



FEED^{THE}FUTURE

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

Innovation for Food Security: USAID's Feed the Future Research, Policy, and Capacity Development Programs

Clara K. Cohen
Bureau for Food Security, USAID
The Penn State University
June 5, 2014





Outline

- ✓ Feed the Future background
- ✓ Agricultural research, policy, and capacity development investments under Feed the Future
- ✓ Opportunities for faculty, students, and administrators

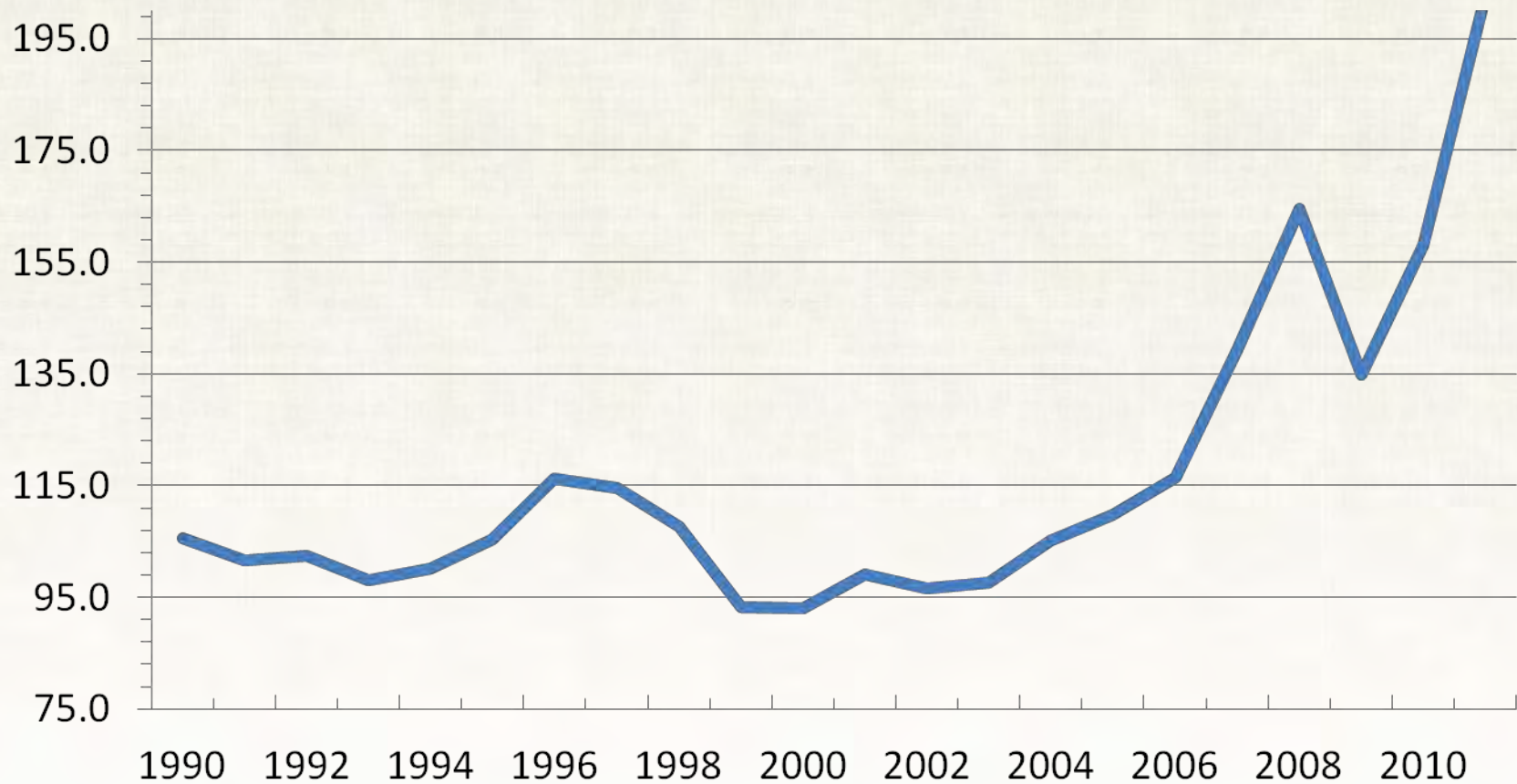


The Global Challenge

- ✓ About **842 million** people suffer from chronic hunger
- ✓ The world's population will increase to more than **9 billion by 2050**
- ✓ Food production will have to **increase by at least 60%** to feed the world



Global Food Prices



Source: FAO



Feed the Future



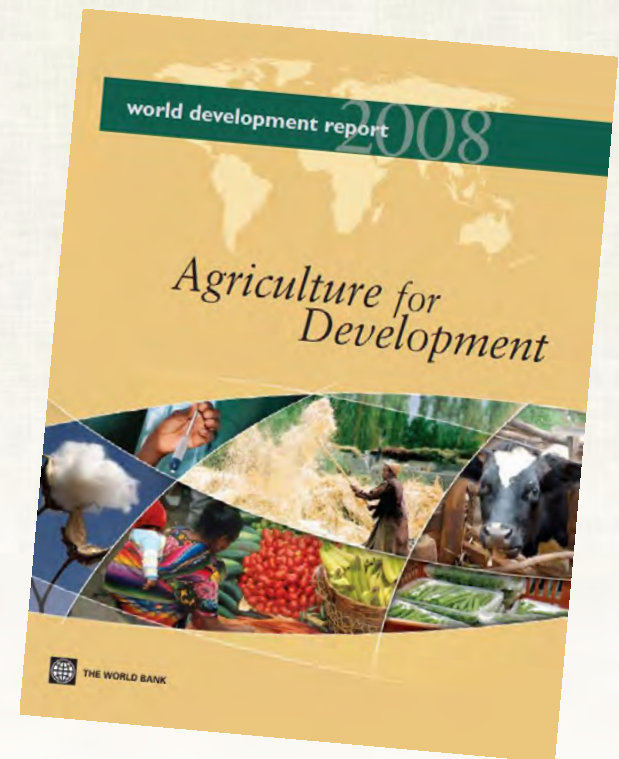
Photo: Borlaug Foundation

- ✓ Announced in 2009 at G-8 Summit in L'Aquila, Italy, with \$3.5 B investment
- ✓ Objectives: reducing poverty and undernutrition
- ✓ Metrics: poverty, stunting
- ✓ Country-owned, country-led



Why Agriculture?

“GDP growth originating in agriculture is **at least twice** as effective in reducing poverty as GDP growth originating outside agriculture.”





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U.S. Government Partners



USAID
FROM THE AMERICAN PEOPLE



MILLENNIUM
CHALLENGE CORPORATION
UNITED STATES OF AMERICA





External Partnerships

- ✓ Governments
- ✓ Multilateral organizations
- ✓ Faith-based community
- ✓ Civil society
- ✓ Private sector





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Focus Countries





New Alliance for Food Security & Nutrition

- ✓ African countries commit to **policy changes** to increase private investment
- ✓ More than **140 companies (African and international)** have committed over **\$3.75 billion**
- ✓ Ten countries involved: **Ethiopia, Ghana, Tanzania, Benin, Burkina Faso, Côte d'Ivoire, Malawi, Mozambique, Senegal, and Nigeria**



What Does Feed the Future Do?

- 1. Help farmers produce more*
- 2. Help farmers get more food to market*
- 3. Support Research & Development to improve smallholder agriculture in a changing climate*
- 4. Strengthen Regional Trade*
- 5. Create a better Policy Environment*
- 6. Improve Access to Nutritious Food and Nutrition Services*





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SPRING/Bangladesh





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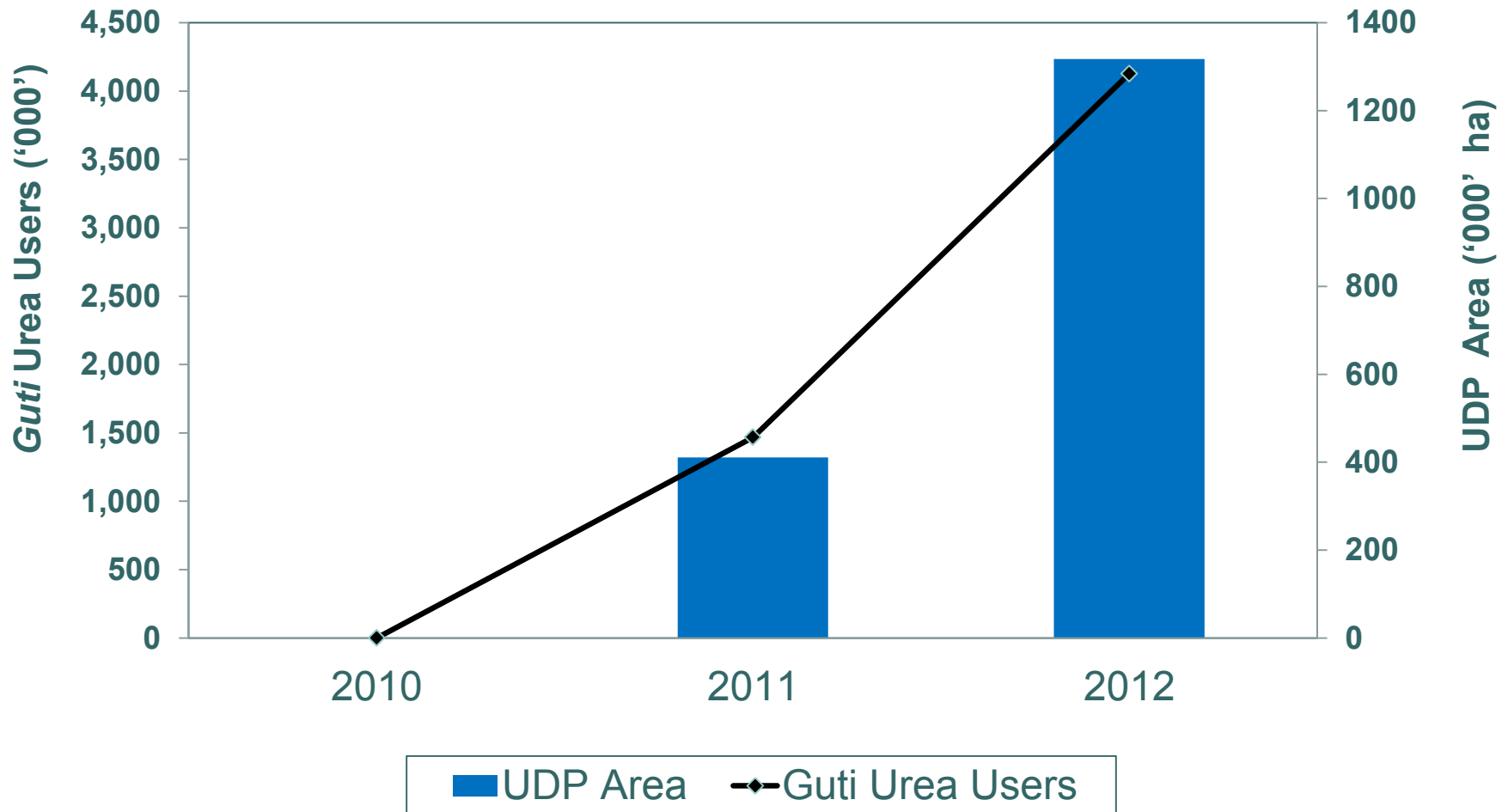
NERICA Rice in Senegal



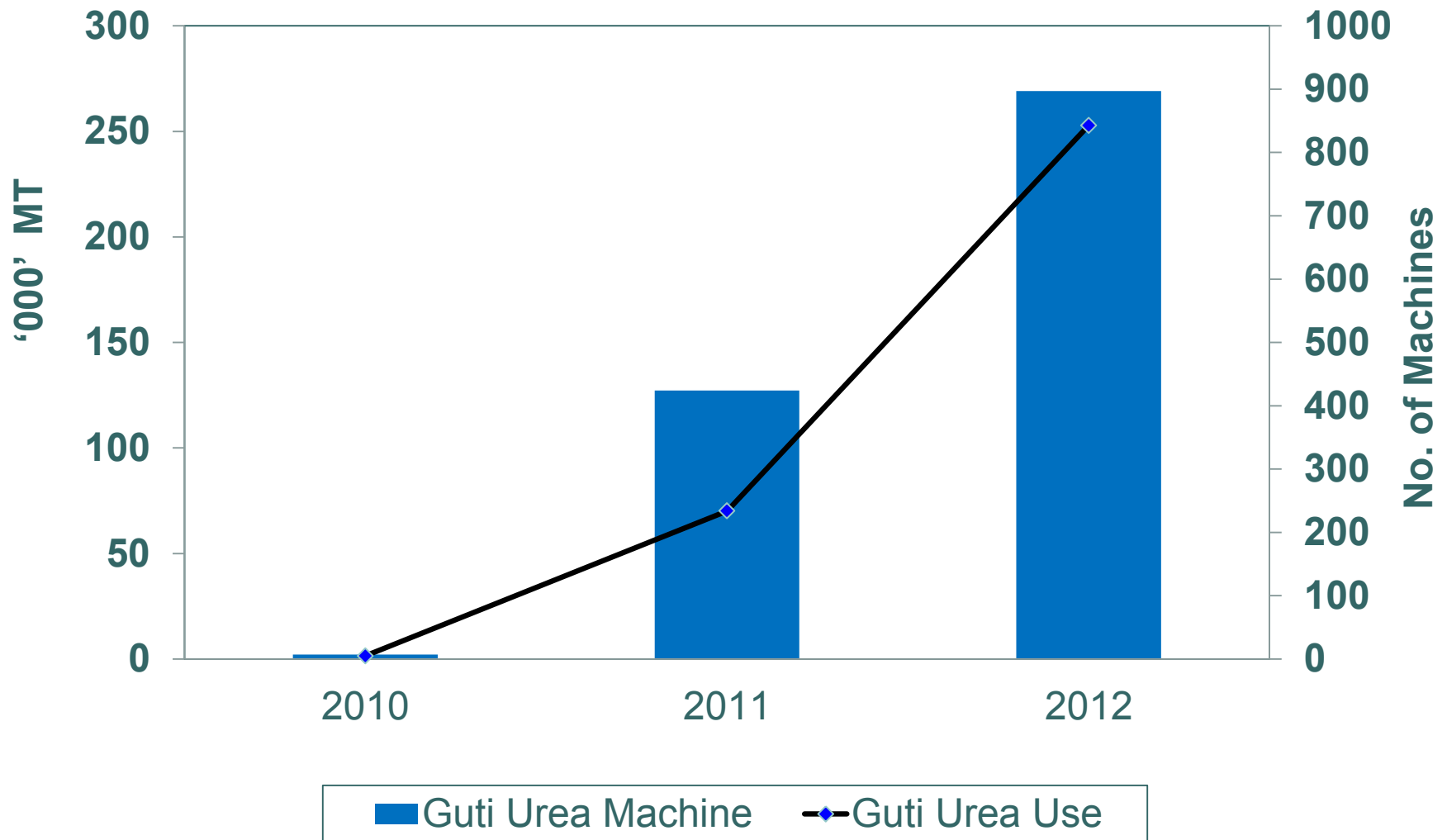
Fertilizer Deep Placement in Bangladesh

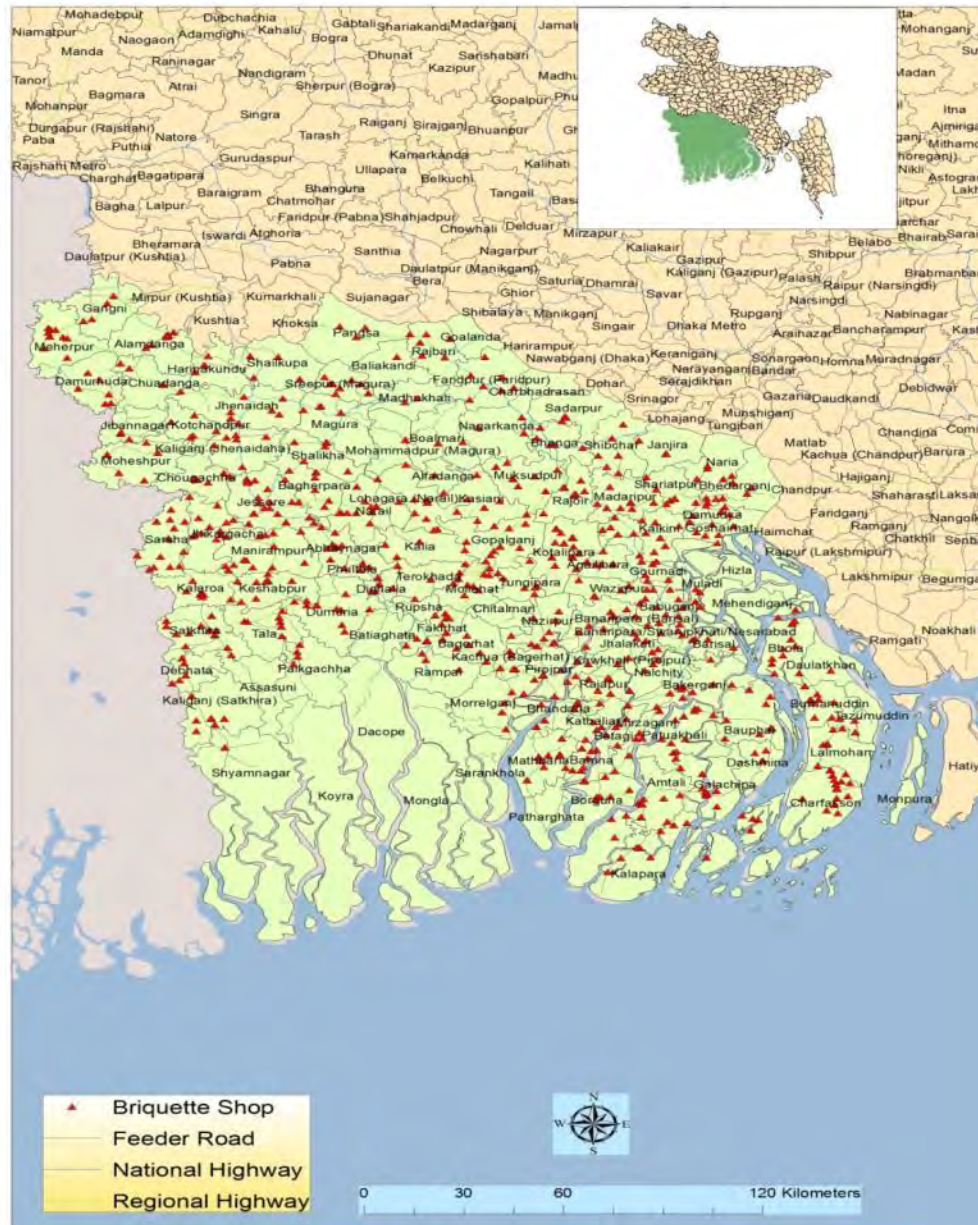


Demand Growth of *Guti* Urea under AAPI – cumulative –



Supply Growth of *Guti* Urea under AAPI







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Feed the Future Food Security Innovation Center

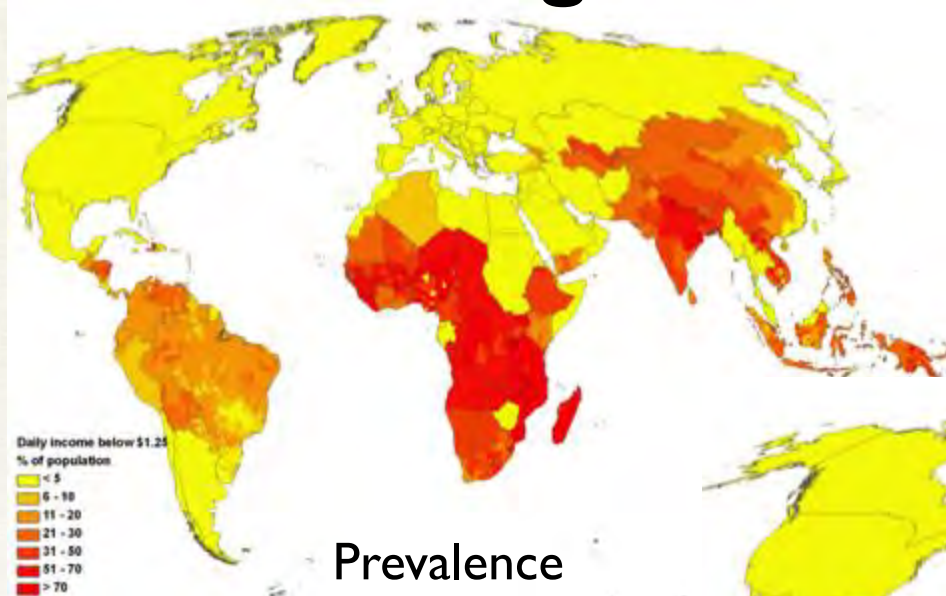


USAID
FROM THE AMERICAN PEOPLE

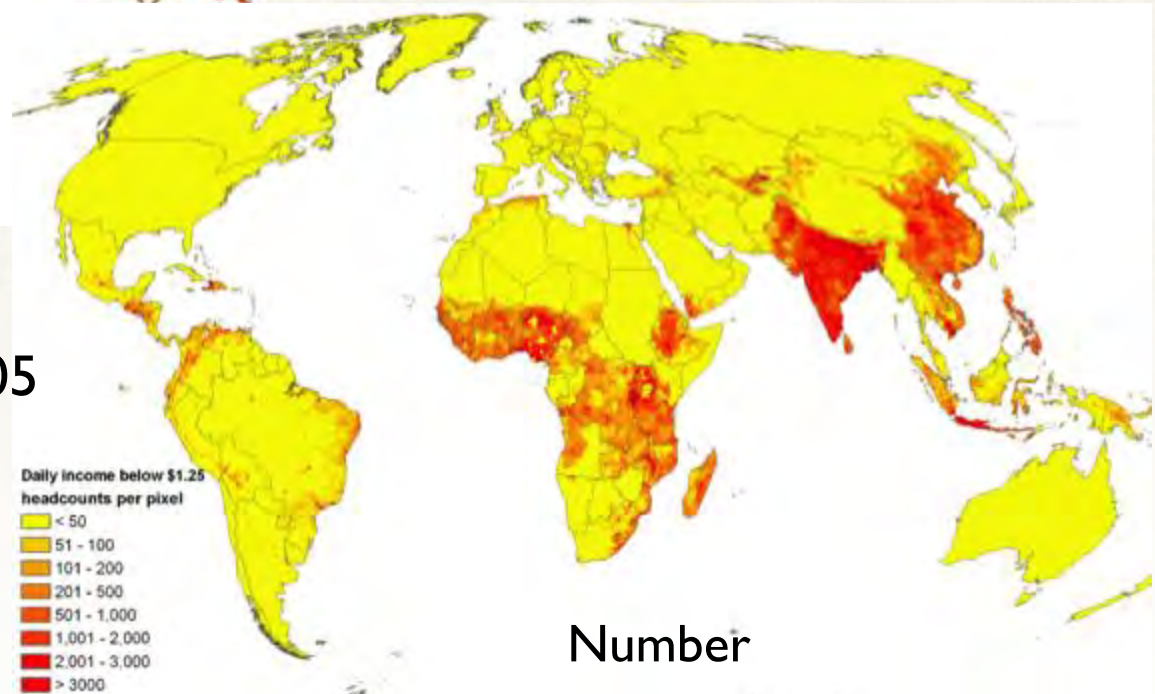


Defining FTF Research Priorities

Using poverty & nutrition lens: Identify key production systems where hunger and poverty are significant...



Sub-national poverty ca. 2005
(<\$1.25/day)

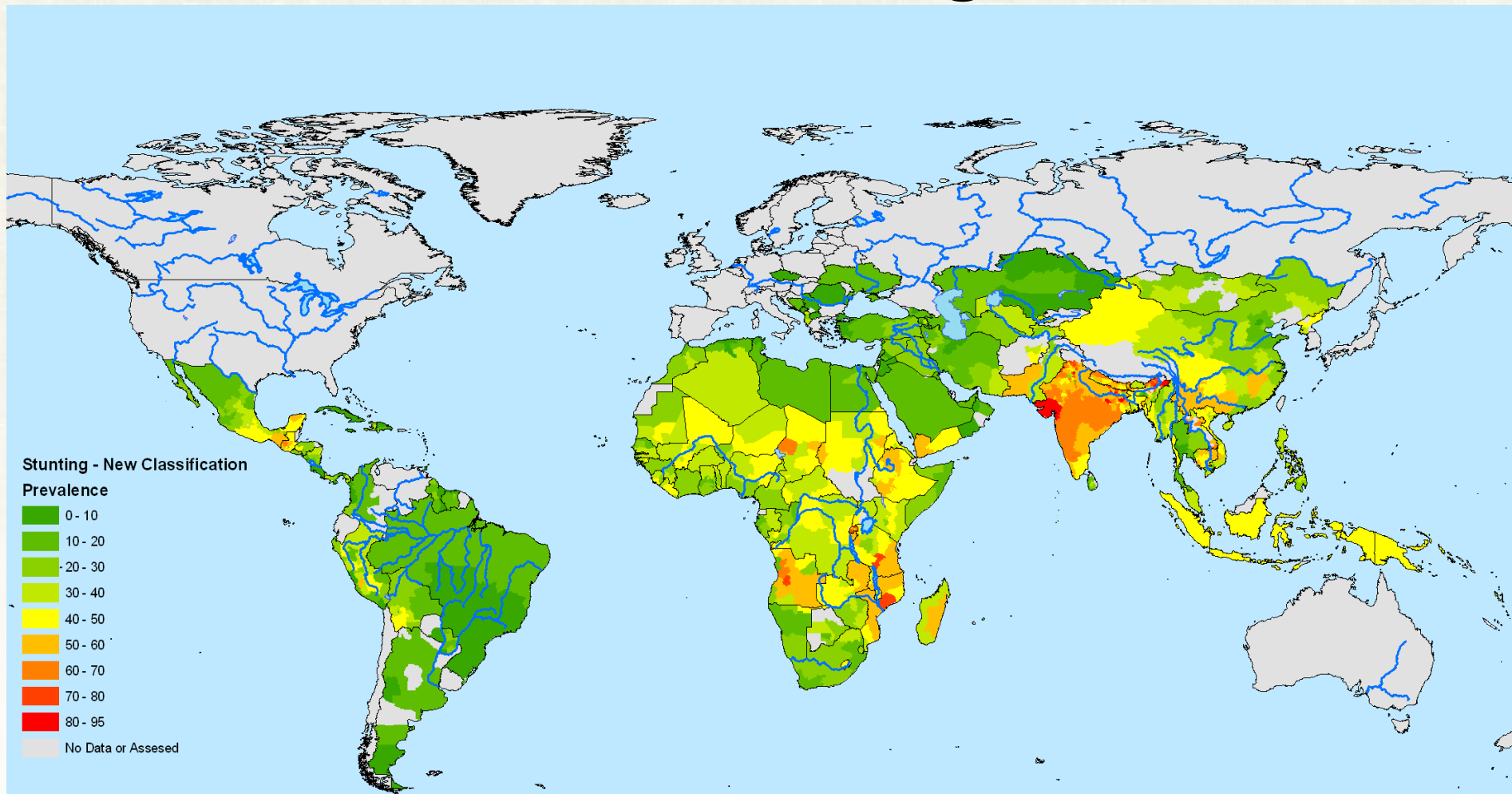




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Child Stunting



Source: USAID and IFPRI, Harvest Choice maps



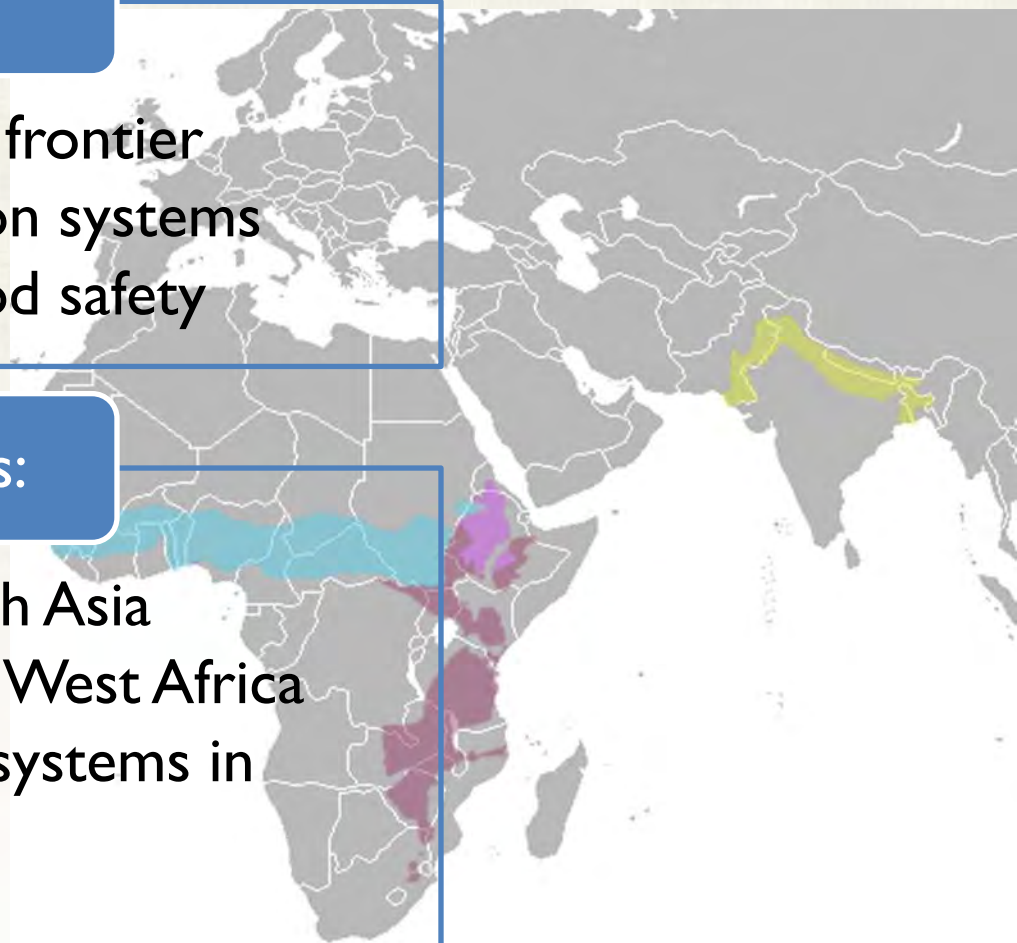
Overarching Goal: Sustainable Intensification

Three research themes:

- Advancing the productivity frontier
- Transforming key production systems
- Improving nutrition and food safety

Anchored by key geographies:

- Indo-gangetic plains in South Asia
- Sudano-sahelian systems in West Africa
- Maize and livestock mixed systems in East and Southern Africa
- Ethiopian highlands





Food Security Innovation Center





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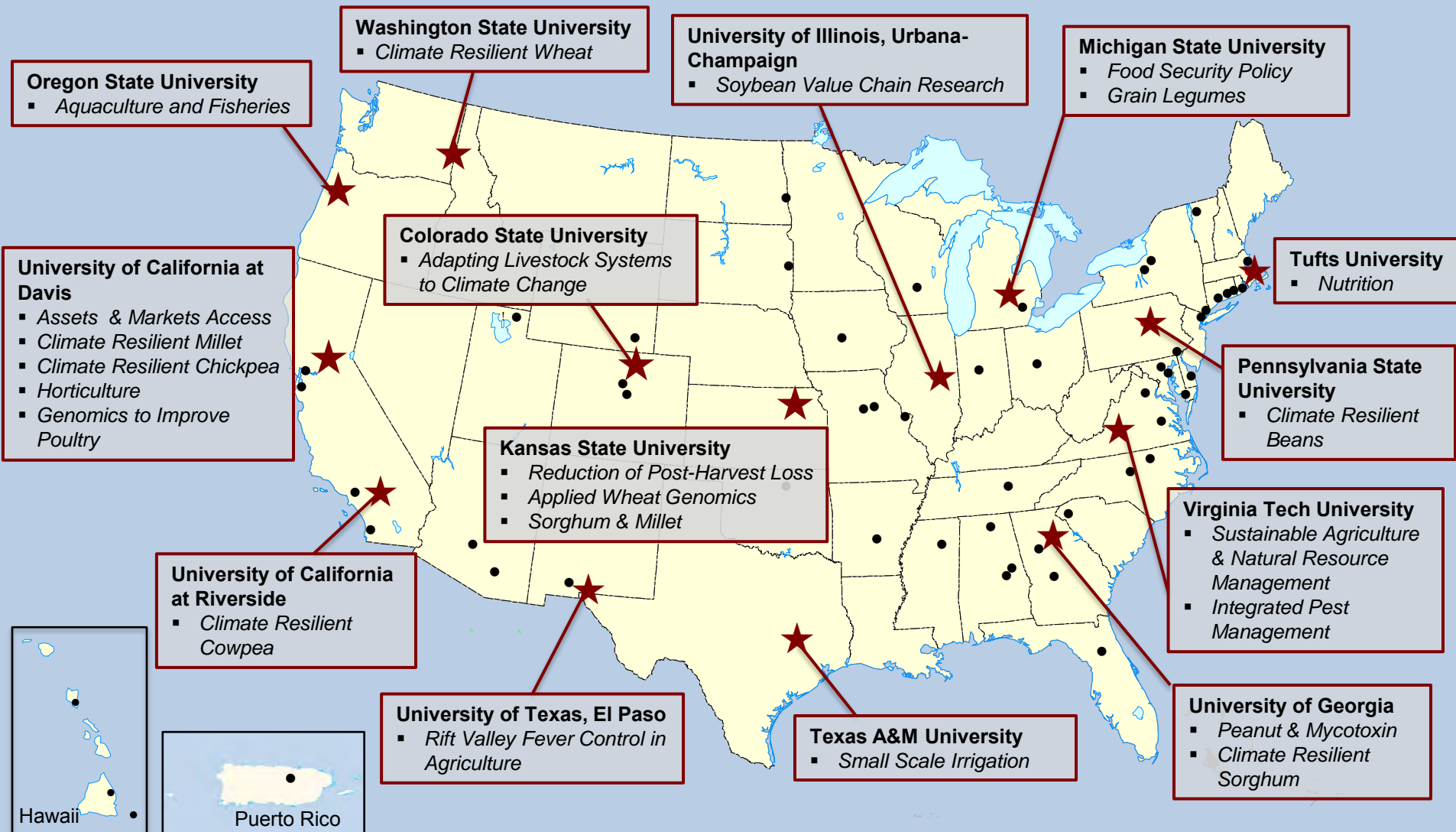
Feed the Future Innovation Labs



Lead Institution



Collaborating Institution





Program for Research on Climate Resilient Cereals

Challenge: Increase cereal yields and adaption to climate change for improved feed and fodder production

- Cereals account for approximately two-thirds of all human energy intake
- An estimated 1.2 billion poor people depend on wheat

Solutions:

- Invest in development and dissemination of improved cereals
- Take advantage of emerging biotech and genomic tools
- Partner with private R&D companies and US universities
- Leverage BMGF investments
- Improve fodder quality for dual purpose use

Example Projects:

- Rice, wheat, maize, dryland cereal CRPs
- WSU Improved Wheat for Heat Tolerance and Climate Resilience
- UC Davis Abiotic Stress Tolerant Millet



Submergence Tolerance in Rice

- Allows rice to tolerate submergence for up to 14 days (dormancy, energy conservation during flood), recover after flooding subsides. Five days destroys most rice crops.
- Rapidly introgressed into popular varieties (IR64, Swarna) through marker assisted selection – already delivered to hundreds of thousands of farmers in South Asia
- Developed by International Rice Research Institute



Swarna

Swarna +
Sub1



IR 64 Control

IR 64 + Sub1

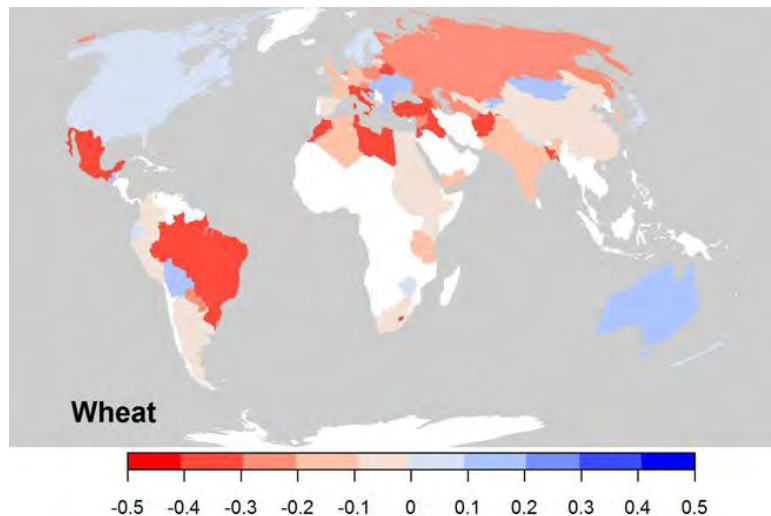
- Allows maize to tolerate and improve yield under moderate drought stress (as defined by USGS/NOAA)
- Taking best drought tolerant traits from existing germplasm to breed into preferred (African) germplasm for hybrids / OPV's (2M farmers adopting)
- Adding additional traits through genetic engineering to increase beyond natural germplasm (commercial “*DroughtGuard*” & “*AQUAMax*” traits released in US last year)



**GE drought tolerant corn
in US**

- Mitigate risks of high temperature during winter growing season - Different forms of heat stress affects 36M ha in developing countries (continuous and “acute”)
- Temp over 80 significantly impact yield (a few percent per degree) – tremendous impact in places like India / Ethiopia
- Many parallel efforts worldwide (Mexico, Australia, US, France) aimed at modern breeding / biotechnology for increasing heat tolerance.
- Identify native genes, sources of heat tolerance, looking at GE approaches for promising genes

Estimate Climate
Impact on Wheat
Productivity
improvement.
1980-2008





Program for Research on Legume Productivity

Challenge: Increase productivity and availability of legumes

- Abiotic stresses decrease legume yields by up to 40%
- Pests and diseases can decrease yields by up to 35%
- The grain legume value chain directly benefits women, especially in Africa

Solutions:

- Elevate legumes as major investment area under the research strategy
- Tackle yield, climate resilience and biotic stresses for staple legumes
- Utilize private sector knowledge and skill in transgenic and emerging genomic tools

Example Projects:

- Grain Legumes Innovation Lab
- Peanut & Mycotoxins Innovation Lab
- AATF Bt Cowpea
- CGIAR Grain Legumes CRP



New black bean varieties grown by >50,000 households

Program: Feed the Future Innovation Lab for
Collaborative Research on **Grain Legumes**

University lead: **Michigan State University**

- Core research for 10+ years on variety development
 - Focus on Central American highlands
 - Beans contribute to nutrition and income gains
- Scale-up effort
 - Honduras, Guatemala, Nicaragua, Haiti
 - Community seed systems get varieties to farmers
 - **>50,000 households** received seed



Quiche Hunapu
variety





Challenge: Protect animals and tropical staples from major pests and diseases

- Plant diseases on major food crops cause up to 40% of pre-harvest losses
- Over 90% of the world's wheat acreage is susceptible to wheat stem rusts
- Over 1.6 billion families depend on livestock for their income and nutrition

Solutions:

- Leverage US science and leadership in advanced genomic/biotech tools
- Utilize transgenic tools for critical plant diseases
- Build public sector capacity to use biotech tools

Example Projects:

- Virus Resistant Cassava for Africa
- East Coast Fever vaccine development (USDA)
- Venganza—Wheat Stem Rust & Mycotoxins
- Late blight resistant potato
- New disease resistant livestock program





Fruit and shoot borer damage



An FSB larva that has bored into the shoot of an eggplant, thus causing the plant to wither.



An FSB larva that has bored into an eggplant fruit, causing considerable damage and rendering it unfit for market.



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Insect Resistant Eggplant



Feed the Future Innovation Lab for Genomics to Improve Poultry

- Newcastle Disease is the number one constraint to raising poultry in Africa with some strains can cause mortality as high as 80% in village flocks
- A vaccine is available but not widely used due to problems of inadequate extension services, a need for a cold chain, and unreliable production and distribution
- This Innovation Lab aims to identify regions in the chicken genome that confer enhanced resistance to Newcastle disease and heat tolerance
- Vaccination combined with enhanced genetics could have a synergistic effect and improve Newcastle disease resistance in chickens



**Feed the Future Innovation Lab
for Genomics to Improve Poultry**

UC DAVIS
UNIVERSITY OF CALIFORNIA

Feed the Future Innovation Lab for Rift Valley Fever Control in Agriculture

- Rift Valley Fever is an episodic, mosquito-borne, viral disease that infects sheep, goats, cattle, and humans in Sub-Saharan Africa
- The Rift Valley Fever vaccines that are available for livestock cause adverse reactions
- Innovation Lab aims to develop a safe and economical Rift Valley Fever vaccine that would provide life-long immunity from a single vaccination, be delivered through a needle-free device, and would be compatible with a diagnostic test to distinguish vaccinated from naturally infected animals



USAID Feed the Future Innovation Lab for Rift Valley Fever Control in Agriculture



Program for Research on Safe and Nutritious Foods

Challenge: Sustainably increase production and consumption of highly nutritious foods and diversify diets

- Fruits, vegetables and animal source foods provide critical micronutrients for child development
- One third of children under five in low income countries are stunted
- Half of all children and pregnant women are anemic

Solutions:

- Nutrition research on behavior, food utilization and household dynamics
- Research on production/consumption biofortified and nutrient-rich crops
- Develop options to strengthen post harvest handling and food safety
- Invest in horticulture, animal sourced food value chains

Example Projects:

- Meat, Milk & Fish and Nutrition CRPs
- Horticulture, Livestock, AquaFish & Nutrition Innovation Labs
- World Vegetable Center





Post-Harvest Losses



Grain handling and storage

Cold-chain management: meat, fish

Breaking down SPS barriers

Controlling post-harvest pests/disease

Food preservation, esp. by women



Coolrooms and Cool Transport for Small-Scale Farmers



Horticulture CRSP tested the 'Cool-bot', which creates a small-scale cooler out of a well-insulated room, in India, Uganda, and Honduras.

Some Successes

- ▶ Robert Paull (U of Hawaii–Manoa) and colleagues screened natural coatings and extracts and developed a wax coating that controls postharvest diseases in papaya.



NEW WAX
FORMULATION

CONTROLS
NO TREATMENT

WAX + ESSENTIAL OIL
PAPAYA HELD FOR 14 DAYS AT 13 °C

Identifying causes of malnutrition in Nepal



What factors **linked to agriculture** contributes to poor child growth?



What is the role for local diet in **treating** worst cases of malnutrition?



Interviewing women in Nepal



- Health seeking behaviors
- Sanitation/hygiene practice
- Knowledge of food safety
- Dietary choices





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Orange-Fleshed Sweet Potato in Ghana



Photo by Robert Zabawa

Aflagoggles

Next generation aflatoxin detection

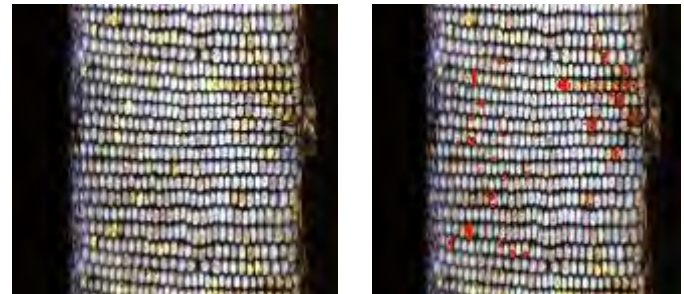
**Feed the Future Innovation Lab for Collaborative Research
On Peanut Productivity & Mycotoxin Control**
Led by **University of Georgia**

Lead PI: Dr. Haibo Yao, Mississippi State
Incorporating UV Fluorescence with Optics



Project goal: to develop portable, fluorescence spectral-based technology for rapid and non-invasive aflatoxin detection in maize.

International development application:
Non-destructive aflatoxin detection
Users: breeders selecting for aflatoxin resistance,
traders, households, consumers at market...



Detection Results:

Normalized Fluorescence Difference Index:

$$\text{NDFI} = (537\text{nm} - 437\text{nm}) / (537\text{nm} + 437\text{nm})$$



Program for Sustainable Intensification

Challenge: Fundamentally Transform Key Production Systems

- In Africa, 65% of agricultural land suffers from physical and chemical degradation
- African cereal and milk yields are less than half the global average

Solutions:

- Integrate research outputs, policy and nutrition in production systems
- Focus multiple interventions within targeted geographic areas
- Diversify major production systems with improved crops and animals
- Evaluate and disseminate improved soil and water management practices

Example Projects:

- Integrated Pest Management Innovation Lab
- Africa RISING
- Cereal Systems Initiative for South Asia
- Sustainable Agriculture and NRM Innovation Lab



Pigeonpea

- Nodulates with indigenous Rhizobium, Fix N
- Yield: 2.5 t/ha
- Multiple uses:

Provisioning

Food
Fodder
Fuel wood
Yield stability

Regulating

Soil cover
Moisture retention
Soil fertility



Intercropping and rotations



Cereal -Legume intercrop



Legume-legume

Inclusion of PP in cropping systems increase grain yield of maize

Cropping system	yield increments (%)	Source
PP/MZ	+58	1
GNPP/MZ	+60	1
PP/MZ	+57	2
PP/MZ	+38-50	3
MZ+PP/MZ	+171-205	4
PP/MZ	+207-309	4

1= Mhango et al., 2010. 2= Daniel and Ong (1990);
3=Abunyewa and Karbo (2004); 4=Egbe et al., 2007

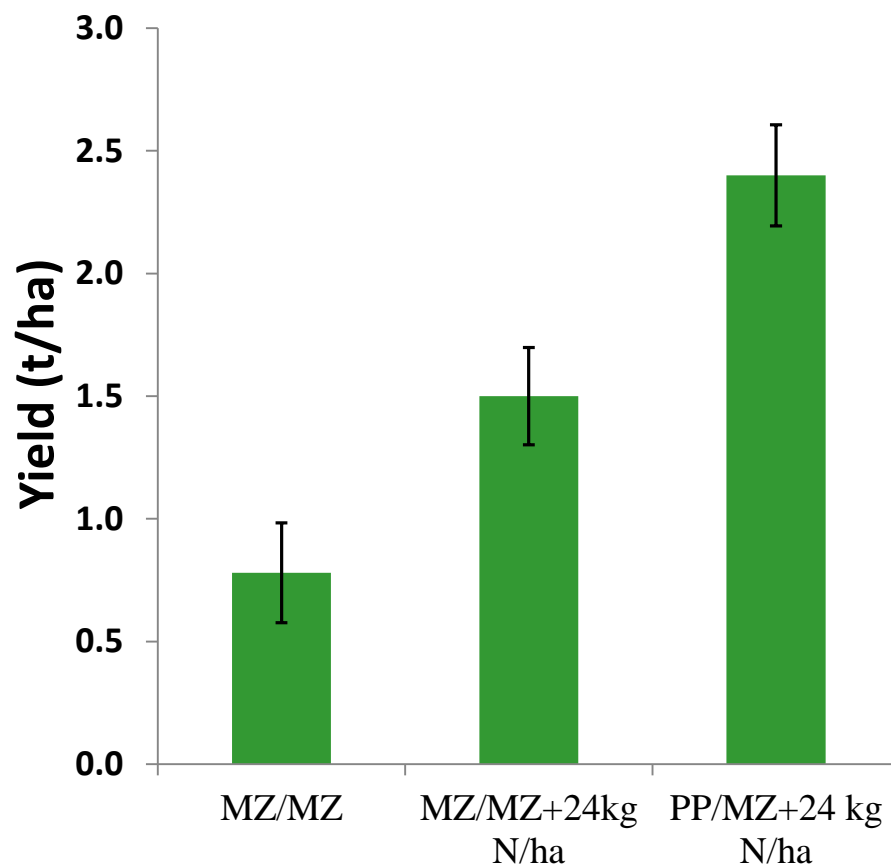


Fig 1: Maize yield under continuous maize and PP/maize rotations, northern Malawi



Challenge: Create supportive agricultural policy environments

- Help countries embrace predictable, inclusive, evidence-based and transparent policy formulation and implementation

Solutions:

- Work with host-country governments and multilateral institutions to improve enabling policy environments
- Address land and natural resource governance and resilience policy, nutrition policy constraints.
- Improve function of and access to markets

Example Projects:

- Feed the Future Policy Plan
- Assets and Market Access Innovation Lab
- Program for Biosafety Systems
- New Alliance partnerships





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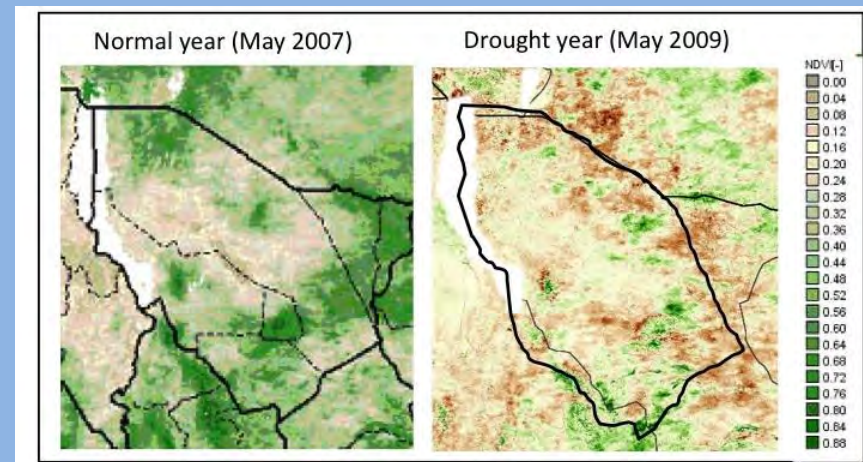
The U.S. Government's Global Hunger and Food Security Initiative

Evidence-based Policy in Tanzania



Index Based Livestock Insurance (IBLI), Marsabit District, Northern Kenya

- Uses satellite spectrometer data to correlate vegetation groundcover with predicted livestock mortality
- Insurance payouts are based on that prediction, rather than on verification of individual losses
- Avoid costly coping strategies that often lead to poverty traps and the intergenerational transfer of poverty
- Enable farmers to increase investment in potentially higher-return activities



Partners



AFRICA RE
AFRICAN REINSURANCE CORPORATION

ILRI
INTERNATIONAL
LIVESTOCK RESEARCH
INSTITUTE



IBLI Kenya: Impacts

The first payment of indemnities took place in October 2011. A survey conducted at that time asked households to predict how the insurance payments would change their coping strategies. Compared to uninsured households, insured households were:

- 22-36 percentage points less likely to draw down assets
- 27-36 percentage points less likely to reduce meals
- 42-50 percentage points less dependent on food aid
- 0-26 percentage points less reliant on other forms of assistance





Challenge: Professional and organizational capacities are inadequate to address agricultural challenges and opportunities

- Public agricultural institutions are weak
- Private sector needs skilled employees
- Experienced faculty and managers are retiring
- Women hold few management positions

Solutions:

- Strengthen human and institutional capital base
- Support best practice development
- Support women in agricultural research
- Develop human skills through fellowships and long-term degree training

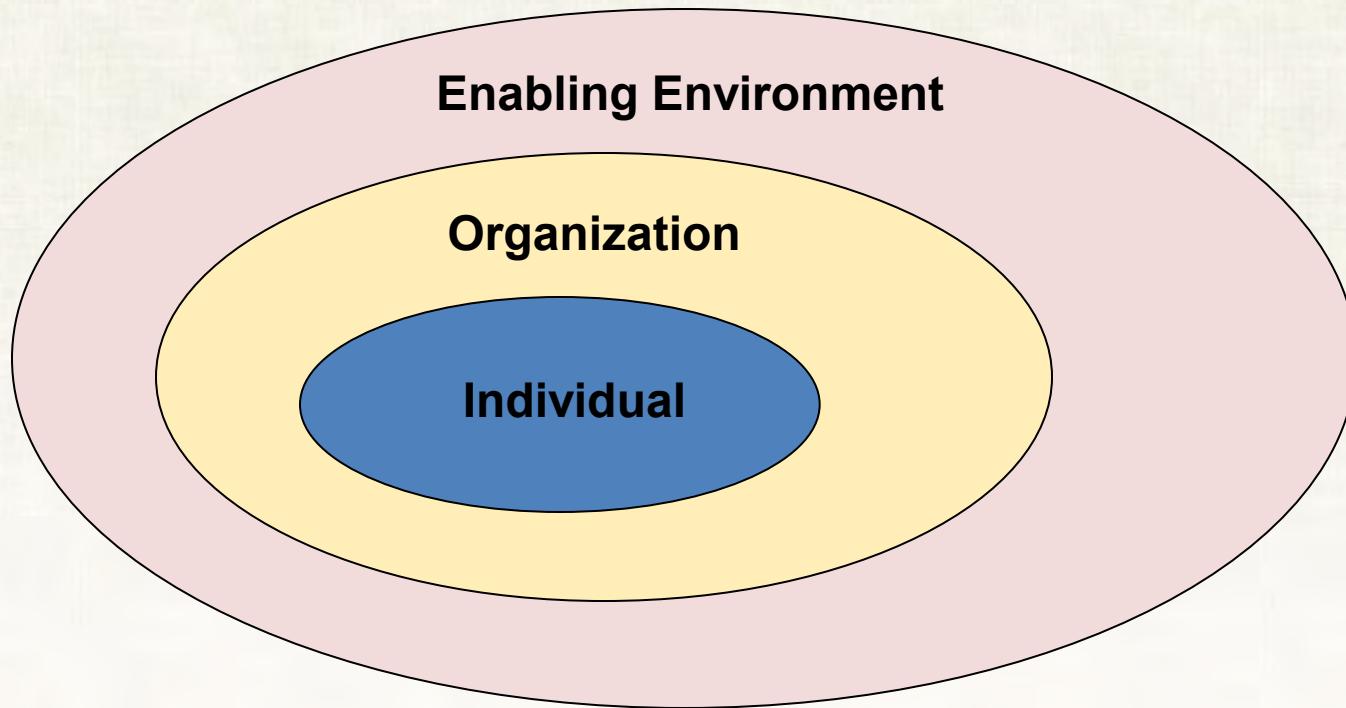


Example Projects:

- InnovATE – Agricultural Training & Education
- African Women in Agricultural Research and Development (AWARD)
- Borlaug Higher Education for Agricultural Research and Development



Multiple Levels of Capacity Development

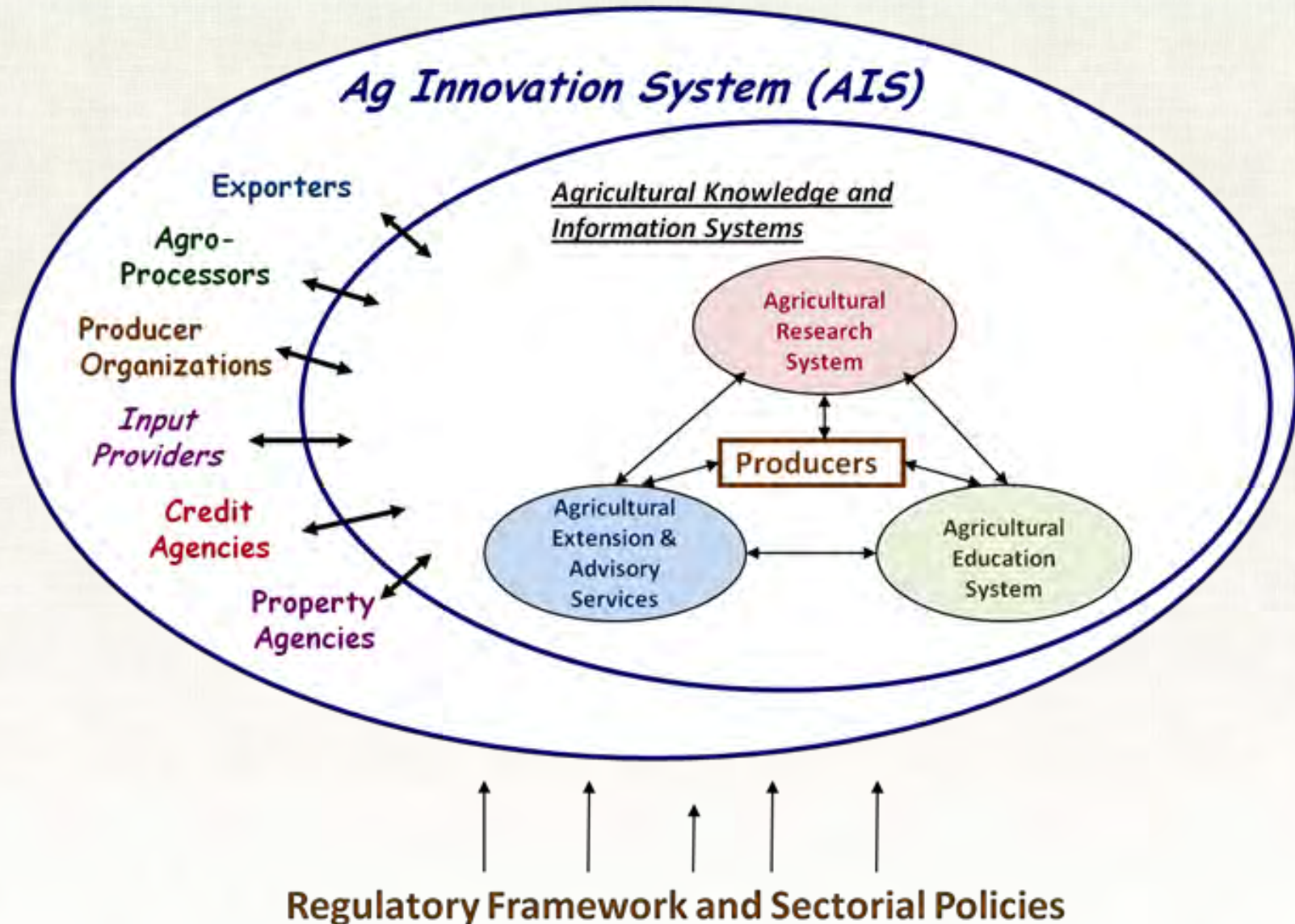




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Program for Human and Institutional Capacity Development





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African Women in Agricultural Research and Development (AWARD)

http://awardfellowships.org/

Citrix XenApp - Logged Off

AWARD: African Women in ...

File Edit View Favorites Tools Help

Welcome to Verizon Live ... Suggested Sites Get more Add-ons

Page Safety Tools

AWARD
African Women in Agricultural Research and Development

MyAWARD Login | search...

Home About Us The AWARD Fellowship Participants Media News & Events Contact Us

What is AWARD?

Why AWARD?

Meet the AWARD Fellows

Empowering Women Agricultural Scientists
In a *Biologist* magazine article, AWARD Fellow Professor Sheila Okoth explains how she succeeded in a male...

The Count Down is On!
The call for applications for the 2012 AWARD Fellowships will be announced on August 1. Get set to apply and reap the award alone...

Interact with us
Join us on Facebook
See Photos on Flickr

Fellow of the Week
Each week, we will feature one of our 70 2011 AWARD Fellows.

11:04 PM 7/19/2012





Borlaug Higher Education for Agricultural Research and Development



- Uganda
- Ghana
- Bangladesh
- Cambodia
- Mali
- Malawi
- Mozambique
- Liberia **NEW**
- Kenya **NEW**
- South Sudan **NEW**

<http://bheard.isp.msu.edu/>





Innovation for Agricultural Training and Education





Armenia: Sustainability Plan for ATC

- Business plan
- Increase revenues
- Decrease costs
- Establish an endowment
- Fundraising for scholarships
- Policy for indirect costs
- Fund management capacity
- Increase tuition
- Increase government investment
- Increase linkages
- Establish a research office
- Joint research ventures
- Innovation incubators
- Engage with Agrarian Univ
- Expand alumni network
- Enhance career counseling
- Long-term partnerships
- Accreditation options
- Advisory board
- New curriculum
- Value chain focus





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Votech Agricultural Education in the RAAS, Nicaragua





Modernizing Extension and Advisory Services



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

←

→

http://pbs.ifpri.info/

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Citrix XenApp - Logged Off

Program for Biosafety Syste... x

File Edit View Favorites Tools Help

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PBS



FACILITATED BY IFPRI

Program for Biosafety Systems



Home About Us Africa Asia Resources Partners Staff Contact Us

What is PBS?

The Program for Biosafety System (PBS) supports partner countries in [Africa](#) and [Asia](#) in the responsible development and use of biotechnology. Managed by the [International Food Policy Research Institute \(IFPRI\)](#), PBS works with countries interested in using biotechnology to enhance agricultural innovation.

Today, smallholder farmers in more than 15 countries successfully grow crop varieties developed through biotechnology.

PBS works with stakeholders to develop and implement science-based, functional biosafety systems that ultimately: Expand producer choice, inspire consumer confidence, facilitate trade, and promote



SEARCH

type and press enter

 Windows E... Program for... Microsoft ... Backup and ... Prioritizing ... Microsoft P...





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Confined field trial guidelines in India





For Students and Faculty: Needed Skills and Experience

- Soft skills beyond core research training
 - Budgeting, communications, management, team work, leadership, working across disciplines
- Build experience – GO ABROAD!





Opportunities for Funding & Engagement

- Business forecast: <http://www.usaid.gov/work-usaid/get-grant-or-contract/business-forecast>
- Contracts: <https://www.fbo.gov/>
- Grants: www.grants.gov
- E-Training modules on partnering with USAID on www.usaid.gov



Opportunities: Current Solicitations

- **Feed the Future Biotechnology Partnership**
 - Q&A Webinar: June 9, 2014
 - Closing Date: August 1, 2014
 - <http://www.grants.gov/web/grants/search-grants.html?keywords=RFA-OAA-14-000029>
- **Feed the Future Innovation Lab for Integrated Pest Management:**
 - Closing Date June 25, 2014
 - <http://www.grants.gov/search-grants.html?agencies%3DUSAID%7CAgency%20for%20International%20Development>



Advisory and Unfunded Engagement

- ✓ Webcasts, Streaming, and Online Discussions
 - Discuss the high-level and programmatic strategies in a public venue accessible to potential partners everywhere
- ✓ International Development Community and Resources
 - Training and Resources for Professional/Curriculum Use
 - Communities of Practice (e.g., AgriLinks)
 - Crowdsourcing and Data
- ✓ Public Meetings
 - Board for International Food and Agriculture Development
 - Advisory Committee on Voluntary and Foreign Aid



Opportunities: Research

- NSF's PEER program (PEER Science and PEER Health)
 - www.nationalacademies.org/peer
- Research and Innovation Fellowships (NSF GRFP eligible)
 - <http://www.usaid.gov/RIFellowships>
- LINKAGES program with CGIAR (faculty)
 - http://feedthefuture.gov/sites/default/files/resource/files/ftf_guidance_cgiar_universities_link_program.pdf
- US Global Food Security Fellows Program (for American graduate students) and Summer Institute
 - <http://www.purdue.edu/discoverypark/food/borlaugfellows/>



US Borlaug Global Food Security Fellows Program





Opportunities: Capacity Development

- Farmer-to-Farmer volunteers
 - <http://www.usaid.gov/what-we-do/agriculture-and-food-security/supporting-agricultural-capacity-development/john-ogonowski>
- Borlaug Higher Education for Agricultural Research and Development (students and mentors)
 - <http://bheard.isp.msu.edu/>
- Borlaug Leadership Enhancement in Agriculture Program (students and mentors)
 - <http://borlaugleap.org/>



Borlaug Leadership Enhancement in Agriculture Program (LEAP)

The screenshot shows a web browser window displaying the UC Davis International Programs website. The browser's address bar shows the URL <http://www.leap.ucdavis.edu/>. The website header includes the UC Davis logo and the text "COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES". A search bar is located in the top right corner. The main navigation menu includes links for Home, What We Do, Where We Work, Knowledge Resources, Study Opportunities, and Contact Us. The page title is "International Programs". The breadcrumb trail shows "Study Opportunities > Borlaug LEAP". The main heading is "The Norman E. Borlaug Leadership Enhancement in Agriculture Program (LEAP)". Below the heading is a large image showing a collage of agricultural scenes, including a person working in a field, a close-up of grain, and a person working in a laboratory. To the right of the main content is a "Navigation" sidebar with links: Borlaug LEAP, About Dr. Norman E. Borlaug, Fellows, Eligibility Criteria, Program Description, Application Evaluation, How to apply, Publications, Frequently Asked Questions, Contact Information, and Related Links. At the bottom of the page, a paragraph describes the program: "The Norman E. Borlaug Leadership Enhancement in Agriculture Program (Borlaug LEAP) is a fellowship program, funded by the United States Agency for International Development (USAID), to enhance the quality of thesis research of graduate students from developing countries who show strong promise as leaders in the field of agriculture and related disciplines as defined by Title XII. LEAP was developed in conjunction with the Borlaug International Agricultural". The Windows taskbar at the bottom shows the system clock as 11:07 PM on 7/19/2012, and several open applications including Outlook, Skype, and AIDNet Telework.

UC DAVIS COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES

Search...

International Programs

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Study Opportunities > Borlaug LEAP

The Norman E. Borlaug Leadership Enhancement in Agriculture Program (LEAP)



The Norman E. Borlaug Leadership Enhancement in Agriculture Program (Borlaug LEAP) is a fellowship program, funded by the United States Agency for International Development (USAID), to enhance the quality of thesis research of graduate students from developing countries who show strong promise as leaders in the field of agriculture and related disciplines as defined by Title XII. LEAP was developed in conjunction with the Borlaug International Agricultural

Navigation

- Borlaug LEAP
- About Dr. Norman E. Borlaug
- Fellows
- Eligibility Criteria
- Program Description
- Application Evaluation
- How to apply
- Publications
- Frequently Asked Questions
- Contact Information
- Related Links

100%

11:07 PM 7/19/2012



2006 Borlaug LEAP Fellow Peter Aikpokpodion set out on a career path in academia but instead ended up in government helping to lead Nigeria's cocoa transformation agenda.



2014 Borlaug LEAP Fellow Allan Bomuhangi will be arriving at Penn State in the Fall. He is studying the gender dimensions to climate change.



2010 Borlaug LEAP Fellow Senorpe Asem-Hiabilie used her fellowship to collect field data in Ghana for her study investigating human exposure to environmental estrogens.



The Norman Borlaug Award for Field Research and Application, Endowed by the Rockefeller Foundation

2013 recipient, Dr. Charity Mutegi



- Employee KARI
- Gender & Diversity (AWARD pilot)
- 2008 Borlaug LEAP Fellow
 - Fellowship at Penn State/ICRISAT
- USAID Linkage grant, ICRISAT/U Georgia
- Peanut CRSP & IITA
- IITA & USAID Aflasafe Project
- Borlaug LEAP support for WFP, 2011
- Borlaug Award for Field Research



Opportunities: Policy & Development

- AAAS Science & Technology Policy Fellowships (State/USAID, others)
 - <http://www.aaas.org/program/science-technology-policy-fellowships>
- Payne Fellowships (Foreign Service for minorities)
 - <http://www.paynefellows.org/>
- USAID Internships and Virtual Foreign Service:
 - <http://www.usaid.gov/work-usaid/careers/student-internships>
 - <http://www.state.gov/vsfs/>
- Jefferson Science Fellows (Dept of State/USAID)
 - <http://sites.nationalacademies.org/pga/jefferson/>



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

“We will drive the growth of the future that lifts all of us up.”
– President Barack Obama, 2009



Thank You!

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