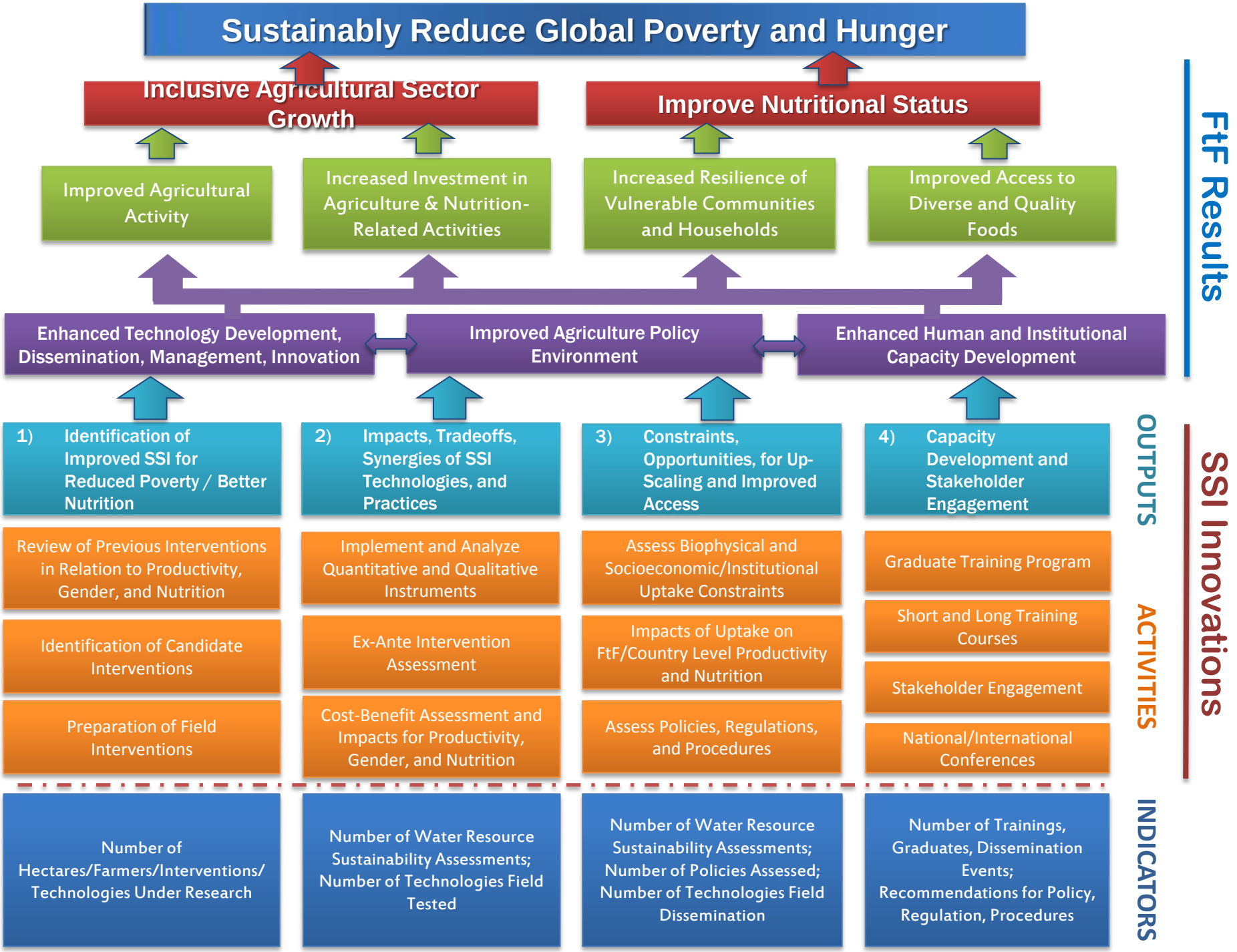
- Evaluating production, environmental, economic, nutritional, and gender impacts, trade-offs, and synergies of small scale irrigation technologies and practices

- Identifying key constraints and opportunities to improve access to small scale irrigation technologies and practices

- Capacity Development and Stakeholder Engagement

Collaborators and Their Areas of Leadership

- Borlaug Institute IDSS – Lead
  - IDSS Training (APEX, SWAT, FARMSIM) for National Stakeholders
  - IDSS Model and Database Improvement, Maintenance, and Distribution
  - Assessment of Production, Environmental, and Economic Impacts of Promising Small-Scale Irrigation Technologies
  - Reporting to USAID
- IWMI
  - Identification of Promising Small-Scale Irrigation Technologies
  - Communication with National Irrigation R&D Organizations
  - Data Collection and Field Testing for Promising Small-Scale Irrigation Technologies
  - Assisting BI in Model Parameterization, Improvement, Training, and Impact Assessment
  - Assisting IFPRI in Analysis of Gender, Labor, and Nutritional Impacts
- ILRI
  - Identification of Promising Small-Scale Irrigation Technologies (for Livestock)
  - Field Testing of Promising Small-Scale Irrigation Technologies (for Livestock)
  - Assisting BI in Model Parameterization, Improvement, and Training (for Livestock)
  - Assisting IFPRI in Analysis of Gender, Labor, and Nutritional Impacts (for Livestock)
- IFPRI
  - Collection of Data and Analysis of Gender, Labor, and Nutritional Impacts of Small-Scale Irrigation Technologies
- NCA&T
  - Identification of Promising Small-Scale Irrigation Technologies
  - Assisting BI in IDSS Training and Model Parameterization
  - Assisting IWMI in Field Testing for Promising Small-Scale Irrigation Technologies


Sustainably Reduce Global Poverty and Hunger
Inclusive Agricultural Sector Growth
Improve Nutritional Status
Improved Agricultural Activity
Increased Investment in Agriculture & Nutrition-Related Activities
Increased Resilience of Vulnerable Communities and Households
Improved Access to Diverse and Quality Foods
Enhanced Technology Development, Dissemination, Management, Innovation
Improved Agriculture Policy Environment
Enhanced Human and Institutional Capacity Development
FtF Results
1) Identification of Improved SSI for Reduced Poverty / Better Nutrition
2) Impacts, Tradeoffs, Synergies of SSI Technologies, and Practices
3) Constraints, Opportunities, for Up-Scaling and Improved Access
4) Capacity Development and Stakeholder Engagement
OUTPUTS
Review of Previous Interventions in Relation to Productivity, Gender, and Nutrition
Identification of Candidate Interventions
Preparation of Field Interventions
Implement and Analyze Quantitative and Qualitative Instruments
Ex-Ante Intervention Assessment
Cost-Benefit Assessment and Impacts for Productivity, Gender, and Nutrition
Assess Biophysical and Socioeconomic/Institutional Uptake Constraints
Impacts of Uptake on FtF/Country Level Productivity and Nutrition
Assess Policies, Regulations, and Procedures
Graduate Training Program
Short and Long Training Courses
Stakeholder Engagement
National/International Conferences
ACTIVITIES
SSI Innovations
Number of Hectares/Farmers/Interventions/ Technologies Under Research
Number of Water Resource Sustainability Assessments; Number of Technologies Field Tested
Number of Water Resource Sustainability Assessments; Number of Policies Assessed; Number of Technologies Field Dissemination
Number of Trainings, Graduates, Dissemination Events; Recommendations for Policy, Regulation, Procedures
INDICATORS

Feed the Future Food Security Innovation Labs: Collaborative Research Programs

Feed the Future Innovation Lab for Collaborative Research on Grain Legumes

Irvin Widders

Michigan State University

Legume Innovation Lab

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

USAID
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Grain Legumes are a strategic group of crops in USAID's Feed the Future initiative.

Grain Legumes have Multi-functional Roles

- 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

Legume Innovation Lab Strategic Objectives (SOs)

contribute to

Feed the Future R & D Priorities

- **SO1.** *Advancing the Productivity Frontier for Grain Legumes*
- **SO2.** *Transforming Pulse Systems and Value Chains*
- **SO3.** *Enhancing Nutrition*
- **SO4.** *Improving Outcomes of Research and Capacity Building*

Target Regions and Countries
Legume Innovation Lab

West Africa- Benin, Burkina Faso, Ghana, Mali Niger, Senegal

Eastern and Southern Africa- Malawi, Mozambique, Tanzania, Uganda, Zambia

Latin America and Caribbean- Haiti, Honduras, Guatemala and Ecuador

Contact Information

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Legume Innovation Lab

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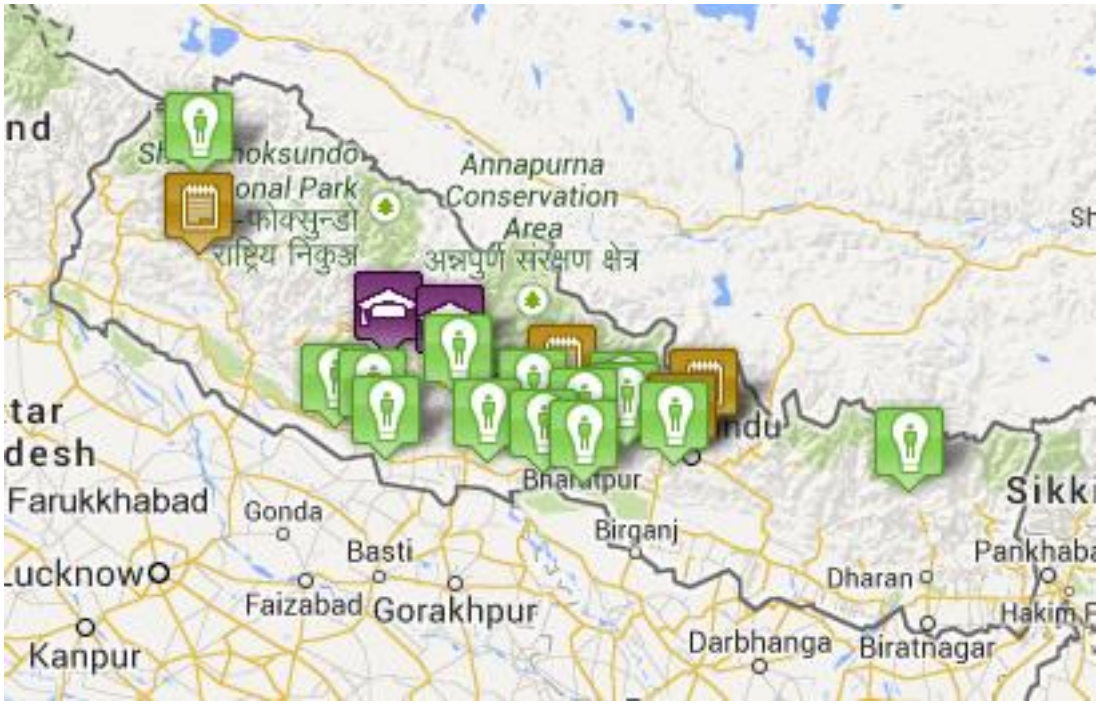
INNOVATION LABS COLLABORATIVE RESEARCH





Focus Countries

- Nepal
- East Africa:
  - Tanzania, Kenya, Ethiopia
- West Africa:
  - Senegal, Mali

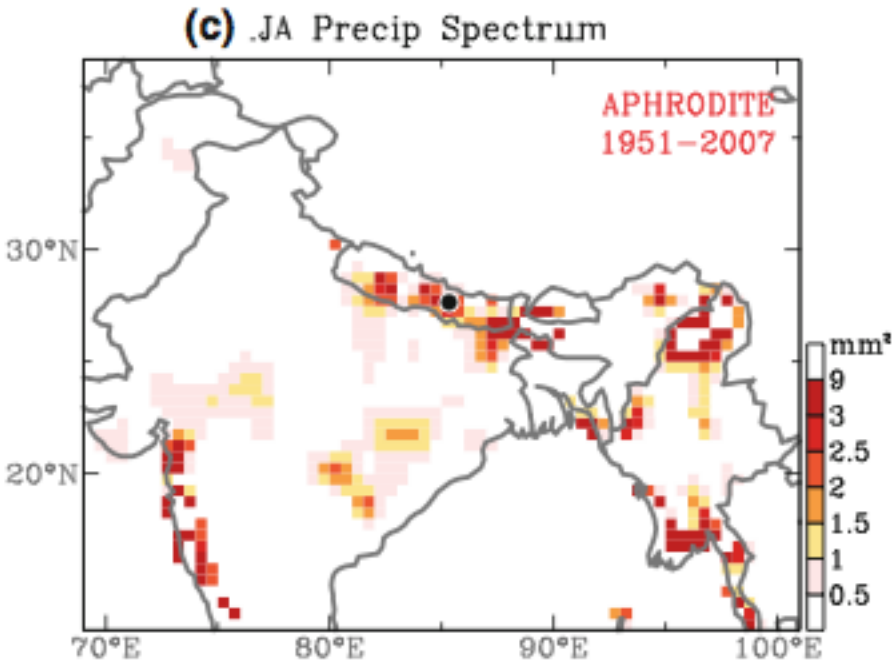


Types of Research Projects

- Long term: Led by US university researchers
- Gap-filling: Led by US university researchers
- Fellowships: Graduate students (mostly in country)
- Scholars: Small grants to post-graduate students to do their own, mentored research projects (18 in Nepal, 10 in East Africa)

Key Components of All Research

- Understanding and mitigating climate change (2 climatology projects in Nepal)
- Gender equity
- Human nutrition (collaboration with Nutrition Innovation Lab in Nepal)



Feed the Future Food Security Innovation Labs: Collaborative Research Programs

Feed the Future Innovation Lab for Collaborative Research on Peanut and Mycotoxin

(Peanut and Mycotoxin Innovation Lab)

For more details, see

pmil.caes.uga.edu

Food Security Innovation Centers

- Climate Resilient Cereals
- **Legume Productivity**
- Advanced Approaches to Combat Pests and Diseases
- Safe and Nutritious Foods
- Sustainable Intensification
- Policy and Markets Research and Support
- Human and Institutional Capacity Development

Program Area in Legume Productivity

- **Peanut and Mycotoxin Innovation Lab**
- Legume Innovation Lab
- Soybean Value Chain Research Innovation Lab
- Climate Resilient Bean Innovation Lab
- Climate Resilient Cowpea Innovation Lab
- Climate Resilient Chickpea Innovation Lab
- BT cowpea (AATF)
- CGIAR Research Program on Grain Legumes
- USDA Norman Borlaug Commemorative Research Initiative

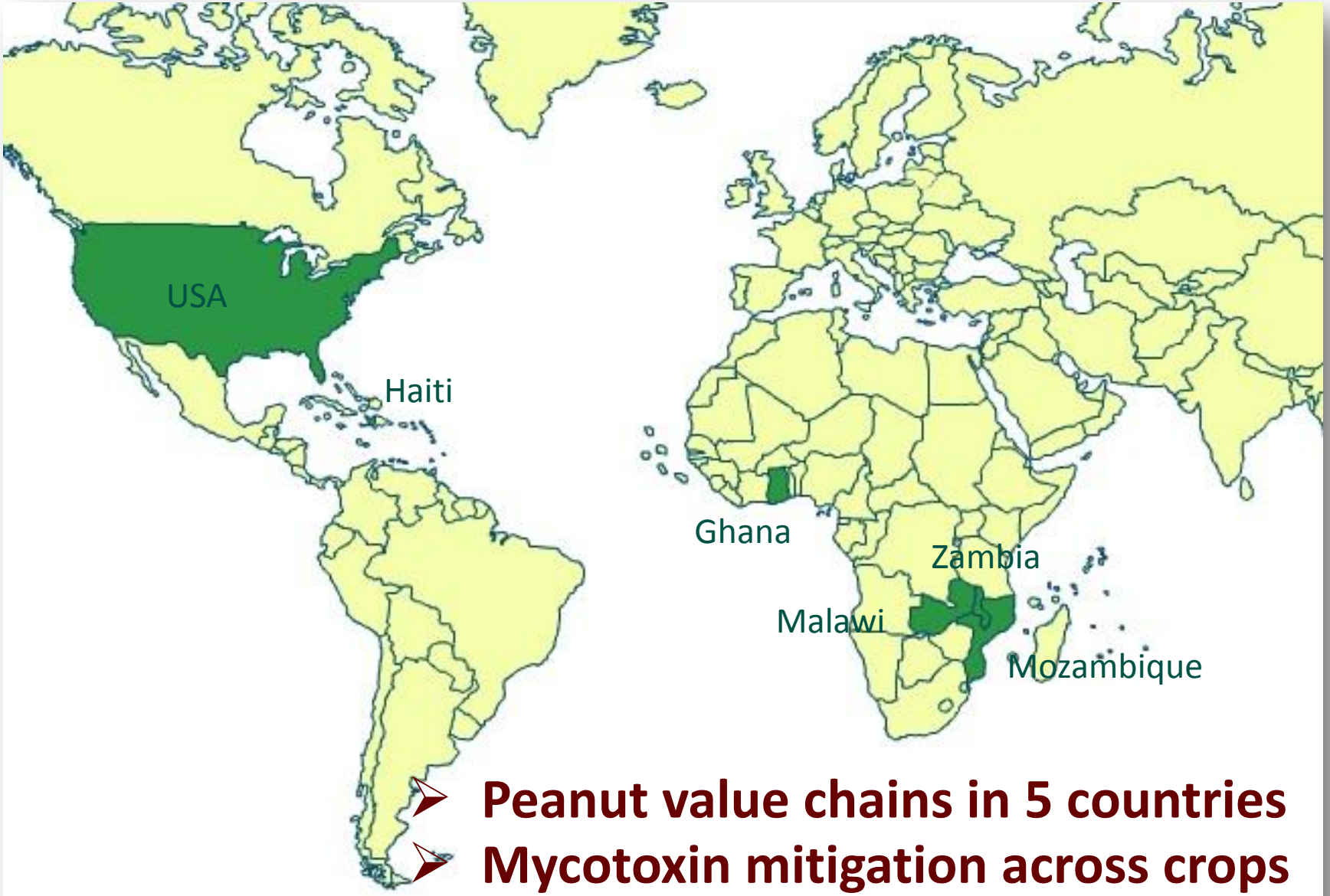
Why peanuts?

- Global importance (39 million tons, 95% in developing countries)
- Highly nutritious (25% protein, no transfats, RUTF)
- Valuable as a legume in cereal systems (fixes nitrogen)

Why mycotoxins?

- Contaminate numerous crops
- Reduce quality and marketability
- Carcinogenic with serious health effects



- **Peanut value chains in 5 countries**
- **Mycotoxin mitigation across crops**

Research along the value chain

On-farm productivity research

- Breeding
- Agronomy
- Crop Protection
- Technology adoption research
- Labor allocation & availability
- Scale

Postharvest handling/Marketing research

- Drying – low cost, energy efficient
- Storage – collective vs individual, biophysical
- End-user market opportunities/quality requirements
- Scale

Utilization research

- Developing new processes/products
- Product formulation
- Market analysis/consumer research

PMIL Research Portfolio

Improved peanut varieties

Mycotoxin management

Seed production

Post-harvest handling & processing

Market opportunities

CAPACITY BUILDING

GENDER EQUALITY

The Feed the Future Innovation Lab for Collaborative Research on Sustainable Agriculture and Natural Resource Management (SANREM)

Office of International Research, Education and Development (OIRED)
Virginia Tech

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SANREM INNOVATION LAB
Feed the Future Innovation Lab for Collaborative Research on Sustainable Agriculture and Natural Resource Management

1872 VirginiaTech
Invent the Future

About SANREM

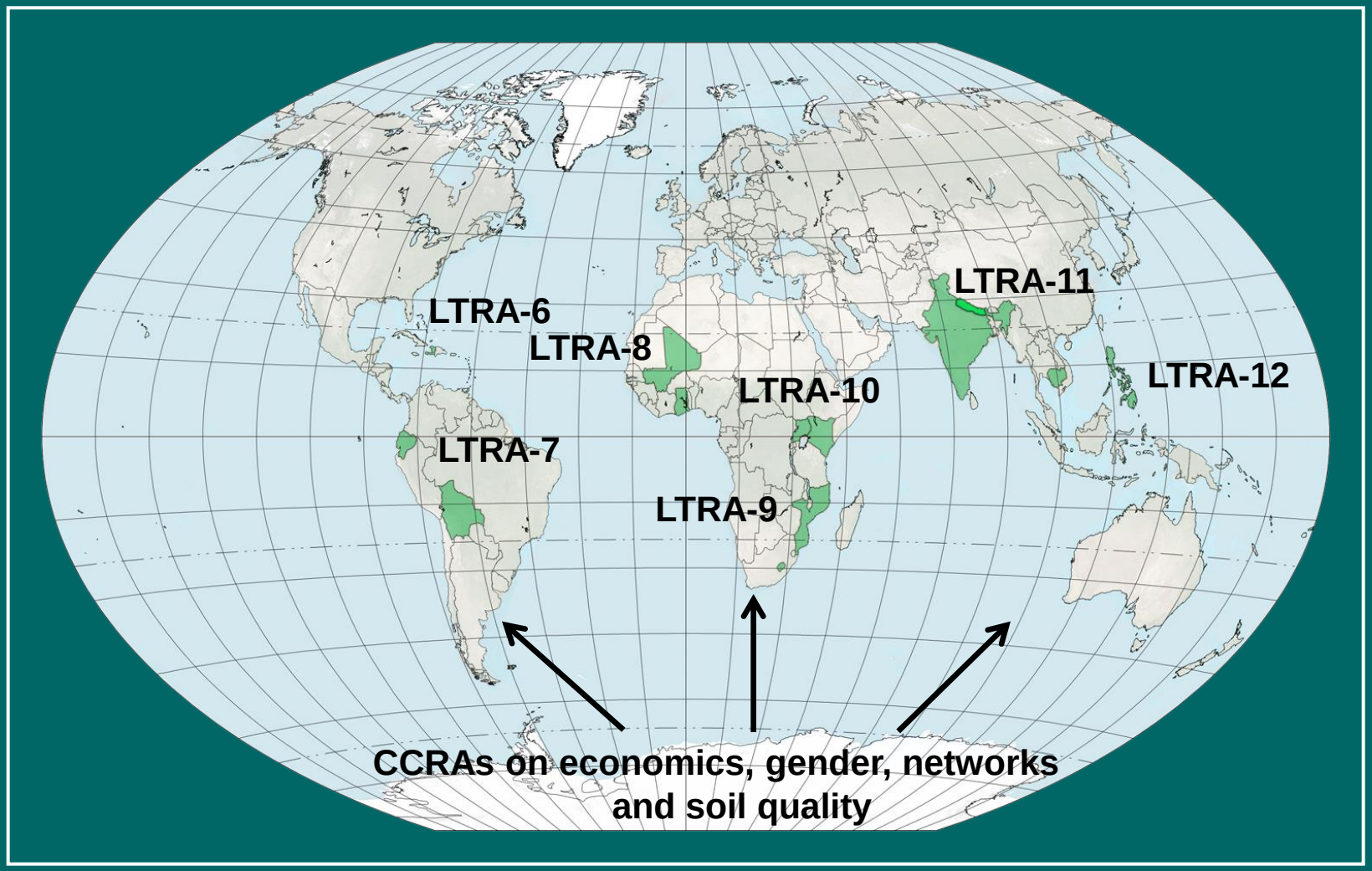
SANREM is a cohesive, inter-disciplinary, system-focused and science-based program

SANREM overall goals are:

- increase smallholder food security and income
- Promote natural resource conservation
- Develop and adapt participatory, gender-sensitive, economically-viable and socially-scalable conservation agriculture production systems

About SANREM

- SANREM includes seven core and four cross-cutting projects working in 13 countries



SANREM is within the USAID's FTF Food Security Innovation Center

- Climate resilient cereals
- Legume productivity
- Advanced approaches to combat pests and diseases
- Research on nutritious and safe foods
- Markets and policy research and support
- Sustainable intensification
- Human and institutional capacity development

Collaborative Research on Sorghum and Millet

FEED THE FUTURE INNOVATION LAB

Collaborative Research on Sorghum and Millet

Program period: July 23, 2013-July 22, 2018

Timothy J. Dalton, Director

Nat Bascom, Assistant Director

Kira Everhart-Valentin, Program Coordinator

Kansas State University

Manhattan, KS 66506

KANSAS STATE UNIVERSITY

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Collaborative Research on Sorghum and Millet

FEED THE FUTURE INNOVATION LAB

Why Focus on Sorghum and Millet?

- 400-500 million people worldwide rely upon these crops as primary staple grain
- Key climate-resilient crops for semi-arid environments
- SMIL target countries (Senegal, Niger, Ethiopia)
  - 34+ million sorghum and millet farmers
  - Some of the poorest nations in the world
  - $0.40/pp investment over the next 5 years

Collaborative Research Areas and Geography

Focus Countries

- Senegal
  - Sorghum and Pearl Millet
- Niger
  - Sorghum and Pearl Millet
- Ethiopia
  - Sorghum

Collaborative Research

- Genetic Enhancement
  - Sorghum
  - Pearl millet
  - Genomics-enabled breeding
- Production Systems Management
- Market and Added-Value Product Development
  - Human food value chain
  - Animal feed value chain
- Cross-cutting themes
  - Gender, Environment, Nutrition

Research Activities (pending contracts)

Collaborative Research on Sorghum and Millet

FEED THE FUTURE INNOVATION LAB

Ethiopia (4 Projects)

- Texas A&M University
  - Grain quality and food products
- Purdue University
  - Striga and drought tolerance
  - Disease resistance
- Kansas State University
  - Yield development and genomics enabled breeding
- 14 Ethiopian institutions

West Africa (6 projects)

- Kansas State University
  - Genomics enabled breeding
- West Texas A&M
  - Biotic resistance of sorghum
- University of Hohenheim
  - Agronomic seed technology
- ICRISAT
  - IPM of millet head miner
- Purdue University
  - Genetic improvement of sorghum
  - Food product development
- 11 West African institutions

Collaborative Research on Sorghum and Millet

FEED THE FUTURE INNOVATION LAB

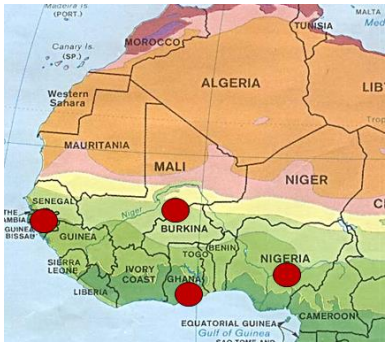
Long-term Training

- Advanced degree training projections
  - 18 Masters of Science degrees
  - 17 Ph.D. degrees
- Combination of training locations
  - U.S. institutions
  - National universities (Ethiopian, South Africa, Niger)
  - West African Center for Crop Improvement
  - Hybrid programs between U.S. and local universities

USAID Feed the Future Marker-Assisted Breeding Projects Led by UCR

Innovation Lab on Climate Resilient Cowpea

- September 2013 – September 2018
- 60k SNP Illumina chip – two per gene
- UCR, Ghana, Senegal, Nigeria, Burkina Faso
- Drought induced rapid senescence, Macrophomina resistance, heat tolerance during reproductive growth



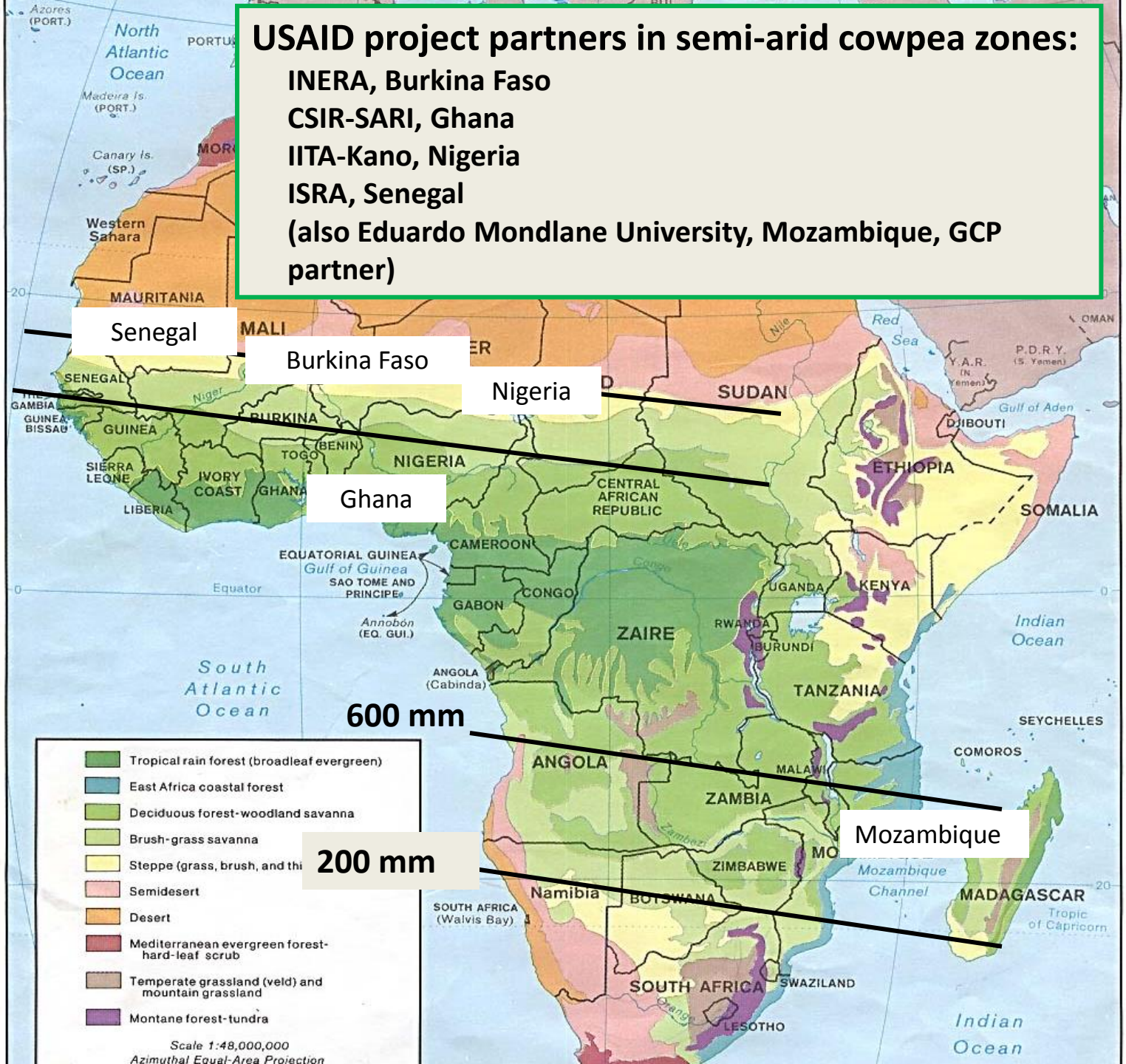
Legume Innovation Lab

- April 2013 – September 2017
- Coordinated by Michigan State University
- UCR, Ghana, Senegal, Burkina Faso
- Insect resistance (aphid, thrips, pod sucking bug) coupled with drought tolerance

Cowpea in sub-Saharan Africa

Forage is highly valued for livestock feed

Grain vitally important in human diet


USAID project partners in semi-arid cowpea zones:
INERA, Burkina Faso
CSIR-SARI, Ghana
IITA-Kano, Nigeria
ISRA, Senegal
(also Eduardo Mondlane University, Mozambique, GCP partner)
200 mm
600 mm
Senegal
Burkina Faso
Nigeria
Ghana
600 mm
Mozambique
200 mm
North Atlantic Ocean
South Atlantic Ocean
Indian Ocean
Red Sea
Gulf of Aden
Gulf of Guinea
Equator
Tropical rain forest (broadleaf evergreen)
East Africa coastal forest
Deciduous forest-woodland savanna
Brush-grass savanna
Steppe (grass, brush, and thi
Semidesert
Desert
Mediterranean evergreen forest-hard-leaf scrub
Temperate grassland (veld) and mountain grassland
Montane forest-tundra
Scale 1:48,000,000
Azimuthal Equal-Area Projection

U California, Riverside

Timothy J. Close
Bao Lam Huynh
Mitchell Lucas
Yi-Ning Guo
Jose Rodriguez
Jasmine Dixon
Philip A. Roberts
Stefano Lonardi
Steve Wanamaker
Arsenio Ndeve
Savanah St. Clair

African Breeding Partners – USAID FtF Projects

ISRA, Senegal

Ndiaga Cisse, Samba Thiaw

INERA, Burkina Faso

Issa Drabo, Jean-Baptiste Tignegre

IITA, Nigeria

Ousman Boukar, Christian Fatokun, Sato Muranaka, Sarah Hearne, Sam Ofodile

CSIR-SARI, Ghana

Ibrahim Atokple, Francis Kusi

Assets and Market Access Innovation Lab

BASIS

TECHNOLOGY ADOPTION

In much of the developing world, agricultural productivity continues to fall short of potential, in part due to low adoption of input technologies (improved seeds, fertilizer, etc.). Small-scale farmers face many prospective barriers to technology adoption (lack of info, liquidity, risk aversion, etc), but there is limited evidence on the relative effects of these barriers and the impact of interventions designed to address them.

BASIS Assets and Market Access Research Program supports a variety of research activities designed to:

- Study the relative importance of different constraints
- Test innovative approaches to ease constraints
- Promote improved productivity for sustainable growth.

FINANCIAL INNOVATIONS

Lack of access to formal financial services is a significant barrier to growth among low-wealth agricultural and pastoral households. Uninsured risk can:

- Cause people to shy away from high-return but potentially risky activities
- Force use of defensive strategies that impede sustained accumulation of productive assets
- Inhibit the development of rural financial markets
- Limit availability of the credit critical to make productivity investments.

BASIS researchers design, implement, and evaluate a new generation of financial innovations to mitigate uninsured risk and improve financial services for poor agricultural and pastoral households.

Assets and Market Access Innovation Lab

BASIS

Adoption of Improved Technology

Household-Level Impacts of SRI Rice in Haiti (University of California Davis)

This randomized control trial of systems of rice intensification (SRI) will test the household-level impacts. Researchers hope to inform plans to scale-up these programs and policies in Haiti and around the world.

Impacts of a Hybrid Maize Program in Kenya (University of California Davis)

This study hopes to learn about two key issues: the effectiveness of a local private seed company in developing locally appropriate technologies, and the impact of relaxing liquidity constraints on technology adoption.

Multiple Interventions Approach to Increasing Technology Adoption in Mexico (University of California Los Angeles)

This study will evaluate a project that hopes to increase maize yields by simultaneously addressing several of the main barriers to technology adoption: risk aversion, credit constraints, and lack of information.

Impacts of Voucher Coupons on Uptake of Improved Technology (University of Michigan)

This randomized controlled trial studies a limited-two year pilot fertilizer subsidy program for maize in Mozambique, overlayed the intervention with a savings program design to study possible complementarity.

Financial Innovations

Insuring Against Weather with Gap Insurance (University of Colorado)

This study tests an insurance design being tested in Ethiopia that allows farmers recourse (via crop cutting verification) when they've experienced widespread losses but insurance payouts were not triggered by the index.

Index Based Livestock Insurance for Pastoralists (Cornell University)

IBLI provides index-based insurance to pastoralists in drought-sensitive regions in Northern Kenya and Southern Ethiopia. The index measures vegetation density using satellite technology to predict livestock losses.

Index-Based Weather Insurance for Coffee Cooperatives in Guatemala (University of California Berkeley)

This project explores the possibility of offering hybrid contracts at the level of coffee cooperatives and individual members, to see whether group benefits can provide benefits in excess of the sum of benefits from individual contracts.

Dual Strike Point Index Insurance Contract (University of California Davis)

Researchers are designing and testing an index insurance contract for cotton farmers in West Africa to reduce basis risk and moral hazard using two strike points to trigger payouts. This research was moved from Mali to Burkina Faso.

Assets and Market Access Innovation Lab

BASIS

Joint Technological and Financial Innovations

Disseminating Innovative Resources and Technologies (Yale University)

Researchers will measure the impact on smallholders in Ghana of providing assured rural access to improved information through mobile technology, improved input technologies, and commercial drought index insurance.

Promoting Improved Productivity Technologies Adoption (Ohio State)

Researchers will test in Ghana if pairing index insurance and production loans that require any indemnity to be applied to outstanding loans will reduce the impact of catastrophic weather on lenders and allow them to expand services.

Tailoring Contract Farming to Improve Welfare in Kenya (Stanford University)

This experiment will test three interventions to improve smallholder welfare: contract farming, index insurance with innovative premium payment options, and use of mobile phones to improve communications in contract farming.

Interlinking Weather Insurance with Credit (University of California San Diego)

Researchers are testing an interlinked credit (for technology adoption) and insurance contract that allows insurance to serve as collateral on the loan, diminishing risk for both farmers and financial institutions in Ethiopia.

Assets and Market Access Innovation Lab

BASIS

KEY LESSONS

- Interlinked credit and insurance has seen even relatively small vouchers have enormous impact on take-up (with vouchers, take-up increased from less than 0.5% to almost 40%).
- Early results from index insurance research in Ghana show that capital constraints alone are not the only problem in technology adoption; risk is a key hindrance to investment and thus improved income and growth.

PRELIMINARY IMPACTS

- After Index-Based Livestock Insurance payouts in 2011, insured households were:
  - 33% less likely to reduce meals
  - 50% less likely to sell assets
  - 33% less likely to rely on food aid
- In Mali, villages where insurance was made available expanded area where cotton (a high risk, high-reward crop) was planted by just under 20% and increased use of yield enhancing inputs by just over 20%
- In Mozambique, two years after a voucher program had ended, households who had received the coupons were
  - using significantly more fertilizer
  - enjoying 15% higher yields
  - increasing consumption 9%
  - increasing assets and savings by 20%

Uganda

Catfish harvest from a pond in Uganda. Photo courtesy of Joe Molnar.

Nepal

Women and children hold fish after the first harvest of a small-scale aquaculture development project in the mid hills region of Nepal. Photo courtesy of Hare Ram Devkota.

Ghana

Researchers installing cages on a pier for a cage-in-pond culture system in Ghana. Photo courtesy of Kwamena Quagrainie.

Cambodia

Although most processing facilities are owned by men, most of the workers are women. These women are weaving small "white" fish onto skewers for smoking. Photo By Peg Herring.